**ParentAdvocate__Archuletts_FAV_SB0300**
Uploaded by: Archuleta, Patricia
Position: FAV

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February 10, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**In support of SB 300: Pesticides – Use of Chlorpyrifos – Prohibition**

Chairman Pinsky, Vice Chairman Kagan and members of the committee:

Good afternoon. My name is Patricia Archuleta and I am the parent of a young adult with an autism spectrum disorder and multiple related co-occurring neurodevelopmental conditions. Over the past 20 years, I have navigated these disabilities for not only my own family but have also supported countless other families of children and youth affected by autism and other neurodevelopmental disorders. My professional experience includes working to improve systems of care for this population. In that capacity, I have served on the Maryland Autism Workgroup as a gubernatorial appointee and continue to serve as an advisory committee member to the national American Academy of Pediatrics. In addition, I have led quality improvement initiatives funded by the federal Maternal Child Health Bureau targeting peer support for families of children and youth with autism and other developmental disabilities. Project partners for these initiatives have included the Department of Behavioral and Developmental Pediatrics at the University of Maryland, the Harriet Lane Clinic at the Johns Hopkins Children's Center, as well as numerous community-based pediatric practices in underserved area.

My son, Eli, is on the autism spectrum. He also suffers from a host of other related challenges, including Sensory Integration Disorder; Auditory Processing Disorder; Cognitive Disorder marked by deficits in Executive Function, Verbal Memory and Learning Fluency; Disorder of Written Expression (Dysgraphia); Obsessive Compulsive Disorder; Attention Deficit Disorder; and Mood Disorder marked by Anxiety and Depression. Since Eli was diagnosed at age 4, I have watched my child struggle to reach developmental milestones that other parents take for granted – language and cognitive processing skills that never come, motor and functional skills that take years to emerge, and social skills that decades later still elude my child. It is heartbreaking as a mother and days and night are often tainted by grief, though we soldier on.

In school, Eli required considerable supports and intensive services, accommodations, and modifications in order to participate in learning. It was a constant battle to secure appropriate special education services. Eli suffered social isolation and, at times, bullying from his peers. I have spent thousands of hours, dollars, and miles pursuing therapies for Eli – speech therapy, occupational therapy, physical therapy, applied behavioral therapy, cognitive behavioral therapy, dialectical behavioral therapy, psychiatry, and medications too numerous to mention. We often encounter months-long wait lists for services, if they are available at all, and even longer wait times for appointments with specialists.

Since adolescence, Eli's experience with anxiety and depression have intensified and resulted in trying to harm himself because he just does not fit in. Words cannot begin to describe the terror and panic of blocking your child from jumping out of a third floor window, as you pray that the mobile crisis unit arrives in time.

In my professional experience as Family Peer Support Specialist, I have worked with hundreds of parents and caregivers of children and youth with autism spectrum disorders and learning disabilities to help them navigate the emotional, physical, educational, financial, and relationship burdens that come with these debilitating diagnoses. Our families disproportionately suffer from bankruptcy, divorce, and mental health challenges, due to the sheer magnitude of this challenge.

You will likely hear from opponents of this bill that they want to keep chlorpyrifos in their toolkit for minimal and "judicious use". Please keep in mind that the "judicious use" of this nerve agent can lead to a lifetime of struggle and suffering for the neurologically impaired child and their family. It will affect both parent and child for the rest of their lives; it will be painful, costly, and mean a level of 24/7 care that is inconceivable to anyone with typically developing children. Many of these children will be dependent and require care for the rest of their lives, and certainly for the remainder of their parents' life, at which time it falls to the state to bear the burden of care for these individuals. I know of parents who are well into their 80s who are caring for adult children who will never mature beyond the age of 10, never be able to support themselves after their parents are gone; and others who have spent their lives and savings providing 24/7 care for their profoundly disabled children.

Just one chlorpyrifos exposure to a pregnant woman can result in unimaginable suffering for a child and family. Maybe her exposure came from pesticide drift across a field in the area where she lives, or the golf course nearby, or the farmers market where she purchases chlorpyrifos-treated apples, or the polluted water she drinks, or a family outing to a "pick your own" orchard. The simple act of living one's life should not result in damaging exposure to this toxic nerve agent.

Of course, I cannot say that being surrounded by cotton fields, which are routinely sprayed with chlorpyrifos in Arizona where we lived during my pregnancy and the first 8 years of life, caused his autism. But the EPA has said that the weight of scientific evidence linking chlorpyrifos exposure to autism spectrum disorders and neurodevelopment conditions is clear.

When you hear from opponents of this bill that they should be allowed to continue to use chlorpyrifos because they use it "judiciously"—please do not be lulled into any sense of safety. Please understand that the practice you are allowing to continue puts the lives of 1.3 million Maryland children at risk of devastating exposure to chlorpyrifos.

Please give SB 300 your full support, with no weakening amendments. Thank you.

**BCA_SB300_FAV**
Uploaded by: Blendy, Nicholas
Position: FAV

BERNARD C. "JACK" YOUNG
MAYOR

*Office of Government Relations*
*88 State Circle*
*Annapolis, Maryland 21401*

**SB 300**

February 11, 2020

**TO:** Members of the Senate Education, Health, and Environmental Affairs Committee

**FROM:** Nicholas Blendy, Deputy Director of Government Relations

**RE:** Senate Bill 300 - Pesticides - Use of Chlorpyrifos - Prohibition

**POSITION: SUPPORT**

Chair Pinsky, Vice-Chair Kagan, and Members of the Committee, please be advised that the Baltimore City Administration (BCA) **supports** Senate Bill (SB) 300.

SB 300 prohibits the sale of chlorpyrifos and insecticides containing the chemical, and requires the Department of Agriculture to provide education and assistance on pest management.

Chlorpyrifos is a commonly used pesticide that was been linked to lung cancer, autoimmune disorders, and disruption in childhood development.[1] [2] In 2019, the Environmental Protection Agency had proposed a rule banning its sale and use, and though it did not follow through, the Agency agreed that it "would continue to monitor the safety of chlorpyrifos through 2022."[3] Coincidentally, the largest manufacturer of chlorpyrifos, Corteva Agriscience will discontinue its production.[4]

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[1] Chlorpyrifos. (n.d.). Retrieved from https://pubchem.ncbi.nlm.nih.gov/compound/Chlorpyrifos
[2] Friedman, L. (2019, July 18). E.P.A. Won't Ban Chlorpyrifos, Pesticide Tied to Children's Health Problems. Retrieved from https://www.nytimes.com/2019/07/18/climate/epa-chlorpyrifos-pesticide-ban.html
[3] *Id.*
[4] Brady Dennis, J. E. (2020, February 7). Trump has kept this controversial pesticide on the market. Now its biggest manufacturer is stopping production. Retrieved from https://www.washingtonpost.com/climate-environment/2020/02/06/trump-kept-this-controversial-pesticide-market-now-its-biggest-manufacturer-is-stopping-production/

Although its applications are limited in Baltimore City, chlorpyrifos is in the City's tributaries and watersheds.[5] The Baltimore Sun reported that "[a] Chesapeake Bay Program report found chlorpyrifos in 90 percent of bay water samples analyzed for this chemical, and 40 percent of those had concentrations that exceeded thresholds indicating possible ecological effects."[6] Although, Corteva Agriscience is no longer a manufacturer of chlorpyrifos, the product is still on retail shelves and in the storage units of agribusinesses throughout Maryland, leaving the door open for even more pollution in the Chesapeake Bay and associated negative public health outcomes.

Locally, Baltimore City is aware of the potential negative environmental and health impacts associated with pesticides. Recently, a City Council Bill #20-0495, "Pesticide Control and Regulation," was proposed, which would curb the use of glyphosate, chlorpyrifos, and neonicotinoids. Unfortunately, whereas the Maryland Department of the Environment is well-versed on these pesticides, most local governments like Baltimore City lack adequate infrastructure and resources to address the wide-scale application and sale of said products. Regardless, action must be taken to protect Baltimoreans, and Marylanders at large.

For the above reasons, we respectfully request a **favorable** report on SB 300.

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[5] Stein, D., & Nathan-Pulliam, S. (2019, June 7). Protect Maryland: Ban chlorpyrifos. Retrieved from https://www.baltimoresun.com/opinion/op-ed/bs-ed-op-0201-ban-chlorpyrifos-20190131-story.html

[6] *Id.*

**CottinghamFarm_Braver_FAV_SB0300**
Uploaded by: Braver, Cleo
Position: FAV

**Cottingham Farm, LLC**
**28038 Goldsborough Neck Road**
**Easton Maryland 21601**
**cleo@cottinghamfarm.com 443-463-1298**

# On behalf of:
# Eighty-three Maryland Farmers

February 11, 2020

Chairman Kumar Barve
Vice-Chair Dana Stein
House Environment and.
Transportstion Committee

Chairman Paul G. Pinsky
Vice-Chair Cheryl C. Kagan
Senate Educ. Health & Environmental
Affairs Committee

**RE: Pesticides - Use of Chlorpyrifos – Prohibition** (HB 229, SB 300)

**POSITION**: Support

Dear Chairs and Vice-Chairs of the Committees:

I am Cleo Braver, co-owner and farmer at Cottingham Farm in Talbot County, where we grow a wide variety of vegetables and raise conventional pastured animals. Scientists and public health experts can address the health impacts of this chemical. As a Marylander, I am quite concerned about its use**. I am joined by 83 other farmers in EVERY COUNTY in our State- noted in my attached list, to tell you that Maryland farmers can and do grow EVERY CROP in our State without the use of this dangerous chemical…**.from grains and wine grapes to vegetables and tree fruits. Yet a number of farmers continue to use this dangerous nerve agent known to cause brain damage in children, and thus, impacts all Marylanders.

As both conventional and organic farmers, we are aware that there are many suitable, safe and effective pesticides that can be used to control Maryland pests on our crops as noted in the attached document A number of these are permissible in organic farming and can be used at the same cost. Even if a particular alternative product did cost more, we should weigh the additional cost versus the potential life-long impacts on children. There are published resources available which describe those alternatives. In addition to safer products, farmers follow practices to reduce or eliminate crop damage from the various pests that Chlorpyrifos is used to control. These cultural practices include crop rotation, sanitation, physical barriers, variety selection, planting timing, release of beneficial insects, etc.)

We have never used chlorpyrifos on our farm's vegetables, even before we transitioned our vegetables to organic production. It not only violates the prescriptions of the organic regime, but it violates our personal principles of not wanting to harm our neighbors. The vast majority of Maryland farmers feel this way and have moved away from chlorpyrifos, whatever they are growing and wherever in the State they are growing it. Even a small amount of use can harm pregnant women and children via drift and also via residue in drinking water and food.

The specifics of how we deal with pests on our farm:

- To control the green peach aphid on our greenhouse tomatoes we have successfully released aphidius colmanii and ervii as a primary control, but we have used insecticidal soaps where necessary.
- On broccoli and kale, we control many varieties of worms, caterpillars, moths and loopers with neem oil, Dipel, or Pyganic.
- On onions, garlic and other alliums, we avoid onion maggots through crop rotations. If they were a serious problem, we can make sure we have good populations of parasitic wasps (either naturally or by buying them) and we could also use physical barriers such as floating row covers to keep any adults onion flies from laying eggs on our crop.
- On sweet potatoes, we avoid wireworm by being careful when and where we plant and we control flea beetles by buying beneficial nematodes in the form of a spray or by physical barriers.
- On cucumbers we control both adult white flies and their eggs and larvae with neem oil.

It is troubling to me and the signators on the attached document that some farmers continue to use a pesticide confirmed by US EPA after twenty years of research to cause long-term permanent harm to our children's brains, especially when safer alternatives exist. We must encourage farmers and gardeners to seek out those tools and alternatives. Our farms, our produce, and our communities will be healthier for it, if we pass a chlorpyrifos ban in 2020.

We have unnecessarily exposed more Marylanders to its harms by delaying passage in 2019, and will continue to increase its impact with any further delays.

Respectfully Submitted,

Cottingham Farm, by Cleo Braver
**on behalf of the attached signators**

# Letter from Maryland Farmers re: SB 300

February 11, 2020

Chairman Paul Pinsky
Vice Chair Cheryl Kagan
Senate Education, Health & Environmental Affairs Committee .

**RE: IN SUPPORT SB 300 - Chlorpyrifos Ban / Testimony of Maryland Farmers**

Dear Chair, Vice-Chair, Members of the Committee:

We are farmers from across the State of Maryland who grow a wide variety of crops – including strawberries and blueberries, apples and pears and other tree fruit, broccoli and other brassicas, grain, dry beans, onions and other allium, sweet potatoes, tomatoes and other solinacea, squash and other cucurbits, wine grapes, corn and sweet corn, rice, flowers, herbs, nuts, and pasture throughout Maryland including Maryland's Eastern Shore.

Chlorpyrifos, which impacts all Marylanders, is used by some farms on certain Maryland crops. Scientists and public health experts can address the health impacts of this chemical. As Marylanders, we are quite concerned about its use. As farmers from around the State, we join together to tell you that Maryland farmers can, and do, grow our crops without the use of this dangerous chemical. Grains, vegetables, fruit, wine grapes can all be grown without chlorpyrifos.

We are aware that there are many suitable, safe and effective pesticides that can be used to control Maryland pests on our crops. Many of these can be used at the same cost. Even if a particular alternative product did cost more, we should weigh the impact on children. We, and many others like us, use much safer products to control pests on our crops. In addition, we reduce or eliminate crop damage from pests with a number of different practices, including scouting, crop rotation, weed control, good sanitation, physical barriers, variety selection, planting timing, release of beneficial insects, and other practices. The crops and the alternative inputs and other controls we use are listed below.

We do not use chlorpyrifos on any of our crops. The majority of Maryland farmers have moved away from chlorpyrifos, but even the small amount that is still used can harm pregnant women and children via drift and also via residue in drinking water and food.

It is troubling to us that a nerve agent pesticide, confirmed by the EPA after twenty years of research to cause long-term permanent harm to our children's brains, is still being sold and used, especially when safe alternatives exist. We must encourage farmers and gardeners to seek out those safer tools and alternatives. Our farms, our produce, and our communities will be healthier for it, if we pass a chlorpyrifos ban in 2019.

Respectfully Submitted,
83 Maryland Farmers
(below and next pages)

| Farm / Address | Name | Phone or Email | County | Crop / Pest | Inputs Used |
|---|---|---|---|---|---|
| **Apocalypse Farm**<br>Street, MD | Danielle Rowland | 410-459-4063<br>apocalypsefarm@yahoo.com | Harford Co | Mixed Vegetables, chickens, rabbits, sheep, dairy/meat goats | Does not use chlorpyrifos |
| **Arc Brac Acres**<br>34255 Main St.<br>Pittsville, MD 21850 | Amanda Ruchalski | 443-365-1824<br>arcbracacres@ | Wicomico | Tomatoes, Carrots, Radishes, Bell Peppers | No synthetic inputs |
| **Bay Water Greens**<br>27616 Little Lane<br>Salisbury, MD 21865 | Tim Fields | 443-783-4165 | Wicomico | Heirloom Produce | Does not use chlorpyrifos |
| **Belle Grove Farm**<br>6621 Belle Grove Lane<br>Chestertown, MD | Marva Jones | 443-243-6971<br>marvandrew@aol.com | Kent | Hay, pasture | None |

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| **Blackbottom Farm**<br>7672 Water Oak Point Rd<br>Pasadena, MD 21122 | Kim Wagner | 410-657-2331<br>blackbottomfarmsllc@gmail.com | Anne Arundel | Mushrooms, Microgreens, Edible Flowers | Traps, Row Cover, Ventilation, Bottom Watering |
| **Brightman Farm**<br>12340 Julian Lane<br>Princess Anne, MD 21853 | Liz Brightman | 410-652-0903 | Somerset | Pasture | None |
| **Butterbee Farm**<br>500 Tristan Lane<br>Pikesville, MD 21208 | Laura Beth Resnick | 410-570-5257<br>butterbeefarm@gmail.com | Baltimore County | Cut flowers | Scouting, Rotation, Beneficial Insects, Insect Cloth |
| **Calico Fields Lavender Farm**<br>108 Immanuel Lane<br>Millington, MD 21651 | Jay Falstad | 410-739-6570<br>jfalstad@yahoo.com | Queen Anne's | Lavender | None |
| **Calliope Farm**<br>5000 Stark Creek Lane<br>Salisbury, MD 21801 | Lisa Garfield | 202-716-0217<br>calliopeorganicfarm@gmail.com | Wicomico | Brassicas, sweet potatoes, other mixed vegetables melons, herbs, sprouts | Biological Controls, Beneficial Habitat, Scouting, Manual Removal, Row Cover, Crop Rotation |
| **Calvert's Gift Farm**<br>16813 Yeoho Road<br>Sparks, MD 21152 | Jack and Beckie Gurley | 410-472-6764<br>giftcal@aol.com | Baltimore County | Stone and pome fruit trees, brassicas, strawberries, sweet potatoes, corn, soy, and other vegetables and fruit | Row covers, crop rotation and other strategies to improve soil health, Surround (Kaolin clay) for stone and pome fruit trees |
| **Celadon Manor**<br>3501 Sam's Creek Rd.<br>New Windsor, MD 21776 | Joshua Parish | 410-935-1282<br>josh.parish@nm.com | Carroll | Mixed Vegetables/Various Pests | Does not use chlorpyrifos |
| **Chesapeake's Bounty**<br>6415 Saint Leonard Rd<br>Saint Leonard, MD 20685 | William Kreamer | 410-610-1606<br>william@chesapeakesbounty.com | Calvert | Brassicas, Herbs, Subtropicals, Nightshades, Perennial Vegetables | None |
| **Chicken of the Woods Permaculture Farm**<br>13405 Pulver Place<br>Darnestown, MD 20878 | Bridgette Downer | 703-231-0411<br>chickenwoodsfarm@gmail.com | Montgomery | Brassica family, tomatos and other solinaca, corn, beans, peas | Bt, Spinosad, Neem Oil, Coffee Grounds Companion Planting, Row Cover, High Tunnel Insect Screen |
| **Clagett Farm**<br>11904 Old Marlboro Pike<br>Upper Marlboro, MD 20772 | Carrie Vaughn | 301-627-4393<br>ccochranvaughn@cbf.org | Prince Georges | Strawberries, Mixed vegetables | Bt, Spinosad, Insecticidal Soap. Pyrethrin, Row Cover, Crop Rotation, Beneficial Insects |
| **Common Root Farm**<br>1801 Bowies Mill Rd.<br>Derwood, MD 20155 | Erica Coady and Ryan Kalivretenos | 301-788-4397<br>farmer@commonrootfarm.com | Montgomery | Mixed Vegetables | No synthetic chemicals or pesticides, minimal-till, crop rotation and other preventive measures |
| **Cottingham Farm**<br>28038 Goldsborough Neck Rd.<br>Easton, MD 21601 | Cleo Braver | 443-463-1298<br>cleo@cottinghamfarm.com | Talbot | Brassicas / loopers<br>Sweet potato / wireworm<br>Allium / maggots<br>Organic Pasture<br>Peach, Cherry, Fig<br>Apple Trees / various<br>Pastured Pork, Eggs | Neem, Bt, Pyganic, Kaolin Clay, Crop Rotation, Row Cover, Parasitic Wasps and other Beneficial Insects, Manual Control, Scouting, Mulch, Traps, Trap Crops |
| **Country Pleasures Farm**<br>6219 Harley Rd.<br>Middleton, MD 21769 | Eric and Lori Rice | 301-379-4814<br>countrypleasuresfarm@gmail.com | Frederick | Apples, pears / various pests | Surround Kaolin Clay |

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| **Deep Creek Cellars**<br>177 Frazee Ridge Rd.<br>Friendsville, MD 21531 | Deep Creek Cellars | deepwine@deepcreekcellars.com | Garrett | Wine Grapes | Does not use chlorpyrifos |
| **DeHaven Farm**<br>11215 DeHaven Road<br>Cumberland, MD 21502 | Scott Harper | 301-777-8497<br>dehavenfarm@atlanticbb.net | Allegany | Brassicas/flea beetle, cabbage moth<br>Corn/earworm | Insect Barriers<br><br>Neem Oil |
| **Dicot Farm**<br>13355 Poplar Hill Rd.<br>Waldorf, MD 20601 | Erik De Guzman | 301-710-3483<br>dicotfarm@gmail.com | Charles | Asst. vegetables / army worms, aphids, loopers, cutworms, flea beetles, cucumber beetles | Manual Control, Row Cover, Rotation, Soap, Bt, Spinosad, Pyrethrin, Diatomaceous Earth |
| **EcoCity Farm**<br>6010 Taylor Rd.<br>Riverdale Park, MD 20737 | Margaret Morgan-Hubbard and Benny Erez | 301-655-5462<br>mbennyerez@gmail.com | Prince Georges | Cherries, apples, pears, onions, sweet potatoes, brassicas / Harlequin bug | Neem Oil, Trapping Covers, Manual Removal, Enhancing Soil Health, Crop Rotation, Row Cover |
| **Elysium Farms**<br>10101 Hayes Landing Rd.<br>Berlin, MD 21811 | Robert and Sandy Mattie | 443-735-8156<br>elysiumpigs@gmail.com | Worcester | Pumpkins, turnips, sunflowers | Crop Rotation, Plantings for Pollinators and Beneficial Insects |
| **Even' Star Organic**<br>48322 Far Cry Rd.<br>Lexington Park, MD 20653 | Brett Grohsgal | evenstarfarm@evenstarfarm.org | St. Mary's | Squash, cukes, tomatoes | Pyrethin, Entrust |
| **Farm Alliance of Baltimore (16 member farms)**<br>2701 Saint Lo Drive, Floor 3<br>Baltimore, MD 21213<br>Baltimore Free Farm<br>Bearfoot Farm<br>Bon Secours Urban Farm<br>Boone Street Farm<br>Cherry Hill Urban Garden<br>Filbert Street Community Garden<br>Food Systems Lab at Cylburn<br>Great Kids Farm<br>The Greener Garden<br>Hidden Harvest Farm<br>Hillen Homestead<br>Oliver Community Garden<br>The Plantation-Park Heights Urb. Garden<br>Strength to Love 2<br>Whitelock Community Farm<br>Yellow House Farm | Mariya Strauss | 410-736-8079<br>mariya@<br>farmalliancebaltimore.org | Baltimore City | 16 member farms: orchard fruit, other fruit, mixed vegetables, small grains, mushrooms, greens, salad, herbs, squash/various pests | Pyrethrin, Neem Row Cover, Manual Control, High Tunnels, Cover Crops, Companion Crops |
| **The Farm at Our House**<br>19715 Zion Rd.<br>Olney, MD 20832 | Mark Grossman | 202-412-5698<br>OurHouseFarmMD@gmail.com | Montgomery | Strawberries<br><br><br>Brassicas | Rotation, Tunnel, Landscape Fabric, Weed Control, Ventilation<br>Scouting, Manual, Dipel, Bt, Weed Control, ventilation |
| **Floating Lotus Farmstead**<br>540 W. Bay Front Rd.<br>Lothian, MD 20711 | Adam & Jocelyne Cottrell | 240-925-7542 | Anne Arundel | Corn, brassicas, mixed vegetables | Predator habitat, including bird |
| **Flying Pigs Farm**<br>9233 Bessie Clemson Rd.<br>Union Bridge, MD 21791 | Pam Burke | 301-524-3968<br>flyingpigsorganic@gmail.com | Frederick | Blueberries/Spotted Wing Drosophila | Entrust |
| **Flying Plow Farm**<br>96 C Johnson Farm Lane<br>Rising Sun, MD 21911 | Sarah Rider and Tom Paduano | 443-686-9786<br>flyingplowfarm@gmail.com | Cecil | Vegetables, grass-fed beef and pastured chicken and eggs, pasture | Inputs permitted for USDA organic production |
| **Forested, LLC**<br>3707 Enterprise Rd.<br>Bowie/Woodbine MD. 20721 | Lincoln Smith | 301-892-8000<br>lincoln@forested.us | Prince George's | Apple Trees, Asian Pear Trees, Aronia Berry, Blackberry, Black Raspberry, | Biodiversity, Encouragement of Predators including Wasps, Assassin Bugs, Spiders, Birds |

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| | | | | Persimmon, Shiitake Mushrooms | |
| **Fox Briar Farm**<br>6650 Bob Town Rd.<br>Hurlock, MD 21643 | Kathleen Moss | 443-497-5245<br>foxbriarfarmandgarden@gmail.com | Dorchester | Mixed Vegetables/ harlequin beetles, potato beetles, squash borers, cabbage moth worm, carrot fly maggot, aphids | Crop Rotation, Row Cover, Manual Removal, Bt, Neem Oil, Pyganic, Spinosad, Regenerative Soil Health practices |
| **Groundworks Farm** LLC<br>8262 Gumboro Rd.<br>Pittsville, MD 21850 | Kevin and Margaret Brown | 443-523-8552<br>margaret@groundworksfarm.com | Wicomico | Mixed Vegetables/ Various | OMRI-listed Inputs, Cover Crops, Weed Control |
| **Habanera Herb Farm**<br>2916 White Haven Rd.<br>Tyaskin, MD 21865 | Henriette Den Ouden | 410-873-2953 | Wicomico | Herbal Teas | No synthetic inputs |
| **House in the Woods Farm**<br>2225 Park Mills Rd.<br>Adamstown, MD 21710 | Phil Freedman | 301-461-6574<br>phil@houseinthewoods.com | Frederick | Broccoli and other brassicas, squash | Row Cover |
| **Hybridoma Organic Fruit Farm**<br>13734 Baldwin Mill Rd.<br>Baldiwn, MD 21013 | Robert Hamilton | 443-386-7619 | Baltimore | Strawberries, blackberries / caterpillar | Manual Control |
| **Karma Farm**<br>16345 Old York Rd.<br>Monkton, MD 21111 | Jon Shaw | 410-925-0962<br>Jbshaw49@gmail.com | Baltimore | Mixed vegetables including brassicas | Ipm, introduction and breeding of beneficial insects |
| **Kensho Farms**<br>21130 Roys Lane<br>Boonsboro, MD | John Krowka | 301-432-2375<br>johnkrowka@gmail.com | Washington | Chestnuts, Cherry Tomatoes, Winter Squash | Azaguard, Bioceres, Crop Rotation |
| **King's Berries**<br>24029 Meadows Drive<br>Ridgely, MD 21660 | Jack King | 410-490-8604<br>JIking09@comcast.net | Caroline | Strawberries, Blackberries, Red Raspberries, Blueberries | Entrust, Pyganic |
| **Krazy Acre** | Jeanne Keegan | 410-299-8774<br>jeanne@thekrazyacre.com | Anne Arundel | Mixed Vegetables/various pests | Organic, no-till, no pesticides used |
| **LeCompte Bay Farm**<br>1744 Travers Wharf Rd.<br>Cambridge, MD 21613 | Scott Lucas | 410-463-2860<br>lecomptebayfarm@gmail.com | Dorchester | Mixed Vegetables | Bt, Pyrethrin, Spinosad, Permanent Beneficial Insectary Rows |
| **Leaning Pine Farm**<br>14611 Mile Lane NW<br>Mount Savage, MD | Sam White | cedarrockcsa@gmail.com | Allegany | Pasture, grass-fed beef, raspberries | Does not use chlorpyrifos |
| **Mason's Heritage, Inc.**<br>1819 Ruthsbug Rd.<br>Queen Anne, MD 21657 | Stephen Kraszewski | 607-742-3162<br>masonsheritageinc@gmail.com | Queen Anne | Corn /army worm<br>Small Grains /army worm | Spinosad, Pyganic, Rotation, Cover Crops |
| **Mason's Farm Produce**<br>1905 Ruthsburg Rd.<br>Queen Anne, MD 21657 | Katherine Kraszewski | 607-742-3162<br>masonsheritageinc@gmail.com | Queen Anne | Tomatoes / Colorado potato beetle<br>Cucurbits / cucumber beetle<br>Sweet Corn/earworm | Neem, Spinosad, Pyganic |
| **Moon Valley Farm**<br>9700 Gravel Hill Rd.<br>Woodsboro, MD 21798 | Emma Jagoz | emma@moonvaleyfarm.net | Baltimore | Mixed Vegetables | Organically approved inputs (Bt, pyrethrin, Neem, insecticidal soap), crop rotation, row cover, timing, crop and variety selection |
| **Mountain City Farm**<br>2007 E. Fairmount Avenue | Seth Wheeler | 667-228-7002<br>Sethwheeler1@gmail.com | Baltimore City | Miixed vegetables | Amedments to improve soil health, beneficial insects |

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| Baltimore, MD. 21231 | | | | | |
| **Next Step Produce**<br>10615 Benton Rd.<br>Newburg, MD 20664 | Heinz Thomet | 301-259-2096<br>farmers@<br>nextstepproduce.com | Charles | Asst. Vegetables / all pests<br>Food grade grain<br>Dry beans<br>Upland rice | Mineral Balancing, Rotation, Compost, Diatomaceous Earth, Insecticidal Soap |
| **Oak Spring Farm**<br>20633 Mt. Zion Rd.<br>Freeland, MD 21053 | Lisa Wheeler Duff | 443-605-3063<br>lisa.springoakfarm@gmail.com | Baltimore | Brassicas, Solinacea, Beets, Carrots, Chard, Lettuces | Barriers, Rotation, Timing, Variety, Beneficial Insects, Bt, Insecticidal Soap, Actinovate, Regalia, last resort: Pyganic |
| **Oksana's Produce**<br>2517 McGinnes Rd.<br>Chestertown, MD 21620 | Okasana Bocharova | Oksanaboch89@gmail.com<br>410-487-1925 | Kent | Mixed Vegetables, fermented vegetables, eggs | Biological management principles and practices including organic production standards |
| **One Acre Farm**<br>18608 Wasche Rd.<br>Dickerson, MD 20842 | Michael Protas | 301-503-3724<br>michael@oneacrefarm.com | Montgomery | Brassica, Solanaceae Cucurbit | Organic Compost Dipel, Entrust SWurround |
| **One Straw Farm**<br>19718 Kirkwood Shop Rd.<br>White Hall, MD 21161 | Joan and Drew Norman | 410-34s-1828 | Baltimore | Mixed Vegetables | Does not use chlorpyrifos |
| **Open Book Farm**<br>6600 B Roy Shafer Rd.<br>Middletown, MD 21769 | MK Barnet | 404-723-8739<br>openbookfarm@gmail.com | Frederick | Brassicas / looper | Bt, Row Cover |
| **Owl's Nest Farm**<br>2612 Ritchie Marlboro Rd.<br>Upper Marlboro, MD 20774 | Liz Whitehurst | 847-989-2347<br>farmers@owls-nest-farm.com | Prince George's | Mixed Vegetables | Bt, Spinosad if necessary Scouting, Crop Rotation, Row Cover, Manual |
| **Peace Hollow Farm**<br>2148 Rohrersville Rd.<br>Knoxville, MD 21758 | Myron Martin | 301-432-2974<br>myjan@copper.net | Frederick | Pasture, Dairy | None |
| **The Pearlstone Center**<br>5425 Mt. Gilead Rd.<br>Reisterstown, MD 21136 | Jakir Manela | 410-500-5366<br>gstrella@pearlstone center.org | Baltimore County | Broccoli / Loopers<br>Allium / Maggots | Neem Oil, Bt<br>Crop Rotation,<br>Cover Crops |
| **Plow and Stars Farm**<br>14010 Montevideo Rd.<br>Poolesville, MD 20837 | Mark Walter | 240-812-2896<br>plowandstarsfarm@gmail.com | Montgomery | Mixed Vegetables | Kaolin Clay, Row Cover, Mechanical Controls, Resistant Varieties, Cover Crops, Insectaries for Beneficials, last resort: Organic Pesticides |
| **Priapi Gardens**<br>5996 Augustine Herman<br>Cecilton, MD 21913 | Victor Priapi | 410-275-9438<br>vic@priapigardens.com | Cecil | Mixed Vegetables/<br>Colorado Potato Beetle<br>Cabbage Worm | Spinosad<br><br>Dipel |
| **Provident Farm**<br>20980 Nanticoke Rd.<br>Salisbury, MD 21814 | Jay Martin | 410-873-2942<br>ubuubok@comcast.net | Wicomico | Mixed Vegetables / harlequin beetle, asparagus beetle, potato beetle, aphid, flea beetle, Mexican bean beetle, tomatoe hormworm | Surround, Neem, Azaguard, Bt (San Diego and Kustaki Strains), Row Cover, Beneficial Insects |
| **Potomac Valley Organics**<br>10866 Bethesda Church Rd<br>Damascus, MD 21872 | Leah Mitchell | 240-338-0320<br>potomacvalleyorganics<br>@gmail.com | Montgomery | Salad Greens/ flea beetle, cabbage looper | Bt, Pyganic, Crop Rotation, Row Cover |
| **Quarter Acre Farm**<br>Corner of Camper Circle and | Andrea Davis-Cettina | 415-533-3106 | Talbot | Mixed Vegetables, Fruit, Seedlings | No inputs |

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|---|---|---|---|---|---|
| Summit St.<br>Tilghman, MD 21671 | | | | | |
| **Red Top Farm**<br>1392 West River Road<br>Shady Side, MD 20764 | V.K. Holtzendorf | 410-867-6283<br>vkay@comcast.net | Anne Arundel | Winter Greens, Tomatoes, Squash, Oats, Buckwheat | Pyrethrin<br>High Tunnels, Row Cover, Cover Crop, Manual Control |
| **Rousedale Farm**<br>2604 Fallston Road<br>Fallston, MD 21047 | Steve Rouse | 410-215-6776<br>steve@rousedalefarm.com | Harford | Mixed Vegetables, Grapes, Blueberries, Strawberries / Flea Beetle, Squash Bug, Cucumber Beetle, Japanese Beetle, Bean Beetle, Potato Beetle | Spinosad, Bacillus Subtilis, Neem Oil, Copper<br>Row Cover, Companion Planting, Developing Healthy Soil |
| **Sassafras Creek Farm**<br>23217 Bayside Rd.<br>Leonardtown, MD 20650 | David and Jennifer Paulk | 301-247-1002 | St. Mary's | Cucurbits / cucumber beetles<br>Potatoes / Colorado potato beetles<br>Sweet corn / Corn earworm<br>Small Fruits | Kaolin Clay<br><br>Bt, Spinosad<br><br>Bt, Spinosad<br>All: Row Cover, Crop Rotation, Timing Planting |
| **Schoolhouse Farmhouse**<br>11462 Old Cordova Rd.<br>Cordova, MD 21625 | Lauren Giordano and George Burroughs | 443-822-0683<br>lauren@<br>schoolhousefarmhouse.com | Talbot | Mixed Vegetables, Flowers/Squash Bug, Cucumber Beetle, Whiteflies | Scouting, Crop Rotation, Beneficial Insects, Manual, Row Cover |
| **Star Bright Farm**<br>2950 Garrett Rd.<br>Whitehall, MD 21161 | Peter Elmore | Peterelmore37@gmail.com | Baltimore | Mixed vegetables | No synthetic inputs |
| **Terrapin Farms**<br>5939 South Point Unit 1<br>Berlin, MD 21811 | John and Ashley Harrison | 443-513-4409<br>ashley@terrapinfarmsmd.com | Worcester | Hyrdoponic Lettuce / Aphids, Grasshoppers | Azamax |
| **Utica Bridge Farms, LLC**<br>10616 Old Frederidk Road<br>Thurmont, MD 21788 | Richard and Jean Jeffries | 818-762-4771; 301-304-0704<br>rjp9999@aol.com | Frederick | 50 Fruit, Vegetables and Berries / Harlequin bugs, cabbage worms, Japanese beetles | Rock dust, compost, sea minerals |
| **Wallin Organic Farm**<br>2130 Cecilton Warwick Rd.<br>Warwick, MD. 21912 | Paul Drummond | 240-281-6107<br>pzdrummond@gmail.com | Cecil | Organic rye, tomatoes, beans, annual vegetables | Crop rotation, OMRI-approved plant-based pesticides, manual control, habitat for birds and other predators |
| **Where Pigs Fly Farm**<br>131 Indiantown Farm Lane<br>Centerville, MD 21617 | Brian Knox | 814-233-0305<br>forests@earthlink.net | Queen Anne | Mixed Vegetables, Brassicas, Potatoes, Asparagus, Tomatoes, Peppers/ Potato Beetles, Harlequin Bugs | Bt, Neem<br>Scouting, Crop Rotation, Manual Control |
| **Zahradka Farm**<br>2300 Golupski Rd.<br>Essex, MD 21221 | George Zahradka, Libby Longendorf | 443-813-1590<br>zfarmlife@thezahradkafarm.com | Baltimore Co. | Mixed vegeatbles | Does not use chlorpyrifos |

**LearningDisabilitiesAssocMd_Brown_FAV_SB0300**
Uploaded by: Brown, Jamie
Position: FAV

February 11, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**In support of SB 300: Pesticides – Use of Chlorpyrifos – Prohibition**

Chairman Pinsky, Vice Chairman Kagan and members of the committee:

Thank you for this opportunity to testify in support of SB 300. My name is Jaime Brown and I am the President of the Learning Disabilities Association (LDA) of Maryland.

Learning disabilities and attention disorders can affect a person's ability to read, write, speak, or complete math and can impair one's ability to build social relationships. On average, it costs twice as much to educate a child with a learning or developmental disability as it does to educate a child without one. Adolescents with learning disabilities are much more likely to drop out of high school, have problems with substance abuse, and wind up in the juvenile justice system. High school graduates with learning disabilities are much more likely to be unemployed and have trouble keeping a job.

As the mother of three children with learning disabilities (LD), I am all too aware of the challenges for LD children and their families. As you have heard from public health experts today, exposure to chlorpyrifos even at a low dose, can result in life-long serious learning disabilities.

My 16 year old son, **Arvin f**or example, has always struggled with his learning disability. Through the years he has been teased, bullied, and even called lazy and stupid. At the age of 11 year-old he wanted to drop out of school and went into a deep depression. As a mom, seeing him and my other two children suffer in this way has been heartbreaking, and the heartbreak doesn't go away.

My 25 year-old son Henry has a LD, and struggles with finding and maintaining meaningful employment. My other daughter with LD struggles daily with low self-esteem and has difficulties expressing thoughts, learning words, and spelling – all things that many of us take for granted. Unfortunately, all three of my children will struggle and have challenges because of their learning disabilities for the rest of their lives.

I spent years fighting for my children and other children with LD to address the school system's failings in not meeting children with LD needs. There is not a day that goes by that my children – and all children and adults with LD – aren't impacted by their disability.

I also want to share the story of a LDA colleague in Illinois, Penny Richards. Penny raised her family on a farm in Plainfield, Illinois. The farm was surrounded by corn and bean fields that were regularly sprayed with pesticides . Chlorpyrifos is often used for corn and bean related pest challenges,  As we now know, chlorpyrifos used on crops like corn and beans can neurologically harm babies. Penny's son, now an adult, has a learning disability that presented challenges throughout his life, but especially when he was young as he was struggling in school. She still wonders if her exposures to pesticides, that likely included chlorpyrifos, that were sprayed on those fields while she was pregnant resulted in his learning disability. This is not idle speculation. Scientists agree that this pesticide is unsafe for children at any detectable level. Across the nation, over half of all apples and broccoli, as well as other crops like citrus, strawberries and grapes are also treated with it.

There are several factors that cause learning and other neurological disabilities, but we know that one cause is exposure to chlorpyrifos. The good news is that exposure to chlorpyrifos is **preventable**. We need to act now to ensure this exposure stops now to protect future generations.

Chlorpyrifos which is sprayed on fruit and vegetable crops across the country is designed to harm the nervous system – and it does. Scientific studies overwhelmingly find that prenatal and early childhood exposures to chlorpyrifos, even at low levels, disrupt children's brain development and can result in loss of IQ, problems with behavior and attention, and learning and developmental disabilities.

Learning and developmental disorders are the result of a complex interaction of multiple factors, including genetics and environmental exposures. For example, researchers have found that some children have a genetic susceptibility that makes their brains more vulnerable to harm from chlorpyrifos.

We cannot change our genes. **However, we can prevent this neurotoxic pesticide from being sprayed into the air we breathe, the water we drink and the fruits and vegetables we eat.**

Multiple studies show that even very low levels of chlorpyrifos can permanently impair children's cognitive skills. Prenatal exposures are especially worrisome. More than 25 scientific studies show strong associations between a pregnant mother's exposure to chlorpyrifos, and problems with learning and behavior in her child.

Project TENDR (Targeting Environmental Neuro-Development Risks), is a group of nearly 60 leading scientists, health professionals and advocates including LDA, focused on preventing toxic exposures contributing to brain-based disorders in children. Project TE calls out this organophosphate pesticide in their list of chemicals linked to neurological harm. In October 2018, Project TENDR experts published a paper on certain pesticides and their health impacts, and the need for policy action[i]. The paper states, *"**Compelling evidence indicates that prenatal exposure at low levels is putting children at risk for cognitive and behavioral deficits and for neurodevelopmental disorders**."*

Prenatal Chlorpyrifos exposure is linked to mental and motor delays when children reach preschool; and decreases in working and visual memory, verbal comprehension and IQ by the time children reach elementary school. Researchers also find that prenatal exposures to chlorpyrifos can increase children's risks for ADHD and autism. Of the organophosphate pesticides, chlorpyrifos shows the strongest association as a risk factor for autism.

Acting on the scientific evidence, EPA banned residential use of this insecticide in 2000, but allowed its continued use in agriculture. **Make no mistake – if chlorpyrifos is too dangerous to be used in our homes and schools, it is certainly too dangerous to spray on our food.**

Chlorpyrifos is widely used in the U.S., sprayed on foods children regularly eat. **EPA has found that all exposures to chlorpyrifos through food exceed safe levels.** Studies show that when chlorpyrifos is sprayed on farm fields, the pesticide is carried into nearby homes and schools, where it collects in indoor air and dust.

National biomonitoring data (NHANES) collected by the U.S. Center for Disease Control and Prevention (CDC), detected chlorpyrifos in more than 91% of women of childbearing age. According to the CDC, this high percentage of detectable levels of chlorpyrifos means that people's exposures are ubiquitous, and likely to be occurring through the food we eat and feed our families. In recent years, multiple studies of pregnant women show chlorpyrifos is present in pregnant women, in umbilical cord blood and in children.

The use of chlorpyrifos on farm fields and crops puts our children and future generations at greater risk of learning and developmental disabilities, attention and behavior disorders.

The science is irrefutable that this pesticide does lasting harm to babies' brains, leaving children, parents and schools struggling to deal with life-long impairments.

I implore the members of this committee to vote to ban the use of chlorpyrifos in our state, without any exemptions. When EPA recommended it be banned, they did not allow for any exemptions as EPA has often done in rare cases where the agency restricted the use of certain pesticides. We urge you to ensure that all of our children are able to learn and grow to their full potential. Thank you.

Sincerely,

Jaime Brown
President, Learning Disabilities Association of Maryland
Severn, MD

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[i] Organophosphate exposures during pregnancy and child neurodevelopment: Recommendations for essential policy reforms, PLOS Medicine, October 2018, https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002671

**ChesPhysiciansSocialResponsibilty_DuboisFAV_SB0300**
Uploaded by: Dubois, Gwen
Position: FAV

CHESAPEAKE PSR PHYSICIANS FOR SOCIAL RESPONSIBILITY

1985 NOBEL PEACE PRIZE

February 11, 2020

**Committee:** **Senate Education, Health and Environmental Affairs**
**Bill:** **SB 300: Pesticide – Use of Chlorpyrifos – Prohibition**
**Position:** **Favorable**

Chesapeake Physicians for Social Responsibility urges the House Environment and Transportation Committee to pass a favorable report on SB 300 which would prohibit the use of the pesticide chlorpyrifos in Maryland.

Chlorpyrifos is a neurotoxic pesticide used in U.S. agriculture to kill a variety of agricultural pests. It puts the developing brains of fetuses, infants and young children at risk and its use on food crops leads to levels in food and water that far exceed safety standards.

Chesapeake PSR supports SB 300 because the scientific evidence lending support to a ban on chlorpyrifos is overwhelming. The clear weight of the evidence confirms that chlorpyrifos is toxic to developing brains of our children, and the developmental damage caused by chlorpyrifos to children is likely irreversible.

Chesapeake PSR would like to highlight a few conclusions that U.S. EPA and other scientists have drawn from 20 years of toxicology and human epidemiology evidence regarding the safety of chlorpyrifos:[1]

- The mechanism of damage is more complex than simply through decreased levels of acetylcholinesterase (AchE), and damage to brains may occur even though levels of AchE are normal
- Dietary exposure to chlorpyrifos exceeds what is safe for all people but especially for children and for infants 1-2 years old, the levels are estimated to be 140 times levels that are safe!
- Exposure to chlorpyrifos in drinking water also exceeds safe levels;
- Exposure to chlorpyrifos in utero is linked to low birthweight, shorter gestation, ADHD, autism, lower IQ scores, memory and other neurodevelopmental issues in children.

[1] Revised Human Health Risk Assessment for Registration Review; Nov. 3, 2016: EPA-HQ-OPP-2015-0653-0454. https://www.regulations.gov/document?D=EPA-HQ-OPP-2015-0653-0454.

Additionally, in adults there are worrisome reports from other studies, some more recent than the EPA report:

- Use of chlorpyrifos in women farmers exposure in another study was shown to be associated with an increase risk of breast cancer in one recent study[2] and exposure was associated with breast cancer in another study[3]
- Parkinson Risk has been associated with exposure to chlorpyrifos in animals and humans and recent evidence suggests certain genetics increase that risk[4]

The Environmental Protection Agency (EPA) proposed a federal ban based on significant risk to fetuses and children, after their scientists review of the data. This conclusion was supported by the U.S. EPA's 2016 Chlorpyrifos Revised Human Health Risk Assessment for Registration Review which indicated that expected exposure to chlorpyrifos from food crop residues exceeds the safety standard established under the Federal Food, Drug and Cosmetic Act.

However, in an unprecedented move, Scott Pruitt, U.S. EPA's new Administrator under the Trump Administration, overruled the recommendations of U.S. EPA's scientific advisors and reversed the agency's decision to ban this toxic pesticide.

A federal court order to the Environmental Protection Agency to ban chlorpyrifos, is now tied up in the Courts. The European Union has banned the pesticide and so has Hawaii and California. In California, a commission has been formed to study and help farmers with safer alternatives to chlorpyrifos based on sustainable pest management. [5] Now seven states . including Maryland, are suing the EPA over its failure to protect children from neurological damage caused by chlorpyrifos use.[6]

With its actions, the U.S. EPA has put politics above science and the economic interests of several large companies above the health and well being of the children of the United States. Since the federal government has failed to perform its most basic function of protecting the health of our children in a fair and impartial way, it is appropriate and necessary for Maryland to step in and provide these basic protections. Otherwise, as warned in a recent report in the New England Journal of Medicine we may be putting a whole generation of developing brains in harm's way.[7]

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[2] https://www.ncbi.nlm.nih.gov/pubmed/28934092

[3] https://journals.lww.com/environepidem/Fulltext/2019/10000/A_case_control_study_of_breast_cancer_risk_and.9.aspx

[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3117899/

[5] https://www.cdpr.ca.gov/docs/pressrls/2019/081419.htm

[6] https://www.capitalpress.com/state/oregon/oregon-joins-lawsuit-challenging-epa-over-chlorpyrifos/article_353e7240-d40b-11e9-a100-9fac57af62a9.html

[7] https://www.nejm.org/doi/pdf/10.1056/NEJMp1716809

# MOMsOrganicMarket_Dysard_FAV_SB0300

Uploaded by: Dysard, Alexandra

Position: FAV

February 11, 2020

**RE: In Support of SB 300**
**Pesticides - Use of Chlorpyrifos - Prohibition**

Dear Chairman Paul Pinsky, Vice Chairwoman Cheryl Kagan and Members of the Maryland Senate Education, Health and Environmental Affairs Committee,

MOM's Organic Market would like to express our **support for SB 300** to ban the use of chlorpyrifos in Maryland.

Chlorpyrifos is not necessary to grow food, it has disastrous and long term effects on the environment, wildlife and pollinators, and it is highly toxic to humans. Banning chlorpyrifos plays an integral role in protecting the health of the Chesapeake Bay and we are asking you to put our residents and environment before pesticides and profits. We urge you to support SB 300 and ensure that Maryland continues to stay a strong environmental leader.

As a thriving local grocer with 19 stores, and 400,000 customers each month, we know what Maryland residents want and they are steadily demanding food that does not impact the air that they breathe or the land and streams that their children play in. We prove every day that dangerous chemicals like chlorpyrifos are not in any way necessary to produce food, as evidenced by our store shelves (all chlorpyrifos free) and our 100% organic produce section.

Chlorpyrifos has been linked to health issues, including developmental delays in children, as well as nausea, dizziness, convulsions, and even death in adults, particularly farmworkers. Moreover, farmers have many other powerful options to protect crops from pest damage that don't endanger their health or the health of the environment and local communities.

Evidence of this dangerous chemical is so compelling that scientists at the Environmental Protection Agency have already concluded that it should be banned altogether. Yet, despite this information, then EPA Administrator Scott Pruitt made the decision to deny a petition to ban chlorpyrifos from being used in food production A recent 9th Circuit Court ruling that EPA must ban chlorpyrifos is being challenged by EPA at an upcoming rehearing of the full court.

We have the opportunity in Maryland to be leaders on this critical issue during. The passing of this bill has never been more urgently needed. MOM's Organic Market urges you to stand up for the bay, the bees, Maryland residents and our local farmers and support SB 300. Thank you for your time and attention to this matter.

Sincerely,

Alexandra DySard

Environmental Manager
MOM's Organic Market
5612 Randolph Rd.
Rockville, MD 20852

**AutismAmbassadors_Ellenby_FAV_SB0300**
Uploaded by: Ellenby, Whitney
Position: FAV

# Whitney Ellenby
# Founder/Executive Director of Autism Ambassadors

**7605 Winterberry Place, Bethesda, MD 20817**
**301-233-0450, wellenby@gmail.com**


**Testimony in *Support***
**SB 300– Pesticides – Use of Chlorpyrifos – Prohibition**
February 11, 2020

**Submitted to: The Maryland Senate Education, Health and Environmental Affairs Committee**

Good afternoon Chairman Pinsky, Vice Chair Kagan, and Members of the Committee, thank you for listening to a different perspective than you may have expected. I anticipate that opponents of the ban will likely characterize my testimony as "emotional" in order to dismiss it, but this is purely scientific and specific to Maryland.

**My name is Whitney Ellenby, I'm the mother of a profoundly autistic 18-year-old son, and the founder of a venture that runs recreational events for over 800 families in Maryland impacted by Autism.** When I began the events 11 years ago, I only had 15 families, but I now have over 800 and rising, with weekly referrals of at least 3 families with newly diagnosed children. As a parent who sees hundreds of families struggling to cope with their own autistic children, it's frankly offensive to me that we are even having a debate about whether to ban chlorpyrifos, given the scientific facts you heard today and safer alternatives.

Here's a staggering fact from the CDC **-- right here in Maryland, our state is now #2 in the nation for babies born with Autism** (*See Article below*). **And, in December 2018, a report based on a 2016 survey conducted by the National Survey of Children's Health found that the current rate of Autism in the U.S. is actually one in 40 children.**

This is not a matter of defection to our state for better resources, this is babies born with their brains incurably warped by a disability that's certain to have an environmental cause. Something is poisoning our children. And the link between chlorpyrifos established by EPA scientists, and increased risk of Autism is clear, which makes perfect sense when you think about what these pesticides are designed to do.

This chemical is proven to seize the spine and arrest the brain once it's ingested – that's how we kill the bugs. But now imagine what happens when it enters our water stream and food, so that pregnant women are ingesting it. Adult bodies may be better equipped to flush out a small dose of poison, but babies growing in the womb cannot. Imagine what this chemical designed to kill is doing to the developing brain of a child during gestation, especially in that first trimester when the brain is forming. Is that really a risk we want to take when they are safer alternatives? When studies ***prove*** that ingestion of chemicals like chlorpyrifos in pregnant women can maim babies' brains?

In an age when everyone is frantic to figure out what is causing Autism, when it's becoming clear that it's an environmental trigger combined with genetics, we continue to apply chemicals that we

know for a fact are designed to cause injury and death. And we are now reaping what we have sowed because the damage can't be reversed, it happens when chlorpyrifos residue is in our food, water, and from direct exposure to applications and drift from our farms, golf courses, and other land care applications.

**Here in a state we laud for being so enlightened and progressive, are we seriously willing to continue the use of poisons that reach our children's' brains?**

As a resident of Montgomery County, I'm well aware that golf courses and fields with lush, green grass are using this chemical. Their argument in defense of this is that they don't use it all that often, as if that matters to parents like me, who will be caring for their disabled children for the rest of their lives. While those who advocate to use this toxic argue about it's necessity, I echo the common refrain of parents with incurably disabled brains – *I cannot die*, *I cannot get sick,* my son is aging into adulthood and I can't care for him forever, but he can't survive without me. The past couple years have been particularly acute because Zack developed aggressive behaviors, I was hit, bit and punched on an almost daily basis. My daughter has suffered depression in part because of the trauma she witnessed. What's extraordinary about my situation is how ordinary it is ~ every single day thousands of families in Maryland endure the identical struggles. Compare that to the dilemma of whether to continue applying a poison implicated in warping their brains.

As public servants, you are charged with keeping us safe. Knowing what we now know, allowing groups to continue to apply chlorpyrifos that leeches into our water and food is a dereliction of duty as far as I'm concerned. It's irrelevant how much poison results in which disabilities, how often companies apply it, we just need to know it's toxic and warping our children's brains.

Setting aside safety issues, consider economics. Maryland is #2 for incidence of Autism in the nation**. Our waitlist for receiving services off the Autism Waiver is over 7 years long, and there aren't enough homes to house our adults. How we are going to manage this expanding demographic and who do you think will pay for it? Maryland Taxpayers. We literally cannot afford for this disability to keep sweeping through our state, and today you have a chance to take an important step to halt it.**

The solution is simple, even if it's inconvenient to some business interests. **Our farms and golf courses and land care professionals have other options, safer ones, and we all know it. But I have no other option, the damage to my son's brain is irreversible**. We take a stand – we don't dare door risk anything that poisons our children. That is what's at stake, and that's the duty with which you have been charged. I'm confident you will do the right thing and give SB 300 a favorable report. Thank you.

# MD Has 2nd Highest Autism Rates In America, CDC Says

## A new report released by the CDC shows that autism rates in Maryland have jumped 10 percent in the past 14 years.

By Deb Belt, Patch Staff

Apr 28, 2018 2:29 pm ET

BALTIMORE, MD — **Autism rates continue to climb nationwide, and Maryland is second in the country in the number of children with autism, according to a new study released by the Centers for Disease Control.** The study used research collected by Rutgers University researchers and found that autism rates have gone up 10 percent in Maryland since 2004, and looks like they will continue to climb. Data released by the CDC finds that Autism Spectrum Disorders affect an average of 1 in 59 children in the U.S. (1 in 38 boys, 1 in 152 girls). The findings are based on 11 sites, including Maryland (which has an autism prevalence of 1 in 50; 1 in 31 for boys, and 1 in 139 for girls). The study focused on 8-year-olds.

One in 34 New Jersey children (three percent of all 8-year-olds) have autism, the study found, the highest in the country. **Maryland has the second highest rate of autism, at one in 55, the CDC reports.**

"Pathfinders for Autism is deeply concerned by the implications the increasing numbers of children diagnosed with ASD will have on our over-burdened public school and adult service systems," said Maryland's largest group advocating for children with autism. **"Already, Maryland's public school system is unable to meet the needs of over 11,000 children with ASD**. Children with autism grow into adults with autism, many in need of supports. Our adult service system has thousands of adults with developmental disabilities on waiting lists for critical supports. Furthermore, health insurance plans continue to deny or simply not cover effective treatments and interventions leaving gaps in individuals' medical care and potentially diminishing their quality of life and long-term potential.

**"While we commend the State of Maryland for their recent budget approval to open an additional 100 Autism Waiver slots, and 800 slots for those on the Developmental Disabilities Administration (DDA) Waiting List, thousands are still left in need of services,"** the group said. "Pathfinders for Autism strongly urges our state leaders to recognize that the rate of autism continues to rise year after year. Maryland needs to acknowledge the increasing demand on services and families and develop a plan to expand supports and services and adequate funding to address the need."

Researchers caution that high rates don't necessarily mean more children with autism live in Maryland. Instead, the data could mean that children with autism are more likely to be diagnosed if they live here, but there's not enough information to know for sure.

"Other states could be underestimating the rate of autism," said Dr. Walter Zahorodny, an Associate Professor at Rutgers New Jersey Medical School and the lead investigator on the study.

The study also found that autism rates are the same among different ethnic groups, the first time there was no racial disparity in diagnosis rates. Researchers believe public awareness about autism is behind that change.

Nationwide, boys are four times more likely to be diagnosed than girls, compared to Maryland, in which boys are 4.5 times more likely diagnosed than girls.

Autism spectrum disorder is a developmental disability that can cause "significant social, communication and behavioral challenges," the CDC says. Those with autism might "communicate, interact, behave, and learn in ways that are different from most other people. The learning, thinking, and problem-solving abilities of people with ASD can range from gifted to severely challenged."

There is no medical test for autism; instead, it is diagnosed based on behavioral traits. Most people with autism are diagnosed as children, but some may be diagnosed as adults.

**These behaviors may be a sign of an Autism Spectrum Disorder:**

**6-12 Month-Olds**

- Infrequent or no babbling
- Lack of eye contact or smile
- No interest in looking at faces
- Unusual, high-pitched squeals

**9-24 Month-Olds**

- ANY signs of regression
- Infrequent response to social interactions
- Decreased eye contact
- Limited facial expressions
- Inconsistent response to name (in absence of hearing loss)
- No words by 16 months or no 2-word phrases by 24 months
- Uses other person's hand as a tool
- Limited use of gestures (especially pointing)
- Doesn't easily learn simple new interactive routines
- Echoing what others say without regular spontaneous speech
- Overly attached to unusual objects
- Repetitive or odd play or other behavior
- Odd sensory interests (fans, lights, spinning)
- Insistence on sameness; resistance to change

Find more information about families living with autism at www.pathfindersforautism.org.
*Image via Shutterstock*

# MNA_Robyn Elliott_FAV_SB 300

Uploaded by: Elliott, Robyn

Position: FAV

| | |
|---|---|
| **Committee:** | **Senate Education, Health, and Environmental Affairs Committee** |
| **Bill Number:** | **SB 300** |
| **Title:** | **Pesticides – Use of Chlorpyrifos - Prohibition** |
| **Hearing Date:** | **February 11, 2020** |
| **Position:** | **Support** |

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The Maryland Nurses Association (MNA) supports *Senate Bill 300 – Pesticides – Use of Chlorpyrifos - Prohibition.* This bill would prohibit using chlorpyrifos in Maryland, including in seeds and insecticides.

Chlorpyrifos is an insecticide widely applied to food crops, and as a result, its residue can be found in many foods. This is very concerning to MNA since chlorpyrifos is a neurotoxin that can interfere with brain development in children. In spite of these and other health concerns, in 2017 the Environmental Protection Agency chose to allow the continued use of chlorpyrifos even though it failed to identify any level at which using the insecticide is considered safe.

In the meantime, the European Union recently banned the use of chloropyrifos for plant application, citing concerns related to human health, particularly in the area of genotoxicity and developmental neurotoxicity. Absent such protection at the federal level, we must take steps to protect our citizens – especially our children – by banning the use of chloropyrifos.

Thank you for your consideration of our testimony, and we urge a favorable vote. If we can provide any further information, please contact Robyn Elliott at relliott@policypartners.net or (443) 926-3443.

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[i] References: Environmental Protection Agency. Retrieved from https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos

European Commission. Retrieved from https://ec.europa.eu/food/plant/pesticides/approval_active_substances/chlorpyrifos_chlorpyrifos-methyl_en

**BeyondPesticides_Feldman_FAV_SB0300**
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Statement of
Jay Feldman, Executive Director
in Support of
**SB300, Pesticides - Use of Chlorpyrifos – Prohibition**
before the
**Education, Health, and Environmental Affairs Committee**
Maryland Senate
Annapolis, Maryland

February 12, 2020

Honorable members of the Committee. Thank you for the opportunity to provide input to the Maryland State Senate's Education, Health, and Environmental Affairs Committee. On behalf of our members and supporters who are residents of the state of Maryland, we urge the passage of SB300 to stop the use of the highly neurotoxic insecticide chlorpyrifos.

Beyond Pesticides is a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to improve protections from pesticides and promote alternative pest management strategies that reduce or eliminate a reliance on toxic pesticides. Our membership spans the 50 states, the District of Columbia, and groups around the world.

The widely used organophosphate (OP) insecticide, chlorpyrifos is binds irreversibly to the active site of an essential enzyme for normal nerve impulse transmission, acetylcholine esterase (AchE), inactivating the enzyme. For that reason, it is a cholinesterase inhibitor. The scientific evidence of neurotoxic dangers associated with chlorpyrifos exposure is extensive and consistent, with particular adverse effect to children and brain development. Epidemiological data also points to subpopulations that are disproportionately affected by chlorpyrifos exposures. Low-income African-American and Latino families, including farmworker families, continue to suffer the most, and this disproportionate impact creates an environmental justice issue that the state must not ignore. Given the serious toxicological issues associated with chlorpyrifos use and exposures, and the U.S. Environmental Protection Agency's (EPA) reversal on its decision to complete rulemaking revoking the food tolerance for chlorpyrifos, it is left to the state to take action to eliminate exposure to this hazardous insecticide.

SB300's prohibition of chlorpyrifos is an important public health measure at the same time that it ensures that farmers and pesticide applicators have the resources they need to transition to safer ecological pest management practices, rather than substitute one toxic chemical for another.

**Chlorpyrifos Is Neurotoxic and Endangers Children's Health**

A study from the Columbia Children's Center for Environmental Health (CCCEH) at Columbia University, which provides important information on the neurological outcomes of children exposed to chlorpyrifos, found that children exposed to high levels of chlorpyrifos exhibit developmental delays, attention deficiencies, attention-deficit/hyperactivity disorder problems, and pervasive developmental disorder problems at three years of age.[1] Concentrations of chlorpyrifos in umbilical cord blood also correspond to a decrease in the psychomotor development and a decrease in the mental development in three-year-olds.[2] A follow-up study in 2012 finds that children with high exposure levels of chlorpyrifos have changes to the brain, including enlargement of superior temporal, posterior middle temporal, and inferior postcentral gyri bilaterally, and enlarged superior frontal gyrus, gyrus rectus, cuneus, and precuneus along the mesial wall of the right hemisphere.[3]

Recent studies add additional evidence that chlorpyrifos affects the developing brain. Using data from California's records of autism disorder diagnosis and birth rates from 1998 to 2010, as well as records from California's pesticide use reporting system, researchers sought to determine associations between early life ambient exposure to a range of pesticides, including chlorpyrifos.[4] Results show, when compared to a control group unexposed to the same pesticides during birth and infancy, modest increases in autism risk for exposure to chlorpyrifos. For cases of autism with co-occurring intellectual disabilities, the link between chlorpyrifos and these disorders was even more robust.[5]

In its 2016 review of chlorpyrifos, EPA concludes that there is "sufficient evidence that there are neurodevelopmental effects occurring at chlorpyrifos exposure levels below that required for

AChE inhibition," and that EPA's current approach for evaluating chlorpyrifos' neurological impact is "not sufficiently health protective." [6] This statement was made as a result of evidence that chlorpyrifos has effects below that which is observed for typical acetylcholinesterase (AChE) inhibition. Data has shown that chlorpyrifos can alter neuronal function outside of, and

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**1** Rauh VA. 2006. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. *Pediatrics*. 118(6):e1845-59.

[2] Lovasi, GS, et al. 2011. Chlorpyrifos Exposure and Urban Residential Environment Characteristics as Determinants of Early Childhood Neurodevelopment. *Am J Public Health;* 101(1):63-70.

[3] Rauh VA, Perera FP, Horton MK, et al. 2012. Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A*. 109(20):7871-6.

[4] Von Ehrenstein et al. 2019. Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based case-control study. BMJ 2019; 364 doi: https://doi.org/10.1136/bmj.l962.

[5] Ibid.

[6] USEPA. 2016. Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review. Office of Chemical Safety and Pollution Prevention. Washington DC.

unrelated to the classical cholinesterase mechanism.[7,8,9] However, regardless of the potential for multiple pathways of toxicity, there remains high confidence in the current available and quantifiable evidence of neurological impact.

A study published in late 2018 finds that the scientific conclusions used to support the initial registration of chlorpyrifos are flawed and omitted key health impacts.[10] Scientists first analyzed a study performed in 1997-8, which used laboratory rats exposed to the chemical as a reference for health impacts to prenatal human exposure. Summary reports indicate possible effects to a specific area of the brain known as the cerebellum, which regulates motor control. This led researchers to further investigate the underlying data. The industry-contracted laboratory concluded that at low to medium doses, there are no observed impacts, and, at high doses, impacts are seen but are a result of undernutrition caused by toxicity in the mother rat. These findings led to an overall determination—–accepted by regulators—–that the chemical does not affect developmental neurotoxicity. However, the study indicates that this conclusion is backed up by averaging impacts to the brain, rather than looking at the cerebellum, the specific brain region affected.[11] Although seemingly subtle to those without considerable scientific background, the study notes that such an approach is considered by EPA to be an "inappropriate and inconclusive manipulation of data."[12] Despite this clear-cut abuse of data, regulators never requested that the laboratory correct this approach.

A re-analysis by scientists finds that in low and medium doses, cerebellum height decreased up to 11%, and up to 14% at the highest dose compared to control rats. This indicates "statistically highly significant" effects the authors note are observed in the absence of toxicity in the mother rat.[13] Although a review of this type was not included in the report submitted to regulators, it strongly supports the conclusion that chlorpyrifos is a developmental neurotoxin.

**Harm to Children Impacts Economic Development**

As a developmental neurotoxin, exposure to chlorpyrifos and other organophosphates in its class results in a lowering of IQ points. A 2011 study examining families in the intensive agricultural region of Salinas Valley, California, found that IQ levels for children with the highest OP exposure were a full seven IQ points lower than those with the lowest exposure levels. This

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[7] Lee I, Eriksson P, Fredriksson A, et al. 2015. Developmental neurotoxic effects of two pesticides: Behavior and biomolecular studies on chlorpyrifos and carbaryl. Toxicol Appl Pharmacol. 288(3):429-38.
[8] Androutsopoulos VP, Hernandez AF, Liesivuori J, Tsatsakis AM. 2013. A mechanistic overview of health associated effects of low levels of organochlorine and organophosphorous pesticides. Toxicology. 307:89-94.
[9] Meijer M, Hamers T, Westerink RH. 2014. Acute disturbance of calcium homeostasis in PC12 cells as a novel mechanism of action for (sub)micromolar concentrations of organophosphate insecticides. Neurotoxicology. 43:110-6.
[10] Mie et al. 2018. Safety of Safety Evaluation of Pesticides: developmental neurotoxicity of chlorpyrifos and chlorpyrifos-methyl. Environmental Health volume 17, Article number: 77 https://doi.org/10.1186/s12940-018-0421-y.
[11] Ibid.
[12] Ibid.
[13] Ibid.

team also found that every tenfold increase in OP exposure during a mother's pregnancy corresponds to a 5.5 point drop in overall IQ scores in seven-year-olds.[14]

A 2020 analysis by a team of scientists at the New York University Grossman School of Medicine identified similar effects to IQ from exposure to organophosphates. Based on a conservative review of available data, researchers determined 4.25 IQ points are lost for every 10-fold increase in organophosphate exposure. The study extrapolates the effect of IQ loss to the impact on the United States economy. Each lost IQ point was assigned a value of $22,268, and each case of intellectual disability (determined to be when IQ drops below 70) resulting from exposure is estimated to result in $1,272,470 in lost productivity. These dollar amounts are all inflation-adjusted to the year 2018.[15]

Despite modest declines in OP use over the study period (2001-2016), the impacts of exposure found to be roughly the same as those currently caused by lead. OPs are estimated to result in over 26 million lost IQ points and over 110,000 cases of intellectual disability, totaling roughly $735 billion in economic costs. The total impact of all the chemicals studied by researchers is estimated at nearly 200 million lost IQ points, and almost 1.2 million cases of intellectual disability, costing the U.S. economy an astounding $7.5 trillion.[16] If even a fraction of this effect is playing out in the state of Maryland, it is incumbent upon lawmakers to stop the brain drain our children's intelligence, and their ability to be productive members of society as a result of chemical poisoning.

**Air and Water Contamination**

EPA assessments find that the chlorpyrifos oxon (derivative), transformed from the parent during chlorination in drinking water treatment, poses a dangerous exposure through drinking water.[17] The chlorpyrifos oxon persists through water treatment and thus remains in drinking water for at least 72 hours.[18] The United States Geological Society's National Water Quality Assessment Program identifies widespread contamination of the nation's waterways from chlorpyrifos use.[19]

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[14] Bouchard MF, Chevrier J, Harley KG, Kogut K, Vedar M, Calderon N, et al. 2011. Prenatal Exposure to Organophosphate Pesticides and IQ in 7-Year-Old Children. *Environ Health Perspect*. 119:1189-1195.
[15] Gaylord et al. 2020. Trends in neurodevelopmental disability burden due to early life chemical exposure in the USA from 2001 to 2016: A population-based disease burden and cost analysis. Molecular and Cellular Endocrinology Volume 502, https://doi.org/10.1016/j.mce.2019.110666.
[16] Ibid.
[17] USEPA. 2014. Chlorpyrifos: Updated Drinking Water Assessment for Registration Review. Office of Chemical Safety and Pollution Prevention. Washington DC.
[18] Kamel A, et al. 2009. Oxidation of selected organophosphate pesticides during chlorination of simulated drinking water. *Water Res*; 43(2):522-34.
[19] USGS. 2020. National Water Quality Assessment Program. Pesticides. https://www.usgs.gov/mission-areas/water-resources/science/pesticides?qt-science_center_objects=0#qt-science_center_objects.

Residues of chlorpyrifos have been detected in indoor air, including childcare centers. [20] Air monitoring reports have found chlorpyrifos at levels exceeding federal guidelines.[21] Vapor phase chlorpyrifos emitted from treated fields could cause adverse effects, especially to those nearby.

**Environmental Impacts**

The adverse effects of chlorpyrifos are not limited to direct impacts on public health. The chemical is highly toxic to mammals, fish, and aquatic invertebrates. A biological opinion conducted by the Fish and Wildlife Service found that chlorpyrifos is "likely to adversely affect" 97% of species listed under the *Endangered Species Act*.[22] This count includes a "likely to adversely affect" determination for the following endangered species: 39 amphibians, 219 aquatic invertebrates, 91 birds, 188 fish, 87 mammals, 959 plants, 48 reptiles, and 147 terrestrial invertebrates. A 2016 study found that chlorpyrifos results in adverse impacts to pollinators at levels well below its lethal dose.[23] Specifically, the chemical is found to slow learning and memory recall in honey bees, with the study authors noting that these impacts have the ability to threaten the success and survival of pollinators.

**European Union and U.S. States Show that Prohibition Is the Appropriate Response**

Section 408(b)(2)(A)(i) of the *Federal Food Drug and Cosmetics Act* (FFDCA) states that EPA can establish a tolerance for a pesticide chemical residue in or on food only if EPA determines that the tolerance is safe. "Safe" is then defined as a "reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures." In 2016, EPA stated that its revised analysis indicates that "expected residues of chlorpyrifos on most individual food crops exceed the 'reasonable certainty of no harm' safety standard under the *Federal Food, Drug, and Cosmetic Act* (FFDCA)." Additionally, the agency also points out that "risk from the potential aggregate exposure does not meet the FFDCA safety standard." Based on this, and in light of the deleterious impact of chlorpyrifos exposure on children, EPA had no choice other than to eliminate use of the chemical in agriculture.

However, one of the first decisions under the new administration was to reverse course on

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[20] Morgan, M. K., Wilson, N. K., and Chuang, J. C. 2014. Exposures of 129 Preschool Children to Organochlorines, Organophosphates, Pyrethroids, and Acid Herbicides at Their Homes and Daycares in North Carolina. *International Journal of Environmental Research and Public Health*, *11*(4), 3743–3764. doi:10.3390/ijerph110403743

[21] CDPR. 2017. AIR MONITORING NETWORK RESULTS FOR 2016. Environmental Monitoring Branch. Sacramento, CA.

[22] EPA. 2016. EPA Releases Draft Biological Evaluations of Three Chemicals' Impacts on Endangered Species. https://web.archive.org/web/20170120193643/https://www.epa.gov/pesticides/epa-releases-draft-biological-evaluations-three-chemicals-impacts-endangered-species.

[23] Urlacher et al. 2016. Measurements of Chlorpyrifos Levels in Forager Bees and Comparison with Levels that Disrupt Honey Bee Odor-Mediated Learning Under Laboratory Conditions. Journal of Chemical Ecology volume 42, pages127–138.

chlorpyrifos and extend its use.[24] In 2017, shortly before making this decision, then-EPA Administrator Scott Pruitt met privately with the CEO of Dow Chemical, the primary registrant for chlorpyrifos.[25] When asked by the Associated Press to provide details on the agency's decision making process, "Pruitt's office responded with quotes from media releases from trade groups and the U.S. Department of Agriculture attesting to the chemicals usefulness to farmers, but did not offer scientific studies on its safety."[26] Despite further litigation requiring EPA to issue a final decision on the chemical, EPA has kept chlorpyrifos on the market.

EPA's approach can be starkly contrasted with the European Union's decision to stop chlorpyrifos use. After comprehensive reviews from the European Food Safety Authority, "Experts concluded that concerns related to human health exist, in particular in relation to possible genotoxicity and developmental neurotoxicity."[27] Regulators confirmed in a statement that, ". . .concerns for human health have been identified and that safe levels of exposure cannot be determined based on the available data."[28]

In the absence of EPA action, U.S. states have the power to protect their residents from harmful exposure to toxic pesticides. Many states have now accepted that charge and are putting in place prohibitions on the use of chlorpyrifos. In 2018, Hawaii legislators, acknowledging the failure of EPA to protect its residents, passed legislation phasing out chlorpyrifos use.[29] In April 2019, the New York state legislature passed legislation to ban chlorpyrifos within the next two years.[30] Although vetoed by the Governor, the chemical will nonetheless be eliminated from use in New York through a regulatory process mandated by the Governor. In May 2019, California followed suit, using regulatory mechanisms to eliminate the use of the hazardous organophosphate.[31] The state also established an *Alternatives to Chlorpyrifos Working Group* to help ease farmers through a transition period.[32] In this sense, Maryland's chlorpyrifos legislation, which, in addition to prohibiting the pesticide's use , includes provisions to assist farmers in transitioning away from chlorpyrifos, represents the best practice for a state wishing to protect its children, waterways, and wildlife from toxic pesticides.

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[24] Levin, Sam. 2019. Trump Administration won't ban pesticide tied to childhood rain damage. The Guardian. https://www.theguardian.com/us-news/2019/jul/18/epa-chlorpyrifos-ban-children-brain-damage-trump

[25] Associated Press. EPA chief met with Dow CEO before deciding on pesticide ban. https://apnews.com/2350d7be5e24469ab445089bf663cdcb

[26] Ibid

[27] European Commission. 2019. Chlorpyrifos and Chlorpyrifos-methyl. https://ec.europa.eu/food/plant/pesticides/approval_active_substances/chlorpyrifos_chlorpyrifos-methyl_en

[28] Ibid

[29] Kay, Robert, 2018. First in the nation chlorpyrifos ban. http://www.hawaiireporter.com/first-nation-chlorpyrifos-ban/.

[30] Earthjustice. 2019. New York Bans Brain-Damaging Pesticide Chlorpyrifos. https://earthjustice.org/news/press/2019/new-york-bans-brain-damaging-pesticide-chlorpyrifos.

[31] Ibarra, Nick. 2019. https://www.mercurynews.com/2019/05/09/california-moves-to-ban-chlorpyrifos-a-controversial-pesticide-linked-to-developmental-harms/.

[32] CDPR. 2019. Alternatives to Chlorpyrifos Work Group Announced. https://www.cdpr.ca.gov/docs/pressrls/2019/081419.htm.

**Conclusion**

The path is clear for Maryland lawmakers. The science is unequivocal: chlorpyrifos exposures result in developmental delays, low birth weights, and other serious neurological health effects.[33] Chlorpyrifos is an incredibly neurotoxic organophosphate that has no place in modern agriculture, as it poses dangers to pollinators, and endangers wildlife and the wider environment, farmworkers, farm families, especially vulnerable children,[34] and others living near agricultural areas—causing calculable damage to the state and national economy.[35] There are alternatives available for farmers and other users that ensure that there will be no disruption in food production and practices once the chemical is removed, and we are supportive of the legislation providing assistance to farmers in moving to ecological alternatives protective of public health. We believe that given the serious risks involved, Maryland lawmakers must eliminate the public health threat associated with chlorpyrifos use and not delay in passing SB300.

Thank you for your consideration of our testimony.

[33] Venerosi, A et al. 2010. Gestational exposure to the organophosphate chlorpyrifos alters social-emotional behaviour and impairs responsiveness to the serotonin transporter inhibitor fluvoxamine in mice *Psychopharmacology*. 2010 Jan;208(1):99-107.

**[34]** Beamer, PI, et al. 2009 Farmworker children's residential non-dietary exposure estimates from micro-level activity time series. *Environ Int* ;35(8):1202-9.

[35] Harnly, ME, et al. 2009. Pesticides in dust from homes in an agricultural area. *Environ Sci Technol*;43(23):8767-74.

**NationallAquarium_Fredericksson_FAV_SB0300**
Uploaded by: Frederiksson, Ryan
Position: FAV

NATIONAL AQUARIUM®

**Date:** February 11, 2020

**Bill:** SB 300 – Pesticides – Use of Chlorpyrifos - Prohibition

**Position:** Support

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Dear Chairman Pinsky and Members of the Committee:

The National Aquarium respectfully requests a favorable report for **Senate Bill 300, Pesticides – Use of Chlorpyrifos – Prohibition**, which prohibits a person from using chlorpyrifos, a pesticide and a pollutant, in the State of Maryland.

Estuaries, including the Chesapeake Bay, serve as critical breeding grounds and nurseries for important marine species such as blue crabs, oysters, striped bass, sandbar sharks and Atlantic bottlenose dolphins. Yet the very dynamics that make estuaries ideal for marine life—their calm waters and flow from shallow tidal creeks—receive polluted runoff from agricultural fields and are susceptible to higher concentrations of pesticides.

Chlorpyrifos, specifically, is highly toxic to fish, aquatic invertebrates, estuarine and marine organisms, and marine environments, even at low concentrations.[1] It is estimated that Chlorpyrifos harms dozens of endangered species and critical habitats throughout the United States, including the Atlantic sturgeon and the Chesapeake Bay.[2]

Exposure to Chlorpyrifos is likely to jeopardize the continued existence of the Atlantic sturgeon, which is found in the Chesapeake Bay.[3] Similarly, Chlorpyrifos pollutes the Bay by reducing prey species and harming water quality.[4] It has been documented in over 90% of Chesapeake Bay water samples and 100% of fish tissue samples analyzed by the Chesapeake Bay Program.[5] The Chesapeake Bay Program listed Chlorpyrifos among its "top five toxics of concern" in the Bay.

The National Aquarium's mission is to *inspire conservation of the world's aquatic treasures*. By passing SB 300, Maryland will protect vulnerable aquatic species and limit the pollutants harming the Bay. **We urge the Committee to issue a favorable report.**

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[1] US Environmental Protection Agency. (1989). *Registration Standard (Second Round Review) for the Registration of Pesticide Products Containing Chlorpyrifos*. Office of Pesticide Programs, US EPA, Washington, DC.
[2] National Marine Fisheries Service. (2017). *Biological Opinion on the Environmental Protection Agency's Registration of Pesticides containing Chlorpyrifos, Diazinon, and Malathion.* Washington, D.C. http://doi.org/10.7289/V5CJ8BQM
[3] National Marine Fisheries Service. (2017). *Biological Opinion on the Environmental Protection Agency's Registration of Pesticides containing Chlorpyrifos, Diazinon, and Malathion.* Washington, D.C. http://doi.org/10.7289/V5CJ8BQM
[4] National Marine Fisheries Service. (2017). *Biological Opinion on the Environmental Protection Agency's Registration of Pesticides containing Chlorpyrifos, Diazinon, and Malathion.* Washington, D.C. http://doi.org/10.7289/V5CJ8BQM
[5] Chesapeake Bay Program. (2006). *Prioritized Chesapeake Bay Organic Toxics of Concern Method and Assessment*. Annapolis, MD.

**MdPesticideEducationNetwork_Garrettson_FAV_SB0300**
Uploaded by: Garrettson, Lorne
Position: FAV

February 11, 2020
Lorne K Garrettson, MD, FAAP, ACMT

**Re: SB 300– Pesticides –Use of Chlorpyrifos - Prohibition**
**Submitted to:** The Senate Education, Health and Environmental Affairs Committee
**Position:** In support of SB 300

Chairman Pinsky and members of the committee,

**I am a pediatrician, retired, Professor Emeritus of Medicine and Public Health, Emory University. I have been active in the Poison Centers of three states and the national association of poison centers. I have treated childhood poisoning, both acute and chronic and have lobbied for laws making the world safer for children. I am a Board member of the Maryland Pesticide Education Network and am also representing three of my colleagues- national experts in children's health ---Drs. Lynn Goldman, Routt Reigart and Phil Landrigan- you can see their submitted testimonies - their credentials clearly speak for themselves.**

Chlorpyrifos has been shown to be harmful to the brain and intellectual development of children. The Columbia group found that domestic use, documented by blood sampling of mothers and newborns, was associated with loss of IQ and the presence of behavioral disorders including attention disorder, hyperactive disorder or ADHD and autism spectrum disorders or ASD. There have been corroborative studies. This is now settled science in the eyes of the pediatric community. The group at the University of California, studying agricultural use of chlorpyrifos and the infants born in the vicinity of this use, have found an increase in ADHD and ASD among the children and it is related to the proximity that their mothers were to the spraying during gestation.
window sill would lead to lead poisoning and brain deterioration. When we learned this, we removed lead from paint. The safer paint is highly durable, but that took study and work.


When I entered the pediatric field, we had a wonderful antibiotic, chloramphenicol, sold under the trade name of Chloromycetin. It was effective in the case of many serious infections and distributed to parts of the body not accessed by other antibiotics. But, with widespread use, we learned that some patients developed aplastic anemia. This is a lethal disease, treated by bone marrow transplantation in some cases. This was never a common side effect, but a devastating one. We don't use chloramphenicol anymore.

This is both a moral and economic issue. We don't knowingly injury our young. When we find out that we are doing so inadvertently, we stop. We must have the same approach to effective environmental toxins. Serious side effects must end their use.

Others may talk better than I about the economic costs of the developmental problems we are discussing here. But, the costs to our society of behavioral disability and cognitive deficits are staggeringly large. Short term local economic benefits don't hold a candle to the long-range deficits to

our society from cognitive loss. The diseases or conditions caused by chlorpyrifos are ones that limit a child's potential for success in school, society and the workplace. The economic loss to society from diminishing the potential of children is awesome to consider. We must take into account that according to the CDC[6] , the percent of children with an ADHD diagnosis continued to increase, from 7.8% in 2003 to 11.0% in 2011-12. In 2011, 8.8% of US children and 8.9% of children in Maryland had current ADHD. Children with ADHD are also likely to have emotional and behavioral problems and may face many challenges including difficulty with their emotions, learning and behavior. This increases a family's need for medical and mental health service s and increase economic burden. The annual financial and societal costs of ADHD on the juvenile and criminal justice systems are approximately $42.5 billion. A recent CDC finding is that 2% of eight year old children in Baltimore County had autism. This is nearly a doubling in the past 6 years. While multifactorial in cause, toxic exposure is one of the causes of autism and chlorpyrifos has been identified as a contributor. We must not be guilty of perpetrating this loss on the future of our country.

I, my three aforementioned colleagues and my fellow Md Pesticide Education Network board members, urge you to pass SB 300 for the sake of our children. It's time we act.

# CHLORPYRIFOS HARMS Children, Waterways & Wildlife

#BanChlorpyrifos

> *"EPA has no basis to allow continued use of chlorpyrifos, and its insistence in doing so puts all children at risk."*[1]
>
> —AMERICAN ACADEMY OF PEDIATRICS

## *Its time to ban Chlorpyrifos, pass HB 229 / SB 300*

**Chlorpyrifos** is a toxic, nerve agent pesticide that has been found to damage children's brain development, contaminate waterways and injure wildlife.

After years of study, the U.S. Environmental Protection Agency concluded that **all uses of chlorpyrifos result in unsafe levels of exposure** and was set to ban it. **Unfortunately, the Trump Administration reversed that decision, putting Marylanders' health and our environment at great risk.**

**MARYLAND MUST PROTECT MARYLAND—OUR CHILDREN'S HEALTH CANNOT WAIT.**

**It's time to BAN CHLORPYRIFOS!**

## HARM TO CHILDREN

Children have a high risk of exposure in utero or during critical periods of growth.

Chlorpyrifos is linked to **autism, ADHD** and **other neurodevelopmental issues.**[2]

**Exposure is associated with adverse birth and developmental outcomes**, including preterm birth, low birth weight, congenital abnormalities, pediatric cancers, neurobehavioral and cognitive deficits, asthma and permanent neurological damage.[3]

Children ages 1–2 can be exposed to levels that are

**140** TIMES WHAT EPA HAD PREVIOUSLY DEEMED "SAFE."[4]

Widely applied in the production of fruits, vegetables, nuts and other conventionally grown crops, including many kid favorites like apples, peaches, grapes and strawberries.[5]

## HARM TO FARM WORKERS AND FARM COMMUNITIES

Pesticide drift continues at toxic levels

**300**

**FEET FROM THE FIELD'S EDGE.**[6]

All workers who mix and apply chlorpyrifos are exposed to elevated levels **even with maximum personal protective equipment and engineering controls.**[7]

Just a month after EPA reversed the decision to ban chlorpyrifos, **it poisoned a dozen farm workers in California.**[8] Chlorpyrifos is found at unsafe levels in the air at schools, homes and communities in agricultural areas.[9]

## HARM TO BAY AND AQUATIC LIFE

A Chesapeake Bay Program report found that chlorpyrifos ranks among the

**TOP 5**

**INDIVIDUAL TOXINS OF CONCERN.**[10]

**Atlantic sturgeon,** which are listed as **endangered**, are also at high risk of harm from exposure to chlorpyrifos.[11]

**Chlorpyrifos toxicology studies** suggest behavioral, reproductive and endocrine **disruption to all aquatic arthropods**, such as crabs, especially those in close proximity to chlorpyrifos runoff.[12]

## HARM TO BEES AND OTHER POLLINATORS

Second only to neonicotinoids as the **most harmful pesticide to bees.**[13]

Causes **colony threatening brain damage to honeybees,** even at sub-lethal concentrations.[14]


**SOURCES**

1 American Academy of Pediatrics: https://cdn2.ewg.org/sites/default/files/testimony/AAP%20EWG%20Chlorpyrifos%20Letter.pdf?_ga=2.149776118.1360151206.1544124802-2112824852.1543353251

2 Environmental Protection Agency. Chlorpyrifos Revised Human Health Risk Assessment (2016): https://www.regulations.gov/document?D=E-PA-HQ-OPP-2015-0653-0454

3 Fernando Stein, President, American Academy of Pediatrics: https://www.nytimes.com/2017/11/01/opinion/pesticide-epa.html?_r=0

4 Environmental Protection Agency. Chlorpyrifos Revised Human Health Risk Assessment (2016): https://www.regulations.gov/document?D=E-PA-HQ-OPP-2015-0653-0454

5 American Bird Conservancy: https://abcbirds.org/dangerous-chemical-ban/

6 United Farm Workers: https://ufw.org/epa-refuses-ban-pesticide-linked-poisonings-damage-childrens-brains/

7 Natural Resources Defense Council: https://www.nrdc.org/sites/default/files/epa-proposal-on-clorpyrifos-tolerence-comments-20170117.pdf

8 "Trump's EPA Greenlights a Nasty Chemical. A Month Later, It Poisons a Bunch of Farmworkers." Tom Philpott, Mother Jones: https://www.motherjones.com/environment/2017/05/california-farm-workers-just-got-poisoned-nasty-pesticide-greenlghted-trump/

9 Environmental Protection Agency: https://www.epa.gov/pesticides/updated-human-health-risk-analyses-chlorpyrifos

10 Chesapeake Bay Program. https://www.chesapeakebay.net/documents/Prioritized_Chesapeake_Bay_Organic_Toxics_of_Concern_Method_and_Assessment_2006.pdf

11 National Marine Fisheries Service: https://repository.library.noaa.gov/view/noaa/16997

12 Edward Odenkirchen, The American University, and Ronald Eisler, U.S. Fish and Wildlife Service: https://www.pwrc.usgs.gov/eisler/CHR_13_Chlorpyrifos.pdf

13 Pesticide Residues and Bees – A Risk Assessment", Sanchez-Bayo and Goka, PLOS ONE, 2014: https://doi.org/10.1371/journal.pone.0094482

14 Measurements of Chlorpyrifos Levels in Forager Bees and Comparison with Levels that Disrupt Honey Bee Odor-Mediated Learning Under Laboratory Conditions", Journal of Chemical Ecology, 2016. See https://phys.org/news/2016-03-bees-dumb-ingesting-tiny-doses.html


SMART on PESTICIDES maryland

*For Safe Water & Healthy Kids*

The Smart on Pesticides Maryland coalition, spearheaded by the Maryland Pesticide Education Network, works to protect Marylanders and the natural systems we depend upon from the toxic impacts of pesticides. The coalition includes more than 100 organizations, and institutions representing communities, businesses, health care providers, farmers, environmentalists, waterkeepers, interfaith congregants as well as environmental justice, public health and wildlife advocates.

**SIGN UP TO RECEIVE LEGISLATIVE UPDATES AT SmartOnPesticides.org**

# *It's Time to*
# BAN CHLORPYRIFOS
## in Maryland (HB 229/SB 300)

### *THIS BAN WOULD PROHIBIT THE USE OF CHLORPYRIFOS*

It would also ban other insecticides containing chlorpyrifos in the state. Numerous alternatives exist: farmers, golf courses and land care professionals are not prohibited from using other pesticides and insecticides.

**Maryland must protect Maryland—our children's health cannot wait.**

**IT'S TIME TO BAN CHLORPYRIFOS.**

**VOTE YES HB 229/SB 300**

**Chlorpyrifos (chlor·pyr·i·fos) is a toxic, nerve agent pesticide that has been found to damage children's brain development, contaminate waterways and injure wildlife.**

Chlorpyrifos is found in the air and water—and in people's bodies. It is widely used in the production of fruits, vegetables, nuts and other conventionally grown crops, including many kid favorites like apples, peaches, grapes and strawberries. Human exposure takes place when people consume contaminated food and drinking water, touch treated surfaces or breathe the air near treated fields. This volatile chemical can also be brought home from golf courses and farm fields through residues on clothing.

After extensive study, **EPA scientists confirmed that all uses of chlorpyrifos result in unsafe levels of exposure and recommended that the pesticide be banned**. The agency cited the high risk of children's exposure in utero or during critical periods of growth and to the link between chlorpyrifos exposure and autism, childhood cancers, ADHD and other neurodevelopmental issues.

Unfortunately, the Trump Administration overrode the recommendations of EPA's own scientists to ban the use of chlorpyrifos. **There was no scientific basis for this decision—it was a blatant political move to satisfy the chemical industry.** See detailed timeline on reverse.

Banning chlorpyrifos in Maryland would protect our residents—particularly babies, children, pregnant women and farmworkers. It would also protect the Chesapeake Bay and wildlife. Taking action at the state level would save us from having to wait for the EPA, while they continue to delay and battle the issue in court. Many safe and effective alternatives exist for all Maryland pests, including the spotted lanternfly.

### Chlorpyrifos is linked to:

- Preterm birth
- Low birth weight
- Congenital abnormalities
- Pediatric cancers
- Neurobehavioral and cognitive deficits
- Asthma
- Permanent neurological damage
- Toxic effects to the Chesapeake Bay, aquatic life, bees and other pollinators and 97% of all federally endangered or threatened species, including over 100 bird species.

# TIMELINE OF ACTION ON CHLORPYRIFOS

**2000**

Dow Chemical and other manufacturers stop home uses of chlorpyrifos due to children's risk.

**DECEMBER 2014**

EPA's *Revised Human Health Risk Assessment for Chlorpyrifos* acknowledges extensive body of peer-reviewed science correlating chlorpyrifos exposure with brain damage in children, even at low exposure.

**NOVEMBER 2015**

EPA proposes to ban chlorpyrifos for agricultural uses.

**NOVEMBER 2016**

EPA releases second revised human health risk assessment with additional scientific data and reaffirms that chlorpyrifos should be banned for agricultural uses.

**MARCH 29 2017**

In a reversal, the new EPA Administrator Scott Pruitt announces the agency will not finalize the chlorpyrifos ban.

**AUGUST 9 2018**

The 9th Circuit Court of Appeals rules against EPA's decision to overturn the proposed chlorpyrifos ban and directs the agency to cancel all registrations for chlorpyrifos within 60 days.

**SEPTEMBER 24 2018**

Trump Administration files appeal of the Court's decision.

**APRIL 19 2019**

After a rehearing, the 9th Circuit Court of Appeals resolves the EPA has 90 days to decide whether to allow the usage of chlorpyrifos.

**JULY 18 2019**

The EPA announces it will not ban chlorpyrifos.

**AUGUST 7 2019**

Maryland joins six other states in suing the EPA and its administrator for not banning chlorpyrifos. Since then, more states have continued to join the suit.

SMART on PESTICIDES maryland
*For Safe Water & Healthy Kids*

The Smart on Pesticides Maryland coalition, spearheaded by the Maryland Pesticide Education Network, works to protect Marylanders and the natural systems we depend upon from the toxic impacts of pesticides. The coalition includes more than 100 organizations, and institutions representing communities, businesses, health care providers, farmers, environmentalists, waterkeepers, interfaith congregants as well as environmental justice, public health and wildlife advocates.

SMARTONPESTICIDES.ORG

SMART on PESTICIDES maryland

Website: www.smartonpesticides.org
Facebook: http://on.fb.me/Ut6rrX
Twitter: @PesticidesSmart #pesticidedata

February 11, 2020

**Re: SB 300– Pesticides –Use of Chlorpyrifos - Prohibition**
**Submitted to:** The Senate Education, Health and Environmental Affairs Committee
**Position:** In support of SB 300

Chairman Pinsky and members of the committee,

**Submitted by:** Ruth Berlin, Executive Director of the Maryland Pesticide Education Network on behalf of the Smart on Pesticides Coalition. mpnberlin@gmail.com; 410.849.3909 ext. 1

The Smart on Pesticides Maryland (MD) coalition, facilitated by the Maryland Pesticide Education Network, works to protect Marylanders and the natural systems we depend upon from the adverse impacts of pesticides. The coalition includes 104 organizations and institutions representing health care associations, communities, businesses, health care providers, farmers, environmentalists, waterkeepers, interfaith congregants as well as environmental justice, public health and wildlife advocates.

> ***"This chemical [chlorpyrifos] is unambiguously dangerous and should be banned from use. We urge the E.P.A. to reverse its decision and protect child health."***
> *– Fernando Stein, M.D., President of the American Academy of Pediatrics, NYT 11/1/2017*

Prior to the current federal administration, the US EPA was poised to implement a national ban on chlorpyrifos. EPA scientists had determined, after a 20-year risk assessment process, that harm to pregnant women and young children from chlorpyrifos – *at any detectable level of exposure* was an unacceptable risk. However, the US EPA refused to enact the ban. This led Maryland and other states, to sue in federal court. Eventually the full 9th Circuit Court of Appeals upheld its previous 3-judge panel ruling that EPA must issue a final ruling on whether to ban chlorpyrifos, stating in August 2018 that there was *"no justification for the EPA's decision… in the face of scientific evidence that its residue on food causes neurodevelopmental damage to children*. On July 18, 2019, the EPA responded, stating it will not ban chlorpyrifos. Several states, including Maryland, are suing the EPA on the agency's continued reversal. US EPA under the current administration, will likely continue its efforts to stall the process and will likely appeal to the Supreme Court potentially tying up the case for years to come.

Chlorpyrifos is a toxic, nerve agent pesticide also known to harm the environment and wildlife. It is found in air and water—and people's bodies. People come in contact with the chemical through residues on food, drinking water contamination and toxic drift from pesticide application. Negative effects include lower birth weight, developmental disorders including learning disabilities, attention and memory deficits, motor delays and behavioral issues. In addition, poorer perceptual reasoning, working memory, and intellectual development have been documented.

Farmworkers and rural communities are also disproportionately affected by chlorpyrifos from use in the fields as well as toxic drift from application sites. Exposure of field workers can result in tremors, nausea, dizziness and, in extreme cases, death. Prenatal exposure from living in close proximity to agriculture fields is associated with

autism spectrum disorders (Shelton et al., 2014[1];). Recent research on children living near treated farms found memory impairment, oppositional disorders, ADHD decreased ability to discriminate colors, and an increased prevalence of cognitive problems in the parents (van Wendel de Joode et al 2016[2]).

**Maryland's children are at continued risk. Given the failure on the federal level to protect our children and farmworkers, Maryland must act to protect Maryland's children, pregnant women, farmers and farmworkers now. Any continued use of chlorpyrifos in our state will allow for life-long adverse health impacts for our children.**

**Autism Spectrum Disorders Statistics of Note:**. In 2019 the CDC reported that current median national autism rates are **1 out of every 40 children**[3] If that isn't already alarming enough, Maryland has been noted as having the second highest rate in the country[4]

In a Centers for Disease Control and Prevention study, published in 2018, scientists found that, 6.1 million children aged 2-17 years living in the U.S. had been diagnosed with attention-deficit/hyperactivity disorder (ADHD)[5]

**WHY THE US EPA PLANNED TO BAN ALL USES OF CHLORPYRIFOS**

**It should be noted that health risks of chlorpyrifos have been raised by US EPA for past two decades**

**2000:** In response to US EPA research-based concerns *20 years ago*, regarding the adverse impacts of chlorpyrifos, in the year 2000, Dow and other manufacturers of chlorpyrifos reached an agreement with the EPA to voluntarily restrict the use of chlorpyrifos in places where children may be exposed, including inside homes, schools and day care centers. At that time, the agency also banned its use on some crops, such as tomatoes, and limited its use on other crops, including apples, grapes and citrus. The EPA also banned its use in certain areas near residential and public spaces.

**2015:** - In November of 2015, after continued and extensive study, U.S. EPA scientists confirmed that there is no detectable level of chlorpyrifos for dietary exposure that can be considered safe and recommended that the pesticide be banned for all uses. At that time the agency determined that all food uses of chlorpyrifos should be stopped due to the high risk of children's exposure *in utero* or during critical periods of growth and to the link between chlorpyrifos exposure and autism, ADHD and other neurodevelopmental issues. [6]

**EPA'S 2015 SCIENTIFIC FINDINGS**

In November 2015**, the EPA's revised human health risk assessment for chlorpyrifos** [7] found that:

- All food exposures exceed safe levels, with children ages 1–2 exposed to levels of chlorpyrifos that are **140 times what EPA deems safe**.
- There is **no safe level** of chlorpyrifos in drinking water.
- Pesticide drift continues at unsafe levels 300 feet from the field's edge.
- Chlorpyrifos is found at unsafe levels in the air at schools, homes, and communities in agricultural areas.
- All workers who mix and apply chlorpyrifos are exposed to unsafe levels of the pesticide **even with maximum personal protective equipment** and engineering controls.

[1] https://ehp.niehs.nih.gov/1307044/
[2] https://www.sciencedirect.com/science/article/pii/S0010945216302350
[3] https://pediatrics.aappublications.org/content/142/6/e20174161
[4] https://www.cdc.gov/nchs/products/databriefs/db291.htm
[5] https://www.tandfonline.com/doi/full/10.1080/15374416.2017.1417860
[6] https://www.regulations.gov/document?D=EPA-HQ-OPP-2015-0653-0454
[7] https://www.epa.gov/pesticides/updated-human-health-risk-analyses-chlorpyrifos

- Field workers are allowed to re-enter fields within 1–5 days after pesticide spraying, but unsafe exposures continue on average 18 days after applications.

**THE VERACITY OF EPA'S RISK ASSESSMENT OF CHLORPYRIFOS**

**You may hear opponents of SB 300 question the scientific basis of EPA's risk assessment**, **claiming that** 1) EPAs Science Advisory Panel (SAP) concluded that there was insufficient evidence for a ban and also claiming that 2) one of three significant epidemiological studies conducted at Columbia University could not be replicated by the other two studies.

1) **EPA submitted its analysis to EPA's Science Advisory Panels (SAP) on multiple occasions beginning in 2008, and each time, the SAP confirmed EPA's conclusion that early life exposures to chlorpyrifos pose a risk of long-lasting, adverse cognitive, behavioral, and motor impairments. And both EPA and the SAP found that the exposures associated with serious damage to children's brains were far below the regulatory endpoint used by EPA in its 2001 and 2006 re-registration determinations, and in establishing the chlorpyrifos tolerances currently in effect.**

As early as 2000, EPA noted that, "Results of multiple studies have consistently shown that the developing brain is susceptible to chlorpyrifos treatment."(EPA, Human Health Risk Assessment: Chlorpyrifos, June 8, 2000), The SAP convened in 2008, found that laboratory studies show that "gestational or early postnatal exposures can lead to neurochemical and behavioral alterations that persist into adulthood," including long-term neurobehavioral changes in motor and cognitive behaviors. (2008 SAP Report)

2) The SAP also found the Columbia study the most sound and appropriate for use in assessing developmental toxicity of chlorpyrifos, citing "chlorpyrifos is likely associated with adverse neurodevelopmental outcomes." Finally, SAP panel members noted that the exposures in the Columbia study were below EPA's regulatory endpoint and of concern in light of evidence demonstrating that low levels of exposure to toxicants like lead, mercury, and PCBs are now known to produce significant adverse effects when they were previously thought to be harmful only at high levels.[8]

**There were small differences between the Columbia and Mount Sinai studies given they were conducted by different groups of scientists in different populations, using somewhat different protocols. The** Columbia University study measured amount of chlorpyrifos in umbilical cord blood whereas a Mt. Sinai study used metabolites in urine that are specific to organophosphates. Chlorpyrifos is an organophosphate. Substantial amount of experimental data supports the Columbia University findings**. The bottom-line findings were powerfully similar**, as described in an editorial by senior scientists from the National Institute of Environmental Health Sciences[9]**. The basic conclusion of both studies was essentially the same, that chlorpyrifos is associated with adverse neurodevelopmental outcomes.**

**In 2012, EPA convened its SAP to review EPA's more comprehensive analysis of the neurotoxicity of chlorpyrifos.** In its report, the SAP noted significant, long-term adverse effects on neurobehavioral development from chlorpyrifos in laboratory animal studies. It found that the epidemiology "studies show some consistent associations relating exposure measures to abnormal reflexes in the newborn, pervasive development disorder at 24 or 36 months, mental development at 7-9 years, and attention and behavior problems at 3 and 5 years of age.") **The Panel concurred with EPA and the 2008 SAP that "chlorpyrifos likely plays a role in impacting the neurodevelopmental outcomes examined in the three cohort studies**.
(https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0040-0029)

[8] https://www.regulations.gov/document?D=EPA-HQ-OPP-2008-0274-0064

[9]https://www.researchgate.net/publication/51538799_Strength_in_Numbers_Three_Separate_Studies_Link_in_Utero_Organophosphate_Pesticide_Exposure_and_Cognitive_Development

**In December 2014, EPA released its *Revised Human Health Risk Assessment* *for Chlorpyrifos ("2014 RHHRA")* and acknowledged the strong convergence in the findings from the animal studies and the three mother-child cohort studies**. It found that the laboratory animal studies indicated "that gestational and/or postnatal exposure may cause persistent behavioral effects into adulthood ...upon review of the published literature a pattern of neurodevelopmental adverse outcomes emerges." It called the cohort studies **strong studies which support a conclusion that chlorpyrifos causes long-lasting damage to children's brains** at exposures lower than EPA's regulatory endpoint. The 2014 risk assessment also documented unsafe chlorpyrifos exposures from drinking water contamination[10].

**2015: EPA proposed to revoke all chlorpyrifos tolerances** based on these findings (Nov. 6, 2015). In the proposed revocation rule, **EPA explicitly and repeatedly found chlorpyrifos unsafe.**

EPA recognized that its 2014 risk assessment and 2015 proposed tolerance revocation did not address the greatest risks and most sensitive endpoint, as EPA policy requires and therefore, continued to explore ways to establish an exposure limit that would protect children from neurodevelopmental harm. Each method it explored revealed more serious risks from chlorpyrifos than the 2014 risk assessment.

**In November 2016,** EPA released its second revised human health risk assessment using a regulatory endpoint designed to guard against damage to children's brains**. That risk assessment found unsafe exposures from every way that people come into contact with chlorpyrifos—**on food, in drinking water, through pesticide drift, and from applying the pesticide or working in fields that had recently been sprayed. **EPA indicated it had found no chlorpyrifos uses that meet the FFDCA safety standard and all chlorpyrifos tolerances would need to be revoked.[11]**

## EPA DETERMINED CHLORPYRIFOS ALSO ADVERSELY IMPACTS WILDLIFE

**2017:** In January 2017 the EPA released its first rigorous nationwide analysis of the effects of pesticides on endangered species, finding that **97 percent of the more than 1,800 animals and plants protected under the Endangered Species Act are likely to be harmed by** malathion and **chlorpyrifos**, including more than 100 listed bird species, fish, aquatic invertebrates, insects and crustaceans.

## CHLORPYRIFOS AND POLLINATORS

Independent research underscores Chlorpyrifos also harms pollinators. According to a 2014 study, Chlorpyrifos is second only to neonicotinoids[12] as a risk to bees (third highest total, after two different types of neonics). Another 2014 study found that chlorpyrifos at hive-residue levels more than doubled larval mortality compared to untreated larvae [Zhu et al., 2014]. A ground-breaking peer-reviewed field study showed that not only does chlorpyrifos cause colony threatening brain damage to honeybees, but it does so at the sub-lethal concentrations found in the majority of fields sprayed as directed by the manufacturer [Urlacher et al., 2016]. A 2014 study listed chlorpyrifos among the top five pesticides considered the highest risk to bees [Sanchez-Bayo and Goka, 2014]. Chlorpyrifos can damage the learning and memory of bees that are exposed.

## CHLORPYRIFOS AND THE CHESAPEAKE BAY

A Chesapeake Bay Program report found[13] chlorpyrifos in 90 percent of Bay water samples analyzed for this chemical, and 40 percent of those had concentrations that exceeded thresholds indicating possible ecological effects. The report found that chlorpyrifos ranks among the "top five individual toxics of concern."In 2018, the National Marine Fisheries Service reported[14] that adult and juvenile Atlantic sturgeon, which are listed as

[10] Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review; Dec. 29, 2014 ; EPA- HQ-OPP-2008-0850-0195
[11] Revised Human Health Risk Assessment for Registration Review; Nov. 3, 2016; EPA- HQ-OPP-2015-0653-0454
[12] https://bit.ly/2smjenY
[13] https://bit.ly/2RoiPk3
[14] https://repository.library.noaa.gov/view/noaa/16997

endangered, are at a high risk from exposure to chlorpyrifos because concentrations of the chemical would reduce their abundance and spawning productivity.
Chlorpyrifos toxicology studies suggest behavioral, reproductive and endocrine disruption to all aquatic arthropods, especially those in close proximity to chlorpyrifos runoff[15] [16] [17] [18] [19]

**ALTERNATIVES TO CHLORPYRIFOS**

Extensive scientific data is available on alternatives to chlorpyrifos for treating pests such as blue grass weevil on golf courses or peach tree borer on orchards. Chlorpyrifos is not needed to address the invasive spotted lanternfly. Detailed information in a report separately submited today regarding specific products that can replace chlorpyrifos for specific Maryland-grown crops comes from resources including:

- **IPM Institute of North America**, Specialty Crop Grower Services - www.ipminstitute.org, www.pesticiderisk.org
- **Rutgers University, The IR-4 Project** - fifty years of successful research into sustainable crop protection in specialty crops and off-label uses, http://ir4.rutgers.edu/index.html
- **Pesticide Research Institute** – provides research, analysis, technical services, expert consulting on chemistry and toxicology of pesticides - www.pesticideresearch.com
- **PRI Pesticide Product Evaluator** - an online tool providing information for over 18,000 pesticide products, http://pesticideresearch.com/site/evaluator/

**MARYLAND CITIZENS ARE CONCERNED**

There is widespread and growing support among Marylanders for banning chlorpyrifos. In a 2017 OpinionWorks poll, three-quarters of voters (74 percent) favored banning this pesticide in Maryland .

This ban must come from the state legislature as the only way to ensure banning this damaging pesticide. Maryland regulators are not equipped to develop and defend a regulation banning chlorpyrifos.

**We cannot rely on the federal government to protect our children, grandchildren, farmer families, farmworkers and aquatic and wild life from the dangerous and damaging impacts of chlorpyrifos. We urge this committee to pass a favorable report on SB 300 to address this urgent issue.**

[15] http://npic.orst.edu/RMPP/rmpp_main2a.pdf
[16] https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-059101_1-Jul-06.pdf
[17] https://www.ncbi.nlm.nih.gov/pubmed/7531775
[18] https://www.pwrc.usgs.gov/eisler/CHR_13_Chlorpyrifos.pdf
[19] https://link.springer.com/article/10.1007/s002449900299

SMART on PESTICIDES maryland

# THE SMART ON PESTICIDES COALITION MEMBERS

**(105 members and still growing)**

A.I.R Lawncare and Landscaping Services
Alliance of Nurses for a Healthy Environment
American Academy of Pediatrics–Md. Chapter
American Public Health Association–Md. Chapter
Anacostia Watershed Society
Annapolis Green
Anne Arundel Beekeepers Association
Assateague Coastal Trust
Audubon Maryland - DC
Audubon Naturalist Society
Baltimore Backyard Beekeepers Network
Baltimore Bird Club
Beyond Pesticides
Big City Farms
Bowie-Upper Marlboro Beekeepers Association
CATA, Farmworker Support Committee
Carroll County Beekeepers Association
Cecil Bird Club
Center for Food Safety
Central Maryland Beekeepers Association
Central Md. Ecumenical Council/Ecumenical Leaders Group
Charm City Meadworks
Chesapeake BaySavers
Chesapeake Physicians for Social Responsibility
Children's Environmental Health Network
Clean Bread and Cheese Creek
Clean Water Action
Common Market Co-Op
Conservation Community Consultants
Cottingham Farm
Crossroads Community Food Network
Earth Coalition
Earthjustice
Eastern Shore Food Hub
Environment Maryland
Fair Farms
F&D and Charles Smith Apiaries
Farmworker Justice
Food and Water Watch
Fox Haven Farm and Learning Center
Frederick Co. Beekeepers Association
Friends of Briers Mill Run
Friends of Lower Beaverdam Creek
Friends of Quincy Run
Friends of the Earth
Greenbelt Forest Preserve Butterfly Brigade
Hampden Community Council
Hereford Bed and Biscuit
HoneyFlower Foods
Howard County Beekeepers Association
Howard County Bird Club
Interfaith Partners of the Chesapeake
Interfaith Power & Light
Johns Hopkins Center for a Livable Future
Karma.Farm
KW Landscaping
Latino Farmers & Ranchers Assoc.–Md. Chapter
League of Women Voters of Maryland
Learning Disabilities Association–Md. Chapter
Lower Susquehanna Riverkeeper
Maryland Autism Project
Maryland Bass Nation
Maryland Conservation Council
Maryland Ethical Cannabis Association
Maryland League of Conservation Voters
Maryland Nurses Association
Maryland Organic Food and Farming Association
Maryland Ornithological Society
Maryland Pesticide Education Network
Maryland Public Interest Research Group
Maryland United for Peace and Justice
Maryland Votes for Animals
McDaniel Honey Farm
Migrant Clinicians Network
Moms Clean Air Force
MOM'S Organic Market
Montgomery Countryside Alliance
National Aquarium
National Resources Defense Council
Organic Consumers Association
Pearlstone Conference Center
Pesticide Action Network–North America
Potomac Riverkeeper
Queen Anne's Conservation Association
Rachel Carson Council
Red Top Farm
Rodale Institute
Rousedale Farm
Ruscombe Community Health Center
SafeGrow Montgomery
Safe Minds
Safe Skies Maryland
Sierra Club–Maryland Chapter
Spa Creek Conservancy
The Flower Factory
Towson Estates Association
Trout Unlimited
Washington County Beekeepers Association
Waterkeepers Chesapeake
Westport Farmers Market
Westport Neighborhood Association
Wicomico Environmental Trust

Maryland Pesticide Education Network

# EVALUATING HEALTH & ENVIRONMENTAL SCIENCE

## A Guide for Legislators

*Scientific evidence is the underpinning for policy decisions regarding health. This checklist offers guidance for legislators listening to and assessing scientific testimony and scientific arguments on these often difficult questions, as well as help in questioning witnesses during a hearing.*

## 1. What is the purpose, and what is the source of the research being presented?

The goal of a study may influence the outcomes. For instance, studies that a manufacturer must undertake to submit a chemical or drug for federal registration are different from studies performed by independent scientists seeking to understand impacts of chemicals on humans, animals, or the ecosystem.

*What you need to know:* Are government findings based on industry-provided research? Are they based on a review of all available sources?

*Example:* In the debate of e-cigarette / vapor product regulation, research reports by the FDA's Division of Pharmaceutical Research was very credible because it reflected totally independent testing.

## 2. Have the studies been peer-reviewed?

Independent scientific research is subject to review by a panel of "peers"; these are other scientists with no stake in the findings and no conflicts of interest. Peer review ensures accuracy in methodology and statistical significance, as well as proper interpretation of the results. When a study passes peer review, it is usually published in a scientific journal, such as Environmental Health Perspectives or the Journal of the American Medical Association. This is a transparent process, ensuring that rigorous standards are upheld.

*What you need to know:* Are the studies being cited peer reviewed? If not, consider the source. Blogs and newspaper articles are not peer-reviewed materials, but may link back to a peer-reviewed source.

**Peer Reviewed**

A panel of independent experts in the same scientific field, who have no connection to the study and no conflicts of interest, have reviewed it and judged it to be valid and worthy of publication.

## 3. How certain is "certain enough" to act?

Scientists examine facts and complex information and then look for a preponderance of evidence. While scientists routinely disclose elements of uncertainty in their research, they form their conclusions based on the weight of the evidence.

*What you need to know:* Is there sufficient evidence regarding possible harms that warrants taking action? Is there sufficient evidence of safety to justify inaction?

*Example:* Based on the preponderance of evidence of likely harm, we passed seat belt laws and prevented children from drinking alcohol.

## 4. Are the scientists being too cautious?

Scientists are conservative regarding "certainty." They use a "95% confidence test" in order to conclude that two observations that happen together are more than accidental and probably causal. When it comes to taking action,

however, public and environmental health experts recommend action based on sufficient scientific evidence to warrant concern and not on a specific percentage.

*What you need to know:* What are the risks and what could be the harm if we wait for more research to be conducted before taking action?

*Example:* Laws limiting human exposure to DDT, lead, tobacco and alcohol were all passed long before a 95% confidence test was met. These laws were based on a preponderance of evidence rather than 95% certainty.

**Weight of the Evidence**

This term refers to a judgment in the scientific community that most studies to date confirm a particular conclusion. Scientists are always open to new findings, so they may avoid using terms like "certainty", "100%" or "we are sure."

## 5. Are the findings influenced by funding source, trade secrets, or suppression of data?

The design of a scientific study may be influenced by the source of its funding. This has been well documented by independent observers. It is therefore reasonable and prudent for legislators to ask all scientists and those who cite scientific research about their sources of funding.

*What you need to know:* What are the sources of funding for the work being cited? Were any data omitted due to trade secret protections or similar reasons?

*Example:* 1) The source of funding for a study can influence important findings or cause contrary results to be omitted from the study's report. 2) Important data that an industry provides to a federal agency before marketing will not be in the public domain and may not have been subjected to peer review.

## 6. Has anyone addressed the economic harm associated with inaction?

Policy-makers must weigh not only the cost of taking action but also the cost of inaction. Science offers insight into the costs of inaction.

*What You Need to Know:* What public and private costs may be incurred if we do not take action on this proposed policy?

*Example:* A 2015 peer reviewed study estimated the costs to the EU of human exposure to endocrine disruptors at $209 billion annually in medical care and lost productivity. *(Trasande et al J Clin Endocrinol Metab. 2015 Apr; 100(4): 1245–1255.)*

*Note:* The fiscal note on a bill will not typically assess the costs of inaction. It addresses only the costs of adopting the policy, and usually only the costs to government.

## 7. Have long term effects been assessed?

Early life exposures can create high risks in later life. An example is the link between lead poisoning and long-term harms to children, or between tobacco and cancer. Over time, human exposures to multiple chemicals will have interactive effects that may be quite different from the effects of a single chemical.

*What you need to know:* Does the science presented also address the long-term effects of exposure? If not, is that because the research does not exist?

*Note:* Federal agency review does not establish absolute safety. The US EPA registers chemicals based on "reasonable certainty of no harm" and has yet to address the synergistic effects of chemicals in real life, such as interactions with other chemicals in the environment, medications, and illness.

**CentralMarylandBeekeepersAssoc_Goembel_FAV_SB0300**
Uploaded by: Goembel, Luke
Position: FAV

Dr. Luke Goembel, Ph.D.
Scientist | Beekeeper

# In Support of: SB 300: Pesticides – Use of Chlorpyrifos - Prohibition
## Submitted to: the Senate Education, Health & Environmental Affairs Committee
## February 11, 2020

As a scientist/beekeeper, I support SB 300. I received a Ph.D. in chemistry from The Johns Hopkins University in 1992 and received a National Academy of Sciences award for Post-doctoral study at NASA in 1994. I have worked professionally as a chemist since 1982, and have authored and reviewed scientific papers for three decades. I have also been a beekeeper since 2009 and have experienced bee losses due to legal pesticide use, which lead to my study of the issue. I am vice president of the Central Maryland Beekeepers Association, have published articles in *American Bee Journal*, have been a panelist at a Congressional Briefing on the effect of pesticides on bees, and have spoken at the White House Council on Environmental Quality. I receive not one cent from either side on the issue of pollinators and pesticides.

**THE SCIENCE of CHLORPYRIFOS and BEES**

Chlorpyrifos harms pollinators. The EPA considers it "highly toxic to bees." Chlorpyrifos is the **third most prevalent and abundant pesticide detected in the hive and is among the top five pesticides of highest risk to bees** [Sanchez-Bayo and Goka, 2014]. Chlorpyrifos at hive-residue levels more than **doubles larval mortality compared to larvae not exposed to chlorpyrifos** [Zhu et al., 2014]. Another study **confirms of the ill effect** of chlorpyrifos on larval bees [Gregorc & Ellis, 2011]. Sublethal exposure of larvae to chlorpyrifos also **reduces queen emergence, with grave consequences for colony survival** [Degrandi-Hoffman et al. 2013].

Chlorpyrifos, when used as directed, is harming adult bees as well. In 2016 a ground-breaking peer-reviewed field study showed that not only does chlorpyrifos **cause colony threatening brain damage to honeybees**, it does so at the sub-lethal **concentrations found in the majority of fields sprayed as directed by the manufacturer** [Urlacher et al., 2016]. Learning and memory are of utmost importance for the behavior of foraging bees, and their impairment may result in negative consequences for colony health and survival [Henry et al., 2012]. A 2013 study noted that adult bees exposed to a sub-lethal dose of chlorpyrifos exhibited altered behaviors: less walking; more difficulty righting themselves; and unusual abdominal spasms [Williamson et al., 2013]. A three-year field study concluded just this year found **17% of pollen samples contained doses of chlorpyrifos higher than that required to cause sublethal effects on bees**, and concluded that **the prevalence of chlopyrifos in pollen is "of great concern for the health status of honey bees and other pollinators"** [Tosi, et al., 2018].

Especially troubling is the fact that current **EPA risk-assessment and regulation of chlorpyrifos does not address sub-lethal effects** [U.S. EPA, 2016]. In fact, current regulation does not even address lethal effects (the dose that kills bees immediately, LD50). A 1986 study found that exposure to chlorpyrifos-treated foliage induces **significant mortality for up to 7 days after chlorpyrifos is applied to a crop** [Lunden et al., 1986]. **Since chlorpyrifos is illegal to apply only if bees are present at the time of application** [EPA approved label, 2018], and it's ability to kill bees (LD50) persists for days, **chlorpyrifos likely kills bees outright, possibly on a large scale, with EPA approval.**

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## PEER REVIEWED RESEARCH

***Excerpts from recent research on the health impacts of chlorpyrifos on Pollinators. References appear in the order of citation.***

### Pesticide Residues and Bees – A Risk Assessment.

Sanchez-Bayo F, Goka K (2014). PLoS ONE 9(4): e94482. https://doi.org/10.1371/journal.pone.0094482

**Peer-reviewed research proves chlorpyifos to be one of the top five pesticides of highest risk to bees, second only to neonicotinoids:**

" … the large number of pesticide residues found in pollen and honey demand a thorough evaluation of all residual compounds so as to identify those of highest risk to bees. … **only five insecticides, namely thiamethoxam, phosmet, imidacloprid, chlorpyrifos and clothianidin, and four insecticide-fungicide mixtures pose risks with probabilities above 5%.**"

### Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae.

Zhu W, Schmehl DR, Mullin CA, Frazier JL (2014). PLoS One. Jan 8;9(1):e77547. Doi10.1 371/journal.pone.0077547.

**Peer-reviewed research has proven chlorpyrifos is especially toxic to larval bees:**

"[Chlorpyrifos] at hive-residue levels **triggered a significant increase in larval mortality compared to untreated larvae by over two fold, with a strong increase after 3 days of exposure."**

"Our findings suggest that chronic dietary feeding at hive levels of common pesticide ingredients including … [the] insecticide **chloropyrifos, individually or in mixtures, have statistically significant impacts on honey bee larval survivorship**."

### A 3-year survey of Italian honey bee-collected pollen reveals widespread contamination by agricultural pesticides.

Tosi, Simone & Costa, Cecilia & Vesco, Umberto & Quaglia, Giancarlo & Guido, Giovanni. (2018) Science of The Total Environment. 615. 208–218. 10.1016/j.scitotenv.2017.09.226.

**A three year long, peer-reviewed study shows that chlorpyrifos is contaminating pollen and is of great concern for the health status of honey bees and other pollinators:**

"Pesticides are considered to be a key factor [in honeybee colony losses], as a multitude of studies have demonstrated their detrimental effects at both individual and colony level...**exposure to low levels of pesticides can elicit sublethal effects on bees, not killing them outright but affecting their behaviour and immune system** … **The active ingredient with the highest frequency of residues (30%) was chlorpyrifos…** Learning and memory are of utmost importance for the behaviour of foraging bees, and their impairment may result in negative consequences for colony health and survival … The high proportion of samples containing chlorpyrifos found in this study, combined with the relatively high average level of residues and Hazard Quotient **are of great concern for the health status of honey bees and other pollinators, especially considering that the use of chlorpyrifos is globally widespread.**"

### Cell death localization *in situ* in laboratory reared honey bee (*Apis mellifera* L.) larvae treated with pesticides.

Gregorc, Aleš & D. Ellis, James. (2011). Pesticide Biochemistry and Physiology - PESTIC BIOCHEM PHYSIOL. 99. . 10.1016/j.pestbp.2010.12.005.

**This peer-reviewed study found that larva fed food containing chlorpyrifos at concentrations typically found in the hive kills larval cells and may outright kill or cripple bees:**

"Collectively, our data indicate that the nine test pesticides can induce apoptosis in tissues of honey bee larvae reared in an incubator. … **tissue deletion and larval death is a potential development in these events.**"

**The Effects of Pesticides on Queen Rearing and Virus Titers in Honey Bees (Apis mellifera L.).**

Degrandi-Hoffman, Gloria & Chen, Yanping & Simonds, Roger. (2013). Insects. 4. 71-89. 10.3390/insects4010071.

**Healthy queens are essential to hive survival. When a queen is failing, or dies, bees make new queens. Anything that effects the process by which queens are produced or causes compromised immunity in queens is likely detrimental to hive survival. This peer-reviewed study finds chlorpyrifos is a likely cause of fewer, and less healthy, queens:**

"The effects of sublethal pesticide exposure on queen emergence and virus titers were examined. Queen rearing colonies were fed pollen with [hive-realistic, minute quantities, of] chlorpyrifos (CPF) ... **Fewer queens emerged when larvae from open foraging (*i.e.*, outside) colonies were reared in colonies fed [chlorpyrifos]** Deformed wing virus (DWV) and black queen cell virus were found in nurse bees [and queen larvae in colonies fed chlorpyrifos tainted pollen]…However, we did not detect virus in emerged queens grafted from and reared in outside colonies [colonies not feed chlorpyrifos contaminated pollen]. **The results suggest that sublethal exposure of CPF [chlorpyrifos] … reduces queen emergence possibly due to compromised immunity in developing queens.**"

**Measurements of Chlorpyrifos Levels in Forager Bees and Comparison with Levels that Disrupt Honey Bee Odor-Mediated Learning Under Laboratory Conditions.**

Urlacher, E., Monchanin, C., Rivière, C. et al. J Chem Ecol (2016) 42: 127. https://doi.org/10.1007/s10886-016-0672-4

**This peer-reviewed field study proves that chlorpyrifos, applied as directed, is poisoning bees in a way might not kill them directly, but likely causes the colony to fail (collapse):**

"Here, we **examined chlorpyrifos levels in bees** collected from 17 locations in Otago, New Zealand, and compared doses of this pesticide that cause sub-lethal effects on learning performance under laboratory conditions with amounts of chlorpyrifos detected in the bees in the field. …**the formation and retrieval of appetitive olfactory memories was severely affected**. Chlorpyrifos fed to bees in amounts several orders of magnitude lower than [what would kill bees outright], and also lower than levels detected in bees, **was found to slow appetitive learning and reduce the specificity of memory recall. As learning and memory play a central role in the behavioral ecology and communication of foraging bees, chlorpyrifos, even in sublethal doses, may threaten the success and survival of this important insect pollinator."**

**A common pesticide decreases foraging success and survival in honey bees.**

Henry, M., Béguin, M., Requier, F., Rollin, O., Odoux, J.-F., Aupinel, P., Aptel, J., Tchamitchian, S., Decourtye, A., (2012)

Science (80–) 336:348–350. https://doi.org/10.1126/science.1215039.

**This, and other peer-reviewed studies, is typical of the overwhelming scientific evidence that sub-lethal doses of pesticides such as chlorpyrifos can no longer be ignored as a cause of the loss of honeybees and other pollinators.**

"**Our study clearly demonstrates that exposure of foragers to nonlethal but commonly encountered doses … can affect forager survival, with potential contributions to collapse risk.** …, **impact studies are likely to severely underestimate sublethal pesticide effects** ...."

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**Exposure to acetylcholinesterase inhibitors alters the physiology and motor function of honeybees.**

Williamson, Sally M.; Moffat, Christopher; Gomersall, Martha A. E.; Saranzewa, Nastja; Connolly, Christopher N.; Wright, Geraldine A. (2013). Front. Physiol., 05 February 2013, DOI: 10.3389/fphys.2013.00013.

**This peer-reviewed study proves that chlorpyrifos has profound effects on bees that could lead to colony collapse:**

"Biochemical assays confirmed that … **chlorpyrifos** … **causes subtle yet profound effects on physiological effects on behavior that could lead to reduced survival**."

**Chlorpyrifos Executive Summary for ESA Assessment.**

United States Environmental Protection Agency, 2016. Downloaded from https://www.epa.gov/endangered-species/biological-evaluation-chapters-chlorpyrifos-esa-assessment#executivesummary, 11/3/17.

**This document from the EPA proves that they do not consider sub-lethal effects in their determination of the risk of chlorpyrifos to bees. This is a decidedly unscientific approach. On page 229 of the document the EPA acknowledges a wide range of sub-lethal effects on pollinators and then simply states that sub-lethal effects "could not be converted to environmentally-relevant concentrations", and therefore are not included in the EPA evaluation of chlorpyrifos.**

**Effects of chlorpyrifos insecticide on pollinators.**

Lunden J, Mayer D, Johansen C, Shanks C, Eves J (1986) Am Bee J 126:441–444

**This industry-funded research (Dow, the makers of chlopryrifos funded the study) showed that long after the chlorpyrifos applicator has determined it is legal to apply the pesticide (by observing no bees were flying onto the crops), chlorpyrifos continues to kill bees:**

**"Chlorpyrifos is much too hazardous to bees to be used on blooming crops or in situations where it may drift onto blooming crops or weeds…Foraging honey bees captured in the chlorpyrifos plot (up to 3 days after application) had high mortality…California data indicate that chlorpyrifos residues up to 3.5 days old are highly hazardous to honey bees."** And, from Table 1. **"Mortality of bees." 25% mortality for honeybees was reported for contact with foliage 7 days after application.**

**EPA approved label.**

For Cobalt insecticide (30% chlorpyrifos). downloaded from http://www.cdms.net/ldat/ld8AA016.pdf, January 24, 2018.

**The EPA label offers no protection to pollinators. An applicator of chlorpyrifos only needs to say "I didn't see any bees when I applied the insecticide" to avoid prosecution:**

"**…** This product is **highly toxic to bees** exposed to direct treatment or residues on blooming crops or weeds. **Do not apply** this product or allow it to drift to blooming crops or weeds **if bees are visiting the treatment area**."

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February 11, 2020

**SUPPORT SB300: Pesticides – Use of Chlorpyrifos - Prohibition**

Dear Chairman Pinsky and members of the Committee:

Maryland League of Conservation Voters strongly urges your support of SB300 Pesticides – Use of Chlorpyrifos – Prohibition, and we thank Senator Lam for his leadership on this issue. SB300 and its House cross-file are priorities of Maryland LCV and of the Citizen's Campaign for the Environment (CCE), a table of 30 organizations working on statewide environmental policy.

Maryland LCV is one member of the Smart on Pesticides, a coalition of 94 organizations and institutions representing diverse interests in the environmental, health, agricultural, and faith communities. We stand together to urge the passage of SB300, in order to ban the use of Chlorpyrifos.

In 2000, Dow Chemical and other manufacturers stopped the use of chlorpyrifos due to the risk to children's health. In 2014, the EPA released an assessment that demonstrated correlation between Chlorpyrifos and brain damage in children at low exposure, prompting the agency to propose a complete, nationwide ban of the product. Additional data released in 2016 supported this action. The science demonstrates that Chlorpyrifos is a proven to cause brain damage in children, contaminate waterways, and harm wildlife.

Banning chlorpyrifos in Maryland would protect the health and safety of our communities, our families, our wildlife and our waterways. The Maryland General Assembly must lead the way to follow the science and protect its people from this dangerous chemical.

For both environmental and public health concerns, Maryland LCV strongly urges a favorable report on this important piece of legislation.

Thank you.

Maryland League of Conservation Voters

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Thank you.

Maryland League of Conservation Voters

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Icahn School of Medicine at Mount Sinai

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February 11, 2020

Re: SB-300 – Pesticides – Use of Chlorpyrifos – Prohibition
Submitted to: The Senate Education, Health and Environmental Affairs Committee
Position: In support of SB 300

Chairman Pinsky and Members of the Committee,

I am an Associate Professor in the Department of Environmental Medicine and Public Health at the Icahn School of Medicine at Mount Sinai in New York. I investigate the relationship between early life exposure to environmental toxicants and adverse neurodevelopmental outcomes, including changes in children's brain structure and function. I am providing this written testimony as an environmental health expert and as a leading researcher in the studies finding that exposure to chlorpyrifos harms children's brains.

I strongly support the passage of Senate Bill 300 to ban all uses of chlorpyrifos in the state of Maryland. Consistent evidence across animal studies and epidemiological studies demonstrate that chlorpyrifos is a powerful developmental neurotoxicant and that early life exposure to chlorpyrifos is associated with persistent adverse outcomes in children, including changes in brain structure. I believe this bill is essential to help protect the health of Maryland's most vulnerable populations: pregnant women and children.

The scientific evidence of neurotoxic dangers associated with chlorpyrifos exposure is extensive and consistent. Three recent epidemiologic studies demonstrate that exposure to chlorpyrifos during pregnancy is harmful to children's brains and that damage persists throughout childhood. These three studies, based on different populations, located in distinct geographical regions of the US, and using different biomarkers of exposure, have produced strongly convergent results. One study from the University of California at Berkeley reported reductions in IQ scores among the children of agricultural workers in the Salinas Valley. The second study was undertaken at my institution, the Icahn School of Medicine at Mount Sinai, and found similar results in a New York City Hispanic population. The third study, also conducted in New York City by investigators at Columbia University among a population of African-American and Dominican children determined that prenatal chlorpyrifos exposure negatively impacted children's brain development. These data sets all support the need to protect children from early life exposure to chlorpyrifos.

Building upon these epidemiologic studies demonstrating associations between early life chlorpyrifos exposure with behavioral and cognitive outcomes in children, Columbia University undertook an MRI study to inform our understanding of the influence of prenatal and early childhood chlorpyrifos exposure on brain regions regulating behavior and cognition in children. In this work, we evaluated the brains of 40 children, ages 5 to 11, whose mothers were enrolled during pregnancy into the Columbia University Mother's and Newborn's Study. This is a non-clinical, representative community-based cohort enrolled from Northern Manhattan and the South Bronx in New York City. We compared the brain scans of 20 children with higher levels of chlorpyrifos exposure (as measured in umbilical cord blood collected at birth) to 20 age- and sex- matched control subjects with lower chlorpyrifos levels. The brain scans of children with higher chlorpyrifos exposure looked markedly different compared with those of children exposed to lower levels of chlorpyrifos. Changes were visible across the surface of the brain, with abnormal enlargements of some areas and thinning in others. Although the study did not examine specific disorders tied to any of these brain changes, the regions affected are associated with

functions such as attention, decision making, language, impulse control and working memory. These changes in brain structure are consistent with the cognitive and behavioral deficits observed in children exposed to this chemical, and consistent with animal literature linking early life exposure to low levels of these chemicals to adverse neurodevelopmental outcomes.

The high chlorpyrifos group also displayed disruption of normal sexual differences in brain structure – effects that were not observed in the low chlorpyrifos group. Expected sex differences (i.e., enlargement of the right inferior frontal lobe) were reversed in the high chlorpyrifos group. These findings are consistent with animal models suggesting that chlorpyrifos exposure reverses normal sexual differences in rates of learning, memory and emotional behaviors.

Notably, the adverse cognitive and motor outcomes and the brain abnormalities observed in these studies appeared to occur following low-level exposures to chlorpyrifos in non-occupationally exposed, community-based samples. **These affects are seen at exposure levels are below EPA safety standards**. This suggests that the mechanisms underlying brain changes may involve other pathways and occur at lower levels than anticipated based on systemic toxicity. And further, it suggests that the current EPA safety standards do no protect vulnerable populations such as the developing infant and small child from the adverse impacts of chlorpyrifos.

In summary, residential exposure to chlorpyrifos in a non-clinical, community-based sample is associated with persistent changes in the morphology of brain regions that support cognitive and behavioral outcomes. These associations occur at levels below the threshold for systemic toxicity suggesting that the fetal and developing brain is uniquely vulnerable to this chemical. These findings, together with decades of animal and epidemiologic research confirm the toxic dangers posed by exposure to even low levels of chlorpyrifos. Based on this evidence, Maryland lawmakers should enact SB 300 and ban all uses of chlorpyrifos in the state of Maryland. It is the right thing to do to protect the health of Maryland's children and future.

***Megan K. Horton, PhD, MPH*** *is an Associate Professor of Environmental Medicine and Public Health at the Icahn School of Medicine at Mount Sinai.*

Dr. Horton is an environmental health scientist with expertise in environmental epidemiology, child neurodevelopment and pediatric neuroimaging. Following her doctoral training in environmental health at Columbia University, she completed a postdoctoral fellowship in neuroepidemiology where she learned to apply magnetic resonance imaging (MRI) to investigate the impact of prenatal exposure to pesticides and secondhand smoke on neuropsychological and behavioral function throughout childhood. In 2010, she received a prestigious NIH-funded career transition award to study co-exposure to endocrine disrupting chemicals (e.g., polybrominated flame retardants, perchlorate, pyrethroid insecticides) and structural and functional brain outcomes in a New York-based longitudinal birth cohort. This award included extensive training in study design and statistical approaches for linking early life exposures to complex chemical mixtures with neuroimaging data to evaluate changes in brain structure and function in children. Her work has been highlighted at national and international meetings.

JOHNS HOPKINS
BLOOMBERG SCHOOL
*of* PUBLIC HEALTH

February 11, 2020

**Written Testimony In Support Of**
**SB 300**– Pesticides –Use of Chlorpyrifos - Prohibition
**Submitted to:** The Maryland Senate Education, Health and Environment Affairs Committee

Honorable Chairman and Members of the Committee,

My name is Lesliam Quirós-Alcalá and I am an Assistant Professor in the Department of Environmental Health and Engineering at the Johns Hopkins Bloomberg School of Public Health and an Adjunct Assistant Professor at the Maryland Institute of Applied Environmental Health at the University of Maryland, School of Public Health. I am also on the Scientific Advisory Board for the Children's Environmental Health Network, a national multi-disciplinary non-governmental organization based in Washington DC whose mission is to protect children from environmental health hazards.

I am an environmental health scientist by training with expertise in children's environmental health, exposure assessment, occupational health, and environmental epidemiology. For over a decade, my research has focused on studying exposures to environmental chemicals, including pesticides, in children and other vulnerable populations, and the potential effects of these exposures on human health.

****

***I am submitting this testimony in strong support of SB 300 to prohibit the use of chlorpyrifos and other insecticides containing chlorpyrifos in the state of Maryland based on my prior work and the weight of the evidence from several peer-reviewed scientific studies.***

****

Prior to starting my first faculty appointment in 2014, I conducted research with colleagues at the Center for Environmental Research and Children's Health (CERCH) at the University of California at Berkeley. The Center is one of the initial vanguard Centers of Excellence in Children's Environmental Health and Disease Prevention Research jointly funded in 1998 by the U.S. Environmental Protection Agency (EPA) and the National Institutes of Environmental Health Sciences (NIEHS)to study the effects of chemicals on children's health.

Over the last 20 years, CERCH has led the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study. The CHAMACOS study enrolled 601 pregnant women between 1999-2001 living in an agricultural community in Salinas Valley, CA to study the effects of pesticides like chlorpyrifos (and other chemicals) on children's health. Researchers have assessed chemical exposures in the CHAMACOS cohort during pregnancy and childhood and have been following the children for 19 years. Data from the CHAMACOS study has been instrumental in contributing to the scientific literature on the potential adverse effects of chemicals on children's health.

****

***Based on research findings from the CHAMACOS study and that of others, one of the major concerns with chlorpyrifos is its potential to affect children's neurodevelopment.***

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Chlorpyrifos belongs to a class of pesticides known as organophosphate (OP) pesticides. OP pesticides have a common mechanism of toxicity and are designed to affect the central nervous system. Chlorpyrifos inhibits an enzyme (acetylcholinesterase) which regulates nerve impulses in the body. Most people are exposed to chlorpyrifos through their diet by eating fruits and vegetables (e.g., apples, broccoli, grapes) that have been treated with these pesticides. Exposures may also occur by inhalation or skin absorption when applying pesticides; working in agricultural fields, golf courses, or other areas treated with pesticides; and by living or going to school near treated sites.[1-3]

****

***Evidence from the CHAMACOS study has shown that exposure to OP pesticides, including chlorpyrifos, during pregnancy is associated with increased risk of mental, motor, and behavioral problems in children, including:***

****

- Abnormal reflexes in infants (abnormal reflexes suggest neurological problems) [4]
- Poor mental development among preschoolers[5]
- Attention problems and hyperactive behavior at age 5 years[6]
- Poor mental development at age 7 years (e.g., decreases in IQ points, working memory, processing speed, verbal comprehension, perceptual reasoning,) [2, 7]

Similar findings have been documented by other U.S. researchers at other universities, including Columbia and Mt. Sinai, as well as in other countries in both urban and farmworker pediatric populations. [3, 8-10] Overall, studies have shown that exposure to OP pesticides, including chlorpyrifos, during pregnancy is associated with mental, motor, and behavioral problems. Specifically, abnormal reflexes in infants; mental and motor delays among preschoolers; decreases in working and visual memory, processing speed, verbal comprehension, perceptual reasoning, and IQ among school-aged children; and increased risk of symptoms or diagnoses of attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD).[3] A recent study also showed that children with high levels of chlorpyrifos in umbilical cord blood had an increased risk of altered brain structure.[11]

*Altogether, these peer-reviewed studies indicate that outcomes associated with exposure to OP pesticides like chlorpyrifos during pregnancy are consistent and persistent, with associations observed from early infancy into late childhood.*

****

***The majority of OP pesticide studies linking exposure to altered neurodevelopment have relied on objective measures of exposure generated according to scientifically established protocols and reported similar findings.***

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Accurate measurement of exposure is critical in any human study trying to establish an association between an exposure to an environmental agent and a particular health outcome. OP pesticide studies in the literature have assessed exposures in various ways, including by directly measuring OP pesticides or their breakdown products in biological samples (urine, blood) to quantifying nearby pesticide use by geographically linking home addresses with pesticide use reporting databases available.[3] Objective measures of exposure have been used and generated according to scientifically established protocols in the vast majority of studies reporting a link between OP pesticides and altered neurodevelopment. These measures have also been obtained independently of the child's outcome.

It is important to highlight that pesticide studies have assessed exposure among different pediatric populations (e.g., urban and farmworker children), in different geographic locations, and have used different methods of measuring pesticide exposure. However, it is these differences that bolster the weight of the evidence that OP pesticides like chlorpyrifos are likely detrimental to children's brains. *Peer-reviewed studies have shown similar consistent findings spanning from early to late childhood despite these study differences.*

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***Scientists in academia and the U.S. EPA agree that low level exposures to chlorpyrifos are of great concern and present a clear risk to children's health.***

****

Based on findings from human studies, EPA scientists concluded that there is "*sufficient evidence that there are neurodevelopmental effects occurring at chlorpyrifos exposure levels below those required to cause acetylcholinesterase inhibition."* [12] That is, reliance of acetylcholinesterase inhibition for regulatory purposes to assess the potential health risks of OP pesticides in children masks the serious threat that OP pesticides pose on children's developing brains.

In 2016, EPA scientists also concluded that based on current labeled uses in the U.S., exposure to chlorpyrifos from either food or drinking water alone could lead to unacceptably high exposures and that some women of reproductive age, infants, and children consume levels of chlorpyrifos that exceed those considered acceptable for these vulnerable stages.[12]

****

***Continued used of chlorpyrifos puts vulnerable and marginalized populations at risk of adverse effects related to these pesticides, representing an environmental justice concern***

****

Farmworkers and their families, and residents living in agricultural rural communities characterized by poverty and limited access to basic resources are at an elevated risk of experiencing higher exposures to chlorpyrifos, placing them at an increased risk of adverse health effects. Exposures may occur from working in the fields and living or going to schools near treated fields. Pesticide exposures may also occur when farmworkers bring pesticides into the home on their clothing or shoes.[13, 14]

**Data from the CHAMACOS study and ancillary CERCH studies show that:**

(1) pregnant women living in an agricultural community experience significantly higher exposures to chlorpyrifos and other OP pesticides compared to pregnant women from the U.S. general population; [15]
(2) residential proximity to agricultural fields where chlorpyrifos is applied is associated with lower IQ at 7 years of age[2]
(3) pesticides used solely in agriculture are found in residences in agricultural communities; [16]

****

***Comprehensive steps are critical to protect our children and other vulnerable populations so they can become thriving contributing members of our society as the potential health effects of chlorpyrifos also represent an economic burden to our state and our nation.***

****

The economic costs associated with neurodevelopmental problems cannot be ignored. It is estimated that, on average, it costs twice as much to educate a child with learning or developmental disabilities in the U.S. compared to the costs associated with educating children without these disabilities.[17] A recent analysis in the European Union reported that annual costs linked to the loss of IQ points and learning disabilities due to chemical exposures, including OP pesticides, were estimated to be $169.43 billion dollars.[18] The detrimental effects of the OP chlorpyrifos on health place children and other vulnerable populations at a clear disadvantage, limiting their ability to become contributing members of our society and resulting in economic consequences to our state and our nation.

***In summary, the science is clear and consistent: chlorpyrifos is putting the health of our children and other vulnerable populations at risk.***

***I strongly support the passage of Senate Bill 300 to ban all uses of chlorpyrifos in the state of Maryland and urge our decision makers to not dismiss the use of sound science and the current weight of the evidence in decision-making to promote and ensure public health.***

Sincerely,

Lesliam Quirós-Alcalá, PhD, MS
Assistant Professor, Department of Environmental Health and Engineering
Johns Hopkins Bloomberg School of Public Health
Adjunct Assistant Professor, Maryland Institute of Applied Environmental Health
University of Maryland School of Public Health

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**Nat.ResourcesDefenseFund_Hucker_FAV_SB0300**
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Position: FAV

**Testimony in *Support***
**SB 300 – Pesticides – Use of Chlorpyrifos - Prohibition**

Good afternoon Chairman Pinsky, Vice Chair Kagan and Members of the Committee.

My name is Tom Hucker, and I'm a Senior Advocate with NRDC, the Natural Resources Defense Council, one of the nation's largest environmental organizations, with over 3 million members and supporters.

Thank you to Senator Lam and to all the cosponsors for your leadership on this critical issue, and to all of you who voted this bill onto the Senate floor last year.

NRDC is again asking all of you to do the right thing by banning the agricultural use of chlorpyrifos. It's crazy that we have to ask you to do this, since the EPA - following its extremely thorough, deliberative process - banned chlorpyrifos for household use twenty years ago - back in 2000. But they undercut the benefits of that action when they continued to allow currently five million pounds of it to be applied annually to a variety of crops, including apples, oranges, broccoli, berries, and tree nuts. And that agricultural use has meant continued contamination of air and water supplies as well.

Of course, that makes no sense. If the EPA decided this chemical is so dangerous that they prevented you from spraying it at home - even in your garage or your yard - why would we allow anyone to spray it on our food, or near our water supplies?

NRDC and Pesticide Action Network originally petitioned EPA to ban chlorpyrifos ban in 2007, thirteen years ago. EPA responded by proposing a ban on chlorpyrifos in 2015 based on finding extensive risk from contaminated drinking water. An update in 2016 affirmed those findings and additionally found that current uses in agriculture are not safe for children - leaving harmful residues behind on common fruits and vegetables that led to exposures in children up to 14,000 percent (equal to 140 times) of EPA's safety limit.

But in March 2017, EPA Administrator Scott Pruitt reversed course and put the brakes on EPA's proposed ban. And that's what brings us here today. It's time for the Maryland General Assembly to protect children's health by taking the action the EPA intended before they were taken over by Pruitt and former chemical executive Nancy Beck.

You have a slamdunk scientific case to ban chlorpyrifos. In addition to the terrific scientific experts urging you to pass this bill, I want to add the formal comments to the EPA submitted by

my NRDC colleague, Dr. Jennifer Sass. Her comments, signed by over 45 top scientific experts, urge the EPA to prohibit the use of chlorpyrifos on food crops.

Those 45 leading, independent health scientists and healthcare professionals support the EPA's 2016 Revised Human Health Risk Assessment, and EPA's 2015 proposal to revoke all food uses of chlorpyrifos. That evaluation by EPA found that chlorpyrifos is unsafe to use in any amount, because use leads to toxic residues on fruits and vegetables, drinking water contamination, and harmful drift from fields in agricultural communities.

So in any ordinary administration, under presidents of both parties, the EPA would have already banned this. The only reason we need this bill is due to Scott Pruitt rejecting the overwhelming scientific evidence and hijacking the EPA's professional process.

But you don't have to go along with that. If the Trump EPA decided that we should reauthorize sales of DDT, you would not comply. You would step up and ban DDT in Maryland. And if you would ban DDT, why would you continue to allow chlorpyrifos - when the EPA's process and the overwhelming weight of independent science would urge you to prohibit it? It's time for Maryland to follow the science, and ban chlorpyrifos.

Since we were here last year, the case for Maryland to take action has grown even stronger. In July, EPA announced that it would refuse to ban chlorpyrifos, so other jurisdictions have stepped up. Last fall, California's EPA reached a settlement with Dow and other pesticide producers to ban all uses of chlorpyrifos in California by the end of this year. In December, New York Gov. Andrew Cuomo issued an administrative order to ban all uses of chlorpyrifos in New York state. And that same month, the 27 nations in the European Union overcame tremendous industry lobbying and voted to ban all uses of chlorpyrifos.

If New York and California and 27 European nations can all stand up to the pesticide industry lobbyists to protect their children's brains, I know Maryland can as well. This committee has stood up for public health and the environment over and over, such as when you banned fracking and when you ended consumer use of neonics. Here you have an open-and-shut case, with the science every bit as overwhelmingly clear and the threat to our children as profound – I know you'll do the right thing and ban the remaining uses of chlorpyrifos. Thank you!

**MDAAP-MedChi_Ichniowski_FAV_SB0300**
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Maryland Chapter
INCORPORATED IN MARYLAND
American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN*
*Speaking for Maryland Kids!*

**Position Statement in support of SB 300 Prohibiting Chlorpyrifos**

**February 11, 2020**

My name is Michael Ichniowski, MD, and I am a pediatrician and Chairperson of the Environmental Health Committee of the MDAAP and a member of the Maryland State Medical Society. This written testimony is presented on behalf of these organizations.

The Maryland Chapter of the American Academy of Pediatrics (MDAAP) is an organization of physicians who provide health care to the children of Maryland and advocate on their behalf in matters concerning their health and well-being. MDAAP, like its parent organization, the American Academy of Pediatrics, supports the prohibition of chlorpyrifos, as proposed for the State of Maryland in SB 300. The Maryland State Medical Society also supports this bill.

**In considering toxic exposures in children, it is extremely important to be aware of their increased susceptibility to adverse effects by virtue of their ongoing physical and neurological development. Any substance that interferes with these developmental processes can result in lasting and potentially irreversible harm to children.** Children are at increased risk because of their smaller size, which results in a higher dose of the toxic substance relative to their body weight. Exposures in pregnant women can affect the growing fetus during the critical times of organ formation, brain development and early growth. Infants and toddlers play and explore at ground level, and their increased hand-to-mouth behavior results in a much greater potential for ingestion of toxic substances in their environment.

**The pesticide, chlorpyrifos, is a nerve agent that works by interfering with acetylcholinesterase**, an enzyme present throughout the human nervous system. Blocking this enzyme prevents the breakdown of acetylcholine; the resulting increase of this neurotransmitter at nerve endings results in excessive stimulation of the nerves to which they connect, and also the target muscles and organs of these nerves. Acute poisoning from chlorpyrifos by this mechanism has been well-known for decades. **However, additional mechanisms of neurotoxicity also play a role, as adverse effects have been observed in association with far lower levels than those that produce significant inhibition of acetylcholinesterase.** These lower-dose toxic effects are of particular concern with in utero exposures. The fetal brain, which has to undergo tremendous growth and development prior to birth, can receive an enormous dose of a toxic chemical relative to its small size from such prenatal exposures. **EPA scientists concluded that there was no safe level of exposure to chlorpyrifos.**

**Chlorpyrifos can be absorbed by oral ingestion, through inhalation or directly through the skin. Ingestion can occur from residues of this chemical on treated crops, which include many fruits, vegetables and nuts, and also through drinking water from watersheds in which chlorpyrifos is used. Inhalation can occur from aerial spraying of this pesticide, which can drift and settle well beyond**

**targeted areas.** It can cause both acute poisoning from a single toxic exposure as well as cumulative toxicity from chronic exposure to much smaller amounts. Because of health concerns associated with household use of chlorpyrifos, its sale for residential use was prohibited by the Environmental Protection Agency (EPA), effective December 31, 2001. An extensive review of the evidence of toxicity from agricultural use, particularly in children and in infants born to exposed mothers, led the EPA to recommend a total ban on the use of chlorpyrifos to become effective in April, 2016. A further analysis and report by the EPA in November, 2016, showed risks from dietary exposures and drinking water, which supported the EPA's original proposal.[1] Unfortunately, this proposal to revoke all tolerances for chlorpyrifos, based on the EPA's own analysis and review of available studies, was overturned by its Administrator in March, 2017.

A number of published studies have demonstrated associations between increased exposure to chlorpyrifos and adverse neurodevelopmental effects. The Columbia Center for Children's Environmental Health (CCCEH) of Columbia University in New York City followed a group of inner-city children with prenatal exposure to chlorpyrifos and compared children with higher and lower levels of chlorpyrifos in cord blood at birth. **At age 3, the children with higher levels had a 2.4 times greater risk of mental delay; a 4.9 times greater risk of psychomotor delay; a 6.5 times risk of attention deficit/hyperactivity disorder (ADHD); an 11.26 times risk of attention disorders; and a 5.39 times risk of pervasive developmental disorder, a group of disorders that includes autism-spectrum disorders.[2] Continued follow-up of this group at age 7 found decreases in Full-Scale IQ and the Working Memory Index subtest in association with increasing levels of cord blood chlorpyrifos levels,[3] which demonstrates the lasting effect from prenatal exposures.**

Another group of children in an agricultural community in the Salinas Valley in California was followed for a number of years and evaluated for possible neurotoxicity in association with prenatal and postnatal exposures to organophosphate pesticides. **Prenatal levels of urinary excretion products were associated with significant increased risk of attention problems and ADHD at age 5 and with lower scores for full-scale IQ and on scores for working memory, processing speed, verbal comprehension and perceptual reasoning in this cohort at age 7.[4,5]** Another study conducted in California evaluated neurodevelopmental disorders and prenatal residence in proximity to agricultural pesticide application. **Pregnant women living within 1.5 kilometers of an agricultural application of chlorpyrifos during the second trimester were found to have a 3.3 times increased risk of their children having an autism spectrum disorder.[6] This shows that chlorpyrifos can have effects almost 1 mile from where it was applied.**

Another study from California, published in the British Medical Journal in March, 2019, looked specifically at agricultural exposures to several pesticides, including chlorpyrifos, and evaluated pesticide use within 2 kilometers of each subject's residence. **The authors found a 27% increase in autism spectrum disorders with intellectual disability from fetal exposures to chlorpyrifos, and a 31% increase from exposures during the first year of life.[7]**

**EPA estimates of median or typical exposures to chlorpyrifos are likely 5 times greater than its proposed level of "safe" intake for pregnant women and infants, and up to 11 to 15 times greater for toddlers and older children.[8]** The nation's Food Quality Protection Act (FQPA) directs the EPA to revoke permitted pesticide residue levels, or tolerances, when those levels are determined no longer to be safe. The FQPA further requires an additional tenfold safety factor be applied for potential prenatal and childhood toxicity compared to adults in considering pesticide safety. Under the FQPA, "safe" means that "there is reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and other exposures for which there is reliable

information."[9]

The prevalence of autism and ADHD continues to rise each year, and these disorders have lasting adverse impacts on children and their families, as well as affecting the quality of their lives. These families bear the costs of increased medical services, including more doctor and specialist visits, long-term medications and therapy services. These children also require increased educational services at a cost to taxpayers throughout the state.

The growing body of evidence of chlorpyrifos toxicity led the EPA to propose revoking all tolerances for this pesticide in 2015 and again in 2016, and the evidence continues to grow. The EPA Administrator's decision not to finalize this revocation continues to put children at unnecessary risk of substantial and irreversible neurodevelopmental injury. **As past AAP President, Dr. Fernando Stein, wrote in an opinion letter to the New York Times in November, 2017, "Pediatricians are alarmed by the EPA's recent decision to allow the continued use of chlorpyrifos…This chemical is unambiguously dangerous and should be banned from use."** Through SB 300, Maryland has the opportunity to protect its youngest citizens by banning the use of chlorpyrifos here. Regulation that allows continued use of chlorpyrifos will not eliminate the risk to Maryland's children; only a complete ban on its use will achieve this. MDAAP, along with the Maryland State Medical Society (Med-Chi), respectfully request a favorable report for this bill.

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[8] US Environmental Protection Administration, *Chlorpyrifos Acute and Steady State Dietary (Food Only) Exposure Analysis to Support Registration Review,* EPA-HQ-OPP-2008-0850-0197 (Nov. 18, 2014).

[9] 21 U.S.C. Sec. 346a(b)(2)(C).

**UticaBridgeFarms_Jeffries_FAV_SB0300**
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February 11, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**In support of SB 300: Pesticides – Use of Chlorpyrifos – Prohibition**

Chairman Pinsky, Vice Chairman Kagan and members of the committee:

My name is Richard Jefferies, my wife Jean and I own and operate Utica Bridge Farms in Frederick County. We are a chemical-free, experimental farm on 42 acres, employing a range of regenerative practices. We grow over 50 varieties of vegetables, berries, fruits, nuts and grains. Most are heirloom varieties, none are genetically modified. We also raise sheep, chickens, guineas and a have a friendly guardian donkey Wilbur who watches over our farm.

We share our experiences and knowledge with other regeneratively minded friends, as well as organizations such as the Bionutrient Food Association, Soil4Climate, the Frederick County Healthy Soils Discussion Group, and Sierra Cub Catoctin Chapter.

We operate our farm on the knowledge that Nature knows best. We regenerate Nature's age-old processes to build healthier soil, grow healthier plants and animals, and yield healthier food for human consumption—while increasing biodiversity above ground and below, improving rainwater capture and reducing inputs. The natural processes we regenerate would be damaged or destroyed by the use of pesticides such as chlorpyrifos, which then addicts the farm to more and more inputs in an attempt to compensate. We have chosen another direction, as have farmers who successfully and profitably farm regeneratively on 6 million acres worldwide, one million in the United States—and these numbers are growing fast.

Like the other 83 Maryland farmers who signed the farmer letter in support of SB 300, we do not use chlorpyrifos and can attest to the fact that it is not needed to produce any of the crops it is applied on in Maryland. This includes the corn, melons, grapes, garlic, okra, tomatoes, peppers, beans, squash, greens, raspberries, silverberries, pears, kiwis, strawberries and cherries we grow. There are plenty of alternative practices and products for farmers to use to address pest pressures, and a wealth of information to back up their efficacy.

Chlorpyrifos is simply too toxic to be going into our food or to be in the proximity of farmers, their workers or their families.

Please give SB 300 your full support, with no weakening amendments. Thank you.

Richard Jeffries

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# STATE OF MARYLAND
# OFFICE OF THE ATTORNEY GENERAL

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February 11, 2020

TO: The Honorable Paul Pinsky
Chair, Education, Health, and Environmental Affairs Committee

FROM: Hannibal G. Williams II Kemerer
Chief Counsel, Legislative Affairs, Office of the Attorney General

RE: SB 300 - Pesticides - Use of Chlorpyrifos – Prohibition (**SUPPORT**)

The Office of Attorney General urges this Committee to support SB 300. SB 300 would ban the use of chlorpyrifos in Maryland, including any insecticide containing chlorpyrifos. Despite clear evidence that chlorpyrifos poses a serious risk to public health—especially to infants, children, and pregnant women—chlorpyrifos is commonly used on food crops throughout the United States.[1] Chlorpyrifos is one of the most widely used insecticides in the United States. It is used on numerous food crops, including those consumed by infants and young children such as apples, strawberries, peaches, and grapes.[2] The Attorney General has become familiar with the dangers of chlorpyrifos through the work he has undertaken pursuant to the Maryland Defense Act, and strongly supports banning the use of this toxic pesticide in the State.

Chlorpyrifos acts by inhibiting an enzyme that is key to the proper development and functioning of the central nervous system and brain. It has been linked to autism, childhood cancers, ADHD and other neurodevelopmental issues for babies and children.[3] Children in utero are especially at high risk of exposure, which is associated with adverse birth defects.[4] The president of the American Academy of Pediatrics stated in a 2017 New York Times article that "exposures for babies are probably five times greater than its proposed "safe" intake, and 11 to 15 times higher for toddlers and older children," and urged that the "chemical is unambiguously dangerous and should be banned from use."[5] Moreover, farmworkers who apply and mix the

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[1] SMART ON PESTICIDES MARYLAND, IT'S TIME TO BAN CHLORPYRIFOS IN MARYLAND 1, http://www.mdpestnet.org/wp-content/uploads/2012/10/2019_MPN_ChlorpyrifosBan_FactSheet_01242019-RQ-NoBillNumber.pdf.
[2] *Id.*
[3] *Id.*
[4] *Id.*
[5] Fernando Stein, *A Pesticide and the E.P.A.*, N.Y. TIMES (Nov. 1, 2017), https://www.nytimes.com/2017/11/01/opinion/pesticide-epa.html?_r=0.

pesticide are at increased risk for breast cancer and reproductive health problems even with maximum personal protective equipment.[6] In addition to these numerous health hazards to humans, the use of the pesticide is also a threat to the Chesapeake Bay, aquatic life, and bees and other pollinators.[7]

The public health dangers associated with the pesticide are well-documented. The U.S. Environmental Protection Agency's (EPA) own scientists have twice been unable to identify a safe level for the pesticide on food.[8] After finding that it was unable to conclude that the risk from aggregate exposure to chlorpyrifos meets the applicable safety standard under Federal Food, Drug, and Cosmetic Act ("Food Act"), in November 2015 and again in November 2016, EPA issued proposed regulations to revoke all "tolerances" (i.e., permitted residues) for the pesticide in food.[9]

Despite EPA's certainty that it could not find the current chlorpyrifos food tolerances safe under the Food Act, one of the former EPA Administrator Scott Pruitt's first official acts was to change positions on the proposed regulations and deny an administrative petition brought by environmental groups to revoke the current tolerances for the pesticide on food. Disregarding decades of accumulated scientific evidence and citing "uncertainty" in chlorpyrifos' toxicity, then Administrator Pruitt instead issued an order putting off under October 2022, if not longer, any decision on whether to revoke or modify current food tolerances for the pesticide.

In reaction to this order, the Attorney General joined with other states and environmental and public health advocates in a legal action to challenge the EPA's failure to include the finding of safety required to maintain those tolerances. *See League of United Later American Citizens v. Wheeler,* 899 F.3d 814 (9th Cir. 2018). The original decision was vacated, and was heard en banc by the Ninth Circuit.[10] Upon re-hearing, the en banc court ordered the Environmental Protection Agency to issue, no later than 90 days after the filing of the order, a full and final decision on LULAC's objections pursuant.[11]

Exactly 90 days after the court ordered a "full and final decision on LULAC's objections," the EPA complied and issued its Final Denial Order. *See* Chlorpyrifos; Final Order Denying Objection to March 2017 Petition Denial Order, 84 Fed. Reg. 35, 555 (July 24, 2019).[12] In its Final Denial Order, the EPA stated that "the data supporting objections to the use of [Chlorpyrifos] was 'not sufficiently valid, complete or reliable,'"[13] and therefore, should not be banned. As a result, the Ninth Circuit granted the respondent's (EPA) motion to dismiss the complaint because the EPA's issuance of the Final Order mooted the petition for review.[14] In

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[6] Smart on Pesticides Maryland, *The 2019 Maryland Chlorpyrifos Ban Bill*, http://www.mdpestnet.org/take-action/smart-on-pesticides-maryland/ (last visited Feb. 8, 2019).
[7] SMART ON PESTICIDES MARYLAND, *supra* note 1.
[8] Environmental Protection Agency, Regulations.gov, *Chlorpyrifos Revised Human Health Risk Assessment* (Nov. 3, 2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2015-0653-0454.
[9] *Id.*
[10] *League of United Latin Am. Citizens v. Wheeler*, 922 F.3d 433 (9th Cir. April 19, 2019).
[11] *Id.*
[12] Final Order Denying Objection to March 2017 Petition Denial Order, 84 Fed. Reg. 35, 555 (July 24, 2019).
[13] *Id,* at 35562.
[14] *League of United Latin Am. Citizens v. Wheeler,* 940 F.3d 1126 (9th Cir., Oct. 16, 2019).

addition, Petitioner's Cross-Motion for leave to amend, as well as the Intervenor's Motion to Consolidate were denied as moot.[15]

In the face of such delay and inaction on the federal level, as well as the EPA's rejection of numerous studies that indicate the negative effects of chlorpyrifos, it is imperative that Maryland act now on a state level to safeguard against the harmful effects of exposure to chlorpyrifos. SB 300 would help protect Marylanders—especially infants, children, and pregnant women—from these well-documented dangers. Accordingly, the Attorney General supports SB 300 and urges the Committee to issue a favorable report.

cc: Members of the Education, Health, and Environmental Affairs Committee

[15] *Id.*

**GlobalPublicHealthBostonCollege_Landrgan_FAV_SB030**
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BOSTON COLLEGE

**Philip J. Landrigan, MD, MSc, FAAP**
**Director, Program in Global Public Health and the Common Good**
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## STATEMENT OF PHILIP J. LANDRIGAN, MD, MSc, FAAP

February 11, 2020

**Re: SB 300– Pesticides –Use of Chlorpyrifos - Prohibition**
**Submitted to:** The Senate Education, Health and Environmental Affairs Committee
**Position:** In support of SB 300

### A Ban on Chlorpyrifos Will Safeguard the Health of Maryland's Children

I am a pediatrician,, public health physician and epidemiologist. I currently serve as Director of the Program in Global Public Health and the Common Good at Boston College. I am also Professor Emeritus of Preventive Medicine and Pediatrics and Chair Emeritus of the Department of Preventive Medicine at the Icahn School of Medicine at Mount Sinai. Until June, 2018 I was Professor of Preventive Medicine, and Pediatrics, and Dean for Global Health at the Icahn School of Medicine at Mount Sinai.

I have undertaken research to understand the impacts of toxic chemicals on children's health, and I have worked for more than four decades to protect children against toxic chemicals and other environmental hazards. I am an elected member of the National Academy of Medicine.

From 1988-1993, I chaired a National Academy of Sciences' Committee on Pesticides in the Diets of Infants and Children. This Committee was convened at the request of the Committee on Agriculture of the United States Senate. Its investigations found that children, including children in the womb, are uniquely susceptible to pesticides - much more vulnerable than adults - and provided the blueprint for the Food Quality Protection act of 1996, the federal law on pesticides.

*****

Chlorpyrifos is an organophosphate insecticide, a member of class of chemicals deliberately engineered to be toxic to the brain and nervous system. It is through injury to nervous system that organophosphate insecticides kill insects, and it is also through injury to the brain and nervous system that these chemicals cause acute and chronic poisoning in humans. Perhaps the most notorious member of the organophosphate family is sarin, the war gas used in the 1995 Tokyo subway attack.

Chlorpyrifos is highly toxic to the developing brains of infants and young children. Infants in the womb are especially vulnerable. When a pregnant woman is exposed to chlorpyrifos, the chemical moves

immediately from her bloodstream into the bloodstream of her unborn child to cause fetal brain damage.

Three recent epidemiologic studies confirm that exposure to chlorpyrifos during the nine months of pregnancy has harmful effects on children's brains that persist at least to the age of 7 years. These three studies, based on different populations, located in distinct geographical regions of the US, with different routes of exposure, and using different biomarkers of exposure, have produced strongly convergent results. One study from the University of California at Berkeley reported harmful effects on cognition – reductions in IQ scores - among the children of agricultural workers in the Salinas Valley. The second study was undertaken at my institution, the Mount Sinai School of Medicine, and found similar effects in a New York City Hispanic population, whose exposures were largely residential. And the third study, also conducted in New York City by investigators at Columbia University among a population of African-American and Dominican children found negative effects of prenatal chlorpyrifos exposure on children's brain development.

In addition to damaging children's cognitive abilities and reducing their IQ, chlorpyrifos exposure during pregnancy is associated also with changes in children's social behavior and with developmental delays. Thus the Columbia University study found that children with higher exposures in the womb to chlorpyrifos were behind their peers from the same communities in motor and mental development by age three. These children were also more than 5 times more likely to be diagnosed on the autism spectrum, more than 6 times more likely to have ADHD-type symptoms, and more than 11 times more likely to have symptoms of other attention disorders.

Another striking finding from the Columbia University study was that children born before a ban on residential use of chlorpyrifos that took effect in the United States in the year 2000 had much higher exposure levels, tended to be smaller, had poorer reflexes, and had smaller head circumference at birth than children born after the ban. Small head circumference at birth is an indicator impaired brain development during pregnancy and is also one of the hallmarks of prenatal Zika virus infection.

Most recently, a study using magnetic resonance imaging (MRI) found that even low to moderate levels of prenatal exposure to chlorpyrifos – levels that are below current EPA standards - may lead to long-term, potentially irreversible changes in the structure of the developing brain. This study was undertaken within the population of chlorpyrifos-exposed children followed at Columbia University.

It is important to note that in addition to being exquisitely sensitive to chlorpyrifos, infants and small children are also extensively exposed to this insecticide. Due to their small body size and greater intake of food per pound of body weight, EPA estimates that children ages 1 to 12 are exposed to significantly more chlorpyrifos through their diets than adults. Chlorpyrifos is authorized for use on nearly 50 food crops, including fruits, vegetables, and nuts heavily consumed by children. In annual tests for pesticide residues on conventionally grown produce, the U.S. Department of Agriculture finds chlorpyrifos on commonly eaten fruits and vegetables, with especially high concentrations on peaches and nectarines.

In conclusion, the medical evidence is consistent and it is overwhelming. Children are extensively exposed to chlorpyrifos, and chlorpyrifos can cause permanent injury to children's brains, and these risks are greatest to unborn children. Chlorpyrifos reduces children's intelligence, impairs their social functioning, and ultimately reduces their ability to contribute to the United States of America. To permit the continuing exposure of unborn children to a chemical that damages their brains is not only an affront to morality, but also a threat to the security of our nation.

Given US EPA's most recent appeal of the 9th Circuit Court of Appeals ruling in August 2018 stating that the EPA must "revoke all tolerances and cancel all registrations for chlorpyrifos", it behooves states to take the lead on banning chlorpyrifos". The previous EPA administrator Scott Pruitt chose to disregard his own agency scientists' recommendation that chlorpyrifos be banned for all agricultural uses, resulting in several state attorney generals, including Maryland Attorney Brian Frosh suing the agency. The 9th Circuit Court ruled that there was *"no justification for the EPA's decision … in the face of scientific evidence that its residue on food causes neurodevelopmental damage to children."* EPA will likely continue its efforts to keep chlorpyrifos on the market.

I urge this committee to pass a favorable report on SB 300 for an immediate ban on all uses of chlorpyrifos in the state of Maryland. It is urgently needed to protect the health of Maryland's children.

***Philip J. Landrigan, MD, MSc, FAAP*** *is Director of the Program in Global Public Health and the Common Good within the Schiller Institute for Integrated Science and Society at Boston College. He is also Professor Emeritus of Preventive Medicine and Pediatrics and Chair Emeritus, Department of Preventive Medicine in the Icahn School of Medicine at Mount Sinai*

*Dr. Landrigan's research on the effects of lead poisoning in children contributed to the U.S. government's decision to remove lead from gasoline and paint. His leadership of a National Academy of Sciences Committee on Pesticides in the Diets of Infants and Children generated widespread understanding that children are uniquely vulnerable to pesticides and other toxic chemicals and helped to secure passage of the Food Quality Protection Act of 1996, the only federal environmental law in the United States that contains explicit protections protecting the health of children. In New York City, Dr. Landrigan was centrally involved in the medical and epidemiologic follow-up studies of the first responders to the attacks on the World Trade Center on September 11, 2001. He has consulted to the World Health Organization and chaired The Lancet*-Mount Sinai Global Commission on Pollution & Health.

*Dr. Landrigan is a graduate of Boston Latin School, Boston College, Harvard Medical School and the London School of Hygiene & Tropical Medicine. He is a 41-year veteran of the US Public Health Service and the US Navy and retired from the Navy at the rank of Captain (O-6).*

Sincerely,

Philip J. Landrigan, MD, MSc, FAAP

**FarmworkerJusticeMCN_Liebman_FAV_SB0300**
Uploaded by: Liebman, Amy
Position: FAV

February 11, 2020

**The Senate Education, Health, and Environmental Affairs Committee**
**In support of SB 330: Pesticides – Use of Chlorpyrifos – Prohibition**

**Submitted by: Amy Liebman, Iris Figueroa, Dr. Rosemary Sokas**

My name is Amy Liebman and I am the Director of Environmental and Occupational Health at Migrant Clinicians Network and I am based in Salisbury, MD. I am writing on behalf of Farmworker Justice and the Migrant Clinicians Network. Farmworker Justice seeks to empower farmworkers to improve their living and working conditions, including their occupational health. MCN is dedicated to migration health and provides extensive training and technical assistance to clinicians across the country serving farmworkers and rural communities. Both are national non-profit organizations with a long history of working to protect the health and working conditions of those who harvest our nation's food. We support farming practices that provide for a safe work environment and seek to decrease the exposure of farmworkers and their families to toxic chemicals. Farmworkers play an important role in our nation's agricultural success and we should do all we can to ensure adequate safeguards for their health.

We urge you to support SB 330 to ban chlorpyrifos use in Maryland. Please consider the impact of this chemical on the health of Marylanders, particularly those who are most vulnerable and most exposed. Farmworkers and their families are routinely exposed to high levels of pesticides in the fields where they work and in the communities where they live. Pesticide exposure causes farmworkers to suffer more chemical-related injuries and illnesses than any other workforce in the nation. They are historically one of the most economically disadvantaged labor groups in the country, working in an industry known for long days, hazardous work, and low wages. The vast majority of these workers have no health insurance, and limited access to health care, making them particularly vulnerable to environmental and occupational health hazards.

Chlorpyrifos poses a significant risk to farmworkers. In its most recent Human Health Risk Assessment for chlorpyrifos, EPA found that there are no safe levels of the pesticide in food or water, that unsafe exposures to farmworkers continues to occur on average 18 days after applications (despite worker re-entry times no longer than 5 days) and that workers who mix and

apply chlorpyrifos are exposed to unsafe levels even when using protective gear and engineering controls.[1]

In 2000, the EPA banned the use of chlorpyrifos in residential settings because of emerging evidence that it posed unacceptable neurodevelopmental risks to young children. But the agency allowed continued use of the pesticide in agriculture, resulting in exposure to the children of farmworkers and other rural residents. In the 20 years since, this double standard has exposed a generation of farmworkers and their children through airborne drift, water contamination, and even the residues on their parents' work clothes.

I will not review the extensive epidemiologic research that confirms serious, permanent neurodevelopmental effects of very low doses of chlorpyrifos exposure in utero or during childhood, which others describe in detail. My point is that farmworkers and their families in Maryland cannot be adequately protected from these outcomes unless there is a ban on the use of chlorpyrifos.

Chlorpyrifos is absorbed through the skin, through the lungs, and through the gut. Farmworkers in Maryland are exposed when they mix or apply the chemical, when they work near an area where chlorpyrifos spraying takes place and are contaminated by drift, or when they enter a field that has previously been sprayed and has residual chemical exposure. Farmworkers exposed at work transport pesticides on their work clothing, shoes, hair and skin into family vehicles and their homes. And farmworker families, particularly those living in labor camps or in substandard dwellings near the fields where they work, experience these exposures essentially around the clock. In Maryland, chlorpyrifos is used for corn, soybeans, vegetables and fruit.

The most immediate concern is for the pregnant farmworker. It is not possible to reduce the level of exposure below the threshold for damaging the fetus. Personal protective equipment is not 100% effective and contributes to the workers' heat burden, which itself can be dangerous. Similarly, field sanitation provisions for handwashing are simply not adequate to reduce the levels of exposure below those known to cause harm. The water provided to workers to prevent heat illness is yet another source of contamination at these low levels.

Farmworkers experience chronic and acute exposure to chlorpyrifos. In 2014, Raynor and others published a report of 371 migrant farmworkers in North Carolina who were found to have levels of urinary chlorpyrifos metabolites (among other pesticides) that were an order of magnitude greater than those found in the US population as a whole.[2] In the past two years, MCN has

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[1] US Environmental Protection Agency. Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review at 36-7. Health Effects Division, Office of Pesticide Programs at 36-7 (November 3, 2016). https://www.epa.gov/ingredients-used-pesticide-products/revised-human-health-risk-assessment-chlorpyrifos

[2] Raymer JH, Studabaker WB, Gardner M, Talton J, Quandt SA, Chen H, Michael LC, McCombs M, Arcury TA. Pesticide exposures to migrant farmworkers in Eastern NC: detection of metabolites in farmworker urine associated

helped physicians and other healthcare providers respond to two acute worker poisoning outbreaks from chlorpyrifos. Poisoned workers suffered from dizziness, nausea, vomiting and they are being monitored for the long-term effects from these incidents. The majority of the workers in both outbreaks were not even working directly with chlorpyrifos. Unbeknownst to the workers in both outbreaks, chlorpyrifos had been sprayed on a nearby field and drifted onto the workers, causing acute poisonings. It's important to make clear that no amount of use of this pesticide is safe. Even a "judicious," one time use of chlorpyrifos in a specific season will expose farmworkers and others living nearby to harm, as traces of chlorpyrifos will drift onto their yards and playgrounds and leach into their drinking water.

Let's all be aware that chlorpyrifos does not discriminate between farmworker families and farmer families when it comes to exposure routes, and family impact may not be limited to children. A 2017 paper published from the Agricultural Health Study has identified a borderline but statistically significant increased risk for pre-menopausal breast cancer among women who reported using chlorpyrifos, consistent with its known effects as an endocrine disrupting chemical.[3]

Farmworker Justice and MCN urge the committee to issue a favorable report on SB 330 that is critically needed to protect Maryland's farmer and farmworker families.

Amy K. Liebman, MPA, MA, Director of Environmental and Occupational Health, Migrant Clinicians Network. Ms. Liebman heads MCN's Eastern Region Office based in Salisbury, MD.

Iris Figueroa, JD, Senior Staff Attorney, Farmworker Justice

Rosemary Sokas, MD, MOH, Professor of Human Science and of Family Medicine, Georgetown University Schools of Nursing & Health Science and of Medicine

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**FederatedGardenClubsMd_Locke_FAV_SB0300**
Uploaded by: Locke, Sherry
Position: FAV

# Testimony on behalf of The Federated Garden Clubs of Maryland

**<u>In Support of</u>: SB 300–Maryland Chlorpyrifos Ban Bill**
**Senate Education, Health and Environmental Affairs Committee**
**February 11, 2020**

Good afternoon Mr. Chairman and Members of the Education, Health and Environment Committee.

My name is Sherry Locke, I am the President of the Amateur Gardeners Club, which is a founding member of the Garden Club of America (GCA) and a member of the Federated Garden Clubs of MD (FGCM), which I am representing. Federated Garden Clubs of Maryland is comprised of 99 garden clubs with 3,558 members divided into five districts located throughout the state, from the Eastern Shore to the mountains of Western Maryland.

The Garden Club of America holds that we can garden without toxic pesticides. We really only use pesticides as a last resort. While residential gardens are certainly not farms, golf courses or vineyards, gardeners also deal with pest pressures. We gardeners are additional proof that pest eradication can be accomplished without a brain-damaging pesticide like chlorpyrifos in the tool box.

I am here today on behalf of FGCM to strongly support Senate Bill 300. In my capacity as president of a garden club, I, along with other garden club presidents, advocate for a healthy environment. Gardeners know that we must work with nature. The growing demand for clean, healthy produce has increased the demand for no - or least toxic - pesticide use in farming and our food. Some farmers, golf courses, and vineyards in Maryland have already proven they can maintain crop production without using brain-damaging chlorpyrifos. In order for our gardens to grow, as with farms, we need the pollinators including - bees, butterflies, birds and insects. Gone are the days when we would routinely spray pesticides and herbicides without regard to the harm we were causing, as in the case with chlorpyrifos.

I am also a mother and grandmother. If I would not allow my children to play in fields or eat fruits sprayed with chlorpyrifos, why would I not want the same for other children?

You have been elected to protect the state of Maryland and all of its inhabitants – human, animal, fish, plants. Together we can make Maryland a healthy, vibrant state. We only have one earth; and as far as I know, it is the only habitable planet. We have been given a tremendous gift, let's not put it in the rubbish heap. I, and the Federated Garden Clubs of MD, urge you to pass Senate Bill 300.

Thank you.
Sherry Locke

**McDanielHoneyFarm_McDaniel_FAV_0300**
Uploaded by: McDaniel, Steve
Position: FAV

McDaniel Honey Farm
4964 Wentz Road, Manchester, Maryland 21102

February 11, 2020

Chairman Paul Pinsky
Vice Chair Cheryl Kagan
Members of the Senate Education, Health & Environmental Affairs Committee

**Testimony in Support of SB 300**: Pesticides - Use of Chlorpyrifos - Prohibition

Mr. Chair, Ms. Vice Chair and Members of the Committee:

I am a professional beekeeper for over 30 years and a Board Member of the Central Maryland Beekeepers Association. I am also Past President of the Central Maryland Beekeepers Association, the Carroll County Beekeepers Association, and the Maryland State Beekeepers Association, as well as certified as a Master Beekeeper (one of about 150 in the U.S.) by the Eastern Apicultural Society. I have a degree in chemistry from Harvard.

In 2017, many of the bees in my hives died on the ground in my apiary. The Maryland Department of Agriculture answered my call for help, and an MDA employee came and collected samples of the dead bees on the ground and the comb inside the hives. The MDA found one insecticide from their tests: chlorpyrifos. The amount was listed as a 'trace' because their test was not very sensitive. The limit of detection--20 ppb--is more than enough to kill a bee. I did not even know that chlorpyrifos was being used on farms in my neighborhood near Manchester, but it appears that chemical likely killed my bees.

Honeybees are far more than just bugs in a box. They are critical to agriculture for pollination of fruits and vegetables. Bees in Maryland are in serious decline. In the last ten years, beekeepers have been contending with unacceptably high losses of 50-100% annually. This is financially unsustainable and county bee associations are experiencing significant attrition as people leave beekeeping after several years of such losses. These losses have a financial impact for the beekeeper, who invests to replace lost hives and then labors all year so the new hive will produce a honey crop the following summer.

I estimate that the deaths of my bees since 2012 have cost me over $100,000, and I am a small-scale beekeeper trying to maintain about 20 colonies. I am currently down to three, from 18 in September. With losses over 10-15%, beekeeping is a losing proposition that is unsustainable for the beekeeper and ultimately will impact farmers' production and the cost of food. Chlorpyrifos is the second most harmful pesticide for bees and the third most prevalent pesticide found in honeybee hives. It causes brain damage to bees, impairing critical communication and navigation function, and harms reproduction.

Chlorpyrifos is a deadly poison, chemically similar to nerve gas. It is an act of desperation to use it on a farm, as there are many other options that are not as toxic. In my opinion, it should never have been allowed to be sold in the first place, especially considering the severe damage it does to people's nervous systems. Children are especially sensitive to it, and many kids now suffer from learning disabilities that may have been avoided. The EPA studied it for many years and made the decision to ban it nationally, which was overturned by the current administration. For decades, it has been killing bees and harming people because the EPA did not do its job of protecting the environment, the bees, and us. It is now up to you to do their job for them by banning the use and sale of chlorpyrifos in Maryland. It is only one state, but it is our state. Please support HB 229.

Thank you,
Stephen McDaniel

**UMDCtrEnvironmentalScience_Mitchelmore_FAV_SB0300**
Uploaded by: Mitchelmore, Carys
Position: FAV

**Written Testimony of Carys L. Mitchelmore, Ph.D.**
**To the Senate Education, Health and Environmental Affairs Committee**
**Regarding SB 300: Pesticides – Use of Chlorpyrifos - Prohibition**

**February 11th, 2020**

*Carys L. Mitchelmore, Ph.D., Professor*
*University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, Solomons, MD 20688*

Chairman Pinsky, Vice Chairwoman Kagan and members of the Committee, I would like to take this opportunity to thank you for considering my written testimony outlining the state of the science on the impact of chlorpyrifos to aquatic organisms. My name is Dr. Carys Mitchelmore. I am a Professor at the University of Maryland Center for Environmental Science (UMCES), Chesapeake Biological Laboratory. My field of study is in environmental health and aquatic toxicology and includes research into the fate and effects of chemical contaminants on organisms. Today I am representing my personal views as a researcher in the field of environmental health and as a local citizen of the Chesapeake Bay watershed. My views do not reflect the Institution where I work. I will specifically focus on the weight of evidence in the scientific literature relating to the toxicity of the pesticide chlorpyrifos on aquatic organisms.

From my synthesis of the current literature I have two main summary findings to highlight:

1. Chlorpyrifos is widespread in streams and rivers, including in Maryland waterways.
2. Chlorpyrifos is present in aquatic environments at concentrations that may cause harm to a variety of aquatic organisms and also negatively impact various ecosystem services.

Chlorpyrifos has been in use since 1965 as a broad-spectrum chlorinated organophosphate insecticide and is used in agriculture (e.g. on grain, cotton, fruit, nut and vegetable crops), used on farm animals, domestic dwellings and on lawns and ornamental plants. It is effective by direct contact, ingestion and inhalation. This insecticide works by interfering with the enzyme cholinesterase that is essential for the proper working of the nervous system. Specifically, it inhibits the breakdown of the neurotransmitter, acetylcholine, resulting in overstimulation of the nerve cells causing neurotoxicity and ultimately death (Karanth and Pope 2000, USDHSS 1997). Although it can also interact with other enzymes in the body too and impair an organisms normal function as outlined below (Karanth and Pope 2000).

Although this pesticide should not be applied directly to water, chlorpyrifos has been measured in aquatic ecosystems in a number of studies and has been ranked third on the 2006 Chesapeake Bay "Toxics of Concern" list having been detected in 90% of all environmental samples analyzed (Chesapeake Bay Program 2006). This may be due to agricultural runoff, leaching, atmospheric transport, spray drift and improper disposal. The presence of chlorpyrifos in aquatic systems exposes aquatic organisms that may accumulate it, potentially resulting in a number of toxicological impacts. **Indeed over 40% of the samples analyzed in the Chesapeake Bay were at concentrations that exceeded toxicity thresholds indicating potential impacts** (Chesapeake Bay Program 2006).

**Chlorpyrifos is highly effective at controlling insects, however, many studies have shown that it is also very highly toxic to other organisms, such as, fish and aquatic insects** as normal functioning and activity of acetylcholine is essential for normal behavior and muscular function. USEPA 1989, 2017, Barron and Woodburn 1995, Deb and Das 2013). **Exposing fish to low environmentally relevant concentrations of chlorpyrifos has been shown to cause acute toxicity (death)** through inhibition of cholinesterase activity (NYSEDC 1986). For example, acute toxicity concentrations are at low part per billion concentrations in a number of fish (i.e. 96-hour LC50's; the lethal concentration that kills 50% of the population), such as, rainbow trout (3-7ppb) and bluegill sunfish (2-3ppb)(Deb and Das 2013). **Therefore, chlorpyrifos has been classified as very highly toxic to fish. There are many similar fish species in the streams and rivers of the Chesapeake Bay that may also be similarly affected at these low concentrations**. Acute toxicity (i.e. 48-hour LC50s) for aquatic invertebrates has been seen at even lower concentrations of chlorpyrifos, for example, 0.5 and 1.7 ppb for Korean shrimp and *Daphnia* sp. respectively

(Tomlin 2006). Losing important invertebrate species can have drastic effects to the trophic food web as the prey base is lost and also may impact important ecosystem services, such as nutrient recycling and leaf litter breakdown. Furthermore, the toxicity of chlorpyrifos has been shown to increase with other co-stressors, including those relevant to climate change, such as, increasing temperatures (Schimmel et al. 1983). This is very important for Chesapeake Bay organisms as they are exposed to these chemicals and also experiencing increased water temperatures due to climate change. In addition, **chlorpyrifos can impact the fish directly due to its toxicity but also indirectly by reducing the amount of invertebrate prey that the fish rely on for food.**

**In addition to acute toxicity, various sublethal effects of exposure to chlorpyrifos at low, environmentally-relevant concentrations have also been demonstrated that ultimately may impact the growth, survival and reproductive success of aquatic organisms** (TOXNET 1986, Sunanda et al. 2016). Multiple mechanisms of effect include, damage to DNA (Ali 2008, Ismail et al. 2018), liver problems (Muttappa et al. 2015), blood cell changes (Ismail et al. 2018, Sunanda et al. 2016), oxidative stress and alterations in protective antioxidant mechanisms (Goel et al. 2005), neurobehavioral and neurochemical changes (Slotkin et al., 2005). Studies in larval and embryonic fish show problems with development, their body shape and form, and behavior, including alterations in swimming (Levin et al. 2003, 2004, Richendrfer et al. 2012). Exposures of juvenile common carp demonstrated an array of irregular and erratic swimming movements, in addition to body form changes and deformities (Halappa and David, 2009). **Chlorpyrifos causes permanent neurotoxic effects also at low concentrations** (Sledge et al. 2011). There is also evidence that **chlorpyrifos may be an endocrine disruptor in fish** and interfere with steroid hormone (e.g. cortisol) production at low parts per billion concentrations, which are responsible for normal homeostatic mechanisms and immune function (Oruc 2010).

**In December, 2017, the National Marine Fisheries Service (NMFS) in their biological opinion report concluded that three pesticides, including chlorpyrifos, were likely to significantly impact the survival of salmon species** (genus *Oncorhynchus*), many of which are already endangered species of fish. **We have similar fish species as these in the Chesapeake Bay that may also be impacted, for example the freshwater Brook trout (genus *Salvelinus* or Char) and Rainbow trout**. Rainbow trout belong to the genera *Oncorhynchus* as do Pacific Salmon. This report, highlighted that chlorpyrifos is affecting 38 species of endangered fish (NMFS 2017). Bioaccumulation of chlorpyrifos in the tissues of aquatic organisms, including fish, has been observed with values ranging from 58 to 5100 (i.e. accumulations up to 5100 times more concentrated in the tissues than levels of the chemical in water; Ahmad et al. 2000, Banu et al. 2001, Racke 1992). Indeed, **the NMFS report also stated that chlorpyrifos negatively impacts the orcas that eat the pesticide-contaminated salmon. The Chesapeake Bay also has a number of higher trophic level organisms (including humans) that could also eat pesticide-contaminated fish and so there may also be food-web implications.**

In summary, there are a number of studies demonstrating that chlorpyrifos is present in the Chesapeake Bay at concentrations that may be detrimental to a number of important species in the Bay. This includes aquatic invertebrates that perform essential ecosystem services and are important food sources for recreationally, commercially and ecologically important fish species. Studies have also shown significant impacts, including endocrine disruption, behavioral and genetic integrity changes in fish and other vertebrate species at these environmental concentrations and warrants concern and further investigation. If you would like a further explanation or copies of the listed references please contact me.

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**ChesapeakeBayFoundation_Myers_FAV_SB0300**
Uploaded by: Myers, Doug
Position: FAV

# CHESAPEAKE BAY FOUNDATION

*Environmental Protection and Restoration*
*Environmental Education*

**Senate Bill 300**

Pesticides – Use of Chlorpyrifos - Prohibition

**DATE: FEBRUARY 11, 2020** **POSITION: SUPPORT**

**POSITION**

Chesapeake Bay Foundation urges a favorable report from the Senate Education Health and Environmental Affairs Committee on SB 300.

**COMMENTS**

It has been known since at least the early 1990s that, in general, aquatic and terrestrial microorganisms and plants are tolerant to chlorpyrifos exposure. Chlorpyrifos binds strongly to soils, is relatively immobile, and has low water solubility. In contrast, its degradate TCP adsorbs weakly to soil particles and is moderately mobile and persistent in soils[1]. Aquatic invertebrates, particularly crustaceans and insect larvae, are quite sensitive to exposure. Lethal Concentrations for 50 percent of the population, or LC50s, are generally less than 1 microgram/L and No-observed-effect concentrations (NOECs) may be below 0.1 microgram/L in laboratory studies. [2] Numerous studies on chlorpyrifos describe affects to the central nervous system of crustaceans impairing their physiology, behavior, survival and reproduction, leading to further ecosystem effects changing the balance of predators and prey. Chlorpyrifos physically sorbs to particles and can be transported by dust in agricultural areas to deposit during rainfall runoff events at concentrations beyond what would be expected from the most recent application rate[3].

There is potential for chlorpyrifos to bioaccumulate in the tissues of aquatic species[4] Residues of chlorpyrifos found in fish tissue included the metabolites TCP and two glucuronide conjugates of TCP. Researchers exposed various fish species to chlorpyrifos continuously during early development, and calculated bioconcentration values ranging from 58 to 5100[5].

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[1] Reregistration Eligibility Science Chapter for Chlorpyrifos Fate and Environmental Risk Assessment Chapter; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs, Environmental Fate and Effects Division, U.S. Government Printing Office: Washington, DC, 1999.

[2] Reviews of Environmental Contamination and Toxicology 1995, 144-1-93 Ecotoxicology of chlorpyrifos, Barron M.G. and Woodburn K.B.

[3] Diazinon and Chlorpyrifos Loads in Precipitation and Urban and Agricultural Storm Runoff during January and February 2001 in the San Joaquin River Basin, California, Celia Zamora, Charles R. Kratzer, Michael S. Majewski, and Donna L. Knifong

[4] Reregistration Eligibility Decision (RED) for Chlorpyrifos; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs, U.S. Government Printing Office: Washington, DC: 200

Kamrin, M. A. Pesticide Profiles Toxicity, Environmental Impact, and Fate; Lewis Publishers: Boca Raton, FL, 1997; pp 147- 152.

Racke, K. D. Environmental Fate of Chlorpyrifos. Rev. Environ. Contam. Toxicol. 1993, 131, 1-150

[5] Ibid

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*The Chesapeake Bay Foundation (CBF) is a non-profit environmental education and advocacy organization dedicated to the restoration and protection of the Chesapeake Bay. With over 300,000 members and e-subscribers, including over 107,000 in Maryland alone, CBF works to educate the public and to protect the interest of the Chesapeake and its resources.*

As part of a re-registration review, National Marine Fisheries Service, produced a biological opinion that finds Chlorpyrifos will reduce the abundance and productivity of Atlantic sturgeon. Anticipated levels from ongoing mosquito control in Chesapeake Bay are sufficient to kill fish and invertebrates throughout the sturgeon's critical habitat[6].

The potential for ongoing harm to Maryland's iconic blue crab fishery as well as the myriad insect larvae and other crustacean species that support the base of our aquatic and estuarine food web of the Chesapeake Bay is too great to allow continued use of this known toxic chemical, especially when alternatives exist.

**CONCLUSION**

For these reasons, CBF urges a favorable report on SB 300. If you have any questions, please feel free to contact Doug Myers, Maryland Senior Scientist, at 443-482-2168 or dmyers@cbf.org

[6] National Marine fisheries Service, Endangered Species Act Section 7 Biological Opinion, The Environmental Protection Agency's Registration of Pesticides containing Chlorpyrifos, Diazanon and Malthion, FPR 2017-9241, December 29, 2017

CHESAPEAKE BAY FOUNDATION
*Saving a National Treasure*

July 23, 2018

Submitted via regulations.gov and U.S. Mail

Mr. Andrew Wheeler, Acting Administrator
Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

**RE: Chesapeake Bay Foundation Comments, *Chlorpyrifos, Diazinon, and Malathion; National Marine Fisheries Service Biological Opinion Issued Under the Endangered Species Act; Notice of Availability***
**Docket ID. No. EPA-HQ-OPP-2018-0141; FRL-9975-59**

Dear Acting Administrator Wheeler:

The Chesapeake Bay Foundation, Inc. (CBF) respectfully submits these comments in response to the above-referenced Notice of Availability, *Chlorpyrifos, Diazinon, and Malathion; National Marine Fisheries Service Biological Opinion Issued Under the Endangered Species Act*.[1] CBF is a 501(c)(3) non-profit organization, founded in 1967. The organization's mission – carried out from offices in Maryland, Virginia, Pennsylvania and the District of Columbia – is to restore and protect the ecological health of the Chesapeake Bay, one of the nation's most vital estuaries. As such, and on behalf of our over 275,000 members across the United States, we are very interested in matters that impact the health of the aquatic life in the Chesapeake Bay and the waters that feed into it.

In its Notice, EPA seeks comment on the final Biological Opinion issued by the National Marine Fisheries Service (NMFS) regarding the potential effects of chlorpyrifos, malathion, and diazinon on federally listed or endangered species and their designated critical habitats (BiOp).[2] This BiOp was generated by NMFS, as required by the Endangered Species Act and in response to a court-ordered deadline.[3]

[1] 83 FR 12754, March 23, 2018.
[2] National Marine Fisheries Service, Endangered Species Act, Section 7, Biological Opinion, *The Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion,* FPR-2017-9241, December 29, 2017, https://doiorg/10.7289/V5CJ8BQM.
[3] *See* EPA, *Chlorpyrifos, Diazinon, and Malathion; National Marine Fisheries Service Biological Opinion Issued Under the Endangered Species Act; Notice of Availability*, 83 FR 12754, 12755, March 23, 2018, *citing*, *Nw. Coal. For Alternatives to Pesticides, et al. v. NMFS*, Stipulation and Order, Dkt. 50, No. 07-1791-RSL (D. Wash. May 21, 2014).

EPA seeks stakeholder input prior to its decision to either reinitiate consultation on the BiOp or implement the measures of the BiOp. Our comments focus on the impacts of chlorpyrifos to the Chesapeake Bay, and particularly to the Atlantic Sturgeon. The consideration of banning chlorpyrifos has been going on for far too long. CBF therefore strongly urges EPA to implement the measures of the BiOp and recommends that the BiOp acknowledge the potentially higher risk for exposure to chlorpyrifos in the Distinct Population Segment (DPS) for the Chesapeake Bay.

**I. Background**

Chlorpyrifos is an insecticide commonly used in agriculture and, as the BiOp finds, it is "highly toxic to mammals, fish and aquatic invertebrates."[4] Indoor use of the chemical was banned in 2000 and EPA proposed a complete ban on the substance in 2015. On March 29, 2017, EPA reversed course and denied a petition asking it to revoke all pesticide tolerances and cancel all chlorpyrifos registrations, announcing that it would allow chlorpyrifos to remain on the market until 2022, pending further study.[5] As noted above, the BiOp was prepared by the NMFS in response to a court-ordered deadline and the EPA now seeks comment on the findings of that opinion.

**II. Chlorpyrifos Poses a Particular Threat to the Chesapeake Bay.**

Chlorpyrifos, used on golf courses and widely used on row crops in the Bay region, makes its way into the Chesapeake Bay and its rivers and streams.[6] Chlorpyrifos physically adsorbs to particles and can be transported by dust in agricultural areas during rainfall runoff events. USGS research on this dynamic suggests that the early parts of storms, after long dry spells, can deliver chlorpyrifos at concentrations beyond what would be expected from the most recent application rate.[7]

Indeed, of the thousands of chemicals found in sediments, fish and water in the Chesapeake Bay, chlorpyrifos ranks **third** on the most recent "Toxics of Concern" list.[8] The ranking reflects those chemicals of greatest concern based on estimates of loads, presence in the Bay, and toxicity to aquatic species.

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[4] National Marine Fisheries Service, Endangered Species Act, Section 7, Biological Opinion, *The Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion,* FPR-2017-9241, December 29, 2017, p. 5, https://doiorg/10.7289/V5CJ8BQM.

[5] *See* EPA, Chlorpyrifos, EPA Actions and Regulatory History, found at: https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos#actions.

[6] National Marine Fisheries Service, Endangered Species Act, Section 7, Biological Opinion, *The Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion,* FPR-2017-9241, December 29, 2017, pp. 1081-1089, https://doiorg/10.7289/V5CJ8BQM; *See also:* https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos.

[7] *Diazinon and Chlorpyrifos Loads in Precipitation and Urban and Agricultural Storm Runoff During January and February 2001 in the San Joaquin River Basin, California,* Celia Zamora, Charles R. Krataer, Michael S. Majewski, and Donna L. Knifong.

[8] https://www.chesapeakebay.net/documents/Prioritized_Chesapeake_Bay_Organic_Toxics_of_Concern_Method_and_Assessment_2006.pdf).

It was found in more than 90% of water samples that were analyzed for this chemical, and 40% of those had concentrations that exceeded thresholds indicating possible ecological effects.[9] In addition, aquatic invertebrates, particularly crustaceans and insect larvae, are very sensitive to exposure. Lethal concentrations for 50 percent of the population, or LC50s, are generally less than 1 microgram/L and No-observed-effect concentrations (NOECs) may be below 0.1 microgram/L in laboratory studies.[10] Numerous studies on chlorpyrifos describe effects to the central nervous system of crustaceans impairing their physiology, behavior, survival and reproduction leading to further ecosystem effects changing the balance of predators and prey.[11]

Chlorpyrifos is an obvious threat to the Bay – and particularly to the blue crab fishery as well as the myriad insect larvae and other crustacean species that support the base of the aquatic and estuarine food web. As the BiOp finds, it is also a threat to the Atlantic Sturgeon and should be regulated accordingly. CBF supports the conclusions of the BiOp and offers the following additional consideration to the DPS for the Chesapeake Bay.

**III. CBF Supports the Findings of the BiOp in General and Recommends that the BiOp Acknowledge the Potentially Higher Risk to the Atlantic Sturgeon in the Nanticoke Watershed.**

The BiOp acknowledges that "[c]urrent application rates and application methods are expected to produce aquatic concentrations of all three pesticides that are likely to harm aquatic species as well as contaminate their designated critical habitats."[12] CBF agrees with this statement and while the BiOp is thorough in its review of potential risks to listed species through typical pathways of exposure on a nationwide basis, it seems less protective of Atlantic Sturgeon in the Chesapeake Bay if the landscape context is considered.

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[9] *Id.*

[10] Reviews of Environmental Contamination and Toxicology 1995, *Ecotoxicology of Chlorpyrifos*, Barron M.G. and Woodburn K.B, pp. 144-1-93.

[11] *See* Ecotoxicology and Environmental Safety, *Embryo-toxic effects of environmental concentrations of chlorpyrifos on the crustacean* Daphnia magna, P. Palma, *et. al*., Volume 72, Issue 6, September 2009, pp. 1714-1718, https://www.sciencedirect.com/science/article/pii/S0147651309001006; Journal of Experimental Marine Biology and Ecology, *Cellular energy allocation and scope for growth in the estuarine mysid* Neomysis integer *(Crustacea: Mysidacea) following chlorpyrifos exposure: a method comparison*, Tim Verslycke *et. al*., Vol. 306, Issue 1, July 28, 2004, pp. 1-16, https://www.sciencedirect.com/science/article/pii/S0022098104000243; Environmental Toxicology and Chemistry, Effects of chlorpyrifos on individuals and populations of *Daphnia pulex* in the laboratory and field, Nelly van der Hoeven, Anton A. M. Gerritsen, October 25, 2009, https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/etc.5620161202.

[12] National Marine Fisheries Service, Endangered Species Act, Section 7, Biological Opinion, *The Environmental Protection Agency's Registration of Pesticides Containing Chlorpyrifos, Diazinon, and Malathion,* FPR-2017-9241, December 29, 2017, p. I; https://doiorg/10.7289/V5CJ8BQM.

The BiOp states as follows:

> **Effects analysis summary:**
> Adult and juvenile Atlantic sturgeon, Chesapeake Bay DPS are anticipated to experience reduced abundance and productivity (spawning adults) from exposure to chlorpyrifos. Reduced cholinesterase activity, reduced productivity, reduced prey abundance, and impaired behaviors including ability to swim are anticipated to occur in areas where chlorpyrifos achieves predicted levels. Where formulated products and tank mixtures containing chlorpyrifos occur in aquatic habitats, sturgeon will likely experience more toxicity. The overall risk to Atlantic sturgeon, Chesapeake Bay DPS from the effects of the action is high and the confidence associated with that risk is high.[13]
>
> **Water Quality Risk Hypothesis; Atlantic Sturgeon, Chesapeake Bay DPS, Designated Critical Habitat**
> Comprised water quality occurs when anticipated concentrations of the stressors for the action achieve toxic levels in designated critical habitat. Authorized uses of chlorpyrifos-containing products occur within the designated critical habitat of Atlantic Sturgeon, Chesapeake Bay DPS. Sixteen use site categories, totaling more than 968,635 acres (over 51% of acres) are currently present. In addition, proposed labels for chlorpyrifos allow for mosquito control and wide area use, both of which can be applied to 100% of the species designated critical habitat. The anticipated chlorpyrifos levels in designated critical habitat are sufficient to kill fish and aquatic invertebrates, and for the animals that survive, impaired swimming, reduced reproduction, and reduced growth are anticipated. Multiple (*perhaps all*) habitat types will experience levels that degrade water quality. The likelihood of attaining these concentrations increases with frequency of application, use of the maximum rates, and the proximity to designated critical habitats. Other chemicals within formulations or added to tank mixes increase the extent of water quality degradation.[14]
>
> **Designated Critical Habitat Effects Analysis Summary**
> We anticipate a high likelihood that the stressors of the action will negatively affect physical or biological features (PBFs). Both reductions in prey and degradation of water quality are likely throughout designated critical habitat of Atlantic Sturgeon, Chesapeake Bay DPS. The likelihood and magnitude of toxic effects may reduce overall conservation value of designated critical habitat. We find that the overall risk is high and the confidence associated with that risk is high over the 15-year duration of the action.[15]

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[13] *Id.* at 12-453, 454.
[14] *Id.* at 15-154.
[15] *Id.* at 15-155.

Review of the Atlantic Sturgeon proposed critical habitat in the BiOp differs slightly from the final habitat designations and these should be updated accordingly, especially to acknowledge potential populations in the Marshyhope Creek and Nanticoke River. This is the site of a fragile recovering population, but significant enough for NMFS to designate. The Delmarva Peninsula is a region of heavy agricultural use, especially for grain row cropping which is done in very close proximity to tidal waters. In addition, there are several golf courses located on the Eastern Shore, especially along the Choptank River.[16] Thus, the BiOp should acknowledge the potential for higher risk in this DPS for the Chesapeake Bay and devise special conditions on use.

EPA action regarding its proposed ban of chlorpyrifos is long overdue. CBF therefore urges EPA to implement the measures recommended in the BiOp and consider the additional protections to the Nanticoke watershed mentioned above.

Thank you for the opportunity to comment on the NMFS Biological Opinion Issued under the ESA on Chlorpyrifos, Diazinon and Malathion. Please let us know if we can provide additional information.

Sincerely,

Lisa Feldt

Lisa Feldt
Vice President of Environmental Protection and Restoration

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[16] *See* Maryland Golf Course Map and Guide, https://marylandgolf.com/maps/state.cfm.

**ChildrensEnvHealthNetwork_Whitherspoon_FAV_SB0300**
Uploaded by: Obot Witherspoon, Nsedu
Position: FAV

Children's Environmental Health Network

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Executive Director
Children's Environmental Health Network

February 9, 2020

**Testimony Concerning**
**House Bill 229 and Senate Bill SB 300 – Chlorpyrifos Ban**
**Submitted to Maryland General Assembly**

Position: Support

**Chlorpyrifos is toxic to children's brain development, even at very low levels of exposure. There is no safe level.**

I, Nsedu Obot Whitherspoon, executive director of the Children's Environmental Health Network (CEHN), submit this testimony in strong support of House Bill 229 and Senate Bill SB 300 – to ban the use of chlorpyrifos and protect the health of children.

CEHN is a national non-profit that has been dedicated to protecting children from environmental hazards and promoting a healthy environment for 28 years. CEHN is also a proud member of the Smart on Pesticides Maryland Coalition, which represents 104 member organizations and businesses in advocating for a ban of the toxic pesticide chlorpyrifos.

During this 2020 legislative session, the General Assembly has the historic opportunity to ban chlorpyrifos in Maryland. Along with representing the Smart on Pesticides Coalition and CEHN, I am also a mother of four

Children's Environmental Health Network

Children and a Charles County resident. So both personally, and professionally, I consider this legislation to be one of the most important votes members of both chambers will make this session.

Chlorpyrifos is an inexpensive organophosphate pesticide that has been used since 1965. OPs are toxic nerve agents and have a common method of toxicity; they are designed to impact the central nervous system by blocking an enzyme called acetylcholinesterase. This enzyme normally breaks down acetylcholine, a chemical that the body uses to transmit nerve impulses. It causes insects to convulse and die. **All organophosphate insecticides are toxic and potentially lethal to humans.** Chlorpyrifos is also found in waterways and injures wildlife.

Human exposure to chlorpyrifos can occur through eating fruits and vegetables that have been treated, and through inhalation or skin absorption. Unfortunately, it is used on many kids' favorite fruits including apples, grapes, strawberries and peaches. Exposures can also occur when applying the pesticide, by working and walking in fields where the pesticide has been applied, and by living or going to school near places that have been treated.[i] [ii]

Scientific consensus has found exposure to organophosphate pesticides such as chlorpyrifos can damage children's brains and cause intellectual impairments and neurodevelopmental disorders including poor cognitive, behavioral and social development.[iii] This scientific consensus is based on a wide variety of studies with different locations (urban and rural), diverse populations and methods of measuring exposure.

Additionally, an overwhelming number of studies have linked chlorpyrifos exposure in developing fetuses (several studies have seen changes in the brain structure of children exposed to chlorpyrifos in the womb), infants, children, and pregnant women with a host of impacts including preterm birth, low birth weight, congenital abnormalities, pediatric

cancers, and asthma, in addition to neurobehavioral and cognitive deficits such as lowered IQ, ADHD, and autism spectrum disorders.[iv],[v]

Many of the researchers assessed exposure to chlorpyrifos at low levels of exposure and could not identify a safe level of exposure -- concluding no level is safe. In fact, in 2016, the U.S. Environmental Protection Agency proposed a rule to ban chlorpyrifos after a review of the science citing that even low levels of exposure present a clear risk to children's health and that any level of exposure is unsafe. The Trump administration reversed this decision in 2017 stating that the science was not resolved, and more study was needed.

In 2017 and 2018, additional studies on prenatal exposure to chlorpyrifos in rats added to the weight of epidemiological evidence concerning children's neurodevelopment. These studies found that exposure to chlorpyrifos in the womb caused decreased learning, hyperactivity and anxiety in rat pups at doses lower than those that affected acetylcholinesterase.[vi, vii, viii]

It is also important to consider that farm workers, their children and residents living in agricultural and rural communities are at greater risk. These workers and families have increased exposure to pesticides and can carry the pesticide into the home on their clothes and shoes.[ix], [x] Several studies have found that pregnant women living in an agricultural community have higher exposures to pesticides including chlorpyrifos.[xi] In addition, these families often live in poor areas and have limited access to services, which puts them at even greater risk for adverse health outcomes.

It is cost effective to ban chlorpyrifos. Safe, cost-effective alternatives that are less toxic to humans and the environment are currently used throughout Maryland to target pests on farms, orchards, vineyards, and golf courses. So why risk our children's health when there are safer alternatives available? In addition to these cost-effective alternatives, the economic costs associated with neurodevelopmental problems is large. For example, economists

Children's Environmental Health Network

estimate that it costs twice as much to educate a child with learning and developmental disabilities in the US than a child without disabilities. [xii]

Protecting children is a moral imperative. Children are our most vulnerable population, both in terms of their physiology—children are more susceptible to environmental hazards, like pesticides, due to the continued development of their major organ systems —and because they are not yet able to advocate for their own safety. Eliminating the possibility of exposure to chlorpyrifos through legislation—with no exemptions—is the only action that will keep our children safe.

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[ii] Gunier RB, Bradman A, Harley KG, Kogut K, and Eskenazi B. Prenatal residential proximity to agricultural pesticide use and IQ in 7-year old children. Environ Health Perspec, 2017. 125(5): p. 057002.
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[iv] Gonzalez-Alzaga B, Lacasana M, Aguilar-Garduno C, Rodriguez-Barranco M, Ballester F, Rebagliato M, et al. A systemic review of neurodevelopment effects of prenatal and postnatal organophosphate pesticide exposure. Toxicolo Lett. 2014; 230(2):104-21.
[v] Munoz-Quezadas MT, Lucero BA, Barr DB, Steenland K, Levy K, Ryan PB et al. Neurodevelopmental effects in children associated with exposure to organophosphorus pesticides a systematic review. Neurotoxicology. 2013; 39:158-68.
[vi] Belén Gómez-Giménez, Marta Llansola, Vicente Hernández-Rabaza, Andrea Cabrera-Pastor, Michele Malaguarnera, Ana Agusti, Vicente Felipo. Sex-dependent effects of developmental exposure to different pesticides on spatial learning. The role of induced neuroinflammation in the hippocampus. Food and Chemical Toxicology. 2017; 99: 135-148. ISSN 0278-6915. https://doi.org/10.1016/j.fct.2016.11.028.
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[viii] Jonas G. Silva, Ana C. Boareto, Anne K. Schreiber, Daiany D.B. Redivo, Eder Gambeta, Fernanda Vergara, Helen Morais, Janaína M. Zanoveli, Paulo R. Dalsenter. Chlorpyrifos induces anxiety-like behavior in offspring rats exposed during pregnancy. Neuroscience Letters. 2017; 641: 94-100. ISSN 0304-3940. https://doi.org/10.1016/j.neulet.2017.01.053.
[ix] Lopez-Galvez NWR, Quiros-Alcala L, Ornales Van Horne Y, Furlong M, Avila E, Beamer P. Take-Home Route of Pesticide Exposure, in Reference Module in Earth Systems and Environmental Sciences. ISBN: 9780124095489). 2018.
[x] Bradman A, Salvatore AL, Boeniger M, Castorina R, Synder J, Barr DB, Jewell NP, Kavanagh-Baird G, Striley C, and Eskenazi B. Community-based intervention to reduce pesticide exposure to farm workers potential take-home exposure to their families J. Expo Sci Environ Epidemiol, 2009. 19(1): p. 79-89.
[xi] Castorina R, Bradman A, Fenster L, Barr DB, Bravo R, Vedar MG, Harnley ME, McKone TE, Eisen EA and Eskenazi B. Comparison of current-use pesticide and other toxicant urinary metabolite levels among pregnant women in the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) cohort and NHANES. Environ. Health Perspect, 2010. 118(6): p. 856-63.
[xii] Chambers JG PT, Harr JJ. What are we spending on special education services in the United States, 1999-2000? Washington DC: American Institutes for Research.

**SB0300_BaltimoreCounty_Support**
Uploaded by: Olszewski, Jr., Johnn
Position: FAV

JOHN A. OLSZEWSKI, JR.
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BILL NO.: **SB 300**

TITLE: Pesticides – Use of Chlorpyrifos - Prohibition

SPONSOR: Senator Lam

COMMITTEE: Education, Health and Environmental Affairs

POSITION: **SUPPORT**

DATE: February 11, 2020

Baltimore County **SUPPORTS** Senate Bill 300 – Pesticides – Use of Chlorpyrifos - Prohibition. This bill would prohibit the use of chlorpyrifos in the State, and would require the Department of Agriculture to provide education and assistance related to pest management to farmers, crop advisors and pesticide applicators.

Chlorpyrifos targets the same chemical pathways in the body that sarin gas and other nerve agents do. In high doses, the chemical can cause vomiting, abdominal pain, and headaches. Individuals can be exposed to chlorpyrifos through direct contact or by inhaling it. Farm workers are at the highest risk for exposure, as they generally handle the chemical on a daily basis. Reports from Columbia University also point to chlorpyrifos having a detrimental effect on children's developing brains. Additionally, the chemical is extremely toxic to wildlife, pollinators, and fish—a threat to Maryland's robust seafood industry.

While it is past time that Maryland take steps to protect both human beings and our natural resources from the effects of this poisonous chemical, it is also necessary that we provide other options to individuals and organizations who have utilized chlorpyrifos in the past. Fortunately, SB 300 also does this, laying the groundwork for a safer, more sustainable Maryland.

Accordingly, Baltimore County requests a **FAVORABLE** report on SB 300. For more information, please contact Chuck Conner, Chief Legislative Officer, at 443-900-6582.

**OsborneOrganics_Osborne_FAV_SB0300**
Uploaded by: Osborne, Charles
Position: FAV

February 11, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**In support of SB 300: Pesticides – Use of Chlorpyrifos – Prohibition**

Mr. Chair and Members of the Committee,

I am Charles E. "Chip" Osborne, Jr., President of Osborne Organics, Inc., and Founder of the Organic Landscape Association, Inc. I have over forty-five years of experience as a professional horticulturist. As initially a conventional wholesale and retail nurseryman and greenhouse grower for thirty-seven years, I have had significant first-hand experience with the pesticides, herbicides, and fungicides routinely used in the landscape and horticultural industry. Twenty years ago, I broadened my horticultural specialty to include turf and landscape management. My professional experience led me to become an expert on growing sustainable, natural turf.

I am also Chairman of the Marblehead, Massachusetts Recreation and Parks Commission, an elected position. I have been working with the National Park Service, as well as with clients in Maryland and mid-Atlantic region. I consult nationally with a diverse group of clients on turf and landscapes when there is a desire to move to a more natural approach. I also speak nationwide on the topic of turf management, which is why I was unable to attend this hearing in person.

I provide the above background to underscore I am well-versed on addressing pest and lawn care challenges utilizing both conventional methods and products, as well as organic strategies, products, and protocols.

During the mid 1990's, I began to experience limited efficacy with many of the products I was using. At that same time, I became concerned about low dose exposures to many of these products, chlorpyrifos being one of them. It was a mainline product for me and was one of the first that I sought to replace. I completely understand and can sympathize with a golf course superintendent or turf manager's reluctance to move away from traditional chemistries even though they can often lead to insect resistance. There can be a "fear of failure". **The bio-rational side of the product industry has come a long way in the past ten years and offers viable cost-friendly solutions that will not lead to resistance.**

I began taking a more sustainable approach to my management and sought out alternative strategies and products to accomplish my goals. Insect resistance to insecticides was a problem then, and continues to be now. Just like resistance to pyrethroids is a problem in turf management, so is chlorpyrifos becoming.

According to GCSAA/ Golf Course Superintendents Association of America's March 2017 issue of *GCM Magazine*: "A Survey of Annual Bluegrass Weevil Management," … bluegrass weevil is spreading to new regions at the same time that more populations are becoming resistant to currently available insecticides. "Each superintendent surveyed identified at least one product that was used in managing the weevil… The pyrethroids and chlorpyrifos used by 79% and 65% of respondents, respectively, were the most popular means of controlling annual bluegrass weevil adults, despite development of pyrethroid resistance and indications that chlorpyrifos efficacy may also be reduced.
*(Clavet, C.D., E.D. Requintina Jr., D. Ramoutar and S.R. Alm. 2010. Susceptibility of Listronotus maculicollis (Coleoptera: Curculionidae) adults from southern New England golf courses to chlorpyrifos. Florida Entomologist 93:630-632.)*

The **GCSAA/ Golf Course Superintendents Association of** America's March 2017 issue of *GCM Magazine* article goes on to state, "If more courses move away from primary reliance on adulticides, monitoring of larvae will become more important, which could, in turn, reduce total insecticide use.

**Because highly resistant weevil populations are also more tolerant of — if not resistant to — most of the currently available larvicides, superintendents will also have to start relying more on bio-rational insecticides and cultural means to manage weevil populations."** *(https://www.gcsaa.org/gcm/2017/march/a-survey-of-annual-bluegrass-weevil-management)*

Given the clear and unquestionable science-based EPA risk assessments on chlorpyrifos and impacts on children's developing brains resulting in its recommendation to ban its use—and that **cost-friendly, effective, safer, alternative products are widely available**—there is simply no rational reason to continue its use in landscape and turf management and put children and others at continued risk for life-long neuro-developmental impacts.

Using the annual bluegrass weevil (AWB) as an example, there are indeed cultural, biological and chemical safer management and product options: =

**Cultural management for annual bluegrass weevil:**

- The ABW over-winters in adjacent tree litter and leaves and removing this litter may help to reduce populations.
- One of the most effective cultural control methods is to convert from a susceptible turfgrass species to one that is tolerant or resistant (i.e. perennial ryegrass Lolium perenne) and/or reduce the population of susceptible turfgrass species.
- "Because creeping bentgrass is more tolerant and requires greater larval densities before damage becomes visible (*McGraw, B.A., and A.M. Koppenhöfer. 2009. Development of binomial sequential sampling plans for forecasting Listronotus maculicollis (Coleoptera: Curculionidae) larvae based on the relationship to adult counts and turfgrass damage. Journal of Economic Entomology 102:1325-1335*.), promoting creeping bentgrass in mixed stands should help reduce damage and the need for insecticide applications" (https://www.gcsaa.org/gcm/2017/march/a-survey-of-annual-bluegrass-weevil-management)

**Biological management for annual bluegrass weevil:**

- Biological control has been achieved with late spring applications of a parasitic nematode (Steinernema carpocapsae). Successful control has been a challenge due to environmental factors, but fair (70%) control has been achieved.
- Beauvaria bassiana is another bio-rational that provides adequate control.
- Marrone Bio-Innovations Grandevo and others are providing control to reduce populations below threshold levels.
- It is important to remember that one of the key elements of any IPM plan is the adoption of threshold levels. This means that we do not need to always reduce populations of an insect to zero, but just to below levels that produce serious economic injury.

**Biological management growth industry:**

- Industry reporting groups forecast "US biorational product market shift from synthetic pesticides to biopesticides" with continued expanding growth —over 20% over the next five years.
- On a 2018 visit to the US EPA office of bio-rational pesticides, we were told that sixty-five new registration applications are being submitted every couple of months.
- This gives a clear indication of the direction of the industry. Natural organisms (bacteria and fungi) have been developed and more are being proposed to address a wide variety of turf and landscape issues.
- It is important to note here that a sound and gold standard IPM protocol should include these products before reaching for chlorpyrifos.

I urge this committee for a favorable report on SB 300 in order to protect Maryland's children

Thank you for your time.

Respectfully,
Chip Osborne, President, Osborne Organics, Inc.

**OsborneOrganics_Osborne_FAV_SB0300**
Uploaded by: Osborne, Charles
Position: FAV

February 11, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**In support of SB 300: Pesticides – Use of Chlorpyrifos – Prohibition**

Mr. Chair and Members of the Committee,

I am Charles E. "Chip" Osborne, Jr., President of Osborne Organics, Inc., and Founder of the Organic Landscape Association, Inc. I have over forty-five years of experience as a professional horticulturist. As initially a conventional wholesale and retail nurseryman and greenhouse grower for thirty-seven years, I have had significant first-hand experience with the pesticides, herbicides, and fungicides routinely used in the landscape and horticultural industry. Twenty years ago, I broadened my horticultural specialty to include turf and landscape management. My professional experience led me to become an expert on growing sustainable, natural turf.

I am also Chairman of the Marblehead, Massachusetts Recreation and Parks Commission, an elected position. I have been working with the National Park Service, as well as with clients in Maryland and mid-Atlantic region. I consult nationally with a diverse group of clients on turf and landscapes when there is a desire to move to a more natural approach. I also speak nationwide on the topic of turf management, which is why I was unable to attend this hearing in person.

I provide the above background to underscore I am well-versed on addressing pest and lawn care challenges utilizing both conventional methods and products, as well as organic strategies, products, and protocols.

During the mid 1990's, I began to experience limited efficacy with many of the products I was using. At that same time, I became concerned about low dose exposures to many of these products, chlorpyrifos being one of them. It was a mainline product for me and was one of the first that I sought to replace. I completely understand and can sympathize with a golf course superintendent or turf manager's reluctance to move away from traditional chemistries even though they can often lead to insect resistance. There can be a "fear of failure". **The bio-rational side of the product industry has come a long way in the past ten years and offers viable cost-friendly solutions that will not lead to resistance.**

I began taking a more sustainable approach to my management and sought out alternative strategies and products to accomplish my goals. Insect resistance to insecticides was a problem then, and continues to be now. Just like resistance to pyrethroids is a problem in turf management, so is chlorpyrifos becoming.

According to GCSAA/ Golf Course Superintendents Association of America's March 2017 issue of *GCM Magazine*: "A Survey of Annual Bluegrass Weevil Management," … bluegrass weevil is spreading to new regions at the same time that more populations are becoming resistant to currently available insecticides. "Each superintendent surveyed identified at least one product that was used in managing the weevil… The pyrethroids and chlorpyrifos used by 79% and 65% of respondents, respectively, were the most popular means of controlling annual bluegrass weevil adults, despite development of pyrethroid resistance and indications that chlorpyrifos efficacy may also be reduced.
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Thank you for your time.

Respectfully,
Chip Osborne, President, Osborne Organics, Inc.

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Uploaded by: Payne-Sturges, Devon

Position: FAV

UNIVERSITY OF MARYLAND

SCHOOL OF PUBLIC HEALTH
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February 11, 2020

**Re:** SB300 – Pesticides –Use of Chlorpyrifos - Prohibition
**Submitted to:** The Senate Education, Health and Environmental Affairs Committee
**Position:** In support of SB 300

Chairman Pinsky and members of the committee,

I am an Assistant Professor with the Maryland Institute for Applied Environmental Health and the Department of Epidemiology and Biostatistics within the University of Maryland School of Public Health. My areas of expertise are children's environmental health, risk assessment and environmental health policy. Prior to joining the faculty at the School of Public Health, I worked for the U.S. Environmental Protection Agency for 12 years. While at U.S. EPA, I managed the human health extramural research portfolio that included cohort studies on how environmental factors, including organophosphate pesticides (OP) such as chlorpyrifos, affect children's health. I refer to this research, which was reviewed by EPA's FIFRA Scientific Advisory Panel (SAP), in my testimony. In addition, I have conducted my own research assessing the neurodevelopmental risks to children from cumulative exposures to OP pesticides.

I am providing this written testimony as an environmental health expert and in my role as a member of Project TENDR (Targeting Environmental Neuro-Developmental Risks). TENDR is an alliance of more than 50 leading scientists, health professionals, and children's health advocates with expertise on chemicals and brain development. In 2016, TENDR published a Consensus Statement as a national call to action to significantly reduce exposures to chemicals, including chlorpyrifos and other OP pesticides, that are contributing to neurodevelopmental disorders in America's children (Bennett et al., 2016). Project TENDR concluded that the evidence of significant risks to children's neurodevelopment from exposure to chlorpyrifos and other OPs pesticide warrants strong regulatory action. The TENDR consensus statement (see attached) is supported by leading health care, medical, scientific organizations such as the American College of Obstetricians and Gynecologists, the American Public Health Association, the American Nurses Association, and the National Medical Association.

Consistent with the TENDR recommendations, I strongly support the passage of Senate Bill 300 to ban all uses of chlorpyrifos in the State, without any weakening amendments. We need to follow EPA scientists' lead. They did not recommend any exemptions and neither should Maryland legislators. I believe that this bill is essential to help protect the health of Maryland's most vulnerable populations, pregnant women and children.

The main points I will cover briefly are the following: 1) scientific evidence accumulated over nearly two decades that shows chlorpyrifos is a powerful developmental neurotoxicant; 2) EPA's 2016 Revised Human Health Risk assessment for Chlorpyrifos documents that current levels chlorpyrifos exposures from food and drinking water are unsafe for pregnant women and children and 3) Maryland's children deserve "reasonable certainty of not harm".

**Chlorpyrifos is a powerful developmental neurotoxicant**. Exposures to even very low doses of chlorpyrifos during critical windows over pregnancy can result in child cognitive problems and motor delays (Rauh et al., 2006, 2011, 2015; Whyatt et al. 2005). Further, effects appear to be persistent and potentially life-long. Specifically, chlorpyrifos in umbilical cord blood at birth has been associated with mental and motor delays in preschool age children; with reductions in IQ and working memory when the children reach elementary school age; and with moderate to mild hand tremor hand tremors among the children at age 11 years. The association with reductions in working memory are of particular concern as working memory skills in the elementary school years are a strong predictor of learning outcomes and academic achievement in later years *(*Alloway et al. 2010). Higher versus lower umbilical cord chlorpyrifos concentrations was also associated with maternal report of behavioral problems including attention, ADHD and pervasive developmental disorders (Rauh et al., 2006). Further, application of chlorpyrifos to agricultural fields within 1.5 km of the home during pregnancy has been associated with an increased incidence of autism spectrum disorders in a recent study (Shelton et al., 2014). It should be noted that pregnant women and children living near agricultural fields as well as children of farmworkers are exposed to chlorpyrifos through drift and volatilization (Coronado et al. 2011; Bradman et al., 2005; Thompson et al., 2014; Wofford et al., 2014; Calvert et al., 2008). Additionally, in a pilot study high versus low umbilical cord chlorpyrifos concentrations were associated with changes in brain volume measured using magnetic resonance imaging among children at ages 6-11 years (Rauh 2012). The changes were seen in regions of the brain responsible for attention, receptive language processing, social cognition, and regulation of inhibition. The neuroanatomic alterations may constitute a pathway from pesticide exposure to the associated behavioral and cognitive deficits.

The epidemiologic results are consistent with data from toxicological studies which found disruption in neuronal development, neurotransmitter systems and synaptic formation as well as behavioral and cognitive impairments in test animals following low-dose perinatal chlorpyrifos exposure (Slotkin 2004; Aldridge et al. 2004, 2005; Slotkin and Seidler, 2005, Levin et al 2001; Roy et al., 2004; Garcia et al., 2002).

**Current levels of chlorpyrifos residues in fruits, vegetables, and drinking water are unsafe.** In 2016, the U.S. EPA carefully and thoughtfully followed the recommendations of its FIFRA Scientific Advisory Panel (SAP) and improved the risk assessment for chlorpyrifos to account for prenatal exposures that result in adverse neurodevelopmental effects. The SAP concluded that the negative effects seen in children across multiple studies were occurring below a dose that causes acetylcholinesterase **(**AChE) inhibition in adults (EPA 2014, 2016). The SAP agreed that these effects were also supported by animal (toxicological) studies. EPA's 2016 revised human health risk assessment uses neurodevelopmental effects as the critical effect, taking into account the SAP recommendations on deriving a point of departure, a level of chlorpyrifos exposure in blood that is considered protective for children's neurodevelopment, for estimating risk. (EPA 2016) In comparing target risk level to protect the developing brains and nervous systems of children, EPA concluded that the current residues (amount) of chlorpyrifos on fruits and vegetables regularly consumed by women and children, as well as concentrations in drinking water were above "acceptable levels". The analysis found that current exposures are at 62 times above acceptable levels for women of reproductive ages and 140 times acceptable levels for young children. Additionally EPA confirmed that chlorpyrifos is estimated to be at unsafe levels in air in residential areas adjacent to agricultural fields because of spray drift from pesticide applications. Following the requirements under the federal Food Quality Protection Act, EPA concluded that all food tolerances should be banned and therefore agricultural uses of chlorpyrifos should be eliminated.

**Maryland's children deserve "reasonable certainty of no harm."** Children experience greater exposure to organophosphate pesticides due to their increased hand-to-mouth action, and relative to adults they eat more fruits and vegetables, drink more, and breathe more. The 1996 Food Quality Protection Act specifically requires EPA to take into account specific risks to infants and children, including the developing fetus, when setting standards. In setting or revising tolerances for pesticides in food, EPA must determine that "there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue,

including all anticipated dietary exposures and all other exposures for which there is reliable information." Although the 9th Circuit Court of Appeals has ordered U.S. EPA to "to revoke all tolerances and cancel all

registrations for chlorpyrifos" based on the scientific evidence and requirements under the law, U.S. EPA's appeal of this ruling will likely mean a resolution will not be reached for years. Maryland should act now on the mounting evidence of neurodevelopmental risk following chlorpyrifos exposures and the EPA 2016 risk assessment that exposure to pregnant women and children are well above levels of health concern and thus should enact SB 300 to eliminate all uses of chlorpyrifos in order to ensure "reasonable certainty of no harm" and protect all of Maryland's children.

In closing, chlorpyrifos is an organophosphate insecticide, a member of class of chemicals deliberately engineered to be toxic to the brain and nervous system. **Twenty years ago**, chlorpyrifos was banned from residential use because exposure from residential use, particularly to children, was determined by the U.S. EPA to be above safe levels.(Browner 2000) Yet it still widely today used on fruits and vegetables and other crops across the U.S. and in Maryland specifically and the use has resulted in concentrations in both food and drinking water that are not safe for pregnant women and children and to substantial exposures to women and children from air contamination resulting from volatilization off agricultural fields. I strongly urge Maryland General Assembly to pass SB 300 to provide needed protection of Maryland residents.

Respectfully,
Devon Payne-Sturges, DrPH
Assistant Professor

**Addendum: Regarding length of time it took EPA to propose revocation of all remaining uses of chlorpyrifos in 2015 and 2016.** I am well versed on the issue given my work at EPA and specifically my work on chlorpyrifos and other organophosphates as noted in my submitted testimony.

It is important to put the 16 year timeframe for chlorpyrifos into perspective by comparing to other pesticide revocation decisions. EPA has banned only 141 (less than 1%) of about 16,000 registered pesticides. Here are timelines from first limitations on use to cancellation of all approved uses for a few example pesticides that are currently banned: DDT (14 years); Chlordane (10 years); 1,2-Dibromo-3-chloropropane (8 years); and Sodium Fluoroacetate (18 years). DDT is probably the most well-known among these examples. In 1958, USDA began to phase out the department's own use of DDT. But it was Rachel Carson's 1962 book *Silent Spring* that brought the public's attention to the harms caused by DDT. From that point, specific uses for DDT were cancelled overtime until in 1972, when EPA canceled all remaining crop uses of DDT in the United States. EPA was sued by manufacturers of DDT and but prevailed in federal court.

Chlorpyrifos followed a similar path. In 2000, EPA entered a negotiated settlement with the manufacturers of chlorpyrifos to end uses deemed the most harmful to children (e.g. in-home use) but allowed other uses deemed to be less harmful (e.g. in agriculture) to continue. This was, in my opinion, response to pressure from the manufactures so they could continue selling their product. However, in 2007 a petition was filed by the Pesticide Action Network and the Natural Resources Defense Council against EPA seeking a ban on chlorpyrifos based on the growing evidence of risks and harms to children's brains. EPA delayed in responding to this petition and instead used the time to seek advice from the FIFRA Scientific Advisory Panel (SAP) on review of the science. When EPA began to review the studies correlating chlorpyrifos exposures with damage to children's brains in response to the 2007 petition, it found such a correlation. It submitted its analysis to EPA's SAP on multiple occasions beginning in **2008,** and each time, the SAP confirmed EPA's conclusion that early life exposures to chlorpyrifos pose a risk of long-lasting, adverse cognitive, behavioral, and motor impairments. And both EPA and the SAP found that the exposures associated with **serious damage to children's brains were far below the regulatory endpoint used by EPA in its 2001 and 2006 re-registration determinations** which established the chlorpyrifos tolerances currently in effect.

**In July 2011**, EPA released its Preliminary Human Health Risk Assessment, which confirmed the need to address drift, volatilization, and health impacts to children at low doses. The assessment expressed concern that current tolerances may not afford sufficient protection to children from drinking water. *(EPA, Reader's*

*Guide to the Preliminary Human Health Risk Assessment for Chlorpyrifos at 1-3 July 1, 2011; EPA-HQ-OPP-2008-0850-0027.*

**In 2012, EPA convened its SAP to review EPA's more comprehensive analysis of the neurotoxicity of chlorpyrifos.** In its report, the SAP noted significant, long-term adverse effects on neurobehavioral development from chlorpyrifos in laboratory animal studies. It found that the epidemiology "studies show some consistent associations relating exposure measures to abnormal reflexes in the newborn, pervasive development disorder at 24 or 36 months, mental development at 7-9 years, and attention and behavior problems at 3 and 5 years of age.") The Panel concurred with EPA and the 2008 SAP that "chlorpyrifos likely plays a role in impacting the neurodevelopmental outcomes examined in the three cohort studies, drift exposures, particularly infants. (https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0040-0029)

Seven years after the original petition by Pesticide Action Network and Natural Resources Defense Council and following several lawsuits and delays, EPA had still not acted on the petition. In September 2014, on behalf of PAN and NRDC, Earthjustice filed a petition in the 9th Circuit Court of Appeals to compel EPA to act on the petition.

**2014**: **In December 2014, EPA released its *Revised Human Health Risk Assessment*** *for Chlorpyrifos ("2014 RHHRA")* and acknowledged the strong convergence in the findings from the animal studies and the three mother-child cohort studies. It found that the laboratory animal studies indicated "that gestational and/or postnatal exposure may cause persistent behavioral effects into adulthood ...upon review of the published literature a pattern of neurodevelopmental adverse outcomes emerges." It called the cohort studies strong studies which **support a conclusion that chlorpyrifos causes long-lasting damage to children's brains at exposures lower than EPA's regulatory endpoint**. The 2014 risk assessment also documented unsafe chlorpyrifos exposures from drinking water contamination. *(Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review; Dec. 29, 2014 ; EPA- HQ-OPP-2008-0850-0195).*

The following year, while criticizing EPA's delays, the 9th Circuit Court of Appeals court ordered EPA to issue a final response to the petition by October 31, 2015.

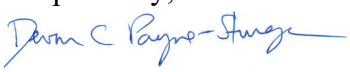
**2015:** In 2015, EPA proposed to revoke all chlorpyrifos tolerances based on the findings from the 2014 risk assessment (Nov. 6, 2015). In the proposed revocation rule, EPA explicitly and repeatedly found chlorpyrifos unsafe.

EPA recognized that its 2014 risk assessment and 2015 proposed tolerance revocation did not address the greatest risks and most sensitive endpoint, as EPA policy requires and therefore, continued to explore ways to establish an exposure limit that would protect children from neurodevelopmental harm. Each method it explored revealed more serious risks from chlorpyrifos than the 2014 risk assessment.

**2016:** In November 2016, EPA released its second revised human health risk assessment using a regulatory endpoint designed to guard against damage to children's brains**. That risk assessment found unsafe exposures from every way that people come into contact with chlorpyrifos—on food, in drinking water, through pesticide drift, and from applying the pesticide or working in fields that had recently been sprayed. EPA indicated it had found no chlorpyrifos uses that meet the FQPA safety standard and all chlorpyrifos tolerances would need to be revoked.** *(Revised Human Health Risk Assessment for Registration Review; Nov. 3, 2016; EPA- HQ-OPP-2015-0653-0454)*

In summary, the delays on chlorpyrifos are related to industry pressure, the EPA Office of Pesticide Programs pursuing multiple reviews of the science before responding to petitions, court involvement and slow acceptance by EPA's Office Pesticide Programs that indeed acetylcholinesterase inhibition in adults, the regulatory endpoint used by EPA in its 2001 and 2006 re-registration determinations, was not protective of children's neurodevelopment.

Respectfully,



Devon Payne-Sturges, DrPH
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A Section 508–conformant HTML version of this article is available at http://dx.doi.org/10.1289/EHP358.

# Project TENDR: Targeting Environmental Neuro-Developmental Risks. The TENDR Consensus Statement

http://dx.doi.org/10.1289/EHP358

**Summary:** Children in America today are at an unacceptably high risk of developing neurodevelopmental disorders that affect the brain and nervous system including autism, attention deficit hyperactivity disorder, intellectual disabilities, and other learning and behavioral disabilities. These are complex disorders with multiple causes—genetic, social, and environmental. The contribution of toxic chemicals to these disorders can be prevented. **Approach:** Leading scientific and medical experts, along with children's health advocates, came together in 2015 under the auspices of Project TENDR: Targeting Environmental Neuro-Developmental Risks to issue a call to action to reduce widespread exposures to chemicals that interfere with fetal and children's brain development. Based on the available scientific evidence, the TENDR authors have identified prime examples of toxic chemicals and pollutants that increase children's risks for neurodevelopmental disorders. These include chemicals that are used extensively in consumer products and that have become widespread in the environment. Some are chemicals to which children and pregnant women are regularly exposed, and they are detected in the bodies of virtually all Americans in national surveys conducted by the U.S. Centers for Disease Control and Prevention. The vast majority of chemicals in industrial and consumer products undergo almost no testing for developmental neurotoxicity or other health effects. **Conclusion:** Based on these findings, we assert that the current system in the United States for evaluating scientific evidence and making health-based decisions about environmental chemicals is fundamentally broken. To help reduce the unacceptably high prevalence of neurodevelopmental disorders in our children, we must eliminate or significantly reduce exposures to chemicals that contribute to these conditions. We must adopt a new framework for assessing chemicals that have the potential to disrupt brain development and prevent the use of those that may pose a risk. This consensus statement lays the foundation for developing recommendations to monitor, assess, and reduce exposures to neurotoxic chemicals. These measures are urgently needed if we are to protect healthy brain development so that current and future generations can reach their fullest potential.

## A Call to Action

The TENDR Consensus Statement is a call to action to reduce exposures to toxic chemicals that can contribute to the prevalence of neurodevelopmental disabilities in America's children. The TENDR authors agree that widespread exposures to toxic chemicals in our air, water, food, soil, and consumer products can increase the risks for cognitive, behavioral, or social impairment, as well as specific neurodevelopmental disorders such as autism and attention deficit hyperactivity disorder (ADHD) (Di Renzo et al. 2015; Gore et al. 2015; Lanphear 2015; Council on Environmental Health 2011). This preventable threat results from a failure of our industrial and consumer markets and regulatory systems to protect the developing brain from toxic chemicals. To lower children's risks for developing neurodevelopmental disorders, policies and actions are urgently needed to eliminate or significantly reduce exposures to these chemicals. Further, if we are to protect children, we must overhaul how government agencies and business assess risks to human health from chemical exposures, how chemicals in commerce are regulated, and how scientific evidence informs decision making by government and the private sector.

### *Trends in Neurodevelopmental Disorders*

We are witnessing an alarming increase in learning and behavioral problems in children. Parents report that 1 in 6 children in the United States, 17% more than a decade ago, have a developmental disability, including learning disabilities, ADHD, autism, and other developmental delays (Boyle et al. 2011). As of 2012, 1 in 10 (> 5.9 million) children in the United States are estimated to have ADHD (Bloom et al. 2013). As of 2014, 1 in 68 children in the United States has an autism spectrum disorder (based on 2010 reporting data) (CDC 2014).

The economic costs associated with neurodevelopmental disorders are staggering. On average, it costs twice as much in the United States to educate a child who has a learning or developmental disability as it costs for a child who does not (Chambers et al. 2004). A recent study in the European Union found that costs associated with lost IQ points and intellectual disability arising from two categories of chemicals—polybrominated diphenyl ether flame retardants (PBDEs) and organophosphate (OP) pesticides—are estimated at 155.44 billion euros ($169.43 billion dollars) annually (Bellanger et al. 2015). A 2009 analysis in the United States found that for every $1 spent to reduce exposures to lead, a potent neurotoxicant, society would benefit by $17–$221 (Gould 2009).

### *Vulnerability of the Developing Brain to Chemicals*

Many toxic chemicals can interfere with healthy brain development, some at extremely low levels of exposure (Adamkiewicz et al. 2011; Bellinger 2008; Committee on Improving Analysis Approaches Used by the U.S. EPA 2009; Zoeller et al. 2012). Research in the neurosciences has identified "critical windows of vulnerability" during embryonic and fetal development, infancy, early childhood and adolescence (Lanphear 2015; Lyall et al. 2014; Rice and Barone 2000). During these windows of development, toxic chemical exposures may cause lasting harm to the brain that interferes with a child's ability to reach his or her full potential.

The developing fetus is continuously exposed to a mixture of environmental chemicals (Mitro et al. 2015). A 2011 analysis of the U.S. Centers for Disease Control and Prevention's (CDC) biomonitoring data found that 90% of pregnant women in the United States have detectable levels of 62 chemicals in their bodies, out of 163 chemicals for which the women were screened (Woodruff et al. 2011). Among the chemicals found in the vast majority of pregnant women are PBDEs, polycyclic aromatic hydrocarbons (PAHS), phthalates, perfluorinated compounds, polychlorinated biphenyls (PCBs), perchlorate, lead and mercury (Woodruff et al. 2011). Many of these chemicals can cross the placenta during pregnancy and are routinely detected in cord blood or other fetal tissues (ATSDR 2011; Brent 2010; Chen et al. 2013; Lien et al. 2011).

### *Prime Examples of Neurodevelopmentally Toxic Chemicals*

The following list provides prime examples of toxic chemicals that can contribute to learning, behavioral, or intellectual impairment, as well as specific neurodevelopmental disorders such as ADHD or autism spectrum disorder:

- Organophosphate (OP) pesticides (Eskenazi et al. 2007; Fortenberry et al. 2014; Furlong et al. 2014; Marks et al. 2010; Rauh et al. 2006; Shelton et al. 2014).
- PBDE flame retardants (Chen et al. 2014; Cowell et al. 2015; Eskenazi et al. 2013; Herbstman et al. 2010).
- Combustion-related air pollutants, which generally include PAHs, nitrogen dioxide and particulate matter, and other air pollutants for which nitrogen dioxide and particulate matter are markers (Becerra et al. 2013; Clifford et al. 2016; Jedrychowski

et al. 2015; Kalkbrenner et al. 2014; Suades-González et al. 2015; Volk et al. 2013).
- Lead (Eubig et al. 2010; Lanphear et al. 2005; Needleman et al. 1979).
- Mercury (Grandjean et al. 1997; Karagas et al. 2012; Sagiv et al. 2012).
- PCBs (Eubig et al. 2010; Jacobson and Jacobson 1996; Schantz et al. 2003).

The United States has restricted some of the production, use and environmental releases of these particular chemicals, but those measures have tended to be too little and too late. We face a crisis from both legacy and ongoing exposures to toxic chemicals. For lead, OP pesticides, PBDEs and air pollution, communities of color and socioeconomically stressed communities face disproportionately high exposures and health impacts (Adamkiewicz et al. 2011; Engel et al. 2015; Zota et al. 2010).

Policies to ban lead from gasoline, paints and other products have been successful in lowering blood lead levels in the American population (Jones et al. 2009), yet lead exposure continues to be a preventable cause of intellectual impairment, ADHD and maladaptive behaviors for millions of children (CDC 2015). Scientists agree that there is no safe level of lead exposure for fetal or early childhood development (Lanphear et al. 2005; Schnur and John 2014), and studies have documented the potential for cumulative and synergistic health effects from combined exposure to lead and social stressors (Bellinger et al. 1988; Cory-Slechta et al. 2004). Thus, taking further preventive actions is imperative.

Epidemiological, toxicological, and mechanistic studies have together provided evidence that clearly demonstrates or strongly suggests neurodevelopmental toxicity for lead, mercury, OP pesticides, air pollution, PBDEs, and PCBs. The level and type of available evidence linking exposures to toxic chemicals with neurodevelopmental disorders, including the examples in this statement, vary both within and among chemical classes. In light of this extensive evidence and continued widespread exposure, the risks for learning and developmental disorders can likely be lowered through targeted exposure reduction, starting with these example chemicals.

### Majority of Chemicals Untested for Neurodevelopmental Effects

The examples of developmental neurotoxic chemicals that we list here likely represent the tip of the iceberg. Of the tens of thousands of chemicals on the U.S. Environmental Protection Agency (EPA) chemical inventory, nearly 7,700 are manufactured or imported into the United States at ≥ 25,000 pounds per year (U.S. EPA 2012). The U.S. EPA has identified nearly 3,000 chemicals that are produced or imported at > 1 million pounds per year (U.S. EPA 2006).

Only a minority of chemicals has been evaluated for neurotoxic effects in adults. Even fewer have been evaluated for potential effects on brain development in children (Grandjean and Landrigan 2006, 2014). Further, toxicological studies and regulatory evaluation seldom address combined effects of chemical mixtures, despite evidence that all people are exposed to dozens of chemicals at any given time.

### Need for a New Approach to Evaluating Evidence

Our failures to protect children from harm underscore the urgent need for a better approach to developing and assessing scientific evidence and using it to make decisions. We as a society should be able to take protective action when scientific evidence indicates a chemical is of concern, and not wait for unequivocal proof that a chemical is causing harm to our children.

Evidence of neurodevelopmental toxicity of any type—epidemiological or toxicological or mechanistic—by itself should constitute a signal sufficient to trigger prioritization and some level of action. Such an approach would enable policy makers and regulators to proactively test and identify chemicals that are emerging concerns for brain development and prevent widespread human exposures.

Some chemicals, like those that disrupt the endocrine system, present a concern because they interfere with the activity of endogenous hormones that are essential for healthy brain development. Endocrine-disrupting chemicals (EDCs) include many pesticides, flame retardants, fuels, and plasticizers. One class of EDCs that is ubiquitous in consumer products are the phthalates. These are an emerging concern for interference with brain development and therefore demand attention (Boas et al. 2012; Ejaredar et al. 2015; Mathieu-Denoncourt et al. 2015; Miodovnik et al. 2014; U.S. Consumer Product Safety Commission 2014).

### Regrettable Substitution

Under our current system, when a toxic chemical or category of chemicals is finally removed from the market, chemical manufacturers often substitute similar chemicals that may pose similar concerns or be virtually untested for toxicity. This practice can result in "regrettable substitution" whereby the cycle of exposures and adverse effects starts all over again. The following list provides examples of this cycle:
- When the federal government banned some uses of OP pesticides, manufacturers responded by expanding the use of neonicotinoid and pyrethroid pesticides. Evidence is emerging that these widely used classes of pesticides pose a threat to the developing brain (Kara et al. 2015; Richardson et al. 2015; Shelton et al. 2014).
- When the U.S. Government reached a voluntary agreement with flame retardant manufacturers to stop making PBDEs, the manufacturers substituted other halogenated and organophosphate flame retardant chemicals. Many of these replacement flame retardants are similar in structure to other neurotoxic chemicals but have not undergone adequate assessment of their effects on developing brains.
- When the federal government banned some phthalates in children's products, the chemical industry responded by replacing the banned chemicals with structurally similar new phthalates. These replacements are now under investigation for disrupting the endocrine system.

### Looking Forward

Our system for evaluating scientific evidence and making decisions about environmental chemicals is broken. We cannot continue to gamble with our children's health. We call for action now to prevent exposures to chemicals and pollutants that can contribute to the prevalence of neurodevelopmental disabilities in America's children.

We need to overhaul our approach to developing and assessing evidence on chemicals of concern for brain development. Toward this end, we call on regulators to follow scientific guidance for assessing how chemicals affect brain development, such as taking into account the special vulnerabilities of the developing fetus and children, cumulative effects resulting from combined exposures to multiple toxic chemicals and stressors, and the lack of a safety threshold for many of these chemicals (Committee on Improving Analysis Approaches Used by the U.S. EPA 2009). We call on businesses to eliminate neurodevelopmental toxicants from their supply chains and products, and on health professionals to integrate knowledge about environmental toxicants into patient care and public health practice.

Finally, we call on policy makers to take seriously the need to reduce exposures of all children to lead—by accelerating the clean up from our past uses of lead such as in paint and water pipes, by halting the current uses of lead, and by better regulating the industrial processes that cause new lead contamination.

We are confident that reducing exposures to chemicals that can interfere with healthy brain development will help to lower the prevalence of neurodevelopmental disabilities, and thus enable many more children to reach their full potential.

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***American College of Obstetricians and Gynecologists (ACOG)***
ACOG supports the value of this clinical document as an educational tool (March 2016)

***Child Neurology Society***

***Endocrine Society***

***International Neurotoxicology Association***

***International Society for Children's Health and the Environment***

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The views expressed in this statement are solely those of the authors and signatories.

Project TENDR has been supported by grants from the John Merck Fund, Ceres Trust, Passport Foundation, and the National Institute of Environmental Health Sciences (R13ES026504).

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The authors certify that all actual or potential competing financial interests have been declared, and the authors' freedom to design, conduct, interpret, and publish research is not compromised by any controlling sponsor as a condition of review and publication.

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February 11, 2020

Dear Maryland Legislators,

As scientists in the fields of biology, chemistry, ecology, ecotoxicology, entomology, sustainability and human sciences, we would like to call your attention to the irreparable harm chlorpyrifos has on the environment and human health of Maryland. The 71 signers of this letter urge you to take immediate action to protect your constituents and the environment by passing HB 229 and SB 300, which would ban this dangerous chemical.

Chlorpyrifos is a toxic pesticide derived from a nerve gas developed by Nazi Germany for use in WWII.[1] Although the EPA banned almost all residential use of Chlorpyrifos in 2000, it is still widely used in the agricultural industry.[2] Marylanders regularly come into contact with chlorpyrifos through residue on food and contaminated drinking water and air. In 2015, a Food and Drug Administration study found that chlorpyrifos is the fourth most common pesticide found in human foods.[3]

Scientific studies have linked chlorpyrifos to brain damage in children, autism, cancer, Parkinson's disease and a whole host of other negative human health impacts such as reduced IQ, loss of working memory, attention deficit disorders and delayed motor development.[4,5,6,7] Farmers, farmworkers, and rural communities have an increased risk of exposure to chlorpyrifos due to proximity to agriculture, which is associated with immediate and long-term adverse health impacts.[8,9,10]

A large body of science, including the U.S. Environmental Protection Agency's scientific review demonstrates that chlorpyrifos residues in water and food are unsafe for pregnant women and children.[11] In fact, studies indicate there are no safe levels for pregnant women since chlorpyrifos exposure can result in negative health outcomes for both the mother and fetus, such as increasing the chance of having a preterm birth.[12]

Chlorpyrifos is also extremely damaging to wildlife, namely birds, fish and pollinators. Federal scientists concluded this pesticide poses a risk to about 1,800 critically threatened or endangered species.[13] Chlorpyrifos contributes to the staggering decline of pollinators because of its sub-lethal effect on bees. In a Chesapeake Bay Program report, chlorpyrifos was found in 90 percent of Bay samples with 40 percent having concentrations exceeding thresholds.[14] Studies have found that chlorpyrifos can have negative physiological, mutagenic, and sub-lethal effects on aquatic life.[15,16,17]

Safer alternatives exist for addressing challenging pests on farms, including on orchards, vineyards, golf courses and land care.

Due to the surmounting evidence of chlorpyrifos' toxicity to humans and the environment, the U.S. Environmental Protection Agency (EPA) experts determined there was no safe way to use the chemical and recommended a complete ban.[18,19] However, former EPA Administrator Scott Pruitt denied the petition to ban chlorpyrifos as one of his first formal acts in office.[20,21]

As a result, numerous state attorneys general, including Maryland Attorney General Brian Frosh, have filed suit against the EPA challenging its ruling.[22] The state of Hawaii responded by banning chlorpyrifos and both California and New York have initiated proceedings to ban it as well.[23] In August 2018, the U.S. Court of Appeals for the Ninth Circuit ordered EPA to ban chlorpyrifos within 60 days.[24]Days before the deadline, EPA and the Department of Justice appealed the decision and requested a re-hearing. [25]

As scientists and academics, we agree that the body of evidence on chlorpyrifos' detrimental effects to human health and the environment is conclusive. We urge the state legislature to take action where the

federal government has failed. We strongly ask that Maryland legislators champion human health and environmental stewardship by passing HB 229 and SB 300 to ban the use of chlorpyrifos in Maryland this congressional session.

Sincerely,

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**FriendsOfEarth_Pica_FAV_SB0300**
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Position: FAV

2/11/2020

Senate Education, Health and Environmental Affairs Committee
2 West, Miller Senate Building
Annapolis, MD 21401

**IN SUPPORT OF SB 300 –Pesticides – Use of Chlorpyrifos – Prohibition**

Dear Honorable members of the Senate Education, Health and Environmental Affairs Committee,

My name is Erich Pica. I am a resident of Silver Spring, Maryland, an avid golfer and President of Friends of the Earth. Friends of the Earth is an environmental organization that defends the environment and champions a healthy and just world. We have over 2 million members and supporters nationwide and 26,887 members and supporters in Maryland. On behalf of these members, my fellow golfers and my family, I urge you to support and favorably pass SB 300 out of committee to protect public health and the environment in Maryland.

I have been a golfer since junior high and frequently play at courses in Montgomery and Prince George's County including Sligo Creek, Northwest, Little Bennett, Hampshire Greens, Paint Branch and University of Maryland. Recently, I have started taking my young eight year old son with me to teach him how to play golf. I'm extremely concerned that my son Zander and other young children, and the parents that are teaching their kids this lifetime sport in Maryland, may unknowingly be exposed to the toxic pesticide chlorpyrifos. This is alarming because chlorpyrifos can cause brain damage in children,[i] contaminates our waterways and harms wildlife.[ii, iii] This chemical is associated with reduced IQ,[iv] loss of working memory,[v] attention deficit disorders[vi] and delayed motor development.[vii] Just a one-time exposure at a critical stage of fetal development can have a life-long impact, including severe learning disabilities and autism spectrum disorders.[viii] Unless banned or identified, parents have no way of knowing if a course is using this chemical.

In addition to harming children and golfers, chlorpyrifos can harm golf course employees and the families that live on or near golf courses. In fact, EPA found that there are virtually no safe ways to apply chlorpyrifos.[ix] Chlorpyrifos drift can continue at unsafe levels 300 feet from the turf's edge, which means it can harm people living on or near golf courses too.[x] Many of the golf courses in Maryland are integrated into the community. For example, Hampshire Green, which I play, has many family homes located immediately adjacent to the golf course. This means that these families and their children are exposed to chlorpyrifos if this course is using this chemical.

There is no reason for us to be putting our children, public health or the environment in jeopardy. There are safer alternatives that golf courses can use. For example, Kenwood Golf and Country Club in Bethesda, Maryland has stopped using all organophosphate pesticides, including chlorpyrifos and are using safer and more effective insecticides. Kenwood is joined by a number of Maryland golf courses that are not using chlorpyrifos including Eisenhower Golf Course in Crownsville, Compass Pointe Golf Course in Pasadena, Hobbit's Glen Golf Club in Columbia and Wicomico Shores Golf Course in Mechanicsville, and Hunt Valley Country Club in Baltimore. In addition to Maryland golf courses, the Golf Course Superintendents Association noted in its 2017 March magazine that, "If more courses move away from primary reliance on adulticides [like chlorpyrifos], monitoring of larvae will become more important, which could, in turn, reduce total insecticide use. Because highly resistant weevil populations are also more tolerant of — if not resistant to — most of the currently available larvicides, superintendents will also have to start relying more on bio-rational insecticides and cultural means to manage weevil populations." It is really a no-brainer. If there are less-toxic alternatives, they should

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be used and chlorpyrifos should be banned. I urge the state of Maryland to take immediate action by passing SB 300 out of committee to make our state safer for people and the planet.

In addition to putting public health, particularly young children at risk, we are also contaminating our waterways including the Northwest Branch of the Anacostia River by using chlorpryifos. Some of our beautiful courses are located close to waterways. By eliminating chlorpyrifos, golf course superintendents will be protecting our Bay and these waterways from the impact of this toxic runoff. As my son and I tour the courses, it is always beautiful to observe wildlife and insects. We've had the pleasure of seeing birds, turtles and even being chased by a fox. However, we are unnecessarily putting these species at risk by using the toxic pesticide chlorpyrifos. Federal scientists have concluded that this pesticide poses a risk to about 1,800 critically threatened or endangered species.[xi] We will help protect them by taking action in Maryland.

While the federal government is unwilling to prioritize people, especially children, over chemical company profits, other states have been leading the way. Hawai'i has passed legislation to ban chlorpyrifos, and just last year, New York and California, the largest agricultural state in the country, banned it as well. As a result of this leadership, Corteva, the largest (but not lone) manufacturer of chlorpyrifos, announced it will cease production in 2021.

The state of Maryland has an opportunity to stand up and pass legislation to protect its citizens. As a father, I want to be able to teach my son Zander how to play golf without worrying that he could be exposed to pesticides derived from a nerve gas made in Nazi Germany that could harm his developing brain. No parent should carry this burden.

For the sake of our children and for public health, wildlife and the environmental in Maryland, I urge the committee to ban chlorpyrifos in Maryland now. We must take immediate action before another child or family is exposed to this toxic pesticide simply by playing or living near a golf course.

Sincerely,

Erich Pica

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**MdVotesForAnimals_Radov_FAV_SB0300**
Uploaded by: Radov, Lisa
Position: FAV

MARYLAND VOTES FOR ANIMALS

PO BOX 10411
BALTIMORE, MD 21209

February 11, 2020

To: Education, Health, and Environmental Affairs Committee
From:Lisa Radov, President and Chairman, Maryland Votes for Animals, Inc.
Re: Pesticides – Use of Chlorpyrifos – Prohibition -SB 300 – SUPPORT

Chairman Pinsky, Vice Chairman Kagan, members of the Education, Health, and Environmental affairs Committee thank you for the opportunity to testify before to you today. My name is Lisa Radov. I am the President and Chairman of Maryland Votes for Animals. We champion humane legislation to improve the lives of animals in Maryland. Speaking for Maryland Votes for Animals, our Board of Directors, and our thousands of members across Maryland, I respectfully request that the Environment & Transportation Committee vote favorably for Pesticides – Use of Chlorpyrifos – Prohibition - SB 300.

This bill would ban the use of chlorpyrifos including insecticides and seeds treated with the chemical. It would also require the Department of Agriculture to use existing budget resources to educate farmers, crop advisors and pest applicators with pest management.

Chlorpyrifos is toxic to many species of birds including robins, grackles, pigeons, and Mallard ducklings. In addition to laying fewer eggs, the eggshells of those eggs laid by Mallards are thinner than normal, so fewer ducklings survive. Chlorpyrifos is not only toxic to fish and aquatic invertebrates, but also it builds up in the tissues of fish and animals who consume those fish and animals. This contamination by chlorpyrifos goes up the food chain in a process called bioaccumulation. Chlorpyrifos is also toxic to bees and earthworms, lasting days to weeks after its application.

Originally banned at the federal level by the Obama Administration in 2017, the ban was reversed before it went into effect by the Trump Administration. This was despite the fact that in 2017 The US Fish and Wildlife Service found that chlorpyrifos was so toxic that it would “jeopardize the existence” of more than 1200 endangered species including including birds, fish, and other wildlife.

Hawaii, California, and New York have moved to phase out the use of chlorpyrifos and similar legislation is under consideration in Connecticut, Oregon and the State of Washington. Last year, a bill to ban chlorpyrifos in Maryland passed the House but stalled in the Senate. Let’s make 2020 Maryland’s year.

I thank for Senator Lam for sponsoring this bill, and urge a favorable report on SB 300.

**SmartOnPesticides_Raindro_FAV_SB0300**
Uploaded by: Raindrop, Bonnie
Position: FAV

February 11, 2020

Senate Education, Health and Environmental Affairs Committee
Miller Senate Office Building, 11 Bladen St., Annapolis, Maryland 21401

**Testimony in Support of SB 300**: Pesticides - Use of Chlorpyrifos - Prohibition

Mr. Chair, Ms. Vice Chair and Members of the Committee:

My name is Bonnie Raindrop. I am the coordinator of the 105-member Smart on Pesticides Coalition and Board member of Central Maryland Beekeepers Association. **My testimony concerns research I have led in compiling a document in your testimony packet called "Alternatives to Chlorpyrifos for Maryland Agriculture."** This 42-pg report assembles data and resources that are **readily available for finding alternative insecticides to chlorpyrifos**—all data is backed by studies from prestigious agriculture institutions including **USDA Agriculture Resource Service's Interregional Research Project No.4 (IR-4)**, a federally funded program established in 1963 to conduct the research necessary for obtaining registrations of pest control agents needed to grow crops, **Purdue, Rutgers, Penn State, IPM Institute of North America, Pesticide Research Institute, University of Maryland** and many others.

**The report focuses on insects of concern for Maryland crops, where chlorpyrifos may be used.** It demonstrates that Maryland farmers, orchards, vineyards and golf courses have scores of safer alternative products they can adopt to successfully and cost-effectively manage all Maryland agriculture and turf pests—even Spotted Lanternfly, Peach Tree Borer and Annual Bluegrass Weevil--without using chlorpyrifos. Additionally, your testimony packet includes a farmer letter supporting HB 229 that is signed by over 70 Maryland farms who use some of these products and practices quite successfully in their operations.

Fear is powerful, especially if we are being told of catastrophic consequences that could literally wipe out the family farm. No one wants that. This report highlights just some of the advances that are being made in agriculture, turf care, and in the fast-growing industry of safer biological and biorational insect control—a $3.3 billion industry expected to grow to $9.5 billion by 2025.

Safer biorational pesticides are on the rise, but without the millions of dollars the conventional pesticide industry has to influence farmer product choices, you need to look for them. The "Alternatives to Chlorpyrifos for Maryland Agriculture" provides the evidence that it only takes a "need to know" for a farmer to tap into a vast pool of study data, expertise, best management practices and products that will provide safer and better solutions to pest pressures. SB 300 includes a provision to provide this education and training for farmers who will need to make the switch from chlorpyrifos to better solutions. Every industry must evolve, and external pressures are almost always what drives us to change and innovate. Clearly, the industry is moving away from older, highly toxic chemistry.

Following are some example alternatives for pests of concern to Maryland growers and land managers:

**Spotted Lanternfly (SLF)**
USDA formed an expert task force at Penn State to study and recommend the most effective Best Management Practices (BMP) for Spotted Lanternfly in Pennsylvania and neighboring states. From that research, Pennsylvania BMPs include cultural/mechanical practices such as scraping eggs, banding and trap trees, and a list of insecticides they found to be most effective for killing SLF at the nymph and adult stages. The task force report **"**Updated Insecticide Recommendations for Spotted Lanternfly on Tree Fruit**,"** is included in the attached "Alternatives to Chlorpyrifos for Maryland Agriculture**"** report, pg 9.

The Penn State study recommends 15 products for treating SLF at the nymph and adult stages for grape and peach. With many products considered "excellent" or "good"—5 products for grape and 11 products for peach had results of **98%-100% knockdown**—***none of these products contain chlorpyrifos.*** Maryland allows 12 products labelled for SLF, 7 of them are recommended by Penn State; none of these products contain chlorpyrifos; chlorpyrifos is not allowed for this use in Maryland.

A Penn State Green Industry educator, Emilie Swackhammer said, *"Spotted Lanternfly is not that hard to kill, and Penn State Extension is recommending using least toxic insecticides, including pyrethrin, Neem, and Spinosad"* along with an IPM calendar and other cultural measures.

**You may hear that chlorpyrifos kills 100% of eggs.** Even though chlorpyrifos was found to kill egg masses, it is too toxic to use when other safer approaches exist, such as JMS Styletoil which was also effective in killing 71% of eggs in a single application.

**Penn State recommends the best time to treat SLF is not at the egg stage but rather at the nymph stage**, when they are stationary and **easy for growers to kill using the same insecticides already being applied for other common pests at that time.**

**Golf Courses and Annual Bluegrass Weevil (ABW)**
You may also hear the golf course industry needs chlorpyrifos to manage annual bluegrass weevil (ABW). The golf industry is actually moving away from chlorpyrifos: A March 2018 article in ***GCM Magazine*** **for golf course superintendents, recommends they move to less toxic biorational insecticides and cultural means to manage weevil populations**, **and away from chemicals including chlorpyrifos,** due to insect resistance which is inevitable and unsustainable.

In the report attached to my testimony, pg. 15 cites alternative practices being used, such as allowing AWB to feed on *Poa annua* and then over seeding with ABW-resistant grasses, and products, including 75 insecticides labelled for ABW, 17 that are moderate or low hazard biorational products.

**Fourteen Maryland golf courses report they do not use chlorpyrifos**—Compass Point, Eisenhower, Hobbits Glen, Kenwood, Wicomico Shores, Hunt Valley Country Club, Carroll Park, Chesapeake Hills, Clifton Park, Forest Park, Mt. Pleasant, and others, including Eagle's Landing, Whiskey Creek and Mountain Branch Golf Courses plant ABW-resistant grasses, which eliminate the need to use insecticides for ABW (see attached golf course fact sheet).

**Orchards and Peach Tree Borer**
While orchardists may believe that chlorpyrifos is their only effective control for peach tree borer and other pests, this is not so. For example, **USDA found a single application of nematodes suppress 88% of orchard borer infestations; a spring and fall application suppressed 100%.**

Maryland Dept. of Agriculture's Pesticide Database lists over 100 products labelled for peach tree borer. Page 17 of the alternatives report identifies moderate and low hazard products and practices that are successfully used for borers, with an expanded list of other orchard insects and products on pages 28 and 40.

**The Pesticide Industry is Prepared to Ban Chlorpyrifos**

The IR-4 Project is where the pesticide industry is supported in the regulatory process of submitting new pesticide registrations and they work on roughly 100 new requests by the pesticide industry every year. In a conversation with IR-4 Project's Dan Kunkle, Senior Associate Director, Food & International Program, he said the majority of work IR-4 has been engaged in, directly or indirectly, for the last two years has been around the expected banning of chlorpyrifos. So, growers are not going to be left without alternative options. The industry has seen the writing on the wall, and it is just good business to be ready with alternative solutions and they are.

Maryland can also apply for a Special Local Need (SLN) or Emergency Use (24c) request for quick approval if something else is needed.

**Farmers, Farmers Markets and Farm Tourism**

We all want to support Maryland farmers. The growing popularity of buying local at farmers markets, farm tourism, and pick-your-own fruit with families underscores the need to eliminate the use of chlorpyrifos in these settings where children and pregnant women can be exposed onsite, and in the fruits and vegetables they purchase. A chlorpyrifos ban will move growers to using newer and safer methods to grow their produce and Marylanders to support "buying local" without worry that by doing so, they are risking irreversible harm to their children.

As Marylanders, we depend on our legislators to weigh the evidence of serious costs to human health with the knowledge that we have proven safer and effective management tactics readily at hand for every pest for which makers of chlorpyrifos raise alarm.

We ask you to take a stand for the health and well-being of Maryland children, families including our farm families, our pollinators and the Bay, and pass SB 300, with no weakening amendments.

Thank you,

Bonnie Raindrop,
Smart on Pesticides Coalition
2913 Overland Avenue
Baltimore, MD 21214
410-404-3808
legislate@centralmaryandbees.org

* Interregional Research Project No. 4 (IR-4) is a federally funded program established in 1963 to conduct the research necessary for obtaining registrations of pest control agents needed to grow crops. IR-4 works with farmers, agricultural scientists, and extension personnel to conduct research and petition the Environmental Protection Agency (EPA) for tolerances for specific pesticides. The IR-4 program has grown to include biological pest control agents and biochemicals, which are important in the implementation of Integrated Pest Management (IPM).

# SAFER AND EFFECTIVE *AGRICULTURE ALTERNATIVES TO CHLORPYRIFOS IN MARYLAND*

## RESOURCES FOR FARMERS

### SAFER ALTERNATIVES TO CHLORPYRIFOS

- Maryland Department of Agriculture Pesticide Database Searches
- Integrated Pest Management (IPM) Institute of North America
- Rutgers University IR-4 Project
- Pesticide Research Institute
- Alternatives to Chlorpyrifos for Maryland Agriculture report
- University of Maryland Extension Service

**Chlorpyrifos (chlor·pyr·i·fos) is a toxic, nerve agent pesticide that has been found to damage children's brain development, contaminate waterways and injure wildlife. Safer, effective alternatives to chlorpyrifos exist for agriculture use to control every Maryland crop pest, such as conventional pesticides, biopesticides, organic pesticides and cultural controls.**

Maryland farmers—including organic and conventional farmers—are able to produce thriving crops without relying on brain-harming chlorpyrifos. Listed below are numerous alternative treatments and practices available to Maryland farmers and golf course owners.

## Effective Alternative Treatments Against Key Maryland Pests

** While High Hazard rated pesticides increase the number of alternative options, this fact sheet highlights insecticides rated as Low Hazard or Moderate Hazard (by Pesticide Research Institute and Rutgers IR-4 Project)*

### *Orchard Fruits*

| Pests | Alternative Treatments |
|---|---|
| **Peach tree borer** | Over 100 products including 16 Moderate/Low Hazard insecticides plus cultural practices<br>• USDA found a single application of nematodes suppressed 88% of orchard borer infestation; spring and fall application suppressed 100% infestation<br>USDA Agriculture Research Service study<br>• Cultural practices include painting the first 12 inches of trunk area with Surround WP Kaolin clay or Latex paint. Other options are to set pheromone traps or to spread cedar chips or bark around the bases of the trees. |
| **Coddling moth** | Over 300 products |

## FACTS

- "The apple industry is moving away from organophosphates like chlorpyrifos due to safety concerns. For many pests, reduced-risk pesticides and non-pesticide alternatives have replaced chlorpyrifos."
  *- Vincent P. Jones et al., Outlooks on Pest Management*
- "A study of apple orchards found no difference in fruit damage between blocks treated with reduced-risk pesticides (clean fruit: 90-96%) and blocks treated with growers standard pesticides, which were mostly organophosphates like chlorpyrifos (clean fruit: 93%-96%)."
  *- Arthur M. Agnello et al., American Entomologist*

## Vegetables & Grains

| Pests | Alternative Treatments |
|---|---|
| **Corn rootworm** | Over 75 products, including 19 Moderate/Low Hazard insecticides |
| **Seedcorn maggot** | Over 100 products, including 13 Moderate/Low Hazard insecticides, plus Regard SC Seed Treatment as well as biological and cultural controls |

## FACTS

- There are 50 organic corn growers in Maryland who do not use chlorpyrifos
- "Chlorpyrifos-treated seeds can leach chlorpyrifos into the soil, ending up in our waterways as 95% of seed coatings wash off and can become runoff."
  *- Dave Goulson, School of Life Sciences, University of Sussex*

## Golf Courses

| Pests | Alternative Treatments | Cultural Controls/Practices |
|---|---|---|
| **Annual bluegrass weevil (ABW)** | Over 75 products including 17 Moderate/Low Hazard insecticides | • Maryland Cooperative Extension recommends various biological and cultural controls for upkeeping golf courses.<br>• Cultural practices include the use of ABW-tolerant Bermuda grass and creeping bent grass, which is naturally resistant to ABW.<br>*– NJ Turfgrass Assoc on Rutgers Annual Bluegrass Weevil Research* |

## FACTS

**Many Maryland golf courses report they do not use chlorpyrifos**

"Because highly resistant weevil populations are also more tolerant of—if not resistant to—most of the currently available larvicides, superintendents will also have to start relying more on biorational insecticides and cultural means to manage weevil populations."
*— Golf Course Superintendents Association of America's GCM Magazine*

## PEST: Spotted Lanternfly

| Target Crops | Alternative Treatments | Cultural Controls/Practices |
|---|---|---|
| **Tree fruit and Wine grapes** | 15 products that do not contain chlorpyrifos identified as "excellent" or "good" by the Spotted Lanternfly Task Force at Penn State<br>• 10 products are 98-100% effective for nymphs and adults<br>• Insecticides used for other pests will also kill SLF nymphs | Cultural controls include scraping egg masses, baiting trees and using sticky tape |

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*For Safe Water & Healthy Kids*

The Smart on Pesticides Maryland coalition, spearheaded by the Maryland Pesticide Education Network, works to protect Marylanders and the natural systems we depend upon from the toxic impacts of pesticides. The coalition includes more than 100 organizations, and institutions representing communities, businesses, health care providers, farmers, environmentalists, waterkeepers, interfaith.

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# Golf courses don't need chlorpyrifos!

Chlorpyrifos is a toxic, nerve agent pesticide proven to cause brain damage in children, contaminate waterways and harm wildlife. Golf courses that spray chlorpyrifos to control pests expose their patrons and their families, as well as nearby neighborhoods, schools and waterways, to its harmful effects. Recent surveys suggest that the annual bluegrass weevil, which chlorpyrifos is sometimes used to control, is becoming more resistant to the chemical and other insecticides.

## *Many courses in the Chesapeake Bay region are already using safer alternatives. Here are some examples:*

### Eisenhower Golf Course, Crownsville, MD

Treats pests with other chemicals in early spring, late spring and summer.

### Compass Pointe Golf Courses, Pasadena, MD

Superintendent Tim Takarski doesn't like to use chemicals like chlorpyrifos, when there are so many other products available.

Sprays bifenthrin on those areas where there has been bluegrass weevil in the early spring. However, they switched 27 of 36 holes to Bermuda grass which is more insect tolerant, reducing the need for pesticide spraying in these areas.

### Kenwood Golf and Country Club, Bethesda, MD

"These insecticides mess with the bugs' nervous system and apparently overexposure can mess with your own nervous system… **we do not use organophosphate chemicals anymore, because safer and more effective insecticides have been developed**."
– John Casady, superintendent

### Hobbit's Glen Golf Club, Columbia, MD

Uses Acelepyrn once a year in lieu of chlorpyrifos

### Hunt Valley Country Club, Phoenix, MD

Uses nitrogen and biorational controls

*Other courses report using no chlorpyrifos, including:*

Carroll Park Golf Course, Baltimore, MD

Chesapeake Hills Golf Course, Lusby, MD

Clifton Park Golf Course, Baltimore, MD

Forest Park Golf Course, Baltimore, MD

Mount Pleasant Golf Course, Baltimore, MD

Wicomico Shores Golf Course, Mechanicsville, MD

*Some Maryland golf courses report planting grasses that are resistant to annual bluegrass weevil and thereby eliminate the need to control the insect — these include:*

- *Eagle's Landing Golf Course, Ocean City, MD*
- *Whiskey Creek Golf Course, Frederick MD*
- *Mountain Branch Golf Course, Joppa, MD.*

## More on golf courses and chlorpyrifos:

"Entomopathogenic nematodes can provide significant control of annual bluegrass weevil larve."
– *Benjamin A. McGraw, Ph.D, Albrecht M. Koppenhofer, Ph.D., Rutgers University*

"If more courses move away from primary reliance on adulticides, monitoring of larvae will become more important, which could, in turn, reduce total insecticide use. Because highly resistant weevil populations are also more tolerant of — if not resistant to — most of the currently available larvicides, superintendents will also have to start relying more on bio-rational insecticides and cultural means to manage weevil populations."
– *Golf Course Superintendents Association of America's March 2017 issue of GCM*

"Getting on the pesticide treadmill with [annual bluegrass weevil] is a one-way road that over time gets ever uglier and harder to leave. The sooner you leave the better! Best not to get there in the first place."
– *Rutgers New Jersey Agricultural Experiment Station*

"We refuse to use [chlorpyrifos]. **It damages children's brains and is toxic to Bay life.**"
– *Cutler Robinson, head groundskeeper, Bayville Golf Club, Virginia Beach, VA*
*Chesapeake Bay Journal, Jan. 18, 2018*

# It's Time to Ban Chlorpyrifos!

*The Smart on Pesticides Maryland coalition, spearheaded by the Maryland Pesticide Education Network, works to protect Marylanders and the natural systems we depend upon from the toxic impacts of pesticides. The coalition includes over 100 organizations and institutions representing communities, businesses, health care providers, farmers, environmentalists, waterkeepers, interfaith congregants as well as environmental justice, public health and wildlife advocates.* Smartonpesticides.org

# Alternatives to Chlorpyrifos for Maryland Agriculture Crops

*Surround WP, kaolin clay crop protectant is effective in Mid-Atlantic orchards*

A report prepared for the
Maryland General Assembly

February 4, 2020

# Table of Contents

# Executive Summary

## Brief Background

Chlorpyrifos is a member of the organophosphate class of insecticides and acts as a nerve agent on humans and other species. In 2000, Dow AgroSciences and other manufacturers agreed to eliminate virtually all home uses of chlorpyrifos. Under the agreement, Dow halted the manufacture of chlorpyrifos for nearly all indoor residential uses including homes, schools and day care centers, due to both toxicity and its highly volatile nature, which increases pesticide drift.

In 2015, after extensive study, EPA scientists confirmed that chlorpyrifos cannot be considered safe at any detectible level and recommended that the pesticide be banned for agricultural uses. The agency cited the high risk of children's exposure in utero or during critical periods of growth and to the link between chlorpyrifos exposure and autism, childhood cancers, ADHD and other neurodevelopmental issues.

In April 2017, former EPA administrator Scott Pruitt appointed by President Trump, overrode the recommendations of EPA's own scientists to ban the use of chlorpyrifos. Maryland was among several states that sued the EPA for its decision to reverse the ban on chlorpyrifos for agricultural uses. In response, the Ninth Circuit Court of Appeals ruled in August 2018 that the EPA must "revoke all tolerances and cancel all registrations for chlorpyrifos." They said there was "no justification for the EPA's decision in April 2017 [to reverse its decision to ban]… in the face of scientific evidence that its residue on food causes neurodevelopmental damage to children." EPA appealed this decision and now, what is likely to be a lengthy court process regarding the legality of the reversal is underway.

## Alternatives for Chlorpyrifos in Agriculture

This report addresses safer and effective alternatives to chlorpyrifos that are available to Maryland grain growers, specialty crop farmers and applicators for pests that can be of concern to Maryland farmers, orchardists, winegrowers, golf course superintendents and land care professionals.

The report includes alternative insecticides and practices for insects of particular concern in Maryland—Annual Bluegrass Weevil (ABW) for turf grass on golf courses, Peachtree Borer for tree fruit, and Spotted Lanternfly (SLF), a new invasive species which has impacted vineyards and tree fruit in Southeastern Pennsylvania and is expected to become a problem in Maryland.

## Spotted Lanternfly (SLF)

A USDA-convened expert task force at Penn State has completed research on the most effective insecticides and practices to manage SLF. Updated Insecticide Recommendations for Spotted Lanternfly on Tree Fruit, published in January 2019, identified 15 insecticides as most effective for SLF nymphs and adults on grape and peach, many had excellent knockdown at 98-100%. **No insecticides with chlorpyrifos were recommended** in this report.

The Penn State report findings, links to other fact sheets about SLF management, and guidelines by the Pa. Dept. of Agriculture can be found in this report, beginning on page 8.

## Annual Bluegrass Weevil (ABW)

As the golf course industry looks toward moving away from reliance on adulticides such as chlorpyrifos for control of ABW, due to increasing problems of insecticide resistance, this report highlights advances in the industry using effective practices and safer products, on page 15.

## Peach Tree Borer

An insect of concern to orchardists is peach tree borer. Maryland's pesticide database identifies over 100 products for peach tree borer, this report highlights 24 products and practices which are successfully used in production orchards in the Mid-Atlantic and other regions for effective control of peach tree borer and other orchard pests (pages 17, 28 and 40).

This report has been compiled by the Maryland Pesticide Education Network, based on input from Rutgers University, The IR-4 Project, Purdue University, IPM Institute of North America, Pesticide Research Institute, Penn State Extension, University of Maryland Extension and other agricultural sources.

The HB 229 /SB 300 testimony packet also includes a list of more than 70 Maryland farms, as examples of operations which successfully use alternatives to chlorpyrifos.

# How Much Chlorpyrifos is Used in Maryland?

## Reported Chlorpyrifos Use on Maryland Crops

Maryland Dept. of Agriculture's (MDA) 2014 sample pesticide use survey, conducted by USDA National Agriculture Statistics Service (NASS), reported 3,900 lbs. of chlorpyrifos was used on Maryland Agriculture that year. The 2014 MDA report ranks pesticide use by pounds used statewide, with chlorpyrifos listed at #62 out of 286 pesticides applied (compared #1 glyphosate at 634,954 lbs and #286 cholecalciferol at 1 lb).

However, according to the **US Geological Survey calculations* for 2014, the state of Maryland uses between 3,348 lbs and 82,730 lbs of chlorpyrifos every year**. These USGS estimates refer only to agricultural use and do not capture golf course use.

## Crops / Insects Which May Be Treated with Chlorpyrifos

| **Maryland Crop** | **Most Common Listed Pests in Maryland** which may be treated with chlorpyrifos |
|---|---|
| Soybeans | Aphid, bean leaf beetle, grasshopper, spider mite, stinkbug |
| Corn Grain | Corn rootworm, cutworm, white grub, European corn borer, seedcorn maggot |
| Wheat | Aphid, grasshopper, wheat blossom midge |
| Brassicas (broccoli, brussel sprouts, cauliflower, cabbage, etc.) | Maggots, aphids |
| Onions | Onion maggots |
| Sweet potatoes | Flea beetle, Southern corn rootworm, wireworm |
| Pome and stone fruit (apple, peach, pear, etc.) | Peach tree borer, aphids, codling moth, mites, apple maggot, pear psylla, plum curculio, scale insects, brown marmorated stink bug |
| Strawberries | Strawberry aphid, leafhoppers, sap beetles, tarnished plant bugs, two-spotted mites, spotted wing drosphila |
| Turf | Annual bluegrass weevil, white grub, chinch bug, sod webworm |

*From chlorpyrifos.com, Dow Agrosciences' "Use and Benefits of Chlorpyrifos in Agriculture" (2016).*

* USGS data from: https://water.usgs.gov/nawqa/pnsp/usage/maps/county-level/StateLevel/HighEstimate_AgPestUsebyCropGroup92to16.txt and https://water.usgs.gov/nawqa/pnsp/usage/maps/county-level/StateLevel/LowEstimate_AgPestUsebyCropGroup92to16.txt

# Managing Pests of Greater Concern Without Chlorpyrifos

## Spotted Lanternfly
## Annual Bluegrass Weevil
## Peach Tree Borer
## Seedcorn Maggot
## Corn Root Worm

# Spotted Lanternfly: Latest Research on Management

Sixteen insecticide products have been tested and recommended by task force—chlorpyrifos was eliminated in the first trial for nymphs and adult spotted lanternfly.


**Spotted Lanternfly (SLF) has been found in Maryland. The insecticides that vineyards typically use when nymphs would be present, in the normal course of vineyard management, will also kill SLF nymphs effectively.**

Nearby states are looking to the USDA expert task force at Penn State and PA Dept. of Agriculture, who are leading the study and development of best management practices for control of spotted lanternfly. The task force released an updated report January 2019 (page 9) with research findings for the most effective insecticides to combat spotted lanternfly at the nymph and adult stages.

These studies found 12 products for fruit and grape to be “excellent” or “good” in effectiveness. Penn State Extension is continuing study and recommendation of less toxic controls. *Updated Insecticide Recommendations for Spotted Lanternfly report, next page.*

**In Maryland**, 12 products are labelled for use on spotted lanternfly (CDM Label Database), including 7 products recommended by Penn State research. Chlorpyrifos is not among them.

Concern among vineyards has prompted interest in using chlorpyrifos because one trial found it 100% effective on eggs, JMS Styletoil, a mineral oil, was also found to be 71% effective. However, Penn State recommends killing SLF at the nymph stage when they are stationary and **the insecticides that vineyards typically use on other pests in their normal course of vineyard management, will also kill the nymphs effectively at this time**.

**Spotted Lanternfly Resources**

- Website: Penn State Extension: Spotted Lanternfly
  https://extension.psu.edu/spotted-lanternfly

- Pa. Dept of Agriculture Guidelines for Control of Spotted Lanternfly
  https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/Documents/Spotted%20Lanternfly%20%20Property%20Management.pdf

- Updated Insecticide Recommendations for Spotted Lanternfly on Grape
  https://extension.psu.edu/updated-insecticide-recommendations-for-spotted-lanternfly-on-tree-fruit

- Spotted Lanternfly Management: Placing Sticky Bands on Trees
  https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/program-information/Documents/Tree%20Banding%20factsheet.pdf

- Spotted Lanternfly IPM Management Calendar
  https://extension.psu.edu/downloadable/download/sample/sample_id/2577/

PennState Extension

HOME | UPDATED INSECTICIDE RECOMMENDATIONS FOR SPOTTED LANTERNFLY ON GRAPE

# Updated Insecticide Recommendations for Spotted Lanternfly on Grape

Insecticide recommendations for spotted lanternfly in grape, updated January 2019.

ARTICLES | **UPDATED: JANUARY 11, 2019**

**Spotted lanternfly feeding on grapevine. Image by Erica Smyers.**

**Spotted lanternfly (SLF) is an invasive and important pest for grapes and tree fruit in Southeastern PA. Evaluation of insecticides for managing this insect in the 2018 growing season are now complete. There is no current economic threshold for SLF damage. Both nymphs and adults of this pest have been reported feeding on grapes, while only adults have been reported feeding on apple and peach. The most damage has been reported from SLF adults, which have been observed aggregating and feeding heavily on apples and grapes. In areas with heavy feeding, grape growers have reported yield loss, reduced berry quality, and vines not being able to survive the 2017-2018 winter. For more information about the damage that SLF poses, please refer to " Spotted Lanternfly on Grapes and Tree Fruit ."**

## Insecticide results for control of spotted lanternfly nymphs on peach and grape

*From "Updated Insecticide Recommendations for Spotted Lanternfly on Grape" - Penn State Extension*

## Peach

| Product name | Active ingredient | Rate/acre tested | Mean % mortality 0 days after spray | Mean % mortality 7 days after spray | Mean % mortality 14 days after spray |
|---|---|---|---|---|---|
| Brigade 10WSB | bifenthrin | 16 oz | 100 a | 100 a | 78.8 a |
| Carbaryl 4L | carabaryl | 3 qt | 100 a | 100 a | 10.0 c |
| Imidan 70WP | phosmet | 3 lb | 100 a | 96.7 ab | 48.1 bc |
| Vydate 2L | oxamyl | 8 pt | 100 a | 83.9 ab | 2.2 c |
| Danitol 2.4EC | fenpropathrin | 21.33 fl oz | 100 a | 80.6 ab | 24.1 bc |
| Actara 25WDG | thiamethoxam | 5.5 oz | 100 a | 70.2 ab | 17.0 bc |
| Scorpion 35SL | dinotefuron | 7 fl oz | 100 a | 55.9 cd | 24.5 bc |
| Acephate 97WDG | acephate | 1 lb | 100 a | 45.8 cd | --- |
| Mustang Maxx 0.8EC | zeta-cypermethrin | 4 fl oz | 100 a | 29.4 cd | --- |
| Sivanto Prime 1.67SC | flupyradiferone | 14 fl oz | 100 a | 23.3 cd | -- |
| Lannate 90SP | methomyl | 1 lb | 100 a | 8.2 d | --- |

*From "Updated Insecticide Recommendations for Spotted Lanternfly on Grape" - Penn State Extension*

| Product name | Active ingredient | Rate/acre tested | Mean % mortality 0 days after spray | Mean % mortality 7 days after spray | Mean % mortality 14 days after spray |
|---|---|---|---|---|---|
| Avaunt 30DG | indoxicarb | 6 oz | 98 a | --- | --- |
| Closer 2SC | sulfoxaflor | 5.75 fl oz | 90.7 a | 62.8 bc | 23.0 bc |
| Assail 30SG | acetamiprid | 8 oz | 89.5 a | 8.6 cd | --- |
| Entrust 2SC | spinosad | 2.5 fl oz | 57.9 b | 24.4 cd | --- |
| Movento 2SC | spirotetramat + LI-700 (2.6 g/L) | 9 fl oz | 37.9 bc | --- | --- |
| Water Control | --- | --- | 0.0 d | 25.2 cd | 0.0 c |

## Grape

| Product name | Active ingredient | Rate/acre tested | Mean % mortality 0 days after spray | Mean % mortality 7 days after spray | Mean % mortality 14 days after spray |
|---|---|---|---|---|---|
| Brigade 10WSB | bifenthrin | 16 oz | 100 a | 100 a | 94.0 a |
| Actara 25WDG | thiamethoxam | 3.5 oz | 100 a | 100 a | 60.0 ab |
| Scorpion 35SL | dinotefuron | 5 fl oz | 100 a | 98.0 a | 30.0 b |
| Carbaryl 4L | carabaryl | 2 qt | 98.0 ab | 96.0 a | 22.0 b |

*From "Updated Insecticide Recommendations for Spotted Lanternfly on Grape" - Penn State Extension*

| Product name | Active ingredient | Rate/acre tested | Mean % mortality 0 days after spray | Mean % mortality 7 days after spray | Mean % mortality 14 days after spray |
|---|---|---|---|---|---|
| Admire Pro | imidacloprid | 1.4 oz | 79.5 ab | 48.3 b | --- |
| Mustang Maxx 0.8EC | zeta-cypermethrin | 4 fl oz | 64.0 ab | 88.0 a | 11.0 b |
| Sivanto Prime 1.67SC | flupyradiferone | 14 fl oz | 46.0 bcd | --- | -- |
| Assail 30SG | acetamiprid | 5.2 oz | 38.0 cd | --- | --- |
| Closer 2SC | sulfoxaflor | 5.75 fl oz | 20.0 cde | --- | --- |
| Avaunt 30DG | indoxicarb | 6 oz | 20.0 cde | --- | --- |
| Imidan 70WP, high rate | phosmet | 2.125 lb | 20.0 cde | --- | --- |
| Venerate | *Burkholderia spp*. strain A396 | 4 qt | 14.0 de | --- | --- |
| Imidan 70WP, low rate | phosmet | 1.33 lb | 6.0 e | --- | --- |
| Entrust 2SC | spinosad | 2.5 fl oz | 4.0 e | --- | --- |
| Delegate | spinetoram | 5 oz | 2.0 e | --- | --- |
| Water Control | --- | --- | 20.0 e | 11.3 b | 10.0 b |

*From "Updated Insecticide Recommendations for Spotted Lanternfly on Grape" - Penn State Extension*

Percent mortality of spotted lanternfly nymphs and adults after 48 h exposure to foliage sprayed with different insecticides. Different letters following each percent mortality mean within a column indicate a significant difference at a 95% confidence limit. The letter "a" represents the compounds with the highest mortality level, while the subsequent letters (i.e. "e") represent lower mortality levels and means followed by the same letter were not significantly different. The maximum registered peach rates are not necessarily the same rates as those registered for grape.

Of the insecticides tested on peach in the table above, 14 of the 16 chemicals had excellent knockdown activity. Seven days after the application, the insecticides that still had above 60% mortality were: Closer, Imidan, Actara, Danitol, Carbaryl, Brigade, and Vydate. *Note:* Control mortality on the 7-day assessment (24.7%) was higher than the 0-day and 14-day assessments possibly due to very high temperatures. Only two products had mortality greater than 40% at 14 days after the application: Imidan (48% mortality) and Brigade (79% mortality). The Avaunt 7-day mortality reading was mistakenly not taken at the same time as the other products, but all nymphs when evaluated several days late, were dead indicating this product will at least last for 7 days.

Of the insecticides tested for adults on grape in the table above, 5 of the 15 insecticides evaluated had excellent knockdown activity. Seven days after the application, the insecticides that still had above 60% mortality were: Brigade, Actara, Scorpion, Cabaryl, and Mustang Maxx. On both the 14 day and 21 day (not shown) assessment, both Brigade and Actara had at least 60% mortality, and all other products failed at that time. Note that Imidan did not perform well in the adult trial with the two rates tested. However, in the nymph trial at the labeled rate for peaches (3 lb/acre), it performed very well. Both the rate and the life stage could be responsible for this variation.

Please note that some of the chemicals evaluated in this peach trial not are currently labeled specifically for use on SLF. However, many of the insecticides used for other pests in grape, peach, and apple (such as brown marmorated stink bug, Japanese beetle, and grape berry moth) will provide some protection against SLF damage. The control timing of sprays for BMSB adult in apple coincide with the movement of SLF adults into the orchards and two products which have special emergency (section 18) registrations for BMSB in apple are very effective on SLF. Results from this and future trials in the next few weeks are being utilized by several pesticide companies to modify their insecticide labels to specifically include SLF on their

*From "Updated Insecticide Recommendations for Spotted Lanternfly on Grape" - Penn State Extension*

insecticides applied at different rates. Pyrethroids in particular are very disruptive to biological control , and may cause flares of secondary pests such as mites, aphids, scale, or mealybugs.

These SLF control trials have been made available to most pesticide companies so that they will be able to make label changes if necessary. Registrations and recommendations change, so keep informed through our website and your local extension educator.

## Insecticides for control of spotted lanternfly in tree fruit

| Trade name | Active ingredient | Class | Rate per acre | Systemic, Contact, Ingestion | PHI (days) | REI (hrs) | Days of activity | Labeled for SLF? | SLF activity |
|---|---|---|---|---|---|---|---|---|---|
| Imidan 70WP – high | phosmet | Organophosphate | 3 lb (peach) | C, I | 14 | 336 | 14 | Yes, 2(ee) | Excellent (Note: this rate only evaluated for nymphs) |
| Imidan 70WP – medium | phosmet | Organophosphate | 2.125 lb (grape) | C, I | 14 | 336 | 0 | Yes, 2(ee) | Poor |
| Imidan 70WP - low | phosmet | Organophosphate | 1.33 lb (grape) | C, I | 7 | 336 | 0 | Yes, 2(ee) | Poor |
| Scorpion 35SL | dinotefuran | Neonicitinoid | 5 fl oz | S, C, I | 1 | 12 | <14 | Yes, 2(ee) | Excellent |
| Brigade 10WSB | bifenthrin | Pyrethroid | 16 oz. | C, I | 30 | 12 | 21 | Yes, 2(ee) | Excellent |
| Mustang Maxx 0.8EC | zeta-cypermethrin | Pyrethroid | 4 fl. oz. | C, I | 1 | 12 | <7 | Yes, 2(ee) | Good |
| Closer 2SC | sulfoxaflor | Sulfoximine | 5.75 fl oz. | S, C, I | 7 | 12 | 0 | 2(ee) pending | Poor |
| Actara 25WDG | thiamethoxam | Neonicitinoid | 3.5 oz | S, C, I | 5 | 12 | <21 | Yes, 2(ee) | Excellent |
| Assail 30SG | acetamiprid | Neonicitinoid | 5.3 oz (grape), 8.0 (peach) | S, C, I | 3 | 48 | <7 | Yes, 2(ee) on nymphs only | High rate good on nymphs, Low rate poor on adults |
| Carbaryl 4L | carbaryl | Carbamate | 2 qt | C, I | 7 | 12 | <14 | No | Excellent |

Please note that registrations and labels may change, and human error is always possible. You must check the most current label before applying any pesticide.

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# Annual Bluegrass Weevil Control on Turf Grass (Golf Courses)

Annual Bluegrass (Poa annua) is a problematic weed on golf fairways in the Northeast and annual bluegrass weevil is its primary pest. Some Maryland golf courses experience problems with annual bluegrass weevil.

> **14 Maryland golf courses report they do not use chlorpyrifos for AWB**:
> Compass Pointe Golf Course; Eisenhower Golf Course, Hobbit's Glen Golf Club; Kenwood Golf Club; Hunt Valley Country Club; Carroll Park Golf Course; Chesapeake Hills Golf Course; Clifton Park Golf Course; Forest Park Golf Course; Mt. Pleasant Golf Course; Wicomico Shores Golf Course; Eagles Landing Golf Course; Whiskey Creek Golf Course; Mountain Branch Golf Course

Several plant AWB-resistant grasses to eliminate the problem and need for any pesticides – Eagle's Landing Golf Course, Whiskey Greek Golf Course and Mountain Branch Golf Course

The industry is moving away from using insecticide treatments, pyrethroids and chlorpyrifos being most popular. The Golf Course Superintendents Association of America is recommending other strategies, due to the increasing problem of insecticide resistance in ABW populations.

> "Because highly resistant weevil populations are also more tolerant of—if not resistant to—most of the currently available larvicides, **superintendents will also have to start relying more on biorational insecticides and cultural means to manage weevil populations."**
>
> **— Golf Course Superintendents Association of America's GCM Magazine** (March, 2017)
> Article: "A Survey of Annual Bluegrass Weevil Management"
> https://www.gcsaa.org/gcm/2017/march/a-survey-of-annual-bluegrass-weevil-management

### Research Supporting IPM, Cultural Practices and Biorationals for ABW

- Alter management to allow ABW to feed on *Poa annua* for mid-range damage, then overseed year after year with desirable turfgrass (i.e. Bermuda grass, bentgrasses), naturally resistant to ABW. – NJ Turfgrass Assoc on Rutgers Annual Bluegrass Weevil Research
- Northeastern IPM Institute also recommends overseeding non-bluegrass grasses while using nematodes early in the season
- The U.S. Golf Association sponsored research at Rutgers University found "Entomopathogenic nematodes can provide significant control (65%) of annual bluegrass weevil larve."
- Bt has been used to reduce larval populations by 50-65% (Vittum 2005). Spinosad has been found to be 80% effective against larvae. – Annual Bluegrass Weevil in Turf, NC State Extension
- Cultural management includes minimizing stress on perimeter of fairway; maintaining sufficient soil moisture and proper fertility levels; and keeping surrounding woodlands clean of debris.
- Best preventive control for ABW is to keep Poa annua percentages as low as possible using cultural practices and herbicides, monitor populations to make decisions, minimize sprays, get good first-generation control of larvae, minimize adult treatments and concentrate on larvae.
- New York State working with Cornell Extension did not recommend chlorpyrifos. – Reducing Chemical Use on Golf Course Turf: Redefining IPM

- Rutgers NJ Agricultural Experiment Station warns against insecticide use and ABW resistance: **"Getting on the pesticide treadmill with ABW is a one-way road that over time gets ever uglier and harder to leave. The sooner you leave the better! Best not to get there in the first place."**

## Less Toxic Products That Are Proven Effective for ABW

- Acelepryn
- Anti-Pest-O Original Concentrate
- Anti-Pest-O RTU
- AzaGuard Botanical Insecticide/Nematicide
- Azatin O
- Azatrol EC Insecticide
- Bifenthrin
- BotaniGard 22 WP
- BotaniGard ES
- Bt (Bacillus thuringiensis)
- Debug Turbo EC
- Entomopathogenic nematoads
- Met52 EC
- Naturalis L
- Spinosad
- VST-006330 EP or Spear
- Use of ABW-tolerant Bermuda grass, creeping bent grass, etc. reducing need to spray
- Cultural management techniques

**Maryland Pesticide Database lists over 100 conventional pesticides for AWB.**
http://www.kellysolutions.com/md/pesticideindex.htm

# Peach Tree Borer Control on Orchard Tree Fruits

**While Maryland orchardists may believe chlorpyrifos is their only option against peach tree borer, the Maryland Pesticide Database lists over 100 conventional pesticides for peach tree borer.**

The following less toxic biorational pesticides and practices have been tested and are recommended by Rutgers University IR-4 Project and other agriculture institutions.

> **Namatodes – single application found to suppress 88% of orchard borer infestations; spring and fall application suppressed 100%**
> - **USDA Agriculture Research Service study** by Shapiro-Ilan and Cottrell Southeastern Fruit and Tree Nut Research Lab in Byron, Ga, working with Moselle U. Fl and Horton U. GA (2008)

- Azadirachtin
  - Anti-Pest-O Original Concentrate
  - Anti-Pest-O RTU
  - Aza-Direct
  - AzaGuard Botanical Insecticide/Nematicide
  - Azatin O
  - Azatin XL Plus
  - Debug Turbo EC
- BT kurstaki (Bt-j)Capsaicin
  - Bugitol
- Citrus extract sprays, i.e. Orange Guard
- 70% Neem oil
- Parasitic wasps for lesser peach tree borer eggs
- Pheromone
  - Isomate-P
  - Scentry Lures
- Pyrethrins
  - PyGanic Crop Protection EC 5.0 II
- Spinosad
- Surround WP kaolin clay - Paint tree trunks and exposed roots with paste of Surround WP up to 12 inches; latex paint has also been used
- Cultural practices, i.e.
  - removing wild plum, wild cherry and replacing older stressed trees;
  - keeping trees well-watered, strong and undamaged;
  - probing small holes in truck at soil line to crush larve beneath bark
  - for severe infestation, scoop soil from around tree crown where frass collects and dig out the larve
- Use pheromone traps, mating disruption hormones i.e. Tangle-Trap Insect Trap Coating
- Cedar chips and bark spread around stone fruit tree bases
- Moth crystals from napthalene

Expanded list of common Maryland tree fruit pests and biorational alternatives, pgs 28 and 39.

# Seedcorn Maggot Control

**The Maryland Pesticide Database lists over 100 conventional pesticides for seedcorn maggot.**

Cultural practices can play a significant role in creating conditions attractive to seedcorn maggot. Planting on freshly tilled fields and in fields where the cover crops or green manure are still decaying may increase the risk of seedcorn maggot infestations since the female flies are attracted to disturbed soil and decaying organic matter to lay their eggs. Delaying planting after tillage and incorporating cover crops may suppress injury from seedcorn maggot feeding.

**Cultural Practices**
1) Delayed planting to avoid cold wet soil temperatures
2) Shallow planting to speed up germination
3) Higher seeding rates to overcome minor field loss
4) Turning over or otherwise terminating cover crops at least 2-3 weeks before corn planting to ensure breakdown of crop residue
5) Conservation tillage or no till
6) Use of fertilizers other than manure
7) Planting of corn after grasses, rather than legumes
8) Plant between the 4-5 generations by counting 450 Growing Degree Days from the peak infestation the prior year
9) Monitor with yellow sticky traps
10) Attract predators of the eggs, larvae and pupae of the seedcorn maggot (gray fly), including ground beetles, dung flies, wasps, ants, mites, spiders, yellow jacket, and birds
11) Preserve the beneficial predators by not spraying broad spectrum pesticides
12) Crop rotation

**Low Toxic Insecticides and Biopesticide Controls**
1) Venerate
2) Azadirachtin (including Azatin O)
3) Spinosad
4) Regard SC Seed Treatment
5) Introduce Insect Pathogens, such as the parasitic nematode steinernema feltiae
6) Introduce beneficial fungi, such as the fungus entonophthone muscae

**Chemical Controls**
1) Fipronil
2) Permethrin
3) Diazinon 14G
4) Bifenthrin (i.e. Sniper)
5) Lamda Cyhalothrin
6) Terbufos
7) Clothianidin
8) Tefluthrin
9) Thiamethoxam (i.e. Cruiser)
10) Beta Cyfluthrin

## Grain: Corn Rootworm and White Grub Control

Principal uses in Maryland agriculture for chlorpyrifos, as reported by the Maryland Grain Producers Association, are for control of corn rootworm and grub outbreaks on crops planted with untreated corn seed.

**The Maryland Pesticide Database lists over 75 conventional pesticides for corn rootworm and 150 conventional pesticides for white grub.**

This report lists 19 less toxic alternative products for corn rootworm and 28 products for white grub control on corn, beginning on page 29, with scientific data on efficacy, pages 29 and 40.

## Strawberries: UMD Extension IPM Recommendations

University of Maryland Extension cites, "The IPM approach used by organic growers should be nearly identical to the one employed by conventional growers." Cultural control practices and organic insecticides are recommended including Bt, botanical insecticides (Neem, pyrethrin), GPM (usually a pyrethrum, sulfur and copper), horticultural oils (Dorman Oil, Superior Oil, Untr-fine Horticultural Oil) insecticidal soap, Spinosad, Surround (kaolin clay). Recommended non-organic insecticides: Carbaryl, GPM, Malathion—chlorpyrifos is not recommended.
https://extension.umd.edu/hgic/topics/fruit-insecticides

**PRI Product Evaluator identifies 57 low hazard products and 84 moderate hazard products as alternative insecticides to chlorpyrifos for strawberries.**

## Hemp: Industrial and Medical Cannabis

Industrial hemp is an emerging market and possibly a lucrative one for farmers and the state of Maryland. The importance of establishing this market is understandable, however there is no need to include chlorpyrifos in the process. Banning chlorpyrifos in Maryland would have little to no effect on the hemp market due to its documented resiliency and the 226 chlorpyrifos-free insecticide recommendations for overall cannabis production available in the United States, with 77 already registered in Maryland under the approved pesticide list for medical cannabis.

Hemp's resilient nature also implies that low to moderate risk pesticides could be enough for maintenance and there are numerous options for each pest that has been seen to affect industrial hemp so far. If the Maryland Industrial Hemp Research Pilot Program demonstrates a need for pesticides in industrial hemp production, the state of Maryland has extensive avenues to pursue successful growing methods, that may or may not include pesticides however, based on current resources on industrial hemp, it should never need chlorpyrifos.

Maryland's approved pesticides for medical cannabis compared to Colorado's approved pesticides for cannabis production shares 77 low hazard insecticides which have been found effective in Colorado and are already approved for use on medical cannabis in Maryland.

The full report, "Insecticides for Maryland Hemp Crop Pests," includes lists of specific insecticide products for industrial and medical cannabis, and is available by request, please email info@mdpestnet.org.

## Help for Farmers in Finding Safe, Effective Alternatives

Extensive scientific data is available on safe and effective alternatives to chlorpyrifos. The following resources are available to the public and provide farmers with searchable databases, no-cost expertise, access to science, and contacts for safer pest control tools.

- **IPM Institute of North America**, Specialty Crop Grower Services - www.ipminstitute.org
  **IPM Pesticide Risk Tool** – estimates risk of negative impacts of pesticide applications, www.pesticiderisk.org

- **Rutgers University, The IR-4 Project** - fifty years of successful research into sustainable crop protection in specialty crops and off-label uses, http://ir4.rutgers.edu/index.html

- **Pesticide Research Institute** – provides research, analysis, technical services, expert consulting on chemistry and toxicology of pesticides - www.pesticideresearch.com

- **PRI Pesticide Product Evaluator** - an online tool also available as a mobile app providing information for over 18,000 pesticide products, http://pesticideresearch.com/site/evaluator/

## The Rise of Biorational Pesticides and Biopesticides

Pesticides vary in their toxicity and in their potential to cause undesirable human and ecological impacts. Pest control materials that are effective on the target pest, yet relatively non-toxic with few ecological side-effects are sometimes called "biorational" pesticides; the EPA uses the term "biopesticides" for this pesticide type. The major categories of biorational pesticides include botanicals, microbials, minerals, and synthetic materials. Some, but not all, biorationals qualify for use on organic farms.

This biopesticide market has advanced rapidly in the last 10 years, valued at $3.3 billion in 2017, it is expected to grow 13.9% to $9.5 billion by 2025.
- from Transparency Market Research

# Rutgers University IR-4 Project Recommends Biorational Alternatives for Common Maryland Crop Pests

Since 1963, the Rutgers University IR-4 Project has been the major resource for supplying pest management tools for specialty crop growers by developing research data to support new EPA tolerances and labeled product uses.

The following list was prepared by IR-4 Project staff to identify biopesticide alternatives and practices to using chlorpyrifos for Maryland crop pests.

## Biorational Alternatives to Chlorpyrifos by Maryland Pest:

- **Turf grass - Annual bluegrass weevil (ABW)**
  - Anti-Pest-O Original Concentrate
  - Anti-Pest-O RTU
  - AzaGuard Botanical Insecticide/Nematicide
  - Azatin O
  - Azatrol EC Insecticide
  - BotaniGard 22 WP
  - BotaniGard ES
  - Debug Turbo EC
  - Met52 EC
  - Naturalis L
  - VST-006330 EP or Spear
- **Peach tree borer**
  - Azadirachtin
    - Anti-Pest-O Original Concentrate
    - Anti-Pest-O RTU
    - Aza-Direct
    - AzaGuard Botanical Insecticide/Nematicide
    - Azatin O
    - Azatin XL Plus
    - Debug Turbo EC
  - Capsaicin
    - Bugitol
  - Pheromone
    - Isomate-P
    - Scentry Lures
  - Pyrethrins
    - PyGanic Crop Protection EC 5.0 II
- **Seed corn maggots**
  - Azadirachtin
    - Azatin O
  - Spinosad
    - Regard
- **Large grasshoppers**
  - Azadirachtin
    - Agroneem Plus Agricultural
    - Agroneem Plus Lawn & Turf
    - Anti-Pest-O Original Concentrate
    - Anti-Pest-O RTU
    - AzaGuard Botanical Insecticide/Nematicide
    - Azatin O
    - Azatrol EC Insecticide
    - Debug Turbo EC
    - Neemix 4.5 EC
    - Nimbecidine EC
  - *Beauveria bassiana* strain GHA
    - BotaniGard ES
    - Mycotrol WPO
  - Capsaicin
    - Bugitol
  - *Nosema Locustae*

        - Nolo Bait
        - Semaspore Bait
    - Pyrethrins
        - PyGanic Crop Protection EC 5.0 II
    - Kaolin
        - Surround WP Crop Protectant
- **Soybean aphid**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - AzaGuard Botanical Insecticide/Nematicide
        - Azera Insecticide
        - Debug Turbo EC
    - *Beauveria bassiana* strain ANT-03
        - BioCeres WP
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
        - Mycotrol WPO
    - Canola oil
        - Vegol Insecticidal Oil
    - Capsaicin
        - Bugitol
    - Cinnamaldehyde
        - Cinnacure 30%
    - Potassium salts of fatty acids
        - Des-X Insecticidal Soap
- **Soybean leaf beetle**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - AzaGuard Botanical Insecticide/Nematicide
        - Debug Turbo EC
    - *Bacillus thuringiensis* galleriae
        - beetleGONE!
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - Capsaicin
        - Bugitol
- **Corn ear worm**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Azera Insecticide
        - Debug Turbo EC
    - Capsaicin
        - Bugitol
    - *Bacillus thuringiensis subsp. kurstaki* strain EG2348
        - Condor Wettable Powder
    - *Bacillus thuringiensis subspecies kurstaki* strain EG7841
        - Crymax Bioinsecticide
    - *Bacillus thuringiensis subsp. kurstaki* strain ABTS-351
        - Dipel ES
    - *Bacillus thuringiensis subspecies kurstaki* strain EG7826 Lepidopteran active toxin
        - Lepinox WDG Bioinsecticide
    - Polyhedral occlusion bodies (OBs) of the nuclear polyhedrosis virus of *Helicoverpa zea*
        - Gemstar LC
    - Pyrethrins
        - PyGanic Crop Protection EC 5.0 II
    - Oil
        - Golden Pest Spray Oil

        - Vegol Insecticidal Oil
        - JMS Stylet-Oil
- **Green clover worm**
    - *Bacillus thuringiensis* (various strains)
        - Agree WG Biological Insecticide
        - Biobit HP Biological Insecticide
        - BMP 123 (2X WDG)
        - Bonide Dipel 150 Dust For Vegetable
        - Crymax Bioinsecticide
        - Deliver Biological Insecticide
        - Dipel ES
        - Entrust SC Naturalyte Insect Control
        - Javelin WG Biological Insecticide
        - Lepinox WDG Bioinsecticide
    - Spinosad
        - Dipel Pro DF
- **Spider mites**
    - Azadirachtin
        - Agroneem Plus Lawn & Turf
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Azatrol EC Insecticide
        - Debug Turbo
    - Capsaicin
        - Bonide Hot Pepper Wax Insect Repellent RTU
        - Hot Pepper Wax Insect Agricultural
        - Hot Pepper Wax Insect Concentrate
    - Potassium salts of fatty acids
        - Des-X Insecticidal Soap
        - M-Pede Insecticide Miticide Fungicide
    - *Isaria fumosorosea Apopka* Strain 97
        - PFR-97 20% WDG
    - Extract of *Chenopodium ambrosioides*
        - QRD 400
        - Requiem EC
    - Potassium silicate
        - Sil-Matrix
    - Oils
        - Trilogy
        - Vegol
        - Golden Pest Spray Oil
- **Stinkbug**
    - Azadirachtin
        - Aza-Direct
        - AzaGuard Botanical Insecticide/Nematicide
        - Azatin O
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - Cinnamaldehyde
        - Cinnacure
- **Corn grain cinnamon stalk borer**
    - Azadirachtin
        - Anti-Pest-O Original Concentrate
        - AzaGuard Botanical Insecticide/Nematicide
        - Azatin O
        - Debug Turbo EC
        - Neemix 4.5 EC
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - *Bacillus thuringiensis*
        - Dipel ES
    - Capsaicin
        - Bugitol
- **Corn rootworm**
    - *Beauveria bassiana* strain GHA

        - BotaniGard ES
    - Buffalo gourd root powder (feeding stimulant for beetles)
        - Cidetrak D
    - Oil
        - Golden Pest Spray Oil
        - Vegol Insecticidal Oil
        - JMS Stylet-Oil
    - GS-omega/kappa-Hxtx-Hv1a
        - VST-006330 EP or Spear
- **Cutworms & armyworm**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Agroneem Plus Lawn & Turf
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Aza-Direct
        - AzaGuard Botanical Insecticide/Nematicide
        - Azatin O
        - Azatin XL Plus
        - Azatrol EC Insecticide
        - Azera
        - Debug Turbo EC
        - Ecozin 3%
        - Fortune AZA 3% EC
        - Molt-X
    - *Bacillus thuringiensis*
        - Agree WG Biological Insecticide
        - Biobit
        - BMP 123 (2X WDG)
        - Condor Wettable Powder
        - Crymax Bioinsecticide
        - Deliver Biological Insecticide
        - Dipel ES
        - Entrust SC Naturalyte Insect Control
        - Javelin WG Biological Insecticide
        - Lepinox WDG Bioinsecticide
        - Dipel Pro DF
        - Foray XG
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - *Beauveria bassiana* (ATCC 74040)
        - Naturalis L
    - Spinosad
        - Entrust SC Naturalyte Insect Control
    - Capsaicin
        - Nemitol
    - Oil
        - Golden Pest Spray Oil
        - Vegol Insecticidal Oil
        - JMS Stylet-Oil
    - Pyrethrins
        - PyGanic Crop Protection EC 5.0 II
    - Kaolin
        - Surround WP Crop Protectant
    - GS-omega/kappa-Hxtx-Hv1a
        - VST-006330 EP or Spear
- **European corn borer**
    - Azadirachtin
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Aza-Direct
        - AzaGuard Botanical Insecticide/Nematicide
        - Azatin O
        - Azatin XL Plus
        - Debug Turbo EC
    - Capsaicin
        - Bugitol
    - Pheromone
        - Isomate-P

        - Scentry Lures
    - Pyrethrins
        - PyGanic Crop Protection EC 5.0 II
- **Flea beetle**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - AzaGuard Botanical Insecticide/Nematicide
        - Azatin O
        - Azatrol EC Insecticide
        - Azera
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - Spinosad
        - Entrust SC Naturalyte Insect Control
    - Kaolin
        - Surround WP Crop Protectant
- **Rootworm**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Debug Turbo
    - Capsaicin
        - Bugitol
    - Oil
        - Golden Pest Spray Oil
        - JMS Stylet-Oil
    - *Isaria fumosorosea Apopka* Strain 97
        - PFR-97 20% WDG
- **Slugs**
    - Capsaicin
        - Bugitol
        - Dazitol Concentrate
    - Spinosad
        - Bug-N-Sluggo
    - Sodium Ferric EDTA
        - Ferroxx
    - Iron phosphate
        - Sluggo Slug and Snail Bait
    - Kaolin
        - Surround WP Crop Protectant
- **White grub**
    - Azadirachtin
        - Agroneem Plus Lawn & Turf
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Debug Turbo
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - Capsaicin
        - Bugitol
        - Dazitol Concentrate
    - Allyl isothiocyanate
        - Dominus
    - GS-omega/kappa-Hxtx-Hv1a
        - VST-006330 EP or Spear
    - Potassium salts of fatty acids
        - M-Pede Insecticide Miticide Fungicide
- **Wireworm**
    - Azadirachtin
        - Azatin O
    - Capsaicin
        - Bugitol
        - Dazitol Concentrate
- **Wheat aphid**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - AzaGuard Botanical Insecticide/Nematicide
        - Aza-Direct

        - Azera
        - Debug Turbo
    - *Beauveria bassiana* strain ANT-03
        - BioCeres WP
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
        - Mycotrol WPO
    - Capsaicin
        - Bugitol
    - Potassium salts of fatty acids
        - Des-X Insecticidal Soap
        - M-Pede
- **Wheat blossom midge**
    - AzaGuard Botanical Insecticide/Nematicide
- **Brassicas – aphids**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Aza-Direct
        - AzaGuard
        - Azatin O
        - Azera
        - Nimbecidine EC
        - Neemix 4.5 EC
    - Capsaicin
        - Bugitol
    - Cinnamaldehyde
        - Cinnacure 30%
    - Potassium salts of fatty acids
        - M-Pede Insecticide Miticide Fungicide
- **Cabbage maggots**
    - Azadirachtin
        - Anti-Pest-O Original Concentrate
        - Neemix 4.5 EC
    - Pyrethrins
        - PyGanic Crop Protection EC 5.0 II
- **Onions maggots**
    - Azadirachtin
        - Agroneem Plus Agricultural
        - Anti-Pest-O Original Concentrate
        - AzaGuard
        - Azatin O
        - Debug Turbo
        - Neemix 4.5 EC
    - Spinosad
        - Regard
- **Sweet potatoes flea beetles**
    - Azadirachtin
        - Anti-Pest-O Original Concentrate
        - Anti-Pest-O RTU
        - Azatrol EC Insecticide
        - Azera
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
- **Southern corn rootworm**
    - *Beauveria bassiana* strain GHA
        - BotaniGard ES
    - Buffalo gourd root powder (feeding stimulant for beetles)
        - Cidetrak D
    - Oil
        - Golden Pest Spray Oil
        - Vegol Insecticidal Oil
        - JMS Stylet-Oil
    - GS-omega/kappa-Hxtx-Hv1a
        - VST-006330 EP or Spear

Access the IR-4 Project database:
https://www.ir4project.org/

# Understanding Pesticide Product Hazard Rankings

Growers who seek safer alternatives to chlorpyrifos will find many resources to help them identify alternatives, review science on their efficacy and application including the IPM Institute of North America, Rutgers IR-4 Project, the Pesticide Research Institute, IPM consultants, universities, extension services, and others.

An online resource, PRI Product Evaluator database, is a public website available to growers to access a wealth of information on more than 18,000 pesticide products and can be used to acquire comprehensive information on each product. Growers can enter search queries based on crop type, pest type, hazard tier ranking and other variable, to return results listing product options with complete labelling and use information for each product. Access the database at: http://www.pesticideresearch.com

## Hazard Tier Ranking System

PRI Product Evaluator ranks its 18,000 listed products with a hazard tier ranking. This is a scientific analysis, based on the complete labeling and product registration information.


**Highest Concern**
The formulated product has a DANGER signal word on the label because of high acute toxicity, is listed by US EPA as a Restricted Use Product (RUP), and/or is highly toxic to fish or other aquatic life, birds, wildlife, or honey bees. Alternatively, one or more of the known ingredients in the product meets at least one of the following criteria: **Known or probable carcinogen, reproductive or developmental toxicant, suspected endocrine disruptor, persistent bioaccumulative toxic substance, or listed as a non-point source water pollutant on the Clean Water Act Section 303(d) list**.


**Moderate Concern**
The formulated product has a WARNING signal word on the label because of moderate acute toxicity and/or is moderately toxic to fish or other aquatic life, birds, wildlife, or honey bees. Alternatively, one or more of the known ingredients in the product is not a Hazard Tier 1 ingredient but meets at least one of the following criteria: **Possible carcinogen or potential ground or surface water contaminant.**


**Low Concern** (often a biorational or biopesticide)
The formulated product has a CAUTION or no signal word on the label because of low acute toxicity and/or has no warnings about toxicity to fish or other aquatic life, birds, wildlife, or honeybees. For the known ingredients in the product, **no hazard criteria** are flagged for Tier 1 or Tier 2.

# Numbers of Lower Toxicity Alternative Products to Chlorpyrifos, by Maryland Crop and Pest

***In the following lists, only chlorpyrifos alternative products identified as Low or Moderate Concern in Hazard Tier Ranking.***

## Numbers of alternative agricultural products, by crop pest (2018 data):

| **Soybean** | **Number of Alternative PRI-Listed Products** |
|---|---|
| Aphid | 45 products |
| Bean Leaf Beetle | 29 products |
| Corn Earworm | 38 products |
| Grasshopper | 19 products |
| Green Clover worm | 38 products |
| Spider Mites | 3 products |
| Stinkbug | 6 products |

| **Corn Grain** | **Number of Alternative PRI-Listed Products** |
|---|---|
| Cinnamon Stalk Borer | 9 products |
| Corn Rootworm | 19 products |
| Cutworms & Armyworm | 59 products |
| European Corn Borer | 26 products |
| Flea Beetle | 21 products |
| Rootworm | 19 products |
| Slugs | 12 products |
| White Grub | 28 products |
| Wireworm | 6 products |

| **Wheat** | **Number of Alternative PRI-Listed Products** |
|---|---|
| Aphid | 27 products |
| Grasshopper | 10 products |
| Wheat blossom Midge | 11 products |

### Vegetable Crops

| **Brassicas** (i.e. broccoli, cabbage, etc.) | **Number of Alternative PRI-Listed Products** |
|---|---|
| Aphids | 60 products |
| Cabbage Maggots | 36 products |

| **Sweet Potatoes** | **Number of Alternative PRI-Listed Products** |
|---|---|
| Flea Beetles | 24 products |
| Southern Corn Rootworm | 13 products |
| Wireworms | 4 products |

| **Onions** | **Number of Alternative PRI-Listed Products** |
|---|---|
| Onion Maggots | 36 products |

| **Pome & Stone Fruit** | **Alternative Products** (PRI, *Rutgers IR-4, IPMI) |
|---|---|
| Peach tree borer (LPTB, GPTB) | 16 products* |
| Borers – dogwood, roundheadded apple, American plum, apple twig, black stem | 10 products* |
| Aphid – rosy apple, green apple, wooly apple | 93 products |
| Mites | 120 products |
| Apple maggot | 34 products |
| Pear psylla | 9 products |
| Plum curculio | 10 products |
| Scale insects | 92 products |
| Brown marmorated stink bug | 6 products |

| **Turf** | **Number of Alternative Products***, Rutgers IR-4 |
|---|---|
| White grub | 11 products |
| Chinch bug | 20 products |
| Sod webworm | 16 products |
| Annual bluegrass weevil | 16 products |

* https://extension.entm.purdue.edu/publications/E-61.pdf

# Additional Studies on Effectiveness

**Corn Rootworm**

- 2015 Venerate XC In-furrow corn rootworm study, AgoPro/Iowa - https://tinyurl.com/ya7bs5z8
- 2015 AgPro Partners Iowa Venerate VX in-furrow corn rootworm study (excel) - https://tinyurl.com/y8hquque
- 2015 SS Ag Ohio Venerate XC In-furrow corn rootworm study - https://tinyurl.com/y9joxw5u
- 2016 Iowa State University corn rootworm study - https://tinyurl.com/y7fkz9e4
- 2016 Purdue University Venerate XC In-Furrow corn rootworm - https://tinyurl.com/y9nkmd5r

**Tree Fruit**

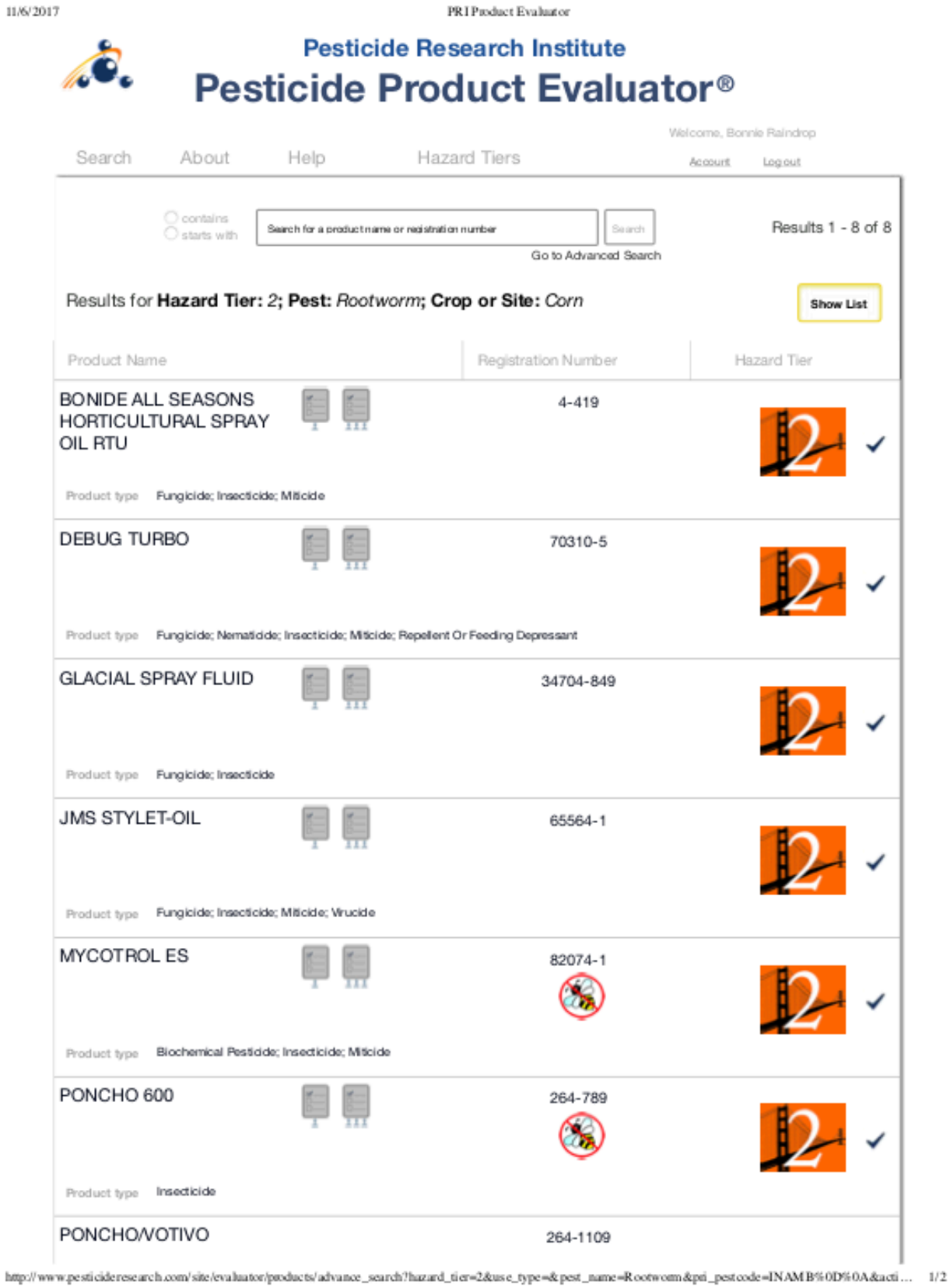
- IPM Institute: *Chlorpyrifos alternatives for select tree fruit pests - https://tinyurl.com/y8r3vutn
- Mounding soils to avoid infestation of dogwood borer in apple - https://tinyurl.com/ybwewofn
- 2014 San Jose scale study – NEFCON Massachusetts - https://tinyurl.com/y962w9dg
- 2017 Hudson Valley Research Lab San Jose scale – part 1 - https://tinyurl.com/y7ebwu2n
- 2017 Hudson Valley Research Lab San Jose scale – part 2 - https://tinyurl.com/y9ng8gpm
- 2017 Hudson Valley Research Lab San Jose scale – part 3 - https://tinyurl.com/y7swp6d8
- 2017 Michigan State University Wooly apply aphid apple - https://tinyurl.com/y9ymhfnx
- 2017 Rutgers University San Jose scale report on peaches - https://tinyurl.com/ycu7uf8h
- Assail – efficacy-DWB trials Wise et al 2003 - https://tinyurl.com/y7nslsln
- Control of Apple Maggot on Apples in Massachusetts & New York - https://tinyurl.com/y79be9s9

# Products to Manage Corn Rootworm (CRW)

Data on products and efficacy of biorational products for corn rootworm is representative of readily available data. This section will:

1) Identify products listed for Corn Rootworm from the PRI Product Evaluator
2) Provide product data on Venerate, a biorational from Marrone BioInnovation
3) Findings - summary data on studies conducted on Venerate and CRW

## 1) Corn Rootworm – Alternative Products List (PRI)



11/6/2017 PRI Product Evaluator

Pesticide Research Institute

Pesticide Product Evaluator®

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Search About Help Hazard Tiers Account Logout

contains / starts with — Search for a product name or registration number — Search

Go to Advanced Search

Results 1 - 8 of 8

Results for **Hazard Tier:** *2*; **Pest:** *Rootworm*; **Crop or Site:** *Corn*

Show List

| Product Name | Registration Number | Hazard Tier |
|---|---|---|
| BONIDE ALL SEASONS HORTICULTURAL SPRAY OIL RTU<br>Product type: Fungicide; Insecticide; Miticide | 4-419 | 2 |
| DEBUG TURBO<br>Product type: Fungicide; Nematicide; Insecticide; Miticide; Repellent Or Feeding Depressant | 70310-5 | 2 |
| GLACIAL SPRAY FLUID<br>Product type: Fungicide; Insecticide | 34704-849 | 2 |
| JMS STYLET-OIL<br>Product type: Fungicide; Insecticide; Miticide; Virucide | 65564-1 | 2 |
| MYCOTROL ES<br>Product type: Biochemical Pesticide; Insecticide; Miticide | 82074-1 | 2 |
| PONCHO 600<br>Product type: Insecticide | 264-789 | 2 |
| PONCHO/VOTIVO | 264-1109 | |

http://www.pesticideresearch.com/site/evaluator/products/advance_search?hazard_tier=2&use_type=&pest_name=Rootworm&pri_pestcode=INAMB%0D%0A&acti… 1/2


11/6/2017
PRI Product Evaluator
Product type Nematicide; Insecticide
SUNSPRAY 6E PLUS
86330-11
Product type Insecticide; Miticide
1 - 8 of 8
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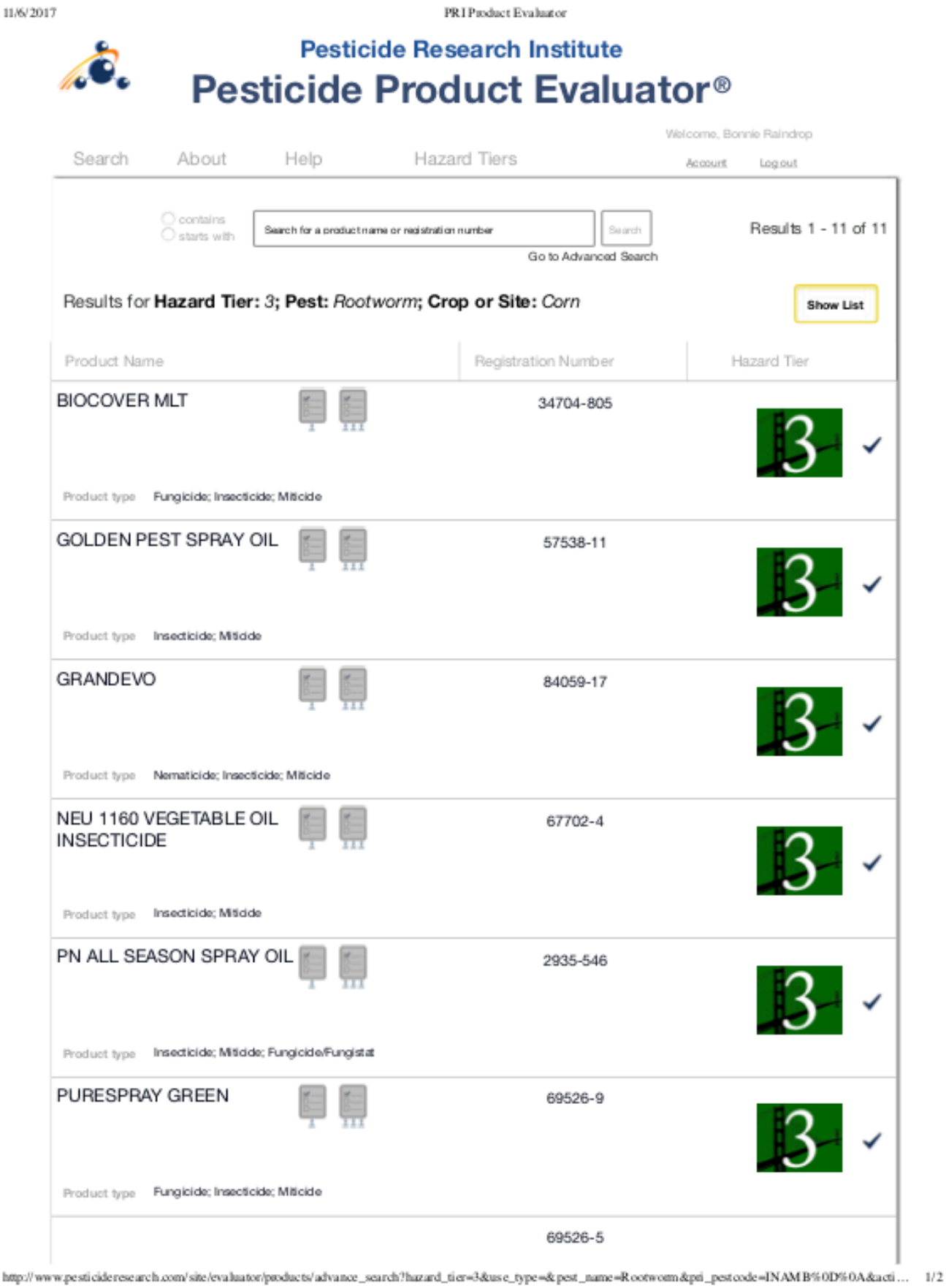

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contains / starts with — Search for a product name or registration number — Search

Go to Advanced Search

Results 1 - 11 of 11

Results for **Hazard Tier:** *3*; **Pest:** *Rootworm*; **Crop or Site:** *Corn*

Show List

| Product Name | Registration Number | Hazard Tier |
|---|---|---|
| BIOCOVER MLT<br>Product type Fungicide; Insecticide; Miticide | 34704-805 | 3 ✓ |
| GOLDEN PEST SPRAY OIL<br>Product type Insecticide; Miticide | 57538-11 | 3 ✓ |
| GRANDEVO<br>Product type Nematicide; Insecticide; Miticide | 84059-17 | 3 ✓ |
| NEU 1160 VEGETABLE OIL INSECTICIDE<br>Product type Insecticide; Miticide | 67702-4 | 3 ✓ |
| PN ALL SEASON SPRAY OIL<br>Product type Insecticide; Miticide; Fungicide/Fungistat | 2935-546 | 3 ✓ |
| PURESPRAY GREEN<br>Product type Fungicide; Insecticide; Miticide | 69526-9 | 3 ✓ |
| | 69526-5 | |

http://www.pesticideresearch.com/site/evaluator/products/advance_search/?hazard_tier=3&use_type=&pest_name=Rootworm&pri_pestcode=INAMB%0D%0A&acti... 1/2

| | | |
|---|---|---|
| PURESPRAY SPRAY OIL 10E<br>Product type: Fungicide; Insecticide; Miticide | | 3 |
| SPRAY OIL 470<br>Product type: Fungicide; Insecticide; Miticide | 34704-809 | 3 |
| SUNSPRAY 6E<br>Product type: Fungicide; Insecticide; Miticide | 86330-6 | 3 |
| SUNSPRAY 6E WESTERN<br>Product type: Insecticide; Miticide | 86330-15 | 3 |
| MYCOTROL O<br>Product type: Biochemical Pesticide; Insecticide; Miticide | 82074-3 | 3 |

1 - 11 of 11

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## 2) Product: Venerate for Control of Corn Rootworm

1/31/2018 MBI-206 EP

Pesticide Research Institute

Pesticide Product Evaluator®

MBI-206 EP

Registration Number
84059-14

Hazard Tier
NOT YET RATED

Product type: Insecticide

**Product Information**

| | |
|---|---|
| Registration Status | Manufacturer |
| EPA: Active | Marrone Bio Innovations |
| CA: Active | Find MSDS / US EPA Label |

Find Registration Status in Other States

| | |
|---|---|
| Cancellation Date | Currently registered |
| Acute Toxicity Signal Word | CAUTION |
| Restricted Use | No |
| Formulation | Emulsifiable Concentrate |

**Active Ingredients**

Burkholderia sp strain A396 cells and spent fermentation media, 94.46%

**Other Known Ingredients**

**Registration Numbers**

| | |
|---|---|
| EPA | 84059-14 |
| CA | 84059-14-ZA, 84059-14-AA, 84059-14-ZB |

Previous EPA Registration Numbers: None

**Other Names for This Product**

| EPA Reg. No. | Product Name |
|---|---|
| 84059-14-42750 | Biost Insecticide 100 |
| 84059-14-42750 | Biost Nematicide 100 |
| 84059-14-ZA | MAJESTENE |
| 84059-14 | MBI-206 EP |
| 84059-14-ZA | VENERATE |
| 84059-14-ZA | VENERATE XC |

**Pests Targeted By This Product**

Aphids
Artichoke Plume Moth
Bacterial Gummosis
Armyworm
Avocado Leafroller
Bagworm

**Hazard Tier Assessment**

This product has not yet been assigned a Hazard Tier Ranking by PRI. To request a Hazard Tier evaluation, please email PRI at support@pesticideresearch.com

Follow all label instructions when using this product.

**PRI Comments**

| EPA Data Updated | PRI Review Date |
|---|---|
| 8/6/2017 | Detailed review not yet available |

Find IPM Solutions

**Environmental Hazards**

PRI has not yet evaluated the environmental hazards of this product. Email PRI to request a review. See the product label for more information.

**Acute Human Health Hazards**

PRI has not yet evaluated the acute human health hazards of this product. Email PRI to request a review. See the product label for more information.

**Crops/Sites On Which This Product Is Approved For Use**

Acerola (Foliar Treatment)
Almonds (Foliar Treatment)
Angelica (Foliar Treatment)
Apricots (Foliar Treatment)
Artichokes (Soil Treatment)
Atemoya (Foliar Treatment)
Balm (Foliar Treatment)
Barley (Foliar Treatment)
Beets (Foliar Treatment)
Aerial Application
Amaranthus (Foliar Treatment)
Apples (Foliar Treatment)
Artichokes (Foliar Treatment)
Asparagus (Foliar Treatment)
Avocado (Foliar Treatment)
Bananas (Foliar Treatment)
Basil (Foliar Treatment)

http://www.pesticideresearch.com/site/evaluator/products/view/84059-14 1/5

Banana Skipper
Beet Armyworm
Blackheaded Budworms
Blossom Weevils
Cabbage Looper
Cabbage Webworm
California Oakworm
Cankerworms
Cherry Fruitworm
Chinch Bug
Citrus Cutworm
Citrus Leafminers
Citrus Peelminer
Citrus Psyllid
Citrus Red Mite
Citrus Rust Mite
Citrus Thrips
Codling Moth
Corn Earworm
Corn Leaf Aphid
Cotton Aphid
Cotton Bollworm
Cranberry Fruitworm
Cranberry Weevil
Cross-Striped
Cutworms
Cabbageworm
Diamondback Moth
Douglas-Fir Tussock Moth
Elm Sparworm
European Corn Borer
European Red Mite
Fall Webworm
Filbert Leafroller
Filbert Worm
Fireworms
Florida Red Scale
Fruittree Leafroller
Grape Berry Moth
Grape Leafroller
Grapeleaf Skeletonizer
Green Cloverworm
Green Fruitworm
Greenbug
Greenstriped Mapleworm
Gummosis
Gypsy Moth
Heliothis Caterpillars
Hemlock Looper
Hickory Shuckworm
Hornworms
Imported Cabbageworm
Jack Pine Budworm
Lace Bugs
Leafrollers
Lesion Nematodes
Loopers
Lygus Bugs
Mcdaniel Spider Mite
Mealybugs
Melonworm
Mimosa Webworm
Mites
Navel Orangeworm
No Pest
Obliquebanded Leafroller
Omnivorous Leafroller
Orange Tortrix
Orangedog
Oriental Fruit Moth
Pacific Spider Mite
Pandemis Leafroller
Peach Twig Borer
Pear Psylla
Pecan Nut Casebearer
Pepper Weevil
Pickleworm
Pine Butterfly
Pine Tip Moths
Plant Bugs
Plum Curculio
Pod Worm
Potato Aphid
Potato Leafhopper
Psyllids
Raspberry Fruitworms
Redbanded Leafhopper
Redbanded Leafroller
Redhumped Caterpillar
Reniform Nematodes
Ringworm Complex
Ring Nematodes
Root-Knot Nematodes
Saddleback Caterpillar
Saddled Prominent
Saltmarsh Caterpillar
Silverleaf Whitefly
Sixspotted Mite
Southwestern Corn Borer
Soybean Looper
Sparganothis Fruitworm
Spruce Budworm
Sting Nematodes
Stink Bugs
Stunt Nematodes
Tecia Thecla Basilides
Tent Caterpillars
Texas Citrus Mite
Thecla Thecla Basilides
Thrips
Tobacco Budworm
Tomato Fruitworm
Tomato Pinworm
Tufted Apple Bud Moth
Tussock Moths
Twig Borers
Twospotted Spider Mite
Variegated Cutworm
Variegated Leafroller
Velvetbean Caterpillar
Walnut Caterpillar
Webworms
Western Bean Cutworm
Western Tussock Moth
Whiteflies
Willamette Spider Mite

Beets (Garden) (Foliar Treatment)
Beets (Garden) (Soil Treatment)
Black Raspberries (Foliar Treatment)
Black Salsify (Foliar Treatment)
Black Salsify (Soil Treatment)
Blackberries (Foliar Treatment)
Blueberries (Foliar Treatment)
Borage (Foliar Treatment)
Broccoli (Foliar Treatment)
Broccoli (Soil Treatment)
Broccoli Raab (Foliar Treatment)
Broccoli Raab (Soil Treatment)
Brussels Sprouts (Foliar Treatment)
Brussels Sprouts (Soil Treatment)
Buckwheat (Foliar Treatment)
Burdock (Edible) (Foliar Treatment)
Burdock (Soil Treatment)
Burnet (Foliar Treatment)
Cabbage (Foliar Treatment)
Cabbage (Soil Treatment)
Canistel (Foliar Treatment)
Canola (Foliar Treatment)
Cantaloupes (Foliar Treatment)
Cantaloupes (Soil Treatment)
Carrots (Foliar Treatment)
Carrots (Soil Treatment)
Cashews (Foliar Treatment)
Cassava (Foliar Treatment)
Cassava (Soil Treatment)
Catnip (Foliar Treatment)
Cauliflower (Foliar Treatment)
Cauliflower (Soil Treatment)
Celeriac (Foliar Treatment)
Celeriac (Soil Treatment)
Celery (Foliar Treatment)
Celery (Soil Treatment)
Chayote (Foliar Treatment)
Chayote (Soil Treatment)
Cherimoya (Foliar Treatment)
Cherries (Foliar Treatment)
Chervil (Foliar Treatment)
Chestnuts (Foliar Treatment)
Chicory (Foliar Treatment)
Chicory (Soil Treatment)
Chinese Artichoke (Foliar Treatment)
Chinese Artichoke (Soil Treatment)
Chinese Broccoli (Foliar Treatment)
Chinese Broccoli (Soil Treatment)
Chinese Cabbage (Bok Choy) (Foliar Treatment)
Chinese Cabbage (Bok Choy) (Soil Treatment)
Chinese Cabbage (Foliar Treatment)
Chinese Cabbage (Gai Choy) (Soil Treatment)
Chinese Cabbage (Mizuna) (Foliar Treatment)
Chinese Cabbage (Mizuna) (Soil Treatment)
Chinese Cabbage (Napa) (Foliar Treatment)
Chinese Cabbage (Napa) (Soil Treatment)
Chinese Mustard (Gai Choy) (Foliar Treatment)
Chive (Foliar Treatment)
Christmas Tree Plantings (Foliar Treatment)
Chrysanthemum (Edible) (Foliar Treatment)
Chrysanthemum (Edible) (Soil Treatment)
Cilantro (Foliar Treatment)
Clary Sage (Foliar Treatment)
Collards (Foliar Treatment)
Collards (Soil Treatment)
Coriander (Foliar Treatment)
Corn (Field) (Foliar Treatment)
Corn (Field) (Soil Treatment)
Corn (Pop) (Foliar Treatment)
Corn (Pop) (Soil Treatment)
Corn (Seed Crop Foliar Treatment)
Corn (Seed Treatment)
Corn (Soil Treatment)
Corn (Sweet) (Foliar Treatment)
Corn (Sweet) (Soil Treatment)
Corn Salad (Foliar Treatment)
Corn Salad (Soil Treatment)
Costmary (Foliar Treatment)
Cotton (Foliar Treatment)
Cotton (Seed Treatment)
Cotton (Soil Treatment)
Crabapples (Foliar Treatment)
Cranberries (Foliar Treatment)
Cress (Foliar Treatment)
Cress (Soil Treatment)
Cucumbers (Foliar Treatment)
Cucumbers (Soil Treatment)
Currants (Foliar Treatment)
Curry Leaf (Foliar Treatment)
Custard Apple (Foliar Treatment)
Dandelion (Foliar Treatment)
Dandelion (Soil Treatment)
Dill (Foliar Treatment)
Dock (Sorrel) (Foliar Treatment)
Dock (Sorrel) (Soil Treatment)
Eggplant (Foliar Treatment)
Eggplant (Soil Treatment)
Elderberry (Foliar Treatment)
Endive (Escarole) (Foliar Treatment)
Endive (Escarole) (Soil Treatment)
Feijoa (Foliar Treatment)
Fennel (Soil Treatment)
Fennel (Foliar Treatment)
Figs (Foliar Treatment)
Filberts (Foliar Treatment)
Forest Trees (Foliar Treatment)
Garden Peas (Foliar Treatment)
Garlic (Foliar Treatment)
Garlic (Soil Treatment)
Ginger (Foliar Treatment)
Ginger (Soil Treatment)
Ginseng (Foliar Treatment)
Ginseng (Soil Treatment)

Gooseberries (Foliar Treatment)
Gourds (Edible) (Soil Treatment)
Grapes (Foliar Treatment)
Ground Cherry (Soil Treatment)
Herbs (Foliar Treatment)
Horehound (Foliar Treatment)
Horseradish (Soil Treatment)
Hyssop (Foliar Treatment)
Jerusalem Artichoke (Foliar Treatment)
Juneberries (Foliar Treatment)
Kiwi (Foliar Treatment)
Kohlrabi (Soil Treatment)
Leeks (Foliar Treatment)
Lemons (Foliar Treatment)
Lettuce (Head) (Soil Treatment)
Lettuce (Leaf) (Soil Treatment)
Longan (Foliar Treatment)
Macadamia Nuts (Foliar Treatment)
Mangos (Foliar Treatment)
Muskmelons (Foliar Treatment)
Mustard (Greens) (Foliar Treatment)
Mustard (Spinach) (Foliar Treatment)
Nasturtium (Foliar Treatment)
Oats (Foliar Treatment)
Okra (Soil Treatment)
Onions (Bulb) (Soil Treatment)
Onions (Green) (Soil Treatment)
Oriental Radish (Foliar Treatment)
Ornamental Broadleaf Evergreen Shrubs (Foliar Treatment)
Ornamental Foliage Plants (Foliar Treatment)
Ornamental Trees (Foliar Treatment)
Ornamental Woody Shrubs (Foliar Treatment)
Parsley (Soil Treatment)
Parsnips (Soil Treatment)
Peaches (Foliar Treatment)
Pears (Foliar Treatment)
Pepinos (Foliar Treatment)
Peppermint (Foliar Treatment)
Pineapple (Foliar Treatment)
Plums (Foliar Treatment)
Potatoes (Foliar Treatment)
Proso Millet (Foliar Treatment)
Pumpkin (Soil Treatment)
Purslane (Soil Treatment)
Radicchio (Foliar Treatment)
Radishes (Soil Treatment)
Rapeseed (Greens) (Foliar Treatment)
Red Raspberries (Foliar Treatment)
Rosemary (Foliar Treatment)
Gourds (Edible) (Foliar Treatment)
Grapefruit (Foliar Treatment)
Ground Cherry (Foliar Treatment)
Guava (Foliar Treatment)
Hazelnut (Foliar Treatment)
Hops (Foliar Treatment)
Horseradish (Foliar Treatment)
Huckleberries (Foliar Treatment)
Jaboticaba (Foliar Treatment)
Jerusalem Artichoke (Soil Treatment)
Kale (Foliar Treatment)
Kale (Soil Treatment)
Kohlrabi (Foliar Treatment)
Lavender (Foliar Treatment)
Leeks (Soil Treatment)
Lettuce (Head) (Foliar Treatment)
Lettuce (Leaf) (Foliar Treatment)
Limes (Foliar Treatment)
Loganberries (Foliar Treatment)
Loquat (Foliar Treatment)
Mamey Sapote (Foliar Treatment)
Marjoram (Foliar Treatment)
Muskmelons (Soil Treatment)
Mustard (Greens) (Soil Treatment)
Mustard (Spinach) (Soil Treatment)
Nectarines (Foliar Treatment)
Okra (Foliar Treatment)
Onions (Bulb) (Foliar Treatment)
Onions (Foliar Treatment)
Onions (Green) (Foliar Treatment)
Oranges (Foliar Treatment)
Orchards (Foliar Treatment)
Oriental Radish (Soil Treatment)
Ornamental Conifers (Foliar Treatment)
Ornamental Flowering Plants (Foliar Treatment)
Ornamental Shade Trees (Foliar Treatment)
Ornamental Turf (Foliar Treatment)
Papayas (Foliar Treatment)
Parsley (Foliar Treatment)
Parsnips (Foliar Treatment)
Passion Fruit (Foliar Treatment)
Pearl Millet (Foliar Treatment)
Pecans (Foliar Treatment)
Pepinos (Soil Treatment)
Peppers (Foliar Treatment)
Peppers (Soil Treatment)
Pistachio Nuts (Foliar Treatment)
Pomegranates (Foliar Treatment)
Potatoes (Soil Treatment)
Prunes (Foliar Treatment)
Pumpkin (Foliar Treatment)
Purslane (Foliar Treatment)
Quinces (Foliar Treatment)
Radicchio (Soil Treatment)
Radishes (Foliar Treatment)
Rambutan (Foliar Treatment)
Rapeseed (Greens) (Soil Treatment)
Rhubarb (Foliar Treatment)
Rhubarb (Soil Treatment)
Rutabagas (Foliar Treatment)

Rutabagas (Soil Treatment)
Rye (Foliar Treatment)
Safflower (Oil Crop) (Foliar Treatment)
Sage (Foliar Treatment)
Salsify (Foliar Treatment)
Salsify (Soil Treatment)
Sapodilla (Foliar Treatment)
Savory (Summer) (Foliar Treatment)
Savory (Winter) (Foliar Treatment)
Shallots (Soil Treatment)
Skirret (Foliar Treatment)
Skirret (Soil Treatment)
Sorghum (Foliar Treatment)
Sorghum (Milo) (Foliar Treatment)
Soursop (Foliar Treatment)
Soybeans (Foliar Treatment)
Soybeans (Seed Treatment)
Soybeans (Soil Treatment)
Spanish Lime (Foliar Treatment)
Spanish Salsify (Foliar Treatment)
Spanish Salsify (Soil Treatment)
Spices (Foliar Treatment)
Spinach (Foliar Treatment)
Spinach (Soil Treatment)
Squash (Summer) (Foliar Treatment)
Squash (Summer) (Soil Treatment)
Squash (Winter) (Foliar Treatment)
Squash (Winter) (Soil Treatment)
Star Apple (Foliar Treatment)
Starfruit (Foliar Treatment)
Strawberries (Foliar Treatment)
Strawberries (Soil Treatment)
Sugar Apple (Foliar Treatment)
Sugar Beets (Foliar Treatment)
Sugar Beets (Soil Treatment)
Sunflowers (Oil Crop) (Foliar Treatment)
Sunflowers (Seed Crop Foliar Treatment)
Sweet Bay (Foliar Treatment)
Sweet Potatoes (Foliar Treatment)
Sweet Potatoes (Soil Treatment)
Swiss Chard (Foliar Treatment)
Swiss Chard (Soil Treatment)
Tangerines (Foliar Treatment)
Tank Mix
Tansy (Foliar Treatment)
Tarragon (Foliar Treatment)
Thyme (Foliar Treatment)
Tobacco (Foliar Treatment)
Tobacco (Soil Treatment)
Tomatillo (Foliar Treatment)
Tomatillo (Soil Treatment)
Tomatoes (Foliar Treatment)
Tomatoes (Soil Treatment)
Tree Farms (Foliar Treatment)
Triticale (Foliar Treatment)
Turmeric (Foliar Treatment)
Turnips (Foliar Treatment)
Turnips (Greens) (Foliar Treatment)
Turnips (Soil Treatment)
Walnuts (Foliar Treatment)
Watercress (Foliar Treatment)
Watermelon (Foliar Treatment)
Watermelon (Soil Treatment)
Wheat (Foliar Treatment)
White Sapote (Foliar Treatment)
Wintergreen (Foliar Treatment)
Woodruff (Foliar Treatment)
Wormwood (Foliar Treatment)
Yams (Foliar Treatment)
Yams (Soil Treatment)

**Chemical ID Information on Known Ingredients in this Product**

Chemical ID

Burkholderia sp strain A396 cells and spent fermentation media

| Chemical Name & Synonyms | Use Type | Classification | CAS Number | Molecular Weight |
|---|---|---|---|---|
| Burkholderia sp strain A396 cells and spent fermentation media | Fungicide | Microbial | NDA | NDA |
| Burkholderia sp strain A396 cells and spent fermentation media | | | | |

Registration

CA DPR Code: 6064
USGS Code: NDA
US: Yes
CA: Yes
EPA PC Code: 006534
PMRA Code: BUA
EU: NDA

NDA = No Data Available

**Hazard Information on Known Ingredients in this Product**

Human Health Hazards | Water Pollution Potential | Low Toxicity Indicators

| Percent | Chemical Name | Cancer Ranking | Reproductive/Developmental Toxicity | Endocrine Disruptor Status |
|---|---|---|---|---|

| Percent | Chemical Name | Cancer Ranking | Reproductive/Developmental Toxicity | Endocrine Disruptor Status |
|---|---|---|---|---|
| 94.46 | Burkholderia sp strain A396 cells and spent fermentation media | Not Listed | Not Listed | Not Listed |

NDA = No Data Available

Human Health Hazards | Water Pollution Potential | Low Toxicity Indicators

| Percent | Chemical Name | Groundwater Ubiquity Score (GUS) | Soil Mobility | Aerobic Half-Life (days) | Exceeds CA Specific Numeric Values | Persistent Bioaccumulative Toxicant | Section 303(d) Listing |
|---|---|---|---|---|---|---|---|
| 94.46 | Burkholderia sp strain A396 cells and spent fermentation media | NDA | NDA | NDA | Not Listed | No | Check local 303(d) listing |

NDA = No Data Available

Human Health Hazards | Water Pollution Potential | Low Toxicity Indicators

| Percent | Chemical Name | Section 25(b) Minimal Risk | Organic Approved | US EPA Biopesticide | US EPA Waived Data Requests |
|---|---|---|---|---|---|
| 94.46 | Burkholderia sp strain A396 cells and spent fermentation media | No | Yes | Yes | No data |

NDA = No Data Available

Review

*Share your experience using this product. In what situations did you find the product to be most effective? Are there particular pests or sites that you would not recommend this product for use?*

Post your review here

Post

# 3) Findings: Venerate XC for Control of Corn Rootworm Larvae, 2015-2016

## *Burkholderia sp. rinojensis* (strain A396) MBI-206

VENERATE

- Discovered in MBI's screening program; isolated from soil.
- Active compounds found within the cell and in the whole cell broth with bioactivity against certain insects, mites and plant parasitic nematodes.
- Commercial product contains 94.46% heat-killed cells and spent fermentation media, no viable cells.
- Excellent non-target and toxicological profile.
- Commercial name for insecticide/miticide is Venerate®
- U.S. launch in late 2014, launch in Mexico in late 2016
- Commercial name for nematicide in the U.S. as Majestene®

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## The pest and the damage – western corn rootworm (*Diabrotica virgifera virgifera*)

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## Materials and Methods

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In-furrow applications made with Venerate XC (*B. rinojensis A396)*

Small plot RCBD with six replications. Individual plots were four rows wide and 35-50 feet in length

Roots dug after adult emergence and grain harvested at end of season

Data analyzed by ANOVA and SNK where applicable

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## Corn Root Protection With Venerate XC – 2016 Trials

*ISU 0-3 Nodal Root Damage Ratings at Iowa and Indiana Locations*

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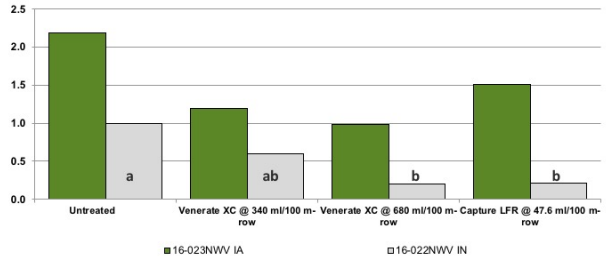


Trial design was a randomized complete block with 6 replications. A replication was 4 rows on 0.76 meter spacing x 9-15 meters in length. Treatments applied with planter-equipped units delivering materials in an in-furrow band over the open seed furrow before row closure. Means followed by different letters are statistically different from one another at p=0.05.
16-023NWV Aaron Gassman Iowa State University
16-022NWV Christian Krupke Purdue University

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## Conclusions

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1. Venerate significantly reduced CRW feeding damage when applied in-furrow.
2. When CRW feeding damage was reduced, yields were significantly higher than in untreated plots.
3. Venerate offers an alternative for corn rootworm control with favorable toxicological profiles compared to standard chemical treatments.

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# Low Toxicity Products for Apples & Pome Fruit Pests

## Purdue IR-4 Project Results for Pest Management on Pome Fruits

| Trade Name | PreHarvest Interval | Organic | Pest |
|---|---|---|---|
| Anti-Pest-O Original Concentrate | 0 days | No | Peach tree borer |
| Anti-Pest-O RTU | 0 days | No | Peach tree borer |
| Aza-Direct | 0 days | Yes | Peach tree borer |
| AzaGuard Botanical Insecticide/Nematicide | 0 days | No | Peach tree borer |
| Azatin O | 0 days | Yes | Peach tree borer |
| Agroneem Plus Agricultural | 0 days | Yes | Borer |
| Allityn Insect Repellent | 12 hours | No | Borer |
| Anti-Pest-O Original Concentrate | 0 days | No | Borer |
| Aza-Direct | 0 days | Yes | Borer |
| AzaGuard Botanical Insecticide/Nematicide | 0 days | No | Borer |
| Azatin O | 0 days | Yes | Borer |
| BotaniGard ES | 0 days | No | Borer |
| Bugitol | 0 days | No | Borer |
| Debug Turbo EC | 0 days | Yes | Borer |
| DiPel DF | 0 days | Yes | Borer |
| Neemix 4.5 EC | 0 days | Yes | Borer |
| PyGanic Crop Protection EC 5.0 II | 0 days | Yes | Borer |
| Agroneem Plus Agricultural | 0 days | Yes | Aphid |
| Allityn Insect Repellent | 12 hours | No | Aphid |
| Anti-Pest-O Original Concentrate | 0 days | No | Aphid |
| Anti-Pest-O RTU | 0 days | No | Aphid |
| Aza-Direct | 0 days | Yes | Aphid |
| AzaGuard Botanical Insecticide/Nematicide | 0 days | No | Aphid |
| Azatin O | 0 days | Yes | Aphid |
| Azatrol EC Insecticide | 0 days | Yes | Aphid |
| Azera Insecticide | 0 days | Yes | Aphid |
| BioCeres WP | 0 days | Yes | Aphid |
| BotaniGard ES | 0 days | No | Aphid |
| Bugitol | 0 days | No | Aphid |
| Cinnacure 30% | 0 days | No | Aphid |
| Debug Turbo EC | 0 days | Yes | Aphid |
| Des-X Insecticidal Soap | 0 days | Yes | Aphid |
| Ecozin 3% EC | 0 days | Yes | Aphid |
| Golden Pest Spray Oil | 0 days | No | Aphid |
| Naturalis L | 0 days | No | Aphid |
| Neemix 4.5 EC | 0 days | Yes | Aphid |
| Nimbecidine EC | 0 days | No | Aphid |
| PFR-97 20% WDG | 0 days | Yes | Aphid |
| PyGanic Crop Protection EC 5.0 II | 0 days | Yes | Aphid |
| Sil-MATRIX | 0 days | Yes | Aphid |
| SuffOil-X | 0 days | Yes | Aphid |
| Trilogy | 0 days | Yes | Aphid |
| Vegol Insecticidal Oil | 0 days | Yes | Aphid |
| Acaritouch | 1 day | No | Mites |
| Agroneem Plus Agricultural | 0 days | Yes | Mites |
| Allityn Insect Repellent | 12 hours | No | Mites |
| Aza-Direct | 0 days | Yes | Mites |
| AzaGuard Botanical Insecticide/Nematicide | 0 days | No | Mites |
| Bugitol | 0 days | No | Mites |
| Cinnacure 30% | 0 days | No | Mites |
| Debug Turbo EC | 0 days | Yes | Mites |
| Des-X Insecticidal Soap | 0 days | Yes | Mites |
| Golden Pest Spray Oil | 0 days | No | Mites |
| JMS Stylet-Oil | 0 days | Yes | Mites |
| Nimbecidine EC | 0 days | No | Mites |
| PFR-97 20% WDG | 0 days | Yes | Mites |
| PyGanic Crop Protection EC 1.4 II | 0 days | Yes | Mites |
| Sil-MATRIX | 0 days | Yes | Mites |
| SuffOil-X | 0 days | Yes | Mites |

# Alternative Practices to Using Chlorpyrifos

**In addition to commercial product alternatives to Chlorpyrifos, U.S. organic producers have developed effective OMRI-certified practices which can be adopted by conventional growers for any crop.**

There are growers in Maryland who are successfully growing without the use of chlorpyrifos, by utilizing these practices. In California, in preparation for the ban that was expected until the EPA's abrupt reversal, conventional farmers have already begun to shift to both preventive measures and alternative treatments. We can do the same here in Maryland.

Preventive measures include mechanical and cultural practices that are core principles of organic or regenerative farming. They include:

- Planting pest-resistant varieties
- Adjusting planting times
- Disruption of the target pest's mating cycle
- Field sanitation practices
- Crop rotations
- Use of cover crops to suppress certain insects
- Establishment of habitat and food for predator insects, bats or other predators
- Introduction of predator insects (e.g., lacewings, soldier bugs or damsel bugs for soybean aphids; trichogamma wasps and lacewing larvae for corn borer eggs; ground beetles, parasitoids for cutworms; parasitic wasps for wheat greenbugs)
- Application of soil beneficial nematodes (e.g., steinernema feltiae kills over 230 different soil pests from fleas and gnats to weevils and grubs)
- Insect traps, pheromone lures, or trap crops to both monitor and control pests
- Introduction of diseases caused by viruses, bacteria, nematodes or fungal pathogens (e.g., beneficial fungi and bacteria for cutworms, milky spore for Japanese beetles, beneficial nematodes for wireworms in potatoes and onions)
- Introduction of materials to slice, repel, confuse or exclude pests (e.g., diatomaceous earth, kaolin clay, hot pepper wax, etc.)
- For vegetable crops, use of mechanical controls such as row covers against flea beetles on brassicas, or hand picking and water spray on vegetables pests
- Scouting to determine economic thresholds of loss, before spraying
- Most importantly, application of non-toxic inputs such as botanical pesticides and the hundreds of non-toxic or less toxic inputs listed in the tiered lists available through several reliable third parties, including Rutgers University I4 project, IPM Institute of North America, and the Pesticide Research Institute (PRI) Pesticide Product Evaluator set forth herein.

**CleanWaterAction_Ranson_FAV_SB0300**
Uploaded by: Ranson, Emily
Position: FAV

CLEAN WATER ACTION
MARYLAND

# SB300 - Pesticides - Use of Chlorpyrifos - Prohibition

Senate Education, Health, and Environmental Affairs Committee
February 12, 2020

**Position: Favorable**

Dear Chairman Pinsky and Members of the Committee,

Clean Water Action is a grassroots, water-quality advocacy group with 50,000 members in Maryland. While our primary interest is in preserving the quality of the water we drink, we also engage on issues impacting environmental justice and reducing toxic exposure.

Chlorpyrifos is a highly toxic pesticide that should not be used in Maryland. The science on chlorpyrifos is clear, it is so toxic that there is **no safe** use of this pesticide. Even when applicators followed labels and wore protective equipment, their exposure level was unsafe. It is highly toxic to both people and pollinators, and is a significant toxic threat to our remaining bees.

In 2015, the EPA made a very unusual move to propose a ban on chlorpyrifos. This was based on the body of peer-reviewed science that correlated chlorpyrifos exposure with brain damage in children, even at low exposures. In 2016, the EPA reaffirmed this decision. When this decision was reversed in 2017, it was based on no changes to the scientific understanding. States, including Maryland, have sued the EPA over this reversal and this lawsuit continues to move through the court system.

While orchardists and golf course managers may like to keep chlorpyrifos in their toolbox, there is **no safe exposure level for chlorpyrifos**. Even with careful use of chlorpyrifos, applicators cannot apply it safely. There are other pesticides available that can be used appropriately and safely, and those should be used instead.

While some may want to continue to use chlorpyrifos because of its effectiveness at killing pests, unfortunately it is too effective at not only killing pests, but also killing and damaging beneficial insects such as bees and other pollinators, aquatic life, and people, especially the very young.

Clean Water Action
1120 N. Charles Street, Suite 415
Baltimore, MD 21201

Maryland can and should ban all uses of chlorpyrifos. Whether applied to trees, vegetables, or turf grass, chlorpyrifos is toxic to people, pollinators, and aquatic life.

- Chlorpyrifos is highly toxic even at low exposures. The EPA determined that there is no safe exposure of chlorpyrifos.[1]
- Chlorpyrifos does not remain confined on farms and golf courses.
    - In the 2006 toxic assessment for the Chesapeake Bay, there was chlorpyrifos present in 90% of the water samples that were tested for it.[2]
    - It can drift 300 feet after application.[3]
    - Chlorpyrifos remains on food, and children are exposed to unsafe levels through fruits and vegetables.[4]
- There are effective alternatives to chlorpyrifos that are safer to use.

Other states have taken action to ban chlorpyrifos. Opponents to this legislation may point out that New York and California opted for regulatory bans, but at the end of the day both states have banned the use of chlorpyrifos. California has continued to allow granular use, which is a small part of chlorpyrifos use, and New York has allowed the continued use of chlorpyrifos, but only on apple tree trunks and only until the end of 2021.

We urge a favorable report on SB 300 to protect Marylanders, our waterways, and our bees from this dangerous pesticide that the EPA determined after extensive review **cannot be used safely**.

Thank you,

Emily Ranson
Maryland Program Coordinator
Clean Water Action
443-562-2832
eranson@cleanwater.org

[1] US EPA, 2016. Chlorpyrifos: Revised Human Health Risk Assessment. EPA-HQ-OPP-2015-0653-054.
[2] Chesapeake Bay Program, 2006. Prioritized Chesapeake Bay Organic Toxics of Concern Method and Assessment. https://www.chesapeakebay.net/documents/Prioritized_Chesapeake_Bay_Organic_Toxics_of_Concern_Method_and_Assessment_2006.pdf
[3] US EPA, 2016. Chlorpyrifos: Revised Human Health Risk Assessment. EPA-HQ-OPP-2015-0653-054.
[4] US EPA, 2016. Chlorpyrifos: Revised Human Health Risk Assessment. EPA-HQ-OPP-2015-0653-054.

**MdPublicHealthAssoc_Rehr_FAV_SB0300**
Uploaded by: Rehr, Rebecca
Position: FAV

**Pesticides – Use of Chlorpyrifos - Prohibition**
**SB 300**
Position: SUPPORT
February 11, 2020

The Maryland Public Health Association appreciates the opportunity to submit this letter of support for Senator Lam's SB 300 to ban the use of the harmful pesticide, chlorpyrifos. A core tenet of public health is prevention, and preventing harm often involves preventing exposure. In the case of chemical safety policy – often involving pesticides – preventing exposure involved banning specific chemicals or classes of chemicals known to cause harm. This is the safest way to protect people, particularly those most vulnerable to impacts if they are exposed. There are other options implemented by the agriculture industry, such as the use of personal protective equipment like masks and gloves, but those are subject to user error and may malfunction, creating scenarios with potential high exposure. Only a ban can prevent further exposure.

Put on the market in 1965, the use of chlorpyrifos rapidly scaled and it became one of the most common ingredients in pesticides in the country. More than 30 years later, the EPA started to phase out chlorpyrifos and it has in fact been banned for use indoors since 2000. The Public Health Statement from 1997 on chlorpyrifos from the Agency for Toxic Substances & Disease Registry (ATSDR) includes the following information about how chlorpyrifos can impact human health:

> In people, short-term oral exposure (one day) to low (milligrams) levels of chlorpyrifos can cause dizziness, fatigue, runny nose or eyes, salivation, nausea, intestinal discomfort, sweating, and changes in heart rate. Short-term oral exposure to much higher (grams) levels of chlorpyrifos may cause paralysis, seizures, loss of consciousness, and death. Reports in people also show that short-term exposure to chlorpyrifos may cause muscle weakness weeks after the original symptoms have disappeared. Other effects of exposure to chlorpyrifos include changes in behavior or sleeping pattern, mood changes, and effects on the nerves and/or muscles in the limbs (which may appear as odd sensations such as numbness or tingling, or as muscle weakness). [1]

The first studies indicating particularly harmful impacts on children were published in the early 2000s. The evidence has only grown. Children can be exposed in utero, most likely from parents who work in agricultural fields and spray the pesticides, and also throughout early childhood directly from fields or on produce shipped around the country. Throughout these stages, children are still developing their vital organs, which is why exposure to harmful chemicals can have lifelong impacts that are costly for individuals, families, and society. In an amicus brief for the ninth circuit court of appeals case, *League of United Latin American Citizens, et al. and the State of New York, et al. vs. Andrew Wheeler and the U.S. Environmental Protection Agency*, health agencies including the American Public Health Association and the American Academy of Pediatrics wrote, "…chlorpyrifos can alter the very structure of the brain itself, as well as result

in an increased prevalence of attention deficit hyperactivity disorder and other behavioral problems."[2] This is why MdPHA supports a ban on chlorpyrifos. It is imperative that we protect the health and wellbeing of all children by eliminating exposure to this hazard. And, while we are heartened by the recent announcement from Corteva Agriscience, the largest domestic producer of chlorpyrifos, that they will stop producing it, we know that it was a business-driven decision and not a one made to protect human health.[3] A permanent ban will by definition protect Maryland residents in perpetuity, regardless of market-driven decisions from any company or political decisions by any administration. Thank you for considering our statement.

MdPHA is a nonprofit, statewide organization of public health professionals dedicated to improving the lives of all Marylanders through education efforts and advocacy of public policies consistent with our vision of healthy Marylanders living in healthy communities. MdPHA is the state affiliate of the American Public Health Association, a 142-year-old professional organization with more than 25,000 members dedicated to improving population health and reducing the health disparities that plague our nation.

1. Available from: https://www.atsdr.cdc.gov/phs/phs.asp?id=493&tid=88
2. Available from: https://www.apha.org/policies-and-advocacy/advocacy-for-public-health/testimony-and-comments
3. Washington Post article, available from https://www.washingtonpost.com/climate-environment/2020/02/06/trump-kept-this-controversial-pesticide-market-now-its-biggest-manufacturer-is-stopping-production/

**MedicalUnivsitySouthCarolina_Reigart_FAV_SB0300**
Uploaded by: Reigart, MD, Routt
Position: FAV

Statement of
J. Routt Reigart, MD, FAAP
Medical University of South Carolina
in Support of
**SB 300: Pesticides – Use of Chlorpyrifos - Prohibition**
before the
**House Environment and Transportation Committee**
Maryland House of Delegates
Annapolis Maryland

**February 11, 2020**

Honorable Chair and members of the Committee. My name is J. Routt Reigart, Professor Emeritus of Pediatrics at Medical University of South Carolina. I have been involved in protecting children from the adverse effects of pesticides for over 40 years. Among my activities, I founded the National Pesticide Telecommunication Network, a dedicated pesticide information center, staffed 24 hours per day 7 days per week to assist health professionals deal with pesticide exposures. This Network is now the National Pesticide Information Center at Oregon State University. I was the founding Chair of the Board of the Children's Environmental Health Network, a nationally recognized and effective NGO dedicated to improving the health of children in relationship to their environment. I was the first Chair of the USEPA's Children's Health Protection Advisory Committee. I chaired the American Academy of Pediatrics Committee on Environmental Health. I am the Co-Editor of the 5th and 6th editions of the USEPA's *Recognition and Management of Pesticide Poisoning.*

I am submitting this testimony in support of Maryland SB 300 because of my concerns regarding continued chlorpyrifos use in Maryland and its demonstrated adverse effects on children. I was disheartened to learn that EPA's Administrator Pruitt rescinded the agency's 2015 proposal to revoke the food tolerances of chlorpyrifos. Researchers, medical professionals, and even EPA's own scientists have reviewed years of data, which all point to chlorpyrifos's long-term adverse impacts on the developing brains of children.

A revocation of its food tolerances would have removed chlorpyrifos from agricultural production and eliminated dietary exposure to the public. It would also end exposure to farmworkers and farmworker families. EPA, in 2000, removed all residential uses from the market because of the chemical's risk to children. EPA continued to review a significant body of research for almost two decades. However, instead of acting on the overwhelming evidence of harm to children that continue to be exposed from ongoing agricultural use of chlorpyrifos, EPA indicated the agency will continue to study the chemical, and would not take any action until 2022. Given my work with EPA on the USEPA Children's Health Protection Advisory Committee and my knowledge of the intensive risk assessment EPA conducted, there is absolutely no reason to delay action for at least four years, other than providing Dow Chemical with permission to grow its market.

**Chlorpyrifos Neurotoxicity Can Occur at Very Low Doses**

The scientific evidence of neurotoxic dangers associated with chlorpyrifos exposure is extensive and consistent. Chlorpyrifos inhibits the enzyme acetylcholinesterase (AChE), necessary to the transmission to normal nerve impulses and the full functioning of the nervous system. Studies document that exposure to low levels of chlorpyrifos during pregnancy can impair learning, change brain function, and alter thyroid levels of offspring into adulthood.[1,2,3,4]

Although the acute toxicity of organophosphates (OPs) such as chlorpyrifos has been attributed to inhibition of acetylcholinesterase (AChE), there is growing evidence that this may not account for all the long-term neurotoxic effects of OPs. Studies show that OPs can induce additional neurotoxic effects at very low levels concentrations below those demonstrated to inhibit AChE.[5] Some studies find that OPs interfere with proper neuronal development and function.[6] Others find that OP pesticides may influence the nervous system by disrupting the lipid profile of the nervous tissue; disrupting axonal transport (movement of mitochondria, lipids, synaptic vesicles, proteins, and other cell parts to and from neuron cells), and decreasing the number of nerve cells.[7]

EPA in its assessment reviewed selected points of departure and their use in the quantitative risk assessment. (A point of departure (PoD) is a data point used as the basis for low dose extrapolation). In particular, EPA uses the dose causing 10% reduction in red blood cell AChE as a PoD for estimating low dose effects of AChE inhibitors.[8] Data have shown that alteration of neuron function by chlorpyrifos that is not related to AChE inhibition.[9,10,11] The agency determined that evidence supports chlorpyrifos's effects at concentrations below AChE inhibition PoD. However, regardless of the potential for multiple pathways of toxicity, the agency noted there remains high confidence in the current available and quantifiable evidence of neurological impact. EPA also stated that its revised analysis indicates "expected residues of chlorpyrifos on most individual food crops exceed the health-based 'reasonable certainty of no harm' safety standard under the Federal Food, Drug,

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[1] Haviland et al. 2009. Long-term sex selective hormonal and behavior alterations in mice exposed to low doses of chlorpyrifos in utero. *Reproduc. Tox*. 29(1):74-9.

[2]Abou-Donia MB, et al. 2006. In utero exposure to nicotine and chlorpyrifos alone, and in combination produces persistent sensorimotor deficits and Purkinje neuron loss in the cerebellum of adult offspring rats. *Arch Toxicol.*;80(9):620-31.

[3] Abdel-Rahman A, et al. 2003. Increased expression of glial fibrillary acidic protein in cerebellum and hippocampus: differential effects on neonatal brain regional acetylcholinesterase following maternal exposure to combined chlorpyrifos and nicotine. *J Toxicol Environ Health A.*;66(21):2047-66.

[4] Icenogle LM, et al. 2004. Behavioral alterations in adolescent and adult rats caused by a brief subtoxic exposure to chlorpyrifos during neurulation. *Neurotoxicol Teratol*;26(1):95-101.

[5] Androutsopoulos VP, Hernandez AF, Liesivuori J, Tsatsakis AM. 2013. A mechanistic overview of health associated effects of low levels of organochlorine and organophosphorous pesticides. Toxicology. 307:89-94.

[6] Meijer M, Hamers T, Westerink RH. 2014. Acute disturbance of calcium homeostasis in PC12 cells as a novel mechanism of action for (sub)micromolar concentrations of organophosphate insecticides. *Neurotoxicology*. 43:110-6.

[7] Roszczenko A, Rogalska J, et al. 2013. The effect of exposure to chlorfenvinphos on lipid metabolism and apoptotic and necrotic cells death in the brain of rats. *Exp Toxicol Pathol.* 65(5):531-9.

[8] Transmittal of Meeting Minutes of the April 19-21, 2016 FIFRA SAP Meeting Held to Consider and Review Scientific Issues Associated with "Chlorpyrifos: Analysis of Biomonitoring Data." July 20, 2016.

[9] Lee I, Eriksson P, Fredriksson A, et al. 2015. Developmental neurotoxic effects of two pesticides: Behavior and biomolecular studies on chlorpyrifos and carbaryl. Toxicol Appl Pharmacol. 288(3):429-38.

[10] Androutsopoulos VP, Hernandez AF, Liesivuori J, Tsatsakis AM. 2013. A mechanistic overview of health associated effects of low levels of organochlorine and organophosphorous pesticides. Toxicology. 307:89-94.

[11] Meijer M, Hamers T, Westerink RH. 2014. Acute disturbance of calcium homeostasis in PC12 cells as a novel mechanism of action for (sub)micromolar concentrations of organophosphate insecticides. Neurotoxicology. 43:110-6.

and Cosmetic Act (FFDCA)." Additionally, the agency also points out that "risk from the potential aggregate exposure does not meet the FFDCA safety standard."

**Overwhelming Scientific Evidence Demonstrates Chlorpyrifos's Danger to Children**

*Columbia University Studies Link Chlorpyrifos Exposure to Brain Changes and Developmental Disorders.*

Researchers at Columbia University measured chlorpyrifos in umbilical cord blood of pregnant mothers and conducted intelligence tests for the children of these mothers later in childhood as part of a series of ongoing prospective cohort studies in inner-city minority populations. One study from this research group compared motor and mental development to levels of exposure to the pesticide at birth in 266 children born between 1998 and 2002 living in low-income neighborhoods of the South Bronx and northern Manhattan in New York City. The study found that concentrations of chlorpyrifos in umbilical cord blood correspond to a decrease in the psychomotor development and a decrease in the mental development in three year olds.[12] A follow-up study based on brain imaging by Magnetic Resonance Imaging found that children with high exposure levels of chlorpyrifos appear be related to changes in brain anatomy.[13]

Data from this research group was rigorously reviewed by EPA scientists who concurred that children exposed to high levels of chlorpyrifos had mental development delays, attention problems, attention-deficit/hyperactivity disorder problems, and pervasive developmental disorder problems.[14,15] The results of these cohort studies have consistently found that depressed cognitive development, birth weights and other neurodevelopmental endpoints are adversely impacted by chlorpyrifos and other pesticide exposures.[16]

You may hear from bill opponents that the Columbia study was not considered a valid study by the EPA's Science Advisory Panel (SAP). This is untrue. Although the SAP disagreed with the use of a data point defined by concentrations of chlorpyrifos in umbilical cord blood as a point of departure for a quantitative risk assessment following agency protocol, it did agree that there is *an association between chlorpyrifos prenatal exposure and neurodevelopmental outcomes in children as noted in the Columbia study.* Specifically, "both epidemiology and toxicology studies suggest there is evidence for adverse health outcomes associated with chlorpyrifos exposures below levels that result in 10% red blood cell (RBC) acetylcholinesterase (AChE) inhibition (i.e., toxicity at lower doses)."[17]

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[12] Lovasi, GS, et al. 2011. Chlorpyrifos Exposure and Urban Residential Environment Characteristics as Determinants of Early Childhood Neurodevelopment. *Am J Public Health;*101(1):63-70.

[13] Rauh VA, Perera FP, Horton MK, et al. 2012. Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A*. 109(20):7871-6.

[14] Rauh VA. 2006. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. *Pediatrics*;118(6):e1845-59.

[15] Rauh V, Arunajadai S, Horton M, Perera F, Hoepner L, Barr DB, et al. 2011. Seven-Year Neurodevelopmental Scores and Prenatal Exposure to Chlorpyrifos, a Common Agricultural Pesticide. *Environ Health Perspect* 119:1196-1201.

[16] Perera FP, et al. 2005. A summary of recent findings on birth outcomes and developmental effects of prenatal ETS, PAH, and pesticide exposures. *Neurotoxicology*;26(4):573-87.

[17] Transmittal of Meeting Minutes of the April 19-21, 2016 FIFRA SAP Meeting Held to Consider and Review Scientific Issues Associated with "Chlorpyrifos: Analysis of Biomonitoring Data." July 20, 2016. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0062-0140.

*University of California Research Finds OP Exposure is linked to IQ Deficit.*
Researchers from the University of California, Berkeley, examining families in the intensive agricultural region of Salinas Valley, California, found that IQ levels for children with the highest OP exposure were a full seven IQ points lower than those with the lowest exposure levels. This team also found that every tenfold increase in measures of OPs detected during a mother's pregnancy corresponded to a 5.5 point drop in overall IQ scores in seven-year-olds.[18]

*Mount Sinai Research Finds Prenatal Exposure Affects Cognitive Development.*
Researchers from Mount Sinai School of Medicine also found that prenatal exposure to organophosphates is negatively associated with cognitive development, particularly perceptual reasoning, with evidence of effects beginning at 12 months and continuing through early childhood.[19] These data sets and others accumulated over years of study support a need to protect children from this pesticide.

**Chlorpyrifos Has Disproportionate Impacts on Children Living Near Treated Fields.**
Research on chlorpyrifos also underscores that certain subpopulations are disproportionately affected by chlorpyrifos exposures. Low-income African-American and Latino families, including farmworker families, continue to suffer the most, and this disproportionate impact creates an environmental justice issue that continues. For farmworkers and their families, threats from chlorpyrifos are dire. Farmworker studies routinely show high exposure from pesticide drift in these communities.[20,21] Pregnant women in these communities are especially at risk. Research from the University of California, Davis, Childhood Autism Risks from Genetics and the Environment (CHARGE) finds that pregnant women who live within a mile of agricultural fields treated with insecticides like chlorpyrifos are more likely to have their child develop autism.[22] For women who lived less than one mile from crops sprayed with OP insecticides during their pregnancy, the chance their child being diagnosed with autism increases by 60%. Women in the second trimester living near chlorpyrifos-treated fields are 3.3 times more likely to have their children diagnosed with autism.[23]

**Federal Regulation Fails to Protect Children.**
Despite several extensive risk assessments over almost two decades showing unacceptable risks, EPA had continued to attempt to mitigate exposures by imposing no-spray buffer zones around public spaces including recreational areas, schools, and homes to reduce bystander exposure risks over the years. In 2000, the agency even banned indoor use of chlorpyrifos in light of indoor risks to children. In 2015, EPA announced it would revoke all food tolerances for chlorpyrifos. This decision to revoke tolerances therefore came at a time when EPA could no longer continue to mitigate risks, given the overwhelming data unquestionably showing risks to human health. EPA's

[18] Bouchard MF, Chevrier J, Harley KG, Kogut K, Vedar M, Calderon N, et al. 2011. Prenatal Exposure to Organophosphate Pesticides and IQ in 7-Year-Old Children. *Environ Health Perspect*. 119:1189-1195.
[19] Engel, S. et al. 2011. Prenatal Exposure to Organophosphates, Paraoxonase 1, and Cognitive Development in Childhood. *Environ Health Perspect.* 119:1182-1188.
[20] Das R, Steege A, Baron S, et al. 2001. Pesticide-related illness among migrant farm workers in the United States. *Int J Occup Environ Health*. 7(4):303-12.
[21] Reeves M, Schafer KS. 2003. Greater risks, fewer rights: U.S. farmworkers and pesticides. *Int J Occup Environ Health*. 9(1):30-9.
[22] Shelton, J, Geraghty, EM, Tancredi, DJ, et al. 2014. Neurodevelopmental Disorders and Prenatal Residential Proximity to Agricultural Pesticides: The CHARGE Study. *Environ Health Perspect*. 122:1103–1109.
[23] Ibid.

assessments have continually found 'significant risks' to children and farmworkers as a result of the chemical's use.

In 2016, EPA convened a Scientific Advisory Panel (SAP) meeting to discuss its proposal. Overall, the SAP agreed with EPA's conclusions and those of independent study – that there is an association between chlorpyrifos prenatal exposure and neurodevelopmental outcomes in children.[24] Finding in accordance with the recommendations from the SAP, EPA concluded again that there is "sufficient evidence that there are neurodevelopmental effects occurring at chlorpyrifos exposure levels below that required for AChE inhibition,"[25] and that EPA's current approach for evaluating chlorpyrifos's neurological impact is "not sufficiently health protective."

It is clear that chlorpyrifos fails to meet the health standards of "no unreasonable adverse effect" and "reasonable certainty of no harm" set forth in law. As a pediatrician, I am concerned about children's unique susceptibilities to pesticide toxicity that cause prenatal and early life exposures to be associated with decreased cognitive function, and behavioral problems. The American Academy of Pediatrics (AAP) published a clinical finding in October 2012 that states that reducing pesticide residues in food is beneficial for children's health. The Academy's policy statement on pesticides identifies the current shortfalls in medical training, public health tracking, and U.S. regulatory action on pesticides. These should serve as a sobering wake-up call for government agencies and elected officials to protect our children and environment from toxic compounds.

**EPA's Previous Decision to Remove Chlorpyrifos Has Been a Long Deliberative Process**
When EPA negotiated the removal of all chlorpyrifos for residential use in 2000, it was keenly aware of the elevated neurotoxic effects to children. That sweeping action by EPA and Dow was not taken lightly. However, it was done knowing that there were still risk factors in the market due to retaining most agricultural uses and drastically reducing allowable residues. But, as more data came in over the last almost two decades, it is impossible to justify retaining the agricultural uses any longer.

The time to act is now. As a pediatrician, I am dedicated to the concept that all children have the right to reach their full potential. They should not be exposed to factors in fetal development and early life that will impair them throughout life and not allow them to reach their full potential. Exposure to chlorpyrifos is clearly one of those factors. It can be removed quite –simply improving the potential of thousands of children in Maryland. Its continued use is of no benefit to these children, but suspension of use will benefit all of them. It has often been said that children are about 20% of our population but represent 100% of our future. Lets work for the best future for them. I urge the adoption of SB 300 so the children in Maryland are free from the toxic dangers posed by chlorpyrifos and are afforded the opportunity to develop in a more healthy environment.

Thank you for your consideration.

[24] Gunier, RB, Bradman A, Harley K, et al. 2016. Prenatal Residential Proximity to Agricultural Pesticide Use and IQ in 7-Year-Old Children. Environ Health Perspect DOI: 10.1289/EHP504.
[25] USEPA. 2016. Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review. Office of Chemical Safety and Pollution Prevention. Washington DC.

**MdPIRG-EnvironMd_Scarr_FAV_SB0300**
Uploaded by: Scarr, Emily
Position: FAV

**SB 300 - Pesticides - Use of Chlorpyrifos – Prohibition**
**Education, Health and Environmental Affairs**
**February 11th, 2020**
**Position: Favorable**

*Maryland PIRG is a statewide, non-partisan, non-profit, citizen-funded public interest advocacy organization with grassroots members across the state and a student-funded, student-directed chapter at the University of Maryland College Park.*

*Environment Maryland is a citizen-based environmental advocacy organization. We work to protect clean air, clean water, and open space.*

It is time to ban chlorpyrifos in Maryland. Chlorpyrifos is an insecticide that is widely used in agriculture throughout the United States, including spraying 24,000 kilograms every year in Maryland.[1]

In 2016, the EPA found that infants, children, young girls and women are exposed to dangerous levels of chlorpyrifos through the food they eat, and that children eat up to 140 times the safety limit throughout their lifetimes.[2]

Even low-level exposure can cause developmental delays, brain damage and behavioral problems in children. This insecticide belongs to a class of chemicals called organophosphates, which includes now outlawed chemicals like sarin gas that were used in WWI as neurotoxins. While chlorpyrifos is most harmful to developing humans, people of all ages can suffer from nausea, dizziness, and convulsions from acute exposure.[3] Evidence of these harmful effects were witnessed in California in 2017, when several workers were hospitalized from exposure and dozens more sought medical attention.[4]

Not only is chlorpyrifos threatening public health, it's also damaging our environment and wildlife, putting more than 1,500 species of plants and animals at risk.[5]

Despite evidence of detrimental effects on our health and environment, agricultural use of chlorpyrifos is still commonly practiced. According to the USDA, chlorpyrifos is used on common crops that families

[1] U.S. Geological Survey, NAWQA Project, https://water.usgs.gov/nawqa/pnsp/usage/maps/county-level/3. Emily WIllingham, "What We Know About Chlorpyrifos, The Pesticide The EPA Thinks Is Bad But Won't Ban," Forbes, March 31, 2017.
[2] CCCEH Team, "April 30, 2012: Prenatal Exposure to the Insecticide Chlorpyrifos Linked to Alterations in Brain Structure and Cognition," Columbia Center for Children's Environmental Health, April 30, 2012.
[3] Virginia A. Rauh, et al., "Brain anomalies in children exposed prenatally to a common organophosphate pesticide," PNAS, April 30, 2012.
[4] Xindi Hu, "The Most Widely Used Pesticide, One Year Later," Harvard University Science in the News, April 17, 2018.
[5] Emily WIllingham, "What We Know About Chlorpyrifos, The Pesticide The EPA Thinks Is Bad But Won't Ban," Forbes, March 31, 2017.

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consume daily, such as wheat, apples, broccoli, corn, citrus fruits, strawberries, and more. USDA's Pesticide Data Program reports chlorpyrifos residues on produce even after being washed and peeled.[6]

A 2012 study at the University of California at Berkeley found that the chemical's widespread agricultural use has caused it to leach into our water sources, and reported that 87 percent of umbilical-cord blood samples from newborn babies studied contained detectable levels of chlorpyrifos.[7] Chlorpyrifos does not just stay on the farm or on produce—it gets into our water and into our bodies.

In November 2016, EPA scientists reported that residues of chlorpyrifos on food crops exceed the federal safety standards for pesticides and that there are no safe uses for the pesticide.[8] Despite the report from EPA scientists, the EPA has since refused to act. Maryland must step in to protect its citizens.

"EPA's own scientists say chlorpyrifos is not safe," stated Attorney General Frosh, in a statement from 2017. Our Attorney General was worried we were giving the green light to a "chemical that jeopardize[s] the health of infants, children and pregnant women."

It's 2020 -- we have better methods to grow the food we need. Toxic pesticides that can end up in our bodies and threaten our health should be banned.

Maryland PIRG, Environment Maryland and our members urge a favorable report on SB 300.

[6] Environmental Working Group, "Pesticides in Produce," https://www.ewg.org/foodnews/summary.php
[7] Karen Huen, et al., "Organophosphate pesticide levels in blood and urine of women and newborns living in an agricultural community," *Environmental Research*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4309544/
[8] "Updated Human Health Risk Analyses for Chlorpyrifos," Environmental Protection Agency, November 10, 2016.

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**MOSAudubonABC_Schwarz_FAV_SB0300**
Uploaded by: Schwarz, Kurt
Position: FAV

MARYLAND ORNITHOLOGICAL SOCIETY

February 11, 2020

**The Senate Education, Health and Environmental Affairs Committee**
**SB 300 : Pesticides –Use of Chlorpyrifos—Prohibition**
**Position: Support**

Dear Members of the Senate Education, Health and Environmental Affairs Committee:

The Maryland Ornithological Society, American Bird Conservancy, and Maryland-DC Audubon support the House bill Pesticides –Use of Chlorpyrifos—Prohibition (no bill number as yet). Not only is Chlorpyrifos dangerous to human health, it is also toxic to birds and to freshwater, estuarine and marine organisms, honeybees and other wildlife. There is no way to use this pesticide safely.

The Environmental Protection Agency's 2016 Draft Biological Evaluation of Chlorpyrifos with reference to endangered species found that Chlorpyrifos was found "likely to adversely affect" 97 percent of all taxa, including 93 out of 110 bird species. Only five birds received a "no effects" determination, and this was based on the fact that these birds are already extinct. Chlorpyrifos was also found to affect 100 percent of the 30 designated Critical Habitats for birds.[1]

Incident data confirm that Chlorpyrifos is lethal to birds. ABC's Avian Incident Monitoring System (AIMS) database includes 58 incidents implicating Chlorpyrifos, with deaths of at least 775 birds.[2] Many of the incidents involved hundreds of individuals, demonstrating that Chlorpyrifos is extremely hazardous to birds. These data reinforce the serious findings of EPA's draft biological evaluation.

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[1] Environmental Protection Agency, Biological Evaluation Chapters for Chlorpyrifos ESA Assessment, update January 18, 2017, https://www.epa.gov/endangered-species/biological-evaluation-chapters-chlorpyrifos-esa-assessment

[2] American Bird Conservancy, Avian Incident Monitoring System (data from 1960s through 2005).

Birds can be poisoned by several means, most notably seed treatments and granular applications to soil, which birds can mistake for grit. Application of mosquito adulticides can cause mortality and reproductive effects as well.[3] There are also indirect impacts by poisoning the invertebrate base on which many bird species rely for food.

A study published in the peer-reviews journal Nature in November, 2017 showed that wild songbirds consuming just eight Chlorpyrifos granules per day over three days could suffer impaired condition, migration delays and improper migratory direction, which could lead to increased risk of mortality or lost breeding opportunity.[4]

In conclusion, MOS, American Bird Conservancy, and Maryland-DC Audubon applaud the efforts of the Maryland legislature in addressing this deadly pesticide. We urge you to pass SB 300 to protect people, birds and other wildlife in Maryland and beyond.

Sincerely,

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[3] Environmental Protection Agency (2016). Draft Biological Evaluation for Chlorpyrifos, Chlorpyrifos Registration Review Docket EPA-HQ-OPP-2008-0850.

[4] Eng, Margaret L., et al, Imidacloprid and chlorpyrifos insecticides impair migratory ability in a seed-eating songbird, Nature, 9 November 2017. https://www.nature.com/articles/s41598-017-15446-x.epdf

**MGA_Sen Lam_FAV_SB0300**
Uploaded by: Senator Lam, Senator Lam
Position: FAV

CLARENCE K. LAM, M.D., M.P.H.
*Legislative District 12*
Baltimore and Howard Counties

Education, Health, and Environmental Affairs Committee

Executive Nominations Committee

Joint Committee on Ending Homelessness

*Chair*
Joint Committee on Fair Practices and State Personnel Oversight

*Chair*
Howard County Senate Delegation

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**Support SB 300: Pesticides - Use of Chlorpyrifos - Prohibition**

**What is chlorpyrifos? What does it do?**

- Chlorpyrifos is a toxic pesticide derived from a nerve gas developed by Nazi Germany for use in World War II.
- The EPA banned most residential use of chlorpyrifos in 2000, but it is still widely used in the agricultural industry:
  - Used on food crops, like those frequently consumed by infants and young children, such as apples, strawberries, peaches and grapes
  - Used on golf course turf, sod farms, nursery production, wood products, and others
- Marylanders regularly come in contact with chlorpyrifos through residue on food and contaminated air and water.
- Chlorpyrifos acts by inhibiting an enzyme that is key to the proper development and functioning of the central nervous system and brain.

**The issue:**

- Chlorpyrifos poses a serious risk to public health:
  - Chlorpyrifos has been linked to autism, childhood cancers, ADHD and other neurodevelopmental issues for babies and children.
  - Children in utero are especially at high risk of exposure, which is associated with adverse birth defects.
  - A 2012 study by the University of California, Berkeley, found that 87% of umbilical-cord blood samples tested from newborn babies contained detectable levels of the pesticide.
  - The President of the American Academy of Pediatrics stated in 2017 that *"Exposures for babies are probably five times greater than its proposed 'safe' intake, and 11 to 15 times higher for toddlers and older children"* and urged that chlorpyrifos *"is unambiguously dangerous and should be banned from use."*
  - Farmworkers who apply and mix the pesticide are at an increased risk for reproductive health problems even with maximum protective equipment.
  - Among 50 farm pesticides studied, chlorpyrifos was one of two found to be associated with higher risks of lung cancer among frequent pesticide applicators than among infrequent or non-users.

- Chlorpyrifos harms wildlife and the environment:
  - Chlorpyrifos is extremely damaging to wildlife, especially birds, fish and pollinators.
  - Federal scientists concluded chlorpyrifos poses a risk to about 1,800 critically threatened or endangered species.
  - Chlorpyrifos contributes to a staggering decline of pollinators because of its sub-lethal effect on bees.
  - The Chesapeake Bay Program report found chlorpyrifos in 90% of Bay samples with 40% having concentrations exceeding thresholds.
  - Studies have found that chlorpyrifos can have negative physiological, mutagenic, and sub-lethal effects on aquatic life.

**Why do we need a law in Maryland to ban it?**

- U.S. EPA scientists were unable to identify safe levels:
  - EPA scientists were unable to conclude that the risk from aggregate exposure to chlorpyrifos meets the applicable safety standard under Federal Food, Drug, and Cosmetic Act ("Food Act") in 2015 and again in 2016.
  - EPA issued proposed regulations to revoke all "tolerances" (i.e. permitted residues) for the pesticide in food in November 2015.
- EPA scientists recommended a complete ban, but the current administration refuses:
  - Surmounting evidence of chlorpyrifos toxicity led EPA experts to determine there was no safe way to use the chemical, so they recommended a ban.
  - Former EPA Administrator Scott Pruitt denied the petition to ban chlorpyrifos.
  - As a result, numerous state attorneys general, including Maryland Attorney General Brian Frosh, have filed suit against the EPA challenging its rule.
  - The states of Hawaii, New York, and California, as well as the European Union, have all banned the use of chlorpyrifos.
- Chlorpyrifos causes irreparable harm to the environment and human health and must be banned in Maryland.

**What Does SB 300 Do?**

- It prohibits the use of chlorpyrifos, including insecticides containing chlorpyrifos and seeds treated with chlorpyrifos.
- It requires the Department of Agriculture, with existing budgeted resources, to provide farmers, certified crop advisors, and pesticide applicators education and assistance relating to integrated pest management.
- SB 300 protects the environment and human health from the devastating effects of chlorpyrifos.

**Additional Background Information**:

- On February 6, 2020, Corteva Inc. (spinoff of Dow/Dupont) the largest manufacturer of chlorpyrifos announced it will stop producing chlorpyrifos by the end of the year, due to drop in sales; but Corteva is not the only manufacturer of chlorpyrifos.
- Unless there is a ban on chlorpyrifos, other companies are likely to continue making it.
- Corteva made this announcement the same day it became illegal to sell chlorpyrifos in California, and as numerous states move toward banning it.

# EARTH jUSTICE_sMATH_fav_SB0300

Uploaded by: Smith, Tyler

Position: FAV

EARTHJUSTICE

**Testimony in Support of SB 300**
**Pesticides – Use of Chlorpyrifos - Prohibition**

**Education, Health, and Environmental Affairs Committee**
**Maryland State Senate**
**February 11, 2020**

Chairman Pinsky and Members of the Committee,

Thank you for the opportunity to testify. My name is Tyler Smith. I am a scientist appearing on behalf of Earthjustice, the largest nonprofit, environmental law organization in the country. Earthjustice strongly supports **SB 300**, which would ban chlorpyrifos in Maryland.

**EPA Proposed Banning Chlorpyrifos**

In 2015, EPA concluded that using chlorpyrifos on food does not meet the federal safety standard of a "reasonable certainty of no harm" and proposed a ban.[1] This ban would have eliminated nearly all uses of this pesticide across the country.

EPA's conclusion is consistent with decades of scientific research. Indeed, almost 20 years ago, EPA banned home and garden uses of chlorpyrifos because studies indicated harm to children.[2] But at that time, EPA allowed the continued use of chlorpyrifos on our food and for other applications, such as pest control on turf grass at golf courses.

After years of further study, EPA's scientists concluded that there is no safe use of chlorpyrifos.[3] They reviewed thousands of studies and examined the hundreds of ways that chlorpyrifos may be used under current law. They found that all of these uses result in unsafe levels of exposure — even when handlers follow pesticide labels and wear personal protective equipment.[4]

EPA's scientists also found that the continued use of chlorpyrifos on food can harm those who eat the food. The uses on food expose infants to 93 times what the agency considers safe and expose children 1 to 2 years of age to 140 times what the agency considers safe.[5] Moreover, according to agency, there is no safe level of chlorpyrifos in drinking water.[6]

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EPA's scientists likewise found that using chlorpyrifos on turf grass at golf courses puts the adults and children who visit these courses at risk.[7] Their analysis indicates that exposures to chlorpyrifos on golf courses are hundreds of times what the agency believes is safe.[8]

**EPA's Proposal to Ban Chlorpyrifos Followed a Rigorous Process**

EPA's conclusions followed years of careful study. The evidence that exposure to chlorpyrifos harms children[9] was reviewed again and again by EPA's scientists and by independent experts who serve on the agency's Scientific Advisory Panel. The agency and the Panel found that the weight of the evidence — that is, the best available science weighed and judged by experts — supports the conclusion that chlorpyrifos is a neurodevelopmental toxicant. Specifically:

- In 2012, the Panel concluded that epidemiologic and animal studies "suggest that chlorpyrifos can affect neurodevelopment at levels lower than those associated with" acute poisoning.[10]

- In 2016, the Panel stated, "The Panel agrees that both epidemiology and toxicology studies suggest there is evidence for adverse health outcomes associated with chlorpyrifos exposures below levels that result in" acute poisoning.[11]

- In 2016, EPA wrote, "The agency agrees with the 2016 [Panel] (and previous [Panels]) that there is a potential for neurodevelopmental effects associated with chlorpyrifos exposure to occur at levels below" those associated with acute poisoning.[12]

In short, even low levels of exposure to chlorpyrifos can harm the developing brain.

The Panel praised a study of chlorpyrifos exposure in children conducted by scientists at Columbia University. The Panel stated, "the Columbia study is the most robust and appropriate for informing risk assessment", "the Columbia study is epidemiologically sound", and "the Columbia study was indeed quite strong and provided extremely valuable information."[13]

The Panel also concluded that the results of the Columbia study were generally consistent with those reached by other scientists across the country. The Panel stated that, overall, epidemiologic studies have found "consistent associations relating exposure measures to abnormal reflexes in the newborn, pervasive development disorder at 24 or 36 months, mental development at 7-9 years, and attention and behavior problems at 3 and 5 years of age."[14]

Yet, despite these studies and the conclusions of experts, in March 2017, the Trump administration announced that it would not finalize the proposed ban.[15] The administration did not present any new scientific evidence. It disregarded the best available science and left millions of people exposed to a toxic chemical.

**Any Possible Federal Action to Ban Chlorpyrifos Has Been, and Likely Will Continue to be, Delayed by Litigation**

A coalition of environmental, health, labor, and civil rights organizations has sued the Trump administration, challenging its refusal to ban chlorpyrifos.[16] In August 2018, a federal appeals court ordered the administration to ban all uses of chlorpyrifos, but the agency appealed further.[17] The litigation is ongoing and may continue for years.

For more than two years, EPA political appointees did not even try to dispute the conclusions reached by agency scientists and instead based their legal arguments on unrelated procedural issues. As a federal court observed in August 2018, "The EPA presents no arguments in defense of its decision. Accordingly, the EPA has forfeited any merits-based argument."[18]

There simply is no debate about the science of chlorpyrifos — except from the people who make money off chlorpyrifos. But unless Maryland takes action, chlorpyrifos will remain on the market and people here will remain exposed while the federal litigation continues. Given the tactics available to the Trump administration, it may take years to resolve all of the potential litigation even if the plaintiffs ultimately prevail.

**Maryland Farmers Have Less Toxic Alternatives**

Maryland farmers and businesses have alternatives to chlorpyrifos. These include less toxic options for controlling borers and spotted lantern fly at orchards, cabbage maggots and onion maggots at vegetable farms, and annual bluegrass weevil on turf grass at golf courses.[19] To the extent a ban would present challenges to growers, the best response is to assist their transition to safer production methods, not to continue jeopardizing children's health.

**Maryland Should Ban Chlorpyrifos Now**

Frankly, we should not be here today. In 2015, EPA concluded that chlorpyrifos did not meet the federal safety standard and proposed to ban this toxic pesticide. The agency should have finalized the proposed ban, and that should have been the end of it.

Politics, pure and simple, stands in the way. It is only because the Trump administration has abandoned science and abdicated its responsibility to public health that Maryland and other states now must consider bills to prohibit the use of chlorpyrifos. But we *should* take action.

**SB 300** would prohibit the use of chlorpyrifos and make this state a safer place for kids to live. I urge your support and am happy to answer your questions. Thank you.

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[1] EPA wrote, "At this time, the agency is unable to conclude that the risk from aggregate exposure from the use of chlorpyrifos meets the safety standard of [a "reasonable certainty of no harm" contained in] section 408(b)(2) of the Federal Food, Drug, and Cosmetic Act (FFDCA). Accordingly, EPA is proposing to revoke all tolerances for chlorpyrifos." Chlorpyrifos; Tolerance Revocations, 80 Fed. Reg. 69,080 (November 6, 2015), https://www.federalregister.gov/documents/2015/11/06/2015-28083/chlorpyrifos-tolerance-revocations.

[2] As EPA explained, "This action comes after completing the most extensive scientific review of the potential hazards from a pesticide ever conducted. This action -- the result of an agreement with the manufacturers -- will significantly minimize potential health risks from exposure to Dursban, also called chlorpyrifos, for all Americans, especially children." EPA, Dursban Announcement (2000), https://archive.epa.gov/epa/aboutepa/dursban-announcement.html.

[3] EPA wrote, "[A]ll agricultural occupational handler scenarios, all primary seed treatment handler scenarios, and all secondary seed treatment (planter) scenarios are of concern with label-specified and maximum levels of personal protective equipment (PPE) or engineering controls[.]" EPA, Chlorpyrifos: Revised Human Health Risk Assessment for Registration Review 7 (2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2015-0653-0454.

[4] *Id*.

[5] *Id*. at 23.

[6] *Id*. at 24.

[7] EPA wrote, "All residential post-application exposure scenarios assessed for playing golf on chlorpyrifos-treated courses, including all relevant populations and in consideration of all TTR data state sites, result in risks of concern (i.e., MOEs are < 100)." EPA, *supra* note 3 at 27.

[8] *Id*. In EPA's risk assessment, the factor by which exposure at a golf course exceeded the safe level ranged from 373 to 923. The factor may be calculated from inputs in EPA's risk assessment as follows: Factor = Dose / (Point of Departure / Uncertainty Factor), where Dose is given by Table 7.2.2, Point of Departure is given by Table 5.3.3.3, and Uncertainty Factor is stated on page 5.

[9] For recent reviews of the evidence that chlorpyrifos harms children, *see* Irva Hertz-Picciotto, Jennifer B. Sass, Stephanie Engel, *et al.*, Organophosphate Exposures During Pregnancy and Child Neurodevelopment: Recommendations for Essential Policy Reforms, 15 *PLoS Medicine* e1002671 (2018), https://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.1002671&type=printable; Maria Teresa Munoz-Quezada, Boris A. Lucero, Dana B. Barr, *et al*., Neurodevelopmental Effects in Children Associated with Exposure to Organophosphate Pesticides: A Systematic Review, 39 *NeuroToxicology* 158 (2013), https://www.sciencedirect.com/science/article/pii/S0161813X13001514.

[10] EPA, Transmittal of Meeting Minutes of the FIFRA Scientific Advisory Panel Meeting held April 10-12, 2012 on "Chlorpyrifos Health Effects" 53 (2012), https://www.epa.gov/sites/production/files/2015-06/documents/041012minutes.pdf.

[11] EPA, Transmittal of Meeting Minutes of the April 19-21, 2016 FIFRA SAP Meeting Held to Consider and Review Scientific Issues Associated with "Chlorpyrifos: Analysis of Biomonitoring Data" 18 (2016), https://www.epa.gov/sites/production/files/2015-06/documents/041012minutes.pdf.

[12] Chlorpyrifos; Tolerance Revocations; Notice of Data Availability and Request for Comment, 81 Fed. Reg. 81,049, 81,050 (November 17, 2016), https://www.federalregister.gov/documents/2016/11/17/2016-27552/chlorpyrifos-tolerance-revocations-notice-of-data-availability-and-request-for-comment.

[13] EPA, Transmittal of Meeting Minutes of the FIFRA Scientific Advisory Panel Meeting Held September 16-18, 2008 on the Agency's Evaluation of the Toxicity Profile of Chlorpyrifos 31, 32, 35 (2012), https://www.regulations.gov/document?D=EPA-HQ-OPP-2008-0274-0064.

[14] EPA, *supra* note 10 at 17.

[15] Eric Lipton, "E.P.A. Chief, Rejecting Agency's Science, Chooses Not to Ban Insecticide," *The New York Times* (March 29, 2017), https://www.nytimes.com/2017/03/29/us/politics/epa-insecticide-chlorpyrifos.html.

[16] The organizations are: Pineros y Campesinos Unidos del Noroeste, League of United Latin American Citizens, United Farm Workers, Farmworker Association of Florida, Labor Council for Latin American Advancement, Farmworker Justice, GreenLatinos, National Hispanic Medical Association, Learning Disability Association of America, California Rural Legal Assistance Foundation, Pesticide Action Network North America, and Natural Resources Defense Council. For more information, *see* Earthjustice, Groups Appeal EPA's Refusal to Ban Dangerous Pesticide (June 6, 2017), https://earthjustice.org/news/press/2017/groups-appeal-epa-s-refusal-to-ban-dangerous-pesticide.

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[19] Please contact me for a summary of information obtained from state extensions in the Northeast.

DECEMBER 10, 2019
Albany, NY

# Governor Cuomo Directs DEC to Ban the Use of Chlorpyrifos

## DEC Will Take Immediate Action to Ban Aerial Use of Chlorpyrifos

Regulations to Ban Chlorpyrifos Will be in Effect by December 2020 for all Uses Except Spraying Apple Tree Trunks, Which Will be Banned by July 2021

New Restrictions on Pesticide Will Protect New Yorkers from Significant Adverse Public Health Impacts, Especially for Children

Governor Andrew M. Cuomo today directed DEC to take immediate action to ban aerial use of chlorpyrifos. DEC will also have regulations in place to ban chlorpyrifos for all uses, except spraying apple tree trunks, by December 2020. Chlorpyrifos will be banned for all uses by July 2021. These actions will protect New Yorkers from significant adverse public health impacts, especially for children.

"Chlorpyrifos is a pesticide that has the potential to cause serious health problems in people who ingest it," **Governor Cuomo said**. "I am directing the state department of environmental conservation to ban the use of this toxic substance to help ensure New York families aren't needlessly exposed to a dangerous chemical."

While organophosphate pesticide chlorpyrifos has been banned for residential use since 2001, it is still currently approved for use in fifty different products, the majority of which are registered for use in agricultural production. The largest agricultural market for chlorpyrifos in terms of total pounds of active ingredient is corn. It is also used on soybeans, fruit and nut trees, Brussels sprouts, broccoli, and cauliflower, seed treatments, as well as other row crops. Non-agricultural uses include golf courses, turf, green houses, and on non-structural wood treatments such as utility poles and fence posts. Scientific research has shown that chlorpyrifos can harm the development of nervous systems of infants and young children. Prenatal exposure to organophosphates can result in diminished cognitive ability, delays in motor development and Attention Deficit/Hyperactivity Disorder (ADHD).

Chlorpyrifos is in some cases the only product available labeled for use against certain pests. It is particularly effective against the American plum borer and rosy apple aphid. Chlorpyrifos can also be used in rotation with other methods of pest management, such as treated seeds, as a means to manage pesticide resistance. As New York and nearby states are infiltrated by invasive species, such as the black stem borer, pest management tools are needed to prevent their spread and the ensuing damage.

The application of pesticides must be done in a manner that is protective of public health and the environment and New York State is one of a few states in the country with a regulatory program designed specifically to review and register pesticides, implement regulatory controls, and enforce worker protection standards. State law affords DEC with a broad range of regulatory powers including the ability to restrict the use of a pesticide to certain crops, limit application to specific conditions, and revocation of a product's registration.

Contact the Governor's Press Office
Albany: (518) 474 - 8418
New York City: (212) 681 - 4640
Press.Office@exec.ny.gov

Agreement Reached to End Sale of Chlorpyrifos in California by February 2020

*Use in agriculture to be prohibited after next year*

*Alternatives to Chlorpyrifos Work Group to hold public meeting in January*

**For Immediate Release**:
October 9, 2019

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**SACRAMENTO** – The California Environmental Protection Agency announced today that virtually all use of the pesticide chlorpyrifos in California will end next year following an agreement between the Department of Pesticide Regulation (DPR) and pesticide manufacturers to withdraw their products.

"For years, environmental justice advocates have fought to get the harmful pesticide chlorpyrifos out of our communities," said Governor Gavin Newsom. "Thanks to their tenacity and the work of countless others, this will now occur faster than originally envisioned. This is a big win for children, workers and public health in California."

"The swift end to the sale of chlorpyrifos protects vulnerable communities by taking a harmful pesticide off the market," said California Secretary for Environmental Protection Jared Blumenfeld. "This agreement avoids a protracted legal process while providing a clear timeline for California farmers as we look toward developing alternative pest management practices."

Earlier this year, DPR announced it was acting to ban use of chlorpyrifos by canceling the pesticide's product registrations. The decision follows mounting evidence that chlorpyrifos is associated with serious health effects in children and other sensitive populations at lower levels of exposure than previously understood, including impaired brain and neurological development.

At the same time, DPR and the California Department of Food and Agriculture (CDFA) have established a cross-sector working group to identify, evaluate and recommend safer, more sustainable pest management alternatives to chlorpyrifos. It will hold its first meeting this month and will hold three public workshops beginning in January.

The agreement with Dow AgroSciences and other companies means that use of chlorpyrifos will end sooner than anticipated had the companies pursued administrative hearings and potential appeals process, which could have taken up to two years. Under the settlement, the companies agreed that:

- All sales of chlorpyrifos products to growers in California will end on Feb. 6, 2020.
- Growers will no longer be allowed to possess or use chlorpyrifos products in California after Dec. 31, 2020.
- Until then, all uses must comply with existing restrictions, including a ban on aerial spraying, quarter-mile buffer zones and limiting use to crop-pest combinations that lack alternatives. DPR will support aggressive enforcement of these restrictions.

To ensure consistency for growers and for enforcement purposes, DPR is applying the terms and deadlines in the settlements to seven other companies that are not part of the settlement agreement but are subject to DPR's cancellation orders.

A few products that apply chlorpyrifos in granular form, representing less than one percent of agricultural use of chlorpyrifos, will be allowed to remain on the market. These products are not associated with detrimental health effects. DPR will continue to monitor for any exposures associated with these products. The development of safe, more sustainable alternatives to chlorpyrifos is being supported through the current state budget, which appropriates more than $5 million in grant funding for the purpose.

- DPR will award more than $2.1 million in grants to fund projects that identify, develop, and implement safer, practical, and sustainable pest management alternatives to chlorpyrifos.
- CDFA will award approximately $2 million in grants to expand outreach about innovative, biologically integrated farming systems that reduce chemical insecticide inputs. Crops that have used chlorpyrifos will be a priority.
- CDFA will also fund approximately $1.5 million in research to develop alternatives to chlorpyrifos that provide safer, more sustainable pest management solutions.

Quick facts:

- Chlorpyrifos is used to control pests on a variety of crops, including alfalfa, almonds, citrus, cotton, grapes and walnuts. It has declined in use over the past decade as California growers have shifted to safer alternatives.
- Use of the pesticide dropped more than 50 percent from two million pounds in 2005 to just over 900,000 pounds in 2017.
- In 2015, DPR designated chlorpyrifos as a "restricted material" that requires a permit from the county agricultural commissioner for its application. In addition, application of chlorpyrifos must be recommended by a licensed pest control advisor and supervised by a licensed certified applicator.
- Following DPR's designation of chlorpyrifos as a toxic air contaminant in 2018, DPR recommended that county agricultural commissioners apply additional permit restrictions, including a ban on aerial spraying, quarter-mile buffer zones and limiting use to crop-pest combinations that lack alternatives.

# # #

February 10, 2020

The Honorable Paul G. Pinsky
Senator
Miller Senate Office Building, 2 West Wing
11 Bladen Street
Annapolis, MD 21401

The Honorable Kumar P. Barve
Delegate
House Office Building, Room 251
6 Bladen Street
Annapolis, MD 21401

**Re: SB 300 / HB 229; Pesticides – Use of Chlorpyrifos – Prohibition**
**Scientific Evidence of the Relationship Between Prenatal Exposure to Chlorpyrifos and Neurodevelopmental Harm in Children**

Dear Chairman Pinsky and Chairman Barve,

We are scientists and health professionals with expertise in toxic chemicals that harm the developing brain. Many of us are affiliated with Project TENDR, a collaboration of leading scientists, health professionals, and children's health and environmental advocates who came together out of concern over the substantial evidence linking toxic chemicals to neurodevelopmental disorders, such as autism spectrum disorder, attention deficits, hyperactivity, intellectual disability, and learning disorders.[1]

In 2016, Project TENDR published a consensus statement that reviewed the scientific evidence and identified organophosphate pesticides, such as chlorpyrifos, as prime examples of chemicals that contribute to intellectual impairments and specific neurodevelopmental disorders.[2] There is clear evidence that the continued use of chlorpyrifos is harmful to brain development, with persistent consequences.

Many studies in the United States and other countries, spanning diverse populations in both urban and agricultural settings, have linked low-level exposure to chlorpyrifos and other organophosphates during pregnancy with poorer cognitive, behavioral, and social development in children.[3,4,5] In one review, adverse effects on neurodevelopment were seen in all but one of the 27 studies evaluated.[6]

The toxic effects of organophosphate pesticides include abnormal reflexes in newborns; mental and psychomotor delays in preschoolers; and decreases in working and visual memory, processing speed, verbal comprehension, perceptual reasoning, and IQ in elementary school-age children. These pesticides are associated with symptoms or diagnoses of attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder. A study has identified changes in the brain structure of children exposed to chlorpyrifos in the womb, and these changes are consistent with neurodevelopmental deficits reported previously.[7] In many of these studies, there was no evidence of a threshold or "safe" level of exposure.

In addition to the epidemiologic findings in children, effects on cognition, motor activity, and social behaviors were repeatedly demonstrated in rodents dosed with low levels of chlorpyrifos and other organophosphates in early life.[8,9] The weight of the scientific evidence clearly indicates that chlorpyrifos is a neurodevelopmental toxicant.

Importantly, the developmental toxicity of chlorpyrifos occurs at levels of exposure that do not cause acute poisoning.[10] The absence of poisoning symptoms does *not* mean that neurologic damage has not occurred.[11] As explained above, the developmental effects do not manifest until months or years after prenatal exposure. The evidence therefore indicates that chlorpyrifos can interfere with brain development at levels previously thought to be safe.

In 2016, US EPA concluded that exposure to chlorpyrifos from food or drinking water could lead to unacceptably high exposures and determined that some reproductive-aged women, infants, and children consume levels of chlorpyrifos on food that are substantially above what the agency deemed an acceptable level for these vulnerable life stages.[12] The agency reviewed hundreds of uses of chlorpyrifos and determined that all of them could result in unsafe exposures for agricultural workers.[13]

US EPA concluded that chlorpyrifos does not meet the federal safety standard of a "reasonable certainty of no harm" and proposed banning uses of chlorpyrifos on food crops.[14] This would have eliminated nearly all of the remaining uses of this pesticide. However, in March 2017, despite the overwhelming evidence of harm and US EPA's own conclusions, the Trump administration announced that it would not ban any uses of chlorpyrifos.[15] It is unfortunate that US EPA did not finalize the proposed ban. However, states can act to protect children where the federal government has stalled.

For additional information, please see a review of the scientific evidence that organophosphates harm child neurodevelopment, which was published in October 2018 by eight scientists affiliated with Project TENDR.[16] This letter draws primarily from that review. If you have any questions, please contact Maureen Swanson, MPA, Co-Director, Project TENDR, at swanson@thearc.org.

Sincerely,

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**SierraClub_Tan-Tulkin_FAV_SB0300**
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SIERRA CLUB

Maryland Chapter
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**Committee: Education, Health, and Environmental Affairs**
**Testimony on: SB 300 - "Pesticides – Use of Chlorpyrifos – Prohibition"**
**Position: Support**
**Hearing Date: February 11, 2020**

The Maryland Sierra Club submits this testimony to strongly urge this committee to issue a favorable report on SB300, a bill to ban the use of chlorpyrifos, a neurotoxin pesticide.

Chlorpyrifos is used to kill, repel, or control pests. It is in the organophosphate (OP) class of chemicals. To protect the public, chlorpyrifos is now banned for most residential use, however, it continues to be used in agriculture, including on corn, soybeans, fruit trees, row vegetable crops, and also is used on golf courses and turf, as a mosquito adulticide, and for roach and ant bait stations.[1] In 2016, with over 30 years of data, EPA scientists determined that the chemical should be completely banned, however, the EPA then reversed course when the Trump administration came into office. Thus, this highly neurotoxic pesticide continues to be used in Maryland – forcing Marylanders to regularly come into contact with it through chemical residue on food, contaminated drinking water, and tainted air.

Chlorpyrifos assaults the health of Maryland families in both urban and rural communities – its use especially places an unacceptable burden of harm on our most vulnerable populations including pregnant women, the unborn, infants and children, and on farmworkers who are exposed to the chemical.

**Mechanism of action and target species** – OPs' poisonous action doesn't discriminate between species – they block the action of a brain enzyme that's critical to the normal activity of the central nervous system, causing a malfunction in the nervous system through overstimulation.[2] Poisoning from chlorpyrifos also affects the cardiovascular and respiratory systems, skin, and eyes. It is acutely toxic to bees and beneficial insects, birds, aquatic life, soil organisms, and mammals, including human adults, children, and fetuses.[3]

**Acute and long-term health effects** – The EPA states that OPs are absorbed by inhalation, ingestion, and dermal penetration. Acute exposure can result in symptoms of uncontrolled muscle contraction and secretions, sensory and behavioral disturbances, loss of motor coordination, depressed motor function, hypertension, seizures, psychiatric symptoms such as depression, memory loss and confusion, and respiratory depression or respiratory failure leading to death.[4] Chronic exposure to OPs can cause the same effects as seen in acute exposure, but also includes impairment of memory, speech loss, and impaired judgment.[5]

Chlorpyrifos is especially a menace to Maryland's children because, like lead, it impairs children's cognition with lasting effects. At standard use levels, it is associated with neurodevelopmental defects, including autism, ADHD, and lowered IQ in children and fetuses.[6,7,8,9]

**The cost of not taking action is immense** – The continued use of chlorpyrifos comes with a high dollar price tag for Maryland families and taxpayers resulting from the health and economic risks and consequences, and the long-term health harms.

Recently, researchers at the New York University Grossman School of Medicine determined that OP-attributable IQ loss and intellectual disability have increased.[10] The research concluded that US children's exposure to certain environmental chemicals resulted in millions of lost IQ points, hundreds of thousands of cases of intellectual disability, and $7.5 trillion in lost economic productivity and societal costs. The class

of OP pesticides to which chlorpyrifos belongs was found to be the second greatest contributor to cognitive loss and intellectual disabilities**.** The impacts of OP exposure appear roughly on par with lead exposure. Prenatal exposure represents a critical window when these effects can be particularly pronounced and long-lasting damage. Each case of intellectual disability was estimated to result in $1,272,470 in lost productivity and medical costs.

The science is clear, chlorpyrifos is too toxic for Maryland. Maryland families deserve protection from chlorpyrifos. We urge you to support this legislation.

Ling Tan
Pesticide Issue Lead Volunteer
Ling.Tan@MDSierra.org

Josh Tulkin
Chapter Director
Josh.Tulkin@MDSierra.org

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Sources:

[1] US EPA. July 2019. "Chlorpyrifos." www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos#basic

[2] Adeyinka A, Pierre L. Organophosphates. In: StatPearls [Internet]. StatPearls Publishing. May 2019. ncbi.nlm.nih.gov/books/NBK499860/

[3] National Pesticide Information Center. 2010. "Chlorpyrifos." npic.orst.edu/factsheets/chlorpgen.html

[4] Roberts,J, Reigart, J. Recognition and Management of Pesticide Poisonings, 6th Edition." 2013. US EPA Office of Pesticide Programs. p.43- 55

[5] Adeyinka.

[6] von Ehrenstein Ondine S, et al. "Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based case-control study." *BMJ* 2019; 364 :l962 bmj.com/content/364/bmj.l962

[7] Dalsager L, et al. "Maternal urinary concentrations of pyrethroid and chlorpyrifos metabolites and attention deficit hyperactivity disorder (ADHD) symptoms in 2-4-year-old children from the Odense Child Cohort." Environmental Research. 2019 Sep;176:108533. DOI: 10.1016/j.envres.2019.108533.

[8] Bouchard M, et al. "Attention-deficit/hyperactivity disorder and urinary metabolites of organophosphate pesticides." *Pediatrics* vol. 125,6 (2010): e1270-7. doi:10.1542/peds.2009-3058

[9] Rauh V, et al. "Brain anomalies and pesticide exposure." *Proceedings of the National Academy of Sciences.* May 2012. 109 (20) 7871-7876; DOI: 10.1073/pnas.1203396109

[10] Gaylord A, et al. "Trends in neurodevelopmental disability burden due to early life chemical exposure in the USA from 2001 to 2016: A population-based disease burden and cost analysis." *Molecular and Cellular Endocrinology.* February 2020.

Founded in 1892, the Sierra Club is America's oldest and largest grassroots environmental organization. The Maryland Chapter has about 70,000 members and supporters, and the Sierra Club nationwide has more than 800,000 members.

**EPAretired_Vallianatos_FAV_SB0300**
Uploaded by: Vallianatos, Evaggelos
Position: FAV

Testimony of Dr. E.G. Vallianatos
675 W. 10th Street, Claremont, CA 91711
evaggelosg@gmail.com
909.399.5074

February 12, 2020

**The House Environment and Transportation Committee**
**HB 229- Pesticides –Use of Chlorpyrifos—Prohibition**
**Position: Support**

Dear Chairman Barve and members of the committee,

I worked in risk evaluation at the EPA for 25 years. I am the author of six books and hundreds of articles, many of which recount my experience at the EPA.

My employment at the EPA has given me insight into the unfortunate tug-of-war between policy based on science and policy based on politics. The failure of the EPA to ban chlorpyrifos is an example of politics winning over public health.

The neurotoxin chlorpyrifos is related to chemical warfare agents. It affects the brain in deleterious ways: causing dizziness, confusion, autism, lower IQ, difficulties in remembering and learning, and death. In the 1990s, EPA had reached partial cancellation agreements with the registrant of chlorpyrifos due to compelling information that these neurotoxic pesticides damage the developing nervous system of fetuses, infants and children. In 2006, chlorpyrifos was among 20 pesticides scheduled for renewal required by the 1996 law, the Food Quality Protection Act. At that time, EPA Union Presidents and scientists signed the following to the EPA administrator:

"Our colleagues in the Pesticide Program feel besieged by political pressure exerted by Agency of officials perceived to be too closely aligned with the pesticide industry and former EPA officials now representing the pesticide and agricultural community; and by the US Department of Agriculture through their Office of Pest Management Policy. Equally alarming is the belief among managers in the Pesticide and Toxics Programs that regulatory decisions should only be made after reaching full consensus with the regulated pesticide and chemicals industry.
Administrator Johnson, we ask that you adhere to your pledge to protect the public health of our nation's infants and children, ensure that final tolerance reassessment decisions are unbiased by outside political influences, and that any decisions be based on a transparent and complete database in conformity with the law, sound science, and our principles of scientific integrity. Until EPA can state with scientific confidence that these pesticides will not harm the neurological development of our nation's born and unborn children, there is no justification to continue to approve the use of the remaining [neurotoxic] OP [organophosphate] and carbamate pesticides."

It is a tragedy that the EPA is still unable to protect the public from chlorpyrifos. Muzzling EPA scientists and ordering EPA to keep chlorpyrifos in the market is a straightforward crime of willfully poisoning children all over the country.

The rule of law, science and public health are not abstractions. They go to the core of civilization. The rule of law protects societies from anarchy. Science distinguish civilized people from barbarians. It's our cherished legacy from Aristotle and the Greeks. Public health is of existential import. We must not allow the crippling of our future generation by chlorpyrifos. I wholeheartedly support the passage of Senate Bill 300 to ban chlorpyrifos in Maryland.

**Biography of Evaggelos Villianatos, Ph.D.**

**Education**
BA, Zoology, University of Illinois
MA, Greek Medieval history, University of Illinois
Ph.D., European / Greek history, University of Wisconsin
Postdoctoral studies in the history of science, Harvard University

**Experience**
Capitol Hill, 1976-78: International food and agriculture politics and development;
US Environmental Protection Agency, 1979-2004: environmental regulation, human and ecological risks of pesticides and industrialized agriculture, climate change; seconded to the UN Development Program, 1995-1996, worked on food sovereignty for Africa.

**Teaching**
History (teaching assistant): University of Wisconsin;
Environmental politics (visiting professor): American University, Humboldt State University, University of New Orleans, Bard College, George Washington University, University of Maryland and Pitcher College.

**Books**
(1) Fear in the Countryside: The Control of Agricultural Resources in the Poor Countries by Non-Peasant Elites (Cambridge: Ballinger, 1976);
(2) From Graikos to Hellene: Adamantios Koraes and the Greek Revolution (Athens: Academy of Athens Press, 1987);
(3) Harvest of Devastation: The Industrialization of Agriculture and its Human and Environmental Consequences (New York: The Apex Press, 1994);
(4) This Land is Their Land: How Corporate Farms Threaten the World (Monroe, Maine: Common Courage Press, 2006);
(5) The Passion of the Greeks: Christianity and the Rape of the Hellenes (Cape Code, MA: Clock and Rose Books, 2006).
(6) Poison Spring: The Secret History of Pollution and the EPA (New York: Bloomsbury Press, 2014).

**Unpublished book**
Science and a Mind-boggling Computer from the Greeks

**Articles**

Hundreds of articles published in academic journals, newspapers, and electronic media (Truthout, AlterNet, On Line Opinion, Independent Science News, Huffington Post, Helios, Hellenic Insider, and Counterpunch).

Articles: (1) history of Greek science and technology; Greek history; and (2) the natural world, public health, and ecological civilization. Articles also examine the political corruption affecting the industry, academia and government on issues of environmental protection and public health.

**ChesPhysiciansSocialResponsibilty_DuboisFAV_SB0300**
Uploaded by: Weil Latshaw, Megan
Position: FAV

CHESAPEAKE PSR PHYSICIANS FOR SOCIAL RESPONSIBILITY

1985 NOBEL PEACE PRIZE

February 11, 2020

**Committee:** **Senate Education, Health and Environmental Affairs**
**Bill:** **SB 300: Pesticide – Use of Chlorpyrifos – Prohibition**
**Position:** **Favorable**

Chesapeake Physicians for Social Responsibility urges the House Environment and Transportation Committee to pass a favorable report on SB 300 which would prohibit the use of the pesticide chlorpyrifos in Maryland.

Chlorpyrifos is a neurotoxic pesticide used in U.S. agriculture to kill a variety of agricultural pests. It puts the developing brains of fetuses, infants and young children at risk and its use on food crops leads to levels in food and water that far exceed safety standards.

Chesapeake PSR supports SB 300 because the scientific evidence lending support to a ban on chlorpyrifos is overwhelming. The clear weight of the evidence confirms that chlorpyrifos is toxic to developing brains of our children, and the developmental damage caused by chlorpyrifos to children is likely irreversible.

Chesapeake PSR would like to highlight a few conclusions that U.S. EPA and other scientists have drawn from 20 years of toxicology and human epidemiology evidence regarding the safety of chlorpyrifos:[1]

- The mechanism of damage is more complex than simply through decreased levels of acetylcholinesterase (AchE), and damage to brains may occur even though levels of AchE are normal
- Dietary exposure to chlorpyrifos exceeds what is safe for all people but especially for children and for infants 1-2 years old, the levels are estimated to be 140 times levels that are safe!
- Exposure to chlorpyrifos in drinking water also exceeds safe levels;
- Exposure to chlorpyrifos in utero is linked to low birthweight, shorter gestation, ADHD, autism, lower IQ scores, memory and other neurodevelopmental issues in children.

[1] Revised Human Health Risk Assessment for Registration Review; Nov. 3, 2016: EPA-HQ-OPP-2015-0653-0454. https://www.regulations.gov/document?D=EPA-HQ-OPP-2015-0653-0454.

Additionally, in adults there are worrisome reports from other studies, some more recent than the EPA report:

- Use of chlorpyrifos in women farmers exposure in another study was shown to be associated with an increase risk of breast cancer in one recent study[2] and exposure was associated with breast cancer in another study[3]
- Parkinson Risk has been associated with exposure to chlorpyrifos in animals and humans and recent evidence suggests certain genetics increase that risk[4]

The Environmental Protection Agency (EPA) proposed a federal ban based on significant risk to fetuses and children, after their scientists review of the data. This conclusion was supported by the U.S. EPA's 2016 Chlorpyrifos Revised Human Health Risk Assessment for Registration Review which indicated that expected exposure to chlorpyrifos from food crop residues exceeds the safety standard established under the Federal Food, Drug and Cosmetic Act.

However, in an unprecedented move, Scott Pruitt, U.S. EPA's new Administrator under the Trump Administration, overruled the recommendations of U.S. EPA's scientific advisors and reversed the agency's decision to ban this toxic pesticide.

A federal court order to the Environmental Protection Agency to ban chlorpyrifos, is now tied up in the Courts. The European Union has banned the pesticide and so has Hawaii and California. In California, a commission has been formed to study and help farmers with safer alternatives to chlorpyrifos based on sustainable pest management. [5] Now seven states . including Maryland, are suing the EPA over its failure to protect children from neurological damage caused by chlorpyrifos use.[6]

With its actions, the U.S. EPA has put politics above science and the economic interests of several large companies above the health and well being of the children of the United States. Since the federal government has failed to perform its most basic function of protecting the health of our children in a fair and impartial way, it is appropriate and necessary for Maryland to step in and provide these basic protections. Otherwise, as warned in a recent report in the New England Journal of Medicine we may be putting a whole generation of developing brains in harm's way.[7]

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[2] https://www.ncbi.nlm.nih.gov/pubmed/28934092

[3] https://journals.lww.com/environepidem/Fulltext/2019/10000/A_case_control_study_of_breast_cancer_risk_and.9.aspx

[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3117899/

[5] https://www.cdpr.ca.gov/docs/pressrls/2019/081419.htm

[6] https://www.capitalpress.com/state/oregon/oregon-joins-lawsuit-challenging-epa-over-chlorpyrifos/article_353e7240-d40b-11e9-a100-9fac57af62a9.html

[7] https://www.nejm.org/doi/pdf/10.1056/NEJMp1716809

**ChildrensEnvHealthProAdvCncil_Latshaw_FAV_SB0300**
Uploaded by: Weil Latshaw, Megan
Position: FAV

CHILDREN'S ENVIRONMENTAL HEALTH &

PROTECTION ADVISORY COUNCIL

January 23, 2020

The Honorable Kumar P. Barve
Chair, Environment and Transportation
House Office Building, Room 251
Annapolis, MD 21401

The Honorable Paul G. Pinsky
Chair, Education, Health, and Environmental Affairs
Miller Senate Office Building, 2 West
Annapolis, MD 21401

RE: **SUPPORT House Bill 229/Senate Bill 300** *Pesticides – Use of Chlorpyrifos – Prohibition*

Dear Chair Barve and Chair Pinsky;

The Children's Environmental Health & Protection Advisory Council (CEHPAC) respectfully submits this letter in **SUPPORT** of **House Bill 229/Senate Bill 300** *Pesticides – Use of Chlorpyrifos – Prohibition.* This bill prohibits the use of chlorpyrifos in the State effective October 1, 2020.

"Impaired neurobehavioral development of children has been significantly linked in epidemiological studies with exposure to pesticides."[1] Prior to Maryland adopting regulations pertaining to the **Integrated Pest Management (IPM) and Notification of Pesticide Use in a Public School (MDA 15.05.02)** in 1997, chlorpyrifos was sprayed extensively throughout many of our public school buildings. The impact to students and staff from exposure to chlorpyrifos (also known as DURSBAN) was a significant factor in the decision to eliminate the routine application of pesticides (including chlorpyrifos) in our schools. As a direct result of Maryland's School IPM Regulations, this chemical is no longer used in schools in Maryland. CEHPAC notes that in 2000, EPA eliminated most approved homeowner uses in the United States.

CEHPAC believes it is prudent to eliminate this product from other uses in the state as well, including agriculture. There is a wealth of science demonstrating adverse health effects of chlorpyrifos exposure to developing fetuses, infants, children and pregnant women.[2,3] According to the Centers for Disease Control and Prevention: "Results from animal studies suggest that chlorpyrifos more easily penetrates the skin of young animals, compared to adults. Children also have a decreased metabolic capacity to eliminate toxicants and are more susceptible to central nervous system toxicants, thus lowering the exposure levels considered protective against the potential toxicity of chlorpyrifos in that population. Chlorpyrifos may also be developmentally toxic. Studies of pregnant rats suggest that low levels of chlorpyrifos exposure during gestation have the potential to increase offspring mortality, reduce birth weight, and alter offspring behavior." [4]

Exposure to organophosphate pesticides in general has been increasingly associated with changes in children's cognitive, behavioral and motor performance.[5] "Evidence of neurological deficits associated with exposure to OP pesticides (organophosphate pesticides) in children is growing. The studies reviewed collectively support the hypothesis that exposure to OP pesticides induces neurotoxic effects."[6]

CEHPAC acknowledges that the US Environmental Protection Agency (EPA) is unable to conclude that the risk from aggregate exposure from the use of chlorpyrifos meets the safety standard of section 408(b)(2) of the Federal Food, Drug, and Cosmetic Act (FFDCA). While the 2015 EPA proposal to revoke all tolerances for chlorpyrifos has not been implemented, the Council urges Maryland to act promptly and firmly in light of the EPA's inability to take action to protect children from this known hazard. CEHPAC supports the proposed Maryland legislation to the extent that it promotes positive

health and environmental outcomes.

As defined in statute (Md. Code Ann., Health-General §§ 13-1501 thru 1506), CEHPAC seeks to ensure that the rules, regulations, and standards adequately protect the health of children from environmental hazards. CEHPAC's goal is to enable children in Maryland to grow up in a safe and healthy environment. Our duties include:

- ✓ provide input to the General Assembly on legislation that may impact environmental hazards that affect the health of children;
- ✓ recommend uniform guidelines for State agencies to follow to help reduce and eliminate children's exposure to environmental hazards; and
- ✓ educate others regarding the environmental hazards that impact children's health, the means to avoid those hazards and provide any other relevant information that will assist in protecting children health.

In establishing CEHPAC, the Maryland General Assembly clearly identified children's environmental health as a priority for the State. HB 229/SB 300 addresses many of our concerns regarding the impact to children and their environment from exposure to Chlorpyrifos which can and does affect children's health and their environment. CEHPAC has increasingly seen the need to advocate for basic protections for children from hazardous chemicals, specifically those that are persistent, bio-accumulate, impact water and food, and which are toxic. This bill is a means of ensuring that children will no longer encounter this product in our state.

CEHPAC urges the legislature to eliminate the use of chlorpyrifos in Maryland. CEHPAC looks forward to working with the General Assembly on this and other issues, and thanks you for your leadership on this issue. Please note that the opinions of the Council expressed in this letter do not necessarily reflect that of the Department of Health or any other State agency.

Sincerely,

Megan Weil Latshaw, PhD MHS
On Behalf of the Children's Environmental Health and Protection Advisory Council

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[1] Timofeeva, Olga A.; Levin, Edward D. (2010). "Lasting Behavioral Consequences of Organophosphate Pesticide Exposure During Development" (http://www.sciencedirect.com/science/article/pii/B9780123743671000331). In R. Krieger (ed.). *Hayes' Handbook of Pesticide Toxicology (Third Edition)*. New York: Academic Press. pp. 837–846. ISBN 978-0-12-374367-1 Accessed January 21, 2020.
[2] Flaskos, J. (2012-02-25). "The developmental neurotoxicity of organophosphorus insecticides: A direct role for the oxon metabolites" (https://www.ncbi.nlm.nih.gov/pubmed/22155227). Accessed January 21, 2020.
[3] Timofeeva, Olga A.; Levin, Edward D., op. cit.
[4] Agency for Toxic Substances and Disease Registry (September 1997). Toxicological Profile for Chlorpyrifos, Chapter 2: Health Effects, p. 91. (https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=495&tid=88). Accessed January 21, 2020.
[5] Muñoz-Quezada, Maria Teresa; Lucero, Boris A.; Barr, Dana B.; Steenland, Kyle; Levy, Karen; Ryan, P. Barry; Iglesias, Veronica; Alvarado, Sergio; Concha, Carlos; Rojas, Evelyn; Vega, Catalina (December 2013). "Neurodevelopmental effects in children associated with exposure to organophosphate pesticides: A systematic review" (https://www.ncbi.nlm.nih.gov/pubmed/24121005). Accessed January 21, 2020.
[6] Flaskos, J., op.cit.

**FairFarms_Whitehurst_FAV_Kalm_SB0300**
Uploaded by: Whitehurst, Liz
Position: FAV

Fair Farms® Maryland
a campaign for healthy food, land & waterways

**Support for Senate Bill 300 (Sen. Lam)**
**Pesticides - Use of Chlorpyrifos - Prohibition**

February 11, 2020

Dear Chairman Pinksy and Members of the Senate Education, Health, and Environmental Affairs Committee:

I am writing in support of Senate Bill 300, sponsored by Senator Lam, that bans the use of the harmful pesticide, chlorpyrifos. The Fair Farms campaign of Waterkeepers Chesapeake brings together consumers, farmers, public health professionals, and conservationists to advocate for a food system that is equitable, fair to farmers, invests in homegrown healthy foods, and restores our waterways.

We are a growing movement of over 35,000 Marylanders and close to 200 partners across the state. These partners include national organizations like Farm Aid, the National Sustainable Agriculture Coalition, Family Farm Defenders, and National Family Farm Coalition.

We strongly support Senate Bill 300 because it will play an integral role in protecting the health of our communities and environment. This insecticide has been linked to many health issues including developmental delays in children as well as nausea, dizziness, convulsions, and even death in adults, particularly farmworkers. As a campaign that prioritizes public health and the health of our food, land, and waterways, it is imperative that we pass this ban in order to protect our communities and the environment in which we live.

We work with farmers across Maryland who are able to make a living while showing that chlorpyrifos is not a necessary step in growing nutritious food. They rely on other practices and products to address pest pressures on their farms. The majority of our farmer partners are in favor of this ban and share a concern about the brain-damaging impact of this pesticide, including Even' Star Farm and Sassafras Creek Farm in Southern Maryland, Bay Water Greens and Groundworks Farm on the Eastern Shore, and Cedar Rock Farm in Western Maryland. Some of our partner farmers even have children with learning disabilities and children on the autism spectrum—a lifelong struggle for them and their children.
We have the opportunity in Maryland to be leaders on this critical issue. I urge a favorable report on SB 300 and ask that you do all you can to ensure the Chlorpyrifos Ban is passed in 2020.

Sincerely,
Shelby Kalm
Fair Farms Campaign Manager

**MdStateEducationAssoc_Zwerling_FAV_SB0300**
Uploaded by: Zwerling, Samantha
Position: FAV

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state education
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EDUCATORS TOGETHER

140 Main Street
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# Testimony in Support to Senate Bill 300
# Pesticides - Use of Chlorpyrifos – Prohibition

## Senate Education, Health, & Environmental Affairs Committee
## February 11, 2020

**Samantha Zwerling**
**Government Relations**

The Maryland State Education Association supports Senate Bill 300, which prohibits anyone in the state from using the pesticide Chlorpyrifos. This bill would help to keep children, teachers, and communities safe from the pesticide's detrimental effects.

MSEA represents 75,000 educators and school employees who work in Maryland's public schools, teaching and preparing our 896,837 students for the careers and jobs of the future. MSEA also represents 39 local affiliates in every county across the state of Maryland, and our parent affiliate is the 3 million-member National Education Association (NEA).

Chlorpyrifos and other pesticides like it have extremely harmful effects on adults and even more so on children during their developmental years. According to a 2012 report by the Pesticide Action Network, the United States has seen a "rampant rise of learning disabilities, childhood cancer and asthma" linked to pesticide exposure. Maryland has made great strides in reducing school children's exposure to pesticides over the years. In 1998, Maryland was the first state in the country to pass a law which limits the use of pesticides in and around public schools. This bill only allows pesticide use if all other options have been exhausted. The law also requires schools to notify the school community if these chemicals are applied. While that legislation has been a great step in the right direction, there is still concern around its enforcement. We must make sure schools are adhering to the notification system as children with severe asthma could be seriously affected.

Chlorpyrifos is such a concern for school children that last year US Senator Kirsten Gillibrand introduced the Safe School Meals for Kids Act. This federal legislation would restrict schools from serving any food with a detectable amount of chlorpyrifos. Chlorpyrifos is typically applied to foods that school children eat such as corn, strawberries, apples, and wheat. Banning it's use in agricultural settings in Maryland would alleviate concerns about consumption in schools and make Maryland agriculture more attractive for school systems to purchase.

Students and teachers are also impacted by pesticide application in the surrounding area. Chlorpyrifos is not only used in typical food production, but also at golf courses and vineyards. Schools near golf courses, vineyards, or farms are negatively impacted by pesticide spray drift. According to the Maryland Pesticide Education Network, "Pesticide spray drift is typically the result of small spray droplets being carried off-site by air movement." Pesticide spray drift has been linked to pesticide poisoning in surrounding areas. Passing Senate Bill 300 would alleviate this concern for schools in agricultural regions.

This bill makes great strides in keeping all of Maryland's school children and educators safe. **MSEA respectfully requests a favorable report on Senate Bill 300.**

**Corteva_Deadwyler_OPP_SB300**
Uploaded by: Deadwyler, Rick
Position: UNF

# MEMORANDUM-IN-OPPOSITION

February 11, 2020

SB 300 Pesticides - Use of Chlorpyrifos - Prohibition (Lam)

Committee: EHEA

An act prohibiting the use of chlorpyrifos in the State, including insecticides containing chlorpyrifos and seeds treated with chlorpyrifos; and requiring the Department of Agriculture, with existing budgeted resources, to provide to farmers, certified crop advisors, and pesticide applicators certain education and assistance relating to integrated pest management.

This bill would establish a Maryland ban of the use of one specific organophosphate pesticide, chlorpyrifos, which is an effective insecticide applied across a broad spectrum of pests. In the presence of some key insect pests, chlorpyrifos is the only effective pest control option. It is thus widely used in 48 U.S. States in agricultural applications on over 60 crops, from specialty to row crops. Farming and agriculture is Maryland's #1 industry.

Corteva Agriscience, is **STRONGLY OPPOSED** to the potential ban of chlorpyrifos in this bill.

Extensive studies have shown that current uses of chlorpyrifos meet the U.S. regulatory standard of a "reasonable certainty of no harm." The U.S. is among about 100 countries, including all major U.S. trading partners, that have registered chlorpyrifos for agricultural use by farmers. Chlorpyrifos is one of the most widely studied crop protection products in the world. In fact, more than 4,000 regulatory guideline studies have been conducted and subjected to critical evaluation by regulatory authorities in the nearly 100 countries where the product is currently registered and legally approved for use.

The U.S. Environmental Protection Agency (EPA) is only allowed to register a pesticide to protect food crops if it concludes, after considering the validity, completeness and reliability of the best available scientific information, that exposures from intended uses pose a "reasonable certainty of no harm" to people, including potentially sensitive individuals such as children and pregnant women. Regarding chlorpyrifos, a full weight of evidence evaluation from thousands of studies, along with a critical examination of the studies being cited by some who have raised safety questions, shows that current uses of chlorpyrifos meet the regulatory standard of a "reasonable certainty of no harm" for humans, including children. Such research confirms that chlorpyrifos is not a specific neurodevelopmental toxicant, not a carcinogen, not a genotoxic agent, not a developmental toxicant, and not a reproductive toxicant. Further, laboratory studies conducted under stringent guidelines set by EPA for such research have shown that the young are not more sensitive than adults.

While safety questions have been raised about certain epidemiologic results, the findings are not consistent with other scientific research. For the epidemiology studies that have looked at

chlorpyrifos, it is important to consider all the evidence. The research referred to as the Columbia study claimed some associations, but had weaknesses in determining exposure during pregnancy, and accounting for other competing causes, such as gestational age at birth, nutritional deficiencies, other environmental exposures, and the quality of maternal interactions with the child. As a result, the study can only raise a hypothesis between possible chlorpyrifos exposures and adverse health effects in children.

Other epidemiology studies, and the two most cited (e.g., CHAMACOS and Mount Sinai), reported no significant associations between possible exposure to chlorpyrifos and any adverse health effects in the children from the study. In scientific terms, these studies tested the hypothesis of the Columbia Study and could not validate or replicate the findings.

The most recent Scientific Advisory Panel (SAP) convened by EPA to review the body of evidence urged EPA not to use the Columbia study as it had proposed in its chlorpyrifos evaluation, noting a number of uncertainties and raising questions about the researcher's methodology and conclusions. In addition to the SAP, multiple published reviews of epidemiology findings of the Columbia study describe the evidence for a neurodevelopmental effect as inadequate, inconsistent and biologically implausible.

As such, EPA's 2006 determination that there is a reasonable certainty of no harm from approved uses of chlorpyrifos on food crops will remain in effect until EPA completes the ongoing periodic registration review of chlorpyrifos on or before October 2022, using valid and reliable scientific information.

Corteva Agriscience is thus confident that chlorpyrifos will continue to safely and effectively protect food crops from insect damage after EPA completes its ongoing pesticide registration review.

Thus, for all of the reasons stated herein, Corteva Agriscience **STRONGLY OPPOSES** SB300.

Respectfully submitted,

Rick M. Deadwyler
Government & Industry Affairs
U.S. East Region
(302) 668-7918

# Howie Feaga_UNF_SB300

Uploaded by: feaga, howie

Position: UNF

February 10,2020

Chairman Pinsky, Vice Chair Kagan, and members of the Education, Health, and Environmental Affairs Committee: I am hoping you can vote against the SB-300 bill. The banning of "chlorpyrifos" at this time is going to put a burden on the Agricultural community by forcing them to use products that are not as well-known as chlorpyrifos. They are also not as effective and therefore may be more hazardous because of the need to overuse them to get the same results. Chlorpyrifos is not as widely used as it has been because of the GMO corn that now protects itself from the corn "rootworm", it is however used to protect stored wheat as well as in the Orchards and Vegetable Farms to protect those crops as well. There are 9 new products that are on the market now but the use of those products is still being learned by the farmers, and if we can just have it regulated until we get up to speed on the new products that would be a tremendous help to us. We are all regulated in the agricultural business by our "Pesticide Licenses" that are renewed annually, and the product is only sold to someone that has a "Pesticide License". We will eventually get to where we don't need the Chlorpyrifos and then the need for that product will eliminate itself. If the bill can be modified to just continue the regulation for just a while longer, the benefits will easily out way the dangers for a short period of time.

Thank You for your consideration on this,

Howie Feaga, former president of the Ho. Co. Farm Bureau. *Howie Feaga*

**MarylandFarmBureau_OPP_SB0300**
Uploaded by: Ferguson, Colby
Position: UNF

# Maryland Farm Bureau, Inc.

3358 Davidsonville Road • Davidsonville, MD 21035 • (410) 922-3426

February 11, 2020

To: Senate Education, Health & Environmental Affairs Committee

From: Maryland Farm Bureau, Inc.

Re: **Opposition of SB300 - Pesticides - Use of Chlorpyrifos – Prohibition**

On behalf of our member families, I submit this written testimony opposing SB 300. This bill bans the use of Chlorpyrifos in Maryland starting October 1, 2020. This includes insecticides that include Chlorpyrifos and seeds treated with Chlorpyrifos.

Chlorpyrifos is sometimes used on non-GMO corn, but since there isn't much non-GMO corn grown in Maryland, one of the main uses in Maryland is in Orchards. They use it only once a year either post-harvest or during the tree's dormant stage. Most contract vegetable growers are required to use seeds treated with Chlorpyrifos as well. In Vineyards, Chlorpyrifos is the only treatment against the Spotted Lanternfly.

Losing the ability to use a pesticide of last resort as Chlorpyrifos is in several cases, severally limits the farmer's ability to address pest invasions and therefore puts the farmer's crop and his/her livelihood in jeopardy. The use of pesticides should be **regulated** using sound science and fully vetting the product, not **legislated** by individuals that are not educated in the subject matter to properly vet whether to allow the pesticide or not.

**MFB Policy:** We believe the use of pesticides should be regulated by available facts, not on emotional issues. We urge keeping all federally labeled crop protection products legal in the state, counties and municipalities.

**MARYLAND FARM BUREAU RESPECTFULLY OPPOSES SB 300**

Colby Ferguson
Director of Government Relations
*For more information contact Colby Ferguson at (240) 578-0396*

**Magi_UNF_Joe M._SB 300**
Uploaded by: Miedusiewski, Joe
Position: UNF

NAVAL ACADEMY GOLF ASSOCIATION
566 BROWNSON ROAD
ANNAPOLIS, MARYLAND 21402

February 10, 2020

11 Bladen Street
Annapolis, MD 21401

Dear Mr. Chair and Members of the Committee:

I am writing on behalf of the Naval Academy Golf Club regarding the ban on chlorpyrifos insecticide. This insecticide is an essential tool we use at the course to combat annual bluegrass weevil. This insect does significant damage to the annual bluegrass greens we have at the Naval Academy and if gone untreated, the catastrophic loss of turf on our greens would be extremely detrimental to ability to use the property. Additionally, this could cause unnecessary problems for the Midshipmen Golf Team as this is their home course, requiring the team to play matches elsewhere if the greens are damaged beyond repair. Everyone would agree this would be incredibility unfortunate to displace such an important group of individuals who have given so much to our country. Chlorpyrifos is one of the tools used to manage the pest and we make a maximum of two applications annually; during the spring for control of the annual bluegrass weevil. If we are unable to use this chemical to fit this pest, we will end up with resistance issues with the other pesticide that manages this pest. Having two chemistries to use in rotation ensures that we do not have resistance issues in the future. Please consider all the evidence before banning this important tool for the golf industry.

Sincerely,

Eric David

Golf Course Superintendent

United States Naval Academy Golf Club

**Magi_UNF_Joe M._SB 300**
Uploaded by: Miedusiewski, Joe
Position: UNF

The Cannon Club
699 Mt. Zion Marlboro Rd.
Lothian, Md. 20711

February 7, 2020
Education, Health and Environmental Affairs Committee
Miller Senate Office Building, 2 west Wing
11 Baden St.
Annapolis, Md. 21401

Dear Members of the Committee,

I am writing in opposition to SB229 and HB300. Chlorpyrifos is only one of two insecticides currently registered by the EPA to control the adult life stage of the Annual Bluegrass Weevil (ABW). The only other product registered to control the adult life stage of this devastating pest is Bifenthrin; which is highly susceptible to resistance.

The ABW has a unique ability to develop a resistance over time to the products used to control the various life stages of this pest if used repeatedly. This is why rotating different chemistries is very important to reducing the populations of this pest. As a responsible steward of the environment, I never apply more than two applications of the same chemical family in the same year to my greens, tees and fairways for the control of the ABW and this includes Chlorpyrifos. Based on this strategy, Chlorpyrifos is used sparingly and responsibly. Until we have a replacement chemistry to control the adult of this destructive pest, the removal of Chlorpyrifos would be devastating to the golf industry.

If Chlorpyrifos is taken away from us, there is no doubt that the turf quality will decline and we will be forced to re-grass these areas; which will require more inputs like fertilizer, fungicides and herbicides to remove weeds where the turf has been damaged. If the damage is severe, it is not unreasonable to think that there will be added erosion that would go against all the efforts of the Chesapeake Bay foundations and other organizations have implemented to try to clean up our Bay.

As a manager of a golf course, I am always looking for ways to reduce inputs into the golf course which is better for the environment and more sustainable for the golf course while providing our members and guests with a quality product for their recreation.

All of us in the golf course industry have adopted Best Management Practices for our facilities to preserve our environment and reduce inputs. The current tools we have are very important to preserving the open space that we all enjoy. When new and improved chemistries/products are brought to market, we adopt them to achieve better results while reducing inputs of pesticides into the environment.

Golf Course Superintendents are well educated and good stewards of the environment. I hope you consider all the facts and industries affected before making a final decision to ban the use of Chlorpyrifos.

Sincerely,
Marlin L. Ewing Jr.
Golf Course Superintendent
The Cannon Club

**Magi_UNF_Joe M._SB 300**
Uploaded by: Miedusiewski, Joe
Position: UNF

THE GOLF CLUB

SOUTH RIVER

February 6, 2020

The Golf Club at South River
3451 Solomon's Island Road
Edgewater, MD 21037

Dear Senate Education, Health, and Environmental Affairs Committee,

I am writing to express my strong objection to Maryland Senate Bill 300. This bill would negatively impact our business by restricting the use of Chlorpyrifos. Furthermore, I strongly believe if more research was done into this matter it would show its removal would drastically impact the environment in a negative way.

Annual Bluegrass Weevil (ABW) is the number one pest we control and has caused the most significant amount of damage to our property. This damage has added up to tens of thousands of dollars since the properties existence. Controlling this pest has been difficult and Chlorpyrifos has been a great tool to help in this battle. Using a rotation of Chlorpyrifos with other products from other IRAC codes, we have been able to avoid any resistance issues.

Taking away Chlorpyrifos, will not only take away one of our most valuable tools to combat this pest, but it will also limit our ability to rotate chemistries and prevent resistance issues. I strongly object Maryland Senate Bill 300 and I hope you see what a negative impact removing Chlorpyrifos will have. Please review this matter more and think about the impact this decision will have on not only my business, but the businesses around the state.

Thank you,

Josh Fuhrman

**Senate Bill 300 2-6-20 letter PB (003)**
Uploaded by: Miedusiewski, Joe
Position: UNF

PINEY BRANCH
GOLF CLUB

5301 TRENTON MILL ROAD
UPPERCO, MARYLAND 21155

410.239.7114 (OFFICE) / 410.239.7105 (FAX)
WWW.PINEYBRANCHGOLF.COM

February 6, 2020

Education, Health and Environment Affairs Committee

Maryland State Senate

Reference: Senate Bill 300

Dear Madam Chair and Members of the Committee,

In response to Bill 300, banning the use of chlorpyrifos, I strongly recommend that this bill be removed. I have been a Class A superintendent for the last thirteen years at a private golf club in Upperco, Maryland and I find the use of chlorpyrifos to be vital in the control of many insect pests on our golf course when used responsibly. Of the many pests that we are charged to control on the course, one particular, the Annual Bluegrass Weevil (Hyperodes Weevil) is the hardest for us to control. Currently and in the recent past we have had great success in controlling this pest with the combination of aggressive scouting and key planned spray applications. Currently we only have a handful of products at our disposal that will control this pest, chlorpyrifos being one. The other key products that control this pest are pyrethroids such as Scimitar and Bifenthrin.

The key to maintaining good control of this pest is having the ability to rotate different chemical classes which helps us to reduce the pests' ability to become immune to one particular pesticide. By rotating chlorpyrifos, an organophosphate and products like bifenthrin, a pyrethroid, we protect the future need to make additional applications. Point being, if we lose chlorpyrifos as a tool in our programs we run the risk of developing resistance to other insecticides and in turn, we would need to make far more applications per year to maintain a greater level of control.

Speaking for many golf course superintendents in our region, with good scouting and IPM strategies we can responsibly and accurately apply chlorpyrifos to select areas on our properties to limit any impacts this product may have on the environment. This particular chemical is already regulated by the EPA and there is no need to further regulate on the state level. In conjunction with that, the general public is not allowed to purchase or apply this product and only licensed professionals can do so. My hope is that this Bill 300 will be removed.

Sincerely,

Scott Wunder

General Manager and Golf Course Superintendent

410-239-7114

**DPI_HPorter_UNF_SB300**
Uploaded by: Porter, Holly
Position: UNF

DELMARVA POULTRY INDUSTRY, INC.
16686 COUNTY SEAT HIGHWAY • GEORGETOWN, DELAWARE 19947-4881
PHONE: 302-856-9037 E-MAIL: dpi@dpichicken.com
www.dpichicken.org

Date: February 11, 2020
To: Members of the Senate Education, Health & Environmental Affairs Committee
From: Holly Porter, Executive Director
Re: SB 300 – Pesticides – Use of Chlorpyrifos - Prohibition - **Oppose**

Delmarva Poultry Industry, Inc. (DPI), the 1,700-member trade association representing the meat-chicken growers, processing companies and allied business members on the Eastern Shore of Maryland, the Eastern Shore of Virginia, and Delaware opposes SB 300 and urges an unfavorable committee report.

SB 300 has both direct and indirect impacts on the poultry industry. Chlorpyrifos is an important insecticide used to manage resistance in insect species, and especially the darkling beetle. This pest is often found in poultry houses and can cause damage in the wood structures and between walls, carry diseases that impact the health of the birds and create feed loss in the houses. The use of chlorpyrifos is important as a tool in integrated pest management practices that our growers use. SB 300 would limit a resource to our growers. And this insecticide is only applied by certified pesticide applicators that have passed several tests and participated in continuous education. This includes growers and outside consultants.

Chlorpyrifos may also be used by grain producers to control for root worms and soil pests in corn and spider mites in soybeans. This is a very important tool for farmers that grow both genetically modified (GMO) and non-GMO corn, and the poultry companies need both types of feed. In 2019, the Delmarva poultry companies used over 89 million bushels of corn and 38 million bushels of soybeans for feed, with most being provided by our farmers in Delmarva. It is often stated that on Maryland's Eastern Shore the industry is comprised like a three-legged stool – the poultry growers, the poultry companies and the grain farmers – and if any one of the legs of that stool were to fall, there would be issues. SB 300 would limit our grain farmers in their pesticide management, possibly producing less bushels for grain and soybeans.

Finally, DPI has concerns with precedent that our legislator is setting in opposing the regulatory and scientific process that determines what pesticides should be used in our state. Before a product can be labeled and sold in Maryland, it receives rigorous scientific review, evaluation and approval by federal experts and outside scientists on health and safety standards. This process often takes years and is in addition to the research the companies also conduct. DPI feels the decision of prohibiting pesticides should be left to the scientific experts.

We urge an unfavorable vote on SB 300.

Should you have any additional questions, please feel free to contact me at porter@dpichicken.com or 302-222-4069 or Nick Manis, Manis Canning & Associates, 410-263-7882.

**DMAA_Thompson_UNF_SB300**
Uploaded by: Thompson, Lindsay
Position: UNF

DELAWARE-MARYLAND AGRIBUSINESS ASSOCIATION
123 Clay Drive, Queenstown, MD 21617
www.demdagribusiness.org
443-262-8491

**SB 300 - Pesticides - Use of Chlorpyrifos - Prohibition**

Committee: EHEA Date: February 11, 2020

DMAA Position: **OPPOSED**

Chlorpyrifos is a pesticide registered by the Environmental Protection Agency (EPA) for control of a variety of pest in many agricultural crops. Important to Maryland, Chlorpyrifos is used in corn, corn for silage, canning vegetables, soybeans, grapes, and orchards.

Pesticide registration and regulation is a function of EPA directed by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). EPA has the capacity and expertise to carefully analyze these products for safety. EPA develops risk assessments for potential harm to humans, wildlife, fish, and plants, including endangered species and non-target organisms and Contamination of surface water or ground water from leaching, runoff, and spray drift. Chlorpyrifos was re-registered for all crops under this rigorous process in 2006.

EPA was petitioned to revoke all tolerances for Chlorpyrifos which triggered a series of events. There was concern about Chlorpyrifos based on a Columbia University study and EPA convened a Scientific Advisory panel (SAP) in April of 2016 to determine whether or not it was appropriate to regulate pesticides, specifically Chlorpyrifos, using epidemiological studies (such as the Columbia study) as opposed to direct exposure and animal studies which are now the basis for pesticide regulations. The SAP, under the Obama Administration, determined that it was not appropriate to use epidemiological studies in this way or use the Columbia Study data as part of the human health assessment on Chlorpyrifos. To demonstrate this fact, please find two quotations below from the SAP report "A set of Scientific Issues Being Considered by the EPA Regarding Chlorpyrifos: Analysis and Biomonitoring Date" April 2016 :

- Because many uncertainties cannot be clarified, the **majority of the Panel does not have confidence that the Columbia Center for Children's Environmental Health (CCCEH) cord blood data on chlorpyrifos concentrations can accurately be used in quantitative risk assessment** to determine a Point of Departure (PoD). Pg. 18
- While **one** Panel member agrees with the Agency's simpler approach of using the CCCEH study cord blood data for directly deriving the PoD, the **majority of the Panel considers the Agency's use of the results from a single longitudinal study to make a decision with immense ramifications based on the use of cord blood measures of chlorpyrifos as a PoD for risk assessment as premature and possibly inappropriate.** Pg. 25

Later in 2016, EPA released the proposed rule to revoke all tolerances stating that they had addressed the concerns of the SAP when in fact they had not. EPA in 2017 denied the petition to ban Chlorpyrifos. Critics of Pruitt's decision to deny the petition say he rushed to a decision and did not consider EPA's science. The reason he had to act quickly was the Court Order to make a decision by March. Pruitt acknowledged in his decision that the product will continue to go through the comprehensive re-registration process by 2022.

Also worth noting, the USDA Office of Pesticide Policy, also under the Obama administration commented on the EPA proposed rule on Chlorpyrifos, questioning the process and the science and calling on them to deny the petition. Here is part of USDA's comment: "**USDA has grave concerns about the EPA process that has led to the Agency publishing three wildly different human health risk assessments for chlorpyrifos within two years, and severe doubts about the validity of the scientific conclusions underpinning EPA's latest chlorpyrifos risk assessment**."

Bottom line here is that while you may hear "the science is clear," there is obvious dissention on certain studies and their appropriateness for use in regulatory risk assessments. This is an information intensive issue with real world implications for our farmers.

Whether or not we can agree on *if* Chlorpyrifos should be used, I hope we can agree that decision should be made through a rigorous, regulatory process, where experts can consider all the science and implications to come to a sound, scientific decision.

DMAA believes that the federal process through FIFRA is the appropriate place to regulate pesticides and requests the committee allow Chlorpyrifos to continue through the re-registration process. Banning a pesticide at the state level creates a competitive disadvantage for Maryland farmers and takes away a tool from farmers and agricultural professionals to use in order to responsibly manage pests.

DMAA respectfully requests your unfavorable report on Senate Bill 300.

Contact:
Lindsay Thompson
Lindsay.mdag@gmail.com

**MGPA_Thompson_UNF_SB300**
Uploaded by: Thompson, Lindsay
Position: UNF

Maryland Grain Producers Association
123 Clay Drive, Queenstown, MD 21658
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www.marylandgrain.com

**SB 300 - Pesticides - Use of Chlorpyrifos - Prohibition**

Committee: EHEA Date: February 11, 2020

MGPA Position: **OPPOSED**

The Maryland Grain Producers Association serves as the voice of grain farmers growing corn, wheat, barley and sorghum across the state. Senate Bill 300 - Pesticides - Use of Chlorpyrifos – Prohibition would deeply impact our farmers' ability to adequately and responsibly control for insects with the potential to devastate entire crops. This bill seeks to ban Chlorpyrifos, products containing Chlorpyrifos, and seeds treated with Chlorpyrifos as of October 1, 2020.

In grain production, Chlorpyrifos is primarily used to control for corn root worm and grubs but can also control for other pests such as spider mites, beetles, and fire ants if necessary. The use of Chlorpyrifos has significantly declined in grain production since the inception of genetically modified (GMO) corn because the GMO corn is modified with *Bacillus thuringiensis* (Bt) which is unappealing to corn root worm. Chlorpyrifos is an essential tool for farmers who choose to grow non-GMO crops. It is also a tool that farmers experiencing Bt resistance in their GMO crops can use in emergencies to control for pests.

According to the Maryland Department of Agriculture, the use in Maryland across all crops is less than four thousand pounds annually. This is a very low use pesticide but when farmers use Chlorpyrifos, it is because they really need it.

Having Chlorpyrifos as a tool in the toolbox for farmers to protect their crops allows them to practice responsible, integrated pest management (IPM) and use only the products and amounts necessary. If Chlorpyrifos were to be banned in Maryland, it would cause hardship for Maryland farmers. While there are alternatives such as neonicotinoids and pyrethroids, they are not always as effective and often have to be used in either greater quantities and/or more applications. Additionally, farmers cannot use the same products over and over again without risking the pests building resistance, that is not responsible IPM.

Chlorpyrifos is a federally restricted pesticide which means that only those with training and certification can apply the products containing it. The pesticide label, which is the law, instructs applicators to take the necessary precautions to avoid exposure. Farmers with a pesticide applicators license have the training and knowledge to apply Chlorpyrifos in a safe manner.

You will hear from proponents of the bill that "there is no safe use of Chlorpyrifos," according to EPA. This is in regards to the previously proposed rule where EPA proposed to revoke all tolerances for Chlorpyrifos. An EPA Scientific Advisory Panel tasked with reviewing the Risk Assessment that informed this proposed rule found several troubling issues with the use of the Columbia Center for Children's Environmental Health (CCCEH) cord blood data on chlorpyrifos concentrations and "majority of the Panel considers the Agency's use of the results from a single longitudinal study to make a decision with immense ramifications based on the use of cord blood measures of chlorpyrifos as a PoD for risk assessment as **premature and possibly inappropriate**." ("A set of Scientific Issues Being Considered by the EPA Regarding Chlorpyrifos: Analysis and Biomonitoring Date" April 2016)

MGPA is confident that Chlorpyrifos is safe when used correctly and knows it to be a necessary tool for farmers to have as an option when needed. Banning Chlorpyrifos in Maryland would cause financial hardship for those who rely on it as well as put Maryland grain farmers at a competitive disadvantage to those in surrounding states who can use this federally approved product. Many grain producers also grow other crops including canning vegetables

such as peas, lima beans and green beans. Currently, these seeds are treated with Chlorpyrifos to protect against soil pest before the seed germinates and the plant comes out of the soil. Producers under contract with the canning companies do not have a choice as to what seeds and treatments are used. **If Maryland bans this product while it can still be used in all the surrounding states, the canning companies have indicated they would just "move those acres elsewhere" meaning the farmers would lose their contracts and that source of income.**

There is a rigorous process at the federal level for pesticide review, approval and registration. There are experts and scientists that are dedicated to this process and have the knowledge to make sound decisions. We ask that you allow EPA to continue the FIFRA process and not take action at the state level.

MGPA respectfully requests your unfavorable report on SB 300.

**CLA_Titus_OPP_SB300**
Uploaded by: Titus, Riley
Position: UNF

DELAWARE-MARYLAND AGRIBUSINESS ASSOCIATION
123 Clay Drive, Queenstown, MD 21617
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443-262-8491

**SB 300 - Pesticides - Use of Chlorpyrifos - Prohibition**

Committee: EHEA Date: February 11, 2020

DMAA Position: **OPPOSED**

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Also worth noting, the USDA Office of Pesticide Policy, also under the Obama administration commented on the EPA proposed rule on Chlorpyrifos, questioning the process and the science and calling on them to deny the petition. Here is part of USDA's comment: "**USDA has grave concerns about the EPA process that has led to the Agency publishing three wildly different human health risk assessments for chlorpyrifos within two years, and severe doubts about the validity of the scientific conclusions underpinning EPA's latest chlorpyrifos risk assessment**."

Bottom line here is that while you may hear "the science is clear," there is obvious dissention on certain studies and their appropriateness for use in regulatory risk assessments. This is an information intensive issue with real world implications for our farmers.

Whether or not we can agree on *if* Chlorpyrifos should be used, I hope we can agree that decision should be made through a rigorous, regulatory process, where experts can consider all the science and implications to come to a sound, scientific decision.

DMAA believes that the federal process through FIFRA is the appropriate place to regulate pesticides and requests the committee allow Chlorpyrifos to continue through the re-registration process. Banning a pesticide at the state level creates a competitive disadvantage for Maryland farmers and takes away a tool from farmers and agricultural professionals to use in order to responsibly manage pests.

DMAA respectfully requests your unfavorable report on Senate Bill 300.

Contact:
Lindsay Thompson
Lindsay.mdag@gmail.com

# SB0300_MDA_Info_Cassie Shirk

Uploaded by: Shirk, Cassie

Position: INFO

Maryland
Department of Agriculture
Office of the Secretary

Agriculture | Maryland's Leading Industry

**Larry Hogan,** Governor
**Boyd K. Rutherford,** Lt. Governor
**Joseph Bartenfelder,** Secretary
**Julianne A. Oberg,** Deputy Secretary

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# MARYLAND DEPARTMENT OF AGRICULTURE

## LEGISLATIVE COMMENT

**DATE:** February 11, 2020

**BILL NUMBER:** SENATE BILL 300

**SHORT TITLE:** PESTICIDES - USE OF CHLORPYRIFOS - PROHIBITION

**MDA POSITION:** INFORMATION

**EXPLANATION:**

This legislation would ban the use of insecticides that contain Chlorpyrifos or seeds that have been treated with Chlorpyrifos in the State of Maryland, and to require the Department to provide education and assistance relating to integrated pest management, which includes information on safer alternatives to chlorpyrifos.

**BACKGROUND INFORMATION:**

The Maryland Department of Agriculture (MDA) is strongly committed to ensuring a healthy environment for all Marylanders, and making sure that all pesticide products, including Chlorpyrifos are registered with the state and are being used in a lawful manner.

MDA's State Chemist Section enforces the federal registration of pesticide products at the state level. To date, MDA has 43 products with 19 registrants in the state that use Chlorpyrifos. These products are used in a wide range of industries with primary uses in agriculture for row crops, including non-GMO corn. However, other industries including manufacturing, landfills, storage areas, railroads, and construction may all use Chlorpyrifos on a case by case basis. It is considered a very valuable tool in the tool box to combat pests such as fire ants, root worms, and termites.

The Federal Environmental Protection Agency (EPA) has always taken the lead on pesticide registration and labeling issues. The EPA can and have canceled or changed pesticide product registrations and product labeling to protect the environment, human health, wildlife, and pollinators. EPA has vast resources, expertise and reach to evaluate the vast volume of data and information available worldwide to assess pesticide use and sales.

This bill does not include any additional funding to carry out the provisions. Special fund expenditures would be directed away from existing enforcement and educational activities, and federal funding could be compromised.

On Thursday, February 6, 2020 Corteva announced it would stop manufacturing chlorpyrifos. In a statement, the company said, "Demand for one of our long-standing products, chlorpyrifos, has declined significantly over the last two decades, particularly in the U.S. Due to this reduced demand, Corteva has made the strategic business decision to phase out our production of chlorpyrifos in 2020."

If you have additional questions, please contact Cassie Shirk, Director of Legislation and Governmental Affairs, at cassie.shirk@maryland.gov or 410-841-5886.