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July 24, 2017

Pesticide Re-Evaluation Division (7508P),
Office of Pesticide Programs,
Environmental Protection Agency,
1200 Pennsylvania Ave. NW.,
Washington, DC 20460-0001

Re: Preliminary Ecological Risk Assessment for Registration review of 2,4-D. Docket number: EPA-HQ-OPP-2012-0330

The much awaited risk assessment for the phenoxy herbicide, 2,4-D, was conducted and published by the U.S Environmental Protection Agency (EPA). We are writing these comments in response to EPA's ecological assessment. As the agency is aware, Beyond Pesticides is concerned about the increasing use of 2,4-D and subsequent impact to human and environmental health. Recent deregulation of 2,4-D tolerant crop varieties and the registration of the accompanying herbicide cocktail, Enlist Duo, ensures that environmental contamination via surface runoff and drift will increase. In comments to the agency regarding the registration of Enlist Duo, we stated that returning to 2,4-D as a preferred option for chemical management of herbicide-resistant weeds was not an appropriate management strategy. With this preliminary ecological assessment, the agency finds that levels of 2,4-D have in fact increased in surface water and even finished drinking waters. We caution that this trend will continue for years to come, threatening sensitive crops, waterways, and endangered species. As evidenced with other GE crops, the use of 2,4-D-tolerant crops will simultaneously increase 2,4-D contamination of the environment, a circumstance EPA must consider before sanctioning an unprecedented increase in 2,4-D use.

According to this preliminary assessment, uses of 2,4-D, its various forms (amine, acid, ester, salt), and its most toxic degradate (2,4-DCP) result in "direct risk concerns" for several aquatic and terrestrial animals and plants, including listed species, at almost all application rates. Due to 2,4-D drift that continues to be a threat to non-target plants, along with elevated detection frequencies in surface and drinking waters, uses of this chemical must be phased out and not marketed as a solution for weed-resistance or chemical management tool for farmers, especially in light of the availability of alternative practices and materials that challenges the benefit of this chemical. In light of EPA's ecological findings, we call on the agency to begin phasing out uses of 2,4-D, revoking tolerances, and cancelling all registrations.

Summary of Ecological Risk Findings

Non-target plants are vulnerable to 2,4-D, with terrestrial plants being the most sensitive. The 2017 preliminary ecological risk assessment for 2,4-D finds "potential risks of direct effects to listed terrestrial plants, birds, reptiles, terrestrial-phase amphibians, mammals, terrestrial invertebrates, fish, aquatic invertebrates, and aquatic plants on some of its registered use sites." EPA also notes that indirect effects for all species are also possible, as a result of impacts to food and habitat of other organisms.[1]

Applications at rates ranging 0.25lb/acre to 2lb/acre and higher were identified as resulting in direct risk concerns for both listed and non-listed species. The ester forms of 2,4-D posed the most risk to water bodies, fish, and vascular plants from certain agricultural uses. The degradate 2,4-DCP is also most toxic in aquatic environments, with both acute and chronic risk concerns.

Independent studies report that 2,4-D decreases the survival and hatching rate of zebrafish,[2] and is lethal to beneficial insects like lady beetle larvae.[3] 2,4-D formulations also have the potential for endocrine disruption, and can exert chronic toxicity in aquatic environments.[4] Research into 2,4-D impacts on soil organisms shows the herbicide exerting cytotoxic effects in earthworms.[5]

The results of this assessment confirm scientific research and real-world findings of 2,4-D's toxicity to non-target species. EPA must move to protect these sensitive organisms, in accordance with the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA) and begin transitioning U.S. agriculture away from a reliance on this toxic chemical.

Current Uses and Increasing Environmental Contamination

2,4-D is used most heavily in agriculture on pasture, wheat, soybean and corn, in that order, although glyphosate still reigns as the most widely used herbicide in the U.S.[6] With the advent of 2,4-D tolerant corn, soybean and cotton, it is expected that 2,4-D use (in pounds per year) will increase for these commodities.

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[1] USEPA. 2017. Preliminary Ecological Risk Assessment for Registration review of 2,4-D. Office of Pesticide Programs. Washington DC.

[2] Li K, Wu JQ, Jiang LL, et al. 2017. Developmental toxicity of 2,4-dichlorophenoxyacetic acid in zebrafish embryos. *Chemosphere*. 171:40-48.

[3] Freydier L and Lundgren JG. 2016. Unintended effects of the herbicides 2,4-D and dicamba on lady beetles. *Ecotoxicology*. 25(6):1270-7.

[4] DeQuattro ZA, Karasov WH. 2016. Impacts of 2,4-dichlorophenoxyacetic acid aquatic herbicide formulations on reproduction and development of the fathead minnow (Pimephales promelas). *Environ Toxicol Chem.* 35(6):1478-88.

[5] Hattab S, Boughattas I, Boussetta H, et al. 2015. Transcriptional expression levels and biochemical markers of oxidative stress in the earthworm Eisenia andrei after exposure to 2,4-dichlorophenoxyacetic acid (2,4-D). *Ecotoxicol Environ Sa*f. 122:76-82.

[6] USEPA. 2017. Preliminary Ecological Risk Assessment for Registration review of 2,4-D. Office of Pesticide Programs. Washington DC

According to water monitoring data cited by EPA, 2,4-D is being detected "at a higher percentage in surface water" since 2004, when the last monitoring reports were reviewed. 2,4-D was detected in 52 percent of samples from federal and state monitoring in the Southeast, with concentrations up to 4.47ug/L, and concentrations up to 2.76ug/L from sites in the Midwest. Detection frequencies also increased for groundwater. The agency also reports residual detection in treated lakes and detections in finished drinking water. For drinking water, 2,4-D levels were reported up to 0.28ug/L. EPA attributed this increasing trend to increased usage and treated areas of the herbicide. It is therefore expected that detection frequencies and concentrations in surface and ground waters will elevate significantly now that Enlist Duo and 2,4-D tolerant crops are in use. Given the toxicity of 2,4-D to aquatic and terrestrial systems, as identified by EPA in its assessment, we can expect increased and continuous environmental damage to occur if EPA does not take action to curb 2,4-D uses.

2,4-D Drift

2,4-D drift has long been a known problem to off-site locations, endangered species, and non-target crops. Drift can injure plants half a mile or more from the application site,[7] and historical evidence of 2,4-D drift and damage to non-target sites demonstrates that the chemical can in fact enter the atmosphere (volatilize) and travel significant distances (drift). Concentrations 100 times below the recommended label rates have been reported to cause injury to grapes. [8]

EPA utilizes modeling software to help estimate spray drift distances that can pose risk to non-target sites. For this assessment, EPA finds that for aerial applications non-target terrestrial plants are still at risk from the effects of 2,4-D drift over 1000 feet distance from the application site (the upper limit of the modeled distance) at rates found on most 2,4-D labels. Overall, drift exposures pose "direct risk concerns" for terrestrial plants, especially at rates above 1lb/acre. In light of confirmatory evidence that 2,4-D poses danger via spray drift, a threat farmers have been dealing with for a number of years, EPA must act quickly to address these concerns.

The new Enlist Duo formulation contains the choline salt of 2,4-D, which EPA states has lower volatility than other forms of 2,4-D. However, claims that the 2,4-D choline salt's comparatively lower volatility do not appear to mean much in the real world when different environmental and application variables play a part in whether the chemical will remain on site or travel off site. In EPA's 2016 assessment for Enlist Duo, the agency notes that a field study "suggests that volatilization of 2,4-D choline salt from treated crops does occur and could result in bystander exposure to vapor phase 2,4-D choline salt."[9] However, EPA quickly dismissed this

[7] Ball, D.A, Parker, R, et al. 2004. Preventing Herbicide Drift and Injury to Grapes. Oregon State University Extension Service.
[8] Ibid.
[9] USEPA. 2016. Proposed Registration Decision of Enlist Duo Herbicide. Office of Pesticide Programs. Washington DC.

finding, saying modeling data show that airborne levels are not a concern. However, all airborne levels of a chemical this toxic are a concern. Dramatic expansion of 2,4-D applications with increase off-site drift leads to increased residues in the air which poses concern to non-target sites.

In previous comments we have stated that that local climate and topographical conditions are important contributing factors for drift. For instance, conditions in the Northwest are markedly different than those in the Southwest, and it is expected that drift in different areas will depend on local conditions. However, current modeling approaches for assessing pesticide drift do not take these factors into consideration. The models should also account for the effects of climate change on drift and volatilization. EPA believes that reducing boom height and increasing droplet size for both aerial and ground applications will reduce drift distances. But with higher concentrations of 2,4-D being released into the air as a result of application to millions of acres of corn, soybean and cotton fields, increases the probability of offsite movement. These uncertainties, coupled with concerns regarding 2,4-D toxicity and evidence of drift, are factors that should not continue to be underestimated by the agency.

Endangered Species Assessment

This 2,4-D ecological assessment does not contain a distinct, completed assessment for endangered species. However, the agency assessment of risks to non-target animals and plants indicates "potential risks of direct effects to listed terrestrial plants, birds, reptiles, terrestrial-phase amphibians, mammals, terrestrial invertebrates, fish, aquatic invertebrates, and aquatic plants," for several registered uses. The agency also notes that "listed species of all taxa may be affected through indirect effects because of the potential for direct effects on listed and non-listed species…"[10]

The EPA's assessment for Enlist Duo found that it is highly toxic to numerous plants and animals, including endangered whooping cranes, Indiana bats and Hines emerald dragonflies found in or near agricultural fields. EPA notes that previous mitigation recommendations like in-field spray drift buffers and revised wind direction mitigations are being revisited. Any assessment of risks to threatened and listed species must be done in accordance with the 2013 recommendations put forward by the National Academy of Sciences.[11] Without a fully completed assessment and consultation process under the Endangered Species Act, EPA should not move forward with sanctioning the increased application of 2,4-D, which it acknowledges can pose risks to listed and threatened species.

Pollinator assessment

[10] USEPA. 2017. Preliminary Ecological Risk Assessment for Registration review of 2,4-D. Office of Pesticide Programs. Washington DC

[11] National Research Council. 2013. Assessing Risks to Endangered and Threatened Species from Pesticides. Washington, DC: The National Academies Press. https://doi.org/10.17226/18344.

EPA was unable to complete a pollinator assessment for 2,4-D. However, the agency has noted that there were sublethal effects observed in dietary and contact studies with adult bees, which could not be precluded for dietary exposures. Although EPA expects 2,4-D to not be a concern for bees, a pollinator assessment, as outlined in the Guidance for Assessing Pesticide Risks to Bees,[12] must be completed to fully understand all potential direct and indirect exposure impacts. Additionally, there are concerns about synthetic-auxin herbicides like 2,4-D, that have the potential to disturb plant and beneficial insect communities in and around agricultural sites, affecting pollination services,[13] with consequences for farmers..

Conclusion

2,4-D has a well-documented history of environmental contamination and adverse human health effects. Knowing this, U.S. agriculture should be moving away from 2,4-D, as we have with older, more toxic pesticides (organophosphates, organochlorines). This herbicide is highly toxic to non-target terrestrial and aquatic plants, with the ester form and degradate 2,4-DCP being especially toxic. We are very concerned about the expansion in uses of this decades-old, hazardous chemical. EPA must be steadfast in its mission under FIFRA to ensure that aggregate residues from 2,4-D water contamination and drift do not increase or pose risks to vulnerable and sensitive organisms, and phase out the use of this deadly herbicide.

Respectfully,

Nichelle Harriott
Science and Regulatory Director

[12] USEPA. 2014. Guidance for assessing pesticide risk to bees. Office of Pesticide Program, Washington DC.
[13] Bohnenblust EW, Vaudo AD, Egan JF, et al. 2016. Effects of the herbicide dicamba on nontarget plants and pollinator visitation. *Environ Toxicol Chem*. 35(1):144-51