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OPP Docket
Environmental Protection Agency Docket Center (EPA/DC)
Mail Code 28221T
1200 Pennsylvania Avenue NW
Washington, DC 20460-0001

Subject: Glyphosate Proposed Interim Registration Review Decision

The Weed Science Society of America (WSSA) and its affiliates, the Aquatic Plant Management Society, the Northeastern Weed Science Society, the North Central Weed Science Society, the Southern Weed Science Society, and the Western Society of Weed Science represent over 3000 weed scientists from around the world. Members include academic, governmental, and private industry research scientists, university extension professionals, educators, graduate students, and federal, state, county, and private land managers. Our societies appreciate and support the use of credible science in making decisions that impact vegetation management practices across the U.S. We welcome the opportunity to comment on the Environmental Protection Agency's (the EPA or the Agency) *Proposed Interim Review Decision* (PID) for glyphosate acid and its various salt forms. We appreciate the Agency's comprehensive work and transparent process in making the Interim Registration Review Decision.

Glyphosate is a uniquely effective and generally nonselective herbicide with a wide range of uses in both agricultural and nonagricultural settings. It has been widely adopted in conjunction with glyphosate-resistant ('Roundup Ready') crops, and is also commonly used to manage weeds in conservation tillage crop production, resulting in significant soil improvement and savings. Glyphosate is used in orchards and vineyards, aquatic settings, around homes and gardens and helps ensure reliable delivery of electric energy to homes, businesses and countless other consumers. Because of its effectiveness and other desirable characteristics, glyphosate has become the most widely used synthetic herbicide in human history.

We appreciate the rigorous, transparent, and risk-based review process undertaken by the EPA as mandated by the Food Quality Protection Act (FQPA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). These statutes specify that when setting exposure tolerances, any

proposed use of a pesticide should provide a “reasonable certainty of no harm” and that using the pesticide as directed “will not generally cause unreasonable adverse effects” to humans or the environment. FIFRA states that when considering these risks, the EPA must consider “the economic, social, and environmental costs and benefits of the use of any pesticide.” **The EPA review process is substantially broader in scope** than a limited hazard-based assessment.

As reiterated in the Interim Registration Review Decision for glyphosate, the National and Regional Weed Science Societies strongly support EPA’s assessment that glyphosate is “**not likely to be carcinogenic to humans**” and that the EPA “thoroughly assessed risks to humans from exposure to glyphosate from all uses and all routes of exposure and did not identify any risks of concern.”

Spray Drift Management

In order to reduce off-site exposure to non-target organisms, the Agency has proposed the following spray drift mitigation recommendations be included on all glyphosate product labels for products applied by liquid spray application:

- 1) Applicators must not spray during temperature inversions.
- 2) For aerial applications, do not apply when wind speeds exceed 15 mph at the application site. If the wind speed is greater than 10 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor blade diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters.
- 3) For aerial applications, the release height must be no higher than 10 feet from the top of the crop canopy or ground, unless a greater application height is required for pilot safety.
- 4) For ground boom applications, apply with the release height no more than 4 feet above the ground or crop canopy.
- 5) For ground and aerial applications, select nozzle and pressure that deliver "fine" or coarser droplets as indicated in nozzle manufacturers’ catalogues and in accordance with American Society of Agricultural & Biological Engineers Standard 572.1 (ASABE S572.1).

The National and Regional Weed Science Societies agree with the Agency that consistent label changes for all glyphosate products to reduce off-target spray drift is important for minimizing exposure to non-target plants. We agree with the Agency’s proposed language in items 2, 3, and 4 above. We acknowledge that spray release height is an important parameter in reducing physical spray drift, but concern was raised that as release height decreases below 10 feet for aerial applications, the entrainment of spray particles in the wing tip vortices may increase spray drift. Reducing the boom length such that it must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor blade diameter for helicopters would be a potential solution, but more research is needed. Another concern about the 10 foot spray release height came from aquatic applicators who noted that that height is too low for safe helicopter operation in heterogenous application environments such as river or lake riparian areas. However, as noted in EPA’s recommendation, an application height above 10 feet is allowed for pilot safety. For spray drift manamement items 1 and 5 above, we have the following recommendations:

1) Applicators must not spray during temperature inversions.

We concur that applicators must avoid applying glyphosate during temperature inversions. In Appendix B of the glyphosate PID, the Agency proposes the following specific Advisory Spray Drift Management Language:

TEMPERATURE INVERSIONS

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which can cause small droplets to remain suspended in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They can begin to form in late afternoon/early evening and often continue into the morning. Their presence can be indicated by ground fog. If fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Identifying temperature inversions can be difficult and we encourage the Agency to be as descriptive as possible. A label that insufficiently informs the applicator then blames the applicator for malfeasance is not acceptable. One suggestion is to include more informative subheadings such as “*What are Temperature Inversions?*” and “*How to Identify Temperature Inversions*”. In addition to fog and smoke, movement of dust from a road or field could also serve as an indicator of temperature inversions.

5) For ground and aerial applications, select nozzle and pressure that deliver "fine" or coarser droplets as indicated in nozzle manufacturers' catalogues and in accordance with American Society of Agricultural & Biological Engineers Standard 572.1 (ASABE S572.1).

The National and Regional Weed Science Societies recommend that a “**coarse**” droplet size or larger be used as a minimum droplet size for glyphosate applied alone or in tank mixes. Nozzle selection for glyphosate applications should be based primarily on minimizing drift potential as it is widely accepted that glyphosate is more efficacious at larger droplet sizes.^{1, 2, 3}

We also recommend that the Agency references the updated **ASABE S572.2** standard for spray nozzle classification. We agree with the Agency’s proposal to remove references to volumetric mean diameter (VMD) information from glyphosate labels as the VMD of a nozzle can be misleading because it does not indicate the range of droplet sizes produced.

¹ Butts, T., Samples, C., Franca, L., Dodds, D., Reynolds, D., Adams, J., Zollinger, R., Howatt, K., Fritz, B., Hoffmann, C., Luck, J. and Kruger, G. (2019). Droplet Size Impact on Efficacy of a Dicamba-plus-Glyphosate Mixture. *Weed Technology*, 33(1), 66-74. doi:10.1017/wet.2018.118

² Ramsdale, B., Messersmith, C., & Nalewaja, J. (2003). Spray Volume, Formulation, Ammonium Sulfate, and Nozzle Effects on Glyphosate Efficacy. *Weed Technology*, 17(3), 589-598. doi:10.1614/WT02-157

³ Mueller, T., & Womac, A. (1997). Effect of Formulation and Nozzle Type on Droplet Size with Isopropylamine and Trimesium Salts of Glyphosate. *Weed Technology*, 11(4), 639-643. doi:10.1017/S0890037X00043177

Herbicide Resistance Management

Herbicide resistance is an important, costly and escalating issue. The National and Regional Weed Science Societies have a long standing commitment to the principals of weed resistance management as documented in Norsworthy et al. (2012)⁴. It is clear that such principals should be applied to the registration, label, and use of a herbicide of such broad utility as glyphosate. We believe it is critical to implement a variety of carefully integrated weed management strategies so weeds resistant to one herbicide can be controlled in other ways before they have an opportunity to spread. This includes alternative herbicide mechanisms of action (MOAs) as well as nonchemical means of weed control, such as crop rotation, cover crops, tillage, cultivation, hand hoeing, seed capture, etc. Evans et al. 2016 showed that herbicide mixtures utilizing **two or more effective MOAs** applied at the same time were more successful at preventing weed resistance than a rotation of herbicide MOAs where only one herbicide MOA is applied at a time⁵. Long-term weed management will require truly diversified management practices that minimize selection for herbicide resistance traits.

The WSSA has created a variety of free educational materials and recommendations concerning resistance and how to avoid it, available online at <http://wssa.net/wssa/weed/resistance/>. In addition, many of our members have also contributed to the preparation of documents for the “Take Action: Pesticide Resistance Management” website at <https://iwilltakeaction.com/>.

Non-target Organism Advisory Statement

The National and Regional Weed Science Societies agree with the Agency on prioritizing the protection of pollinators and other non-target organisms and supports the Agency’s proposed non-target organism advisory statement:

- *“This product is toxic to plants and may adversely impact the forage and habitat of non-target organisms, including pollinators, in areas adjacent to the treated site. Protect the forage and habitat of non-target organisms by following label directions intended to minimize spray drift.”*

Label Consistency Measures

The National and Regional Weed Science Societies agree with the Agency’s proposal to update the following label components on glyphosate labels to modern standards.

Maximum Application Parameters

Our societies support the EPA’s proposal for maximum labeled rates on current labels to be consistent with the maximum application rates that were assessed by the Agency and supported

⁴ Norsworthy, J. K., Ward, S. M., Shaw, D. R., Llewellyn, R., Nichols, R. L., Webster, T. M., Bradley, K. W., Frisvold, G., Powles, S. B., Burgos, N. R., Witt, W., and Barrett, M. (2012). Reducing the risks of herbicide resistance: best management practices and recommendations. *Weed Science*, 60 (Special Issue 1), 31-62. <https://doi.org/10.1614/WS-D-11-00155.1>

⁵ Evans, J. A., Tranel, P. J., Hager, A. G., Schutte, B., Wu, C., Chatham, L. A., & Davis, A. (2016). Managing the evolution of herbicide resistance. *Pest Management Science*, 72(1), 74-80. <https://doi.org/10.1002/ps.4009>

by the Joint Glyphosate Task Force. When clearly defined on the glyphosate label, this will provide better consistency and clarity to users.

Statements for Aquatic Uses

The National and Regional Weed Science Societies, and specifically the Aquatic Plant Management Society, agree with EPA’s proposal to update the environmental hazards statements for aquatic use products to be consistent with modern standards and to be in line with newer glyphosate labels. We also support the Agency’s proposal for an additional statement under “directions for use” for aquatic use labels to instruct users to apply in strips to help avoid oxygen depletion when emerged weed infestations cover the total surface area of an impounded water body (see table below).

Product Type	Proposed Statement
Environmental hazards: for labels with terrestrial uses only	"Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash waters and rinsate."
Environmental hazards: for labels with aquatic uses only	"Killing aquatic weeds can result in depletion or loss of oxygen in the water due to decomposition of dead plant material. This oxygen loss can cause fish suffocation. Consult with your State agency with primary responsibility for regulating pesticides before applying to public waters to determine if a permit is required. Do not contaminate water when cleaning equipment or disposing of equipment wash waters and rinsate."
Environmental hazards: for labels with both aquatic and terrestrial uses	"Killing aquatic weeds can result in depletion or loss of oxygen in the water due to decomposition of dead plant material. This oxygen loss can cause fish suffocation. Consult with your State agency with primary responsibility for regulating pesticides before applying to public waters to determine if a permit is required. For terrestrial uses, do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark (<i>Optional text, if applicable: except when applying this product by air over the forest canopy</i>). Do not contaminate water when cleaning equipment or disposing of equipment wash waters and rinsate."
Directions for use for aquatic uses	"When emerged weed infestations cover the total surface area of an impounded waterbody, apply this product to the emerged vegetation in strips to help avoid oxygen depletion in the water due to decaying vegetation. Oxygen depletion in the water can result in increased fish mortality."

Clarification on Rotation Crop Timing

The National and Regional Weed Societies applaud EPA’s efforts to clarify rotation crop timing on all glyphosate labels. We agree with the Agency’s proposal that glyphosate treated fields may be rotated to a glyphosate-labeled crop at any time and that for fields being rotated to a nonlabeled crop, any glyphosate application must be made a minimum of 30 days prior to planting.

Label Claims

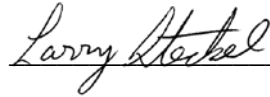
The National and Regional Societies support the Agency’s effort to clarify on existing labels a statement about how glyphosate works. Providing users with consistent labels is imperative in mitigating risks. We suggest adding “*which does not occur in humans or other animals*” to the Agency’s proposed statement so it states:

- "Glyphosate works by targeting an enzyme essential for plant growth **which does not occur in humans or other animals.**"

CONCLUSION

The National and Regional Weed Science Societies appreciate the opportunity to provide comments on the EPA’s *Proposed Interim Review Decision* (PID) for glyphosate acid and its various salt forms. We compliment the Agency on the many positive aspects of the proposal in the effort to mitigate potential risks with glyphosate use while noting its importance in the management of invasive and noxious weeds in agricultural and non-agricultural settings. Scientific literature has clearly shown that the benefits of glyphosate outweigh any potential ecological risks. We agree that improvements to labels that are consistent across all glyphosate products will help to further mitigate these risks. We pledge to continue working with the Agency on proactive spray drift mitigation and herbicide resistance management as well as working towards label consistency and uniformity measures for all herbicides.

Sincerely,



Larry Steckel
President
Weed Science Society of America



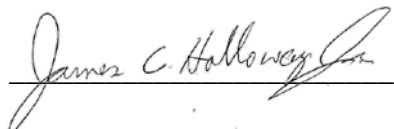
Mark Heilman
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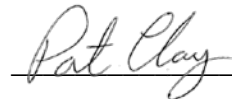
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