



September 23, 2024

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Submitted electronically via Federal eRulemaking Portal

RE: Draft Insecticide Strategy to Reduce Exposure of Federally Listed Endangered and Threatened Species and Designated Critical Habitats from the Use of Conventional Agricultural Insecticides (EPA-HQ-OPP-2024-0299)

The Council of Producers and Distributors of Agrotechnology (CPDA) appreciates the opportunity to provide comments to the agency regarding the draft Insecticide Strategy (IS) as proposed (EPA-HQ-OPP-2024-0299). For more than thirty years, CPDA has been recognized as the premier advocate for formulators, distributors and manufacturers of agrotechnology in the United States. The CPDA community is a nationwide network of basic inert manufacturers, adjuvant formulators, distributors and retailers, including crop protection product marketing companies and affiliates dedicated to addressing regulatory issues and advocating for the industry at the federal and state level. More than 80% of the crop protection products used in the US are distributed by CPDA membership. Members also manufacture 80% of U.S. inert ingredients used in adjuvants and crop protection products.

CPDA supports the protection of wildlife and our environment. We recognize the concerns from the agricultural community, particularly farmers and ranchers, regarding the draft IS. Insect pests are some of the most devastating threats facing agricultural crops. Denying the U.S. agricultural community the ability to meaningfully access and use an array of insecticidal tools that would result from the draft IS, could inflict significant, irreparable harm to the food, fuel, and fiber we produce, our operations, and the consumers we serve, as well as the competitiveness of the US agricultural sector both domestically and on the world stage.

Insecticides are essential for protecting U.S. agricultural operations. Our farms face numerous insect threats, including stinkbugs, psyllids, drosophila, aphids, mites, grubs, lepidopteran, grasshoppers, and beetles, to name a few. Without meaningful access or the ability to use insecticides, these insect pests can quickly destroy an entire crop. Many of these pests can also transmit secondary pests, including bacteria, viruses, or fungal infections, risking further crop damage. We are not only concerned with the draft IS' direct impact on farmers' ability to use tools to control these pests; if producers cannot adequately protect their crops or fields, insect pests can quickly spread throughout an entire region,

placing other crops and producers at risk. Some conservation practices, such as cover crops, which can harbor overwintering insect pests, can also require access to insecticides to maintain. Billions of dollars in potential damage to crops, conservation outcomes, and U.S. agricultural communities hang in the balance, and many farms may not be able to survive losing access to these tools. EPA must consider these potentially devastating impacts when determining the next steps.

No-spray buffer zones have significant impact on the ability of growers to protect their crops and where part of a field is left untreated, not only is the yield reduced, but a safe-haven exists for pest populations which can then rapidly immigrate onto the rest of the field, offering re-infestation following application to the incomplete crop area. A key focus of our response to the IS is in the area of no-spray buffer zones because offering growers a simple tool to follow for avoidance of field loss to buffer zone use is key to success in pest control and yield maintenance. In essence, we believe that decades of prior research and experience support the use of an optimum nozzle and adjuvant combination to reduce buffer zones to zero. This is easily understood by growers because they are already using nozzles and tank mixes in their applications, so such a strategy doesn't require additional hardware, barrier, dose adjustment or application area adjustment considerations which can be complex and variable.

To ensure the protection of endangered and threatened species, the environment and the economic viability of our industry, CPDA offers the following comments and recommendations to the draft Insecticide Strategy.

1. Inclusion of Additional Drift Reduction Adjuvants (DRAs).

CPDA welcomes the inclusion of emulsion modifier Drift Reduction Adjuvants (DRAs) among options to reduce the size of no-spray buffer zones in the strategies.

CPDA holds the view that reducing small droplets which can drift under unfavourable conditions in the wind ("Fines", which are usually considered to be those droplets with diameter below approximately 150 µm, as measured in wind tunnel experiments) is the most widely accessible and understood approach to practical drift management in most pesticide spraying. Atomization of sprays into droplets is affected by the spray equipment hardware involved in spraying (especially the nozzle and its use pressure) and the liquid physical properties. Pesticide applications routinely include adjuvants to improve spray performance. The correct pairing of a good nozzle and Drift Reduction Adjuvant (DRA) is encouraged in the EPA strategy through credit to the combination of both the nozzle and the adjuvant in buffer zone reductions in the range of 40-75% (droplet size category, i.e. nozzle in this context) + 15-30% (adjuvant) for a total reduction of 40-95%.

It is the CPDA view that all effective DRAs, beyond just emulsion modifiers, should be included in the ESA Strategy. In addition to the technical arguments forthcoming, CPDA believes that segregating between types of DRAs adds complexity to grower decisions. Furthermore, growers do not attribute a DRA to a certain type and therefore segregating DRAs in this way will contribute to difficulty in complying with this regulation due to lack of understanding on the part of the end user. Publications in the peer-reviewed and patent literature support the ability of a range of adjuvant chemistries to reduce "Fines" in sprays. These include not only the emulsion modifier types that EPA has included in the ESA Strategy, but also chemistries that increase the extensional viscosity of the tank mix such as many flexible (non-rigid) polymers and gums.

As indicated in appendix C.2 of the Ecological Mitigation Support Document, polymer-based drift reduction adjuvants were not considered as a candidate mitigation method, and therefore not included in the boundary reduction analysis presented in appendix C.3; using as justification for this omission the publication “Atomization of dilute polymer solutions in agricultural spray nozzles” by Mun *et al.* The cited concern was the variation in performance across nozzles measured in this paper.

We ask that this decision be reconsidered, and a buffer reduction analysis be performed for sprays containing polymer (polyacrylamide, guar gum, etc.) based drift reduction adjuvants for ground applications, in addition to emulsion modifiers. We ask that polymers be evaluated based on the merits of the data already submitted voluntarily by CPDA as well as forthcoming data CPDA intends to submit related to herbicides and the forthcoming efforts on insecticide and fungicide mitigation strategies. We believe that this request is justified for the following reasons.

Firstly, the Mun *et al.* paper does show in Figures 9 and 10 that at appropriate polymer use rates, all nozzles considered in their study produce both an increase in volume median diameter, as well as a reduction in the drift-prone sub-105 μm droplets compared to the polymer free measurements¹. This indicates that when used appropriately, polymers should at least be considered as a valid mitigation method for the suppression of drift prone droplets, and therefore a reduction in potential for off target pesticide transport; and therefore merit inclusion as a mitigation method.

Secondly, the nozzles considered in the Mun *et al.* paper included two hollow cone nozzles, and one full cone nozzle. Neither of these classes of nozzle are commonly used in ground applications of pesticides, rather they are more commonly used for air blast applications. As the use of adjuvants as a mitigation method for air blast application was already not considered due to the lack of published studies considering adjuvant with this application method, it does not make sense to base determination on the applicability of polymers for ground application on the variability of performance with airblast applications. Instead, this determination should be based on the analysis of polymer performance with flat fan nozzles (hydraulic, air induction/venturi, and anvil deflection style nozzles) that are commonly used in ground applications, such as those included in the submitted CPDA data sets.

Lastly, the Mun *et al.* paper was published in 1999, and only considered Poly-Ethylene-Oxide (PEO) polymers, which were selected not to be a good model system representative of commercially available polymers drift reduction adjuvants, but rather because it was water soluble, linear, and not surface active. A survey of commercially available drift reduction adjuvants is published in the Compendium of Herbicide Adjuvants shows that the majority of polymer-based drift reduction adjuvants are not based on this chemistry². This is also reflected in the review of Lewis *et al.* which only identified a single commercial drift reducing adjuvant using PEO polymers compared to twenty-two based on polyacrylamides³. Additionally, Mun *et al.* explicitly state in the conclusion that, “Further work needs to be done in quantifying the effect of different types of molecules on the behavior of spray nozzles.”

¹ R. P. Mun, B. W. Young and D. V. Boger, "Atomisation of dilute polymer solutions in agricultural spray nozzles," *Journal of Non-Newtonian Fluid Mechanics*, vol. 83, pp. 162-178.

² B. G. Young, J. L. Matthews and F. Whitford, *Compendium of Herbicide Adjuvants*, Purdue University Extension, 2016.

³ R. W. Lewis, R. A. Evans, N. Malic, K. Saito and N. R. Cameron, "Polymeric Drift Control Adjuvants for Agricultural Spraying," *Macromolecular Chemistry and Physics*, vol. 217, pp. 2223-2242, 2016.

In the 25 years since the Mun *et al.* paper was published, several researchers have performed investigations measuring spray performance of both model polymers as well as commercially available, polymer-based drift reduction adjuvants. Unfortunately, despite PEO being uncommon in commercial drift reduction adjuvants, it continues to be a common choice as a model polymer for academic investigation. Additionally, academic publications tend to focus on model systems, and not characterization of commercial formulations of drift reduction adjuvants. Recently Gaillard *et al.* published a study on the physics of polymers in flat fan agricultural sprays using PEO as the model polymer, and found that “the median droplet size was found to increase linearly with the extensional relaxation time of the polymer solution and to be well captured by a simple empirical expression in terms of non-dimensional Weber and Deborah numbers⁴.” Additionally, this increase in droplet size was found to be the result of an increase in the instability wavelength driving the sheet breakup caused by additional elastic tension in the liquid sheet before breakup caused by the stretching of the polymer molecules, implying that their findings would be applicable to polymers demonstrating similar Weber and Deborah numbers. Hu *et al.* also recently published a study investigating blends of surfactants with PEO polymers as model solutions for flat fan spray nozzles. As Figure 5 in this work shows, a statistically significant increase in droplet diameter was measured for eight of nine combinations measured⁵. Williams *et al.* performed work with polyacrylamide model systems and found that “the presence of the polymers was shown to increase the size of droplets produced in atomization using an agricultural spray nozzle.” This study also performed drift measurements in a purpose-built wind tunnel and found good correlation between measured spray drift and the percentage of droplets less than 150 μm in the spray; this drift was found to decrease with increasing extensional viscosity caused by the addition of the polymer⁶.

As the above studies (and the work of Mun *et al.*) were focused on characterizing the extents of polymer performance, and not developing actual products their findings should be taken only as an indication that when formulated and used appropriately polymer-based adjuvants can be used to increase droplet size and thereby reduce the potential for pesticide drift during spray application. The applicability of commercial formulations of polymer-based drift reduction adjuvants should instead be based on measurements of those formulated adjuvants, which have been optimized to perform under applications conditions with a variety of pesticides and with nozzles commonly used in agricultural practice for ground applications.

Polymer systems, like any DRA, should be evaluated case-by-case to determine their potential for commercially relevant application in the agrochemical space. In fact, over the last 3 decades, guar gum and polyacrylamide polymers of sufficient molecular weight have been extensively used to mitigate pesticide drift. Polymer-based DRAs can reduce Fine droplet content in agricultural sprays. These are important tools for agrochemical applicators. There is much literature to support the use of these

⁴ A. Gaillard, R. Sijs and D. Bonn, "What determines the drop size in sprays of polymer solutions?," *Journal of Non-Newtonian Fluid Mechanics*, vol. 305, 2022.

⁵ P. Hu, R. Zhang, L. Chen, L. Li, Q. Tang, W. Yan and J. Yang, "Effect of polymer adjuvant type and concentration on atomization characteristics of nozzle," *Agriculture*, vol. 404, p. 14, 2024.

⁶ P. A. Williams, R. J. English, R. L. Blanchard, S. A. Rose, L. Lyons and M. Whitehead, "The influence of the extensional viscosity of very low concentrations of high molecular mass water-soluble polymers on atomisation and droplet impact," *Pest Management Science*, vol. 64, pp. 497-504, 2008.

chemistries, both in the patent space and the peer-reviewed space. Below is a summary of pertinent literature with a brief description of the information/conclusions contained in each publication:

Peer-Reviewed Journal Articles

Alves, G. S., Kruger, G. R., & da Cunha, J. P. A. R. (2018). Spray drift and droplet spectrum from dicamba sprayed alone or mixed with adjuvants using air-induction nozzles. *Pesquisa Agropecuaria Brasileira*, 53(6), 693–702.

Dexter, RW, *Atomization and Sprays*, vol. 6, pp. 167-191, 1996 – Comprehensive study on the effect of extensional viscosity of dilute polymer solutions, including discussions on the effect of molecular weight, rigidity, chemical type, and concentration.

Duxenneuner, M.R., P. Fischer, E.J. Windhab, and J.J. Cooper-White. 2008. Extensional properties of hydroxypropyl ether guar gum solutions. *Biomacromol.* 2008:2989-2996. – In-depth study of the effect of guar gum on extensional viscosity of dilute aqueous solutions.

Harrison, G. M., & Boger, D. v. (2000). Well-characterized low viscosity elastic liquids. *Applied Rheology*, 10(4), 166–177. – Study includes data on use of polyacrylamide polymers to reduce Fine droplets.

Jones, E. J., Hanks, J. E., Wills, G. D., & Mack, R. E. (2007). Effect of Two Polysaccharide Adjuvants on Glyphosate Spray Droplet Size and Efficacy. *Weed Technology*, 21(1), 171–174. – Effect of guar-based adjuvants on glyphosate solution spray DSD.

Lan, Y., Hoffmann, W. C., Fritz, B. K., Martin, D. E., & Lopez, J. D. (2008). Spray drift mitigation with spray mix adjuvants. *Applied Engineering in Agriculture*, 24(1), 5–10. – Drift reduction performance of guar and polyacrylamide polymeric DRAs in the presence of an EC-type formulation.

Lewis, R.W., R.A. Evans, N. Malic, K. Saito, and N.R. Cameron. 2016. Polymeric drift control adjuvants for agricultural spraying. *Macromol. Chem. Phys.* 20:2223-2242. – Review covering mechanisms of known polymeric DRA products. Contains list of commercial DRAs that use polymers.

McMullan, P. M. (2000). Utility Adjuvants. *Weed Technology*, 14(4), 792–797. – Contains data showing significant reduction in fines when glyphosate sprayed with guar gum adjuvant.

Patents or Patent Applications

US Patent #5,550,224. 1994. Guar as a drift control agent. Rhodia Operations SAS.

US Patent #5,824,797. 1994. Guar as a deposition and bioefficacy aid. Rhodia Operations SAS.

US Patent #6,288,010. 1999. Compositions comprising anti-drift agents and processes and methods for their use. BASF Performance Products LLC, Xerox Corp.

US Patent #9,332,763. 2012. Aqueous adjuvant concentrates with improved spray drift properties. Lamberti SpA.

US Patent #9,750,243. 2015. Aqueous adjuvant concentrates with improved spray drift properties. Lamberti SpA.

US Patent #11,576,376B2. 2018. Aqueous compositions comprising dicamba and a built-in drift control agent. Speciality Operations France SAS.

US Patent #11,612,164. 2017. Drift reduction adjuvant compositions and methods of using same. Winfield Solutions LLC.

World Patent #WO2023217619A1. 2023. Low drift aqueous liquid formulations for low, medium and high spray volume applications. Bayer Aktiengesellschaft.

For these reasons, we ask that the use of polymer adjuvants be evaluated on their merits based on the already submitted CPDA data as well as the forthcoming data CPDA intends to submit.

Additional DRA data are included below as Appendix 1.

2. The draft Insecticide Strategy is incredibly complex.

Farmers who are trying to comply, will have little confidence that what they are doing or not doing will meet the new restrictions. A 5,000-acre farm could include more than 100 different fields. These farms will need to do a field-by-field analysis to determine the kinds of mitigations they must implement to reduce ESA restrictions. Making the correct, compliant decisions on each and every field is highly unlikely given the complexities. When restrictions from the Herbicide Strategy, the Vulnerable Species Pilot Program and the upcoming Fungicide Strategy are layered upon the IS, there is little chance that growers will have any level of regulatory certainty.

3. There is a lack of technical experts who can assist farmers with compliance.

Related to point 2 is a lack of technical experts that farmers can turn to for questions on compliance. CPDA is unaware of any federal or state agency conducting education and training of people who can provide field level guidance to farmers. While EPA has conducted some outreach, the entire universe of technical experts capable of assisting growers with making a legal application resides within EPA. That has to change.

CPDA notes that USDA's Natural Resource Conservation Service currently lacks an adequate number of Technical Service Providers to implement USDA Conservation Programs. This suggests that finding, training and certifying qualified people to serve all areas of the country will be difficult, if not impossible. Because of this, there will no one farmers can turn to for compliance advice. While EPA can build strategies and restrictions that protect listed species, it will be completely ineffectual if no one knows how to correctly and legally comply.

4. There is no regulatory certainty or "safe harbor."

What's expected of farmers in the draft IS and in the other EPA Strategies is subject to wide interpretation. What a compliant application looks like will almost certainly differ technical expert-by-technical expert, state-by-state and regulatory official-by-regulatory official. Applicators will have little or no confidence that their pest control plans will be legally correct or protective of species.

5. Farmer education, training and outreach should begin now.

In the draft IS, EPA acknowledges the critical need for additional education and outreach. To that end, the draft IS outlines EPA's education and outreach efforts over the past two years and describes EPA's next steps. Included in this is outreach to commodity groups and other users. However, we are unaware of any outreach to farmers – where they live – to explain what the various ESA strategies will require them to do, nor the methods for mitigating local restrictions.

The overall success of the strategies to protect listed species is completely dependent on users understanding what they can and can't do. Given the requirements and the complexities in the various ESA Strategies, getting pesticide users to comply will require significant grower outreach.

As mentioned previously, training and equipping technical experts who can assist growers is a critical need. However, given the current shortage of NRCS TSPs, EPA must be prepared to conduct their own training and outreach to farmers and to start now. At the moment, there appears to be no plan for conducting any grower outreach. Again, given the complexity of the restrictions and mitigation options, this outreach will not be effective via webinar, webpage or pamphlet. Successful outreach must be at the local level where pesticide users live. Therefore, outreach to USDA, the National Association of State Departments of Agriculture and others capable of guiding users through these new requirements must be a critical component.

CPDA also believes agricultural retailer sales agronomists can play a key training role as they are often a farmers most trusted advisor. More importantly, they are already available to growers. We believe EPA should examine certifying these local experts to prepare them to assist growers with compliance. Those efforts should begin now.

6. Implementing the draft IS will be costly for many growers.

The draft IS requires insecticide users to implement runoff and erosion reduction practices to include rate reductions, reduced tillage, cover crops, vegetative filter strips, contour farming, riparian areas, mulching, and water retention systems to attain sufficient points to use most insecticides. Some of these practices could cost growers or landowners hundreds to thousands of dollars per field annually to install and maintain. Because of this, DRAs must play a more prominent role in mitigating restrictions as DRAs will be the easiest and most cost-effective method for reducing drift and run-off.

7. The draft IS is likely to leave significant crop areas untreated and vulnerable to pests and may result in increased pesticide use.

The draft IS would require downwind spray drift buffers as great as 320 feet for aerial application or 230 feet for ground application. While these distances could be reduced by using DRAs, coarser spray droplets, partially treating a field, installing windbreaks, or other mitigations, these significant buffers could leave large crop areas untreated. Untreated crops and edge of field practices may create pest refuges for reinfesting and damaging treated fields, resulting in higher insecticide use.

Appendix 1: Ability of Certified Adjuvants to Reduce No-Spray Buffer Zones by 100% when Paired with Coarser Nozzles

Publications cited by Hewitt (2024)⁷ showed that drift reduction decreases up to 50-80% were possible using adjuvants based on wind tunnel studies in Brazil, Lithuania, the UK, Belgium and Australia and field studies in the US and China.

The EPA Strategy currently gives buffer zone reductions of 40-75% for nozzle use, and an additional 15-30% for adjuvants. That offers a total of 40-95% for Low Boom Fine sprays through all coarser and all boom height applications. CPDA welcomes these generic approaches to drift exposure mitigation but proposes offering 100% buffer zone reduction for the use of low boom Medium (M) through Ultra Coarse (UC) sprays paired with verified drift reduction adjuvants. Candidate adjuvants can for example be tested with a standard approach to droplet size measurement in a wind tunnel or spray chamber, and where the adjuvant reduces the “Fines” by at least 30%.

There are several international standards for testing and classifying drift reduction adjuvant performance⁸.

CPDA has welcomed an analysis of drift reduction adjuvant data owned by BASF to support our positions that a) adjuvants that can reduce the “Fines” and drift potential of sprays include groups other than only emulsion oil types, but also many polymer, gum, lecithin and other chemistry types when droplet size data are measured for performance verification according to established protocols which address requirements for hoods and tank mix in the context of no-spray buffer zones⁹ and b) the relationship between “Fines” volumetric reduction and no-spray buffer zone reduction is in the order of 1%:1.24% which supports a larger increase in no spray buffer zones using adjuvants than the 15-30% proposed in the strategy documents.

The BASF data set in this analysis included over 250 drift reduction adjuvants which were tested in wind tunnels for their effect on droplet size including “Fines”, and the subsequent AGDISP modelled no-spray buffer zone. The following graph shows the relationship between the percent volume of “Fines” with diameter below 150 µm and the AGDISP-calculated no-spray buffer zone reduction from the *no-adjuvant* baseline of 110 feet.

⁷ Hewitt, A.J. (2024). Adjuvant use for the management of pesticide drift, leaching and runoff. Pest Management Science. doi: 10.1002/ps.8255

⁸ International Standards for testing Drift Reduction Adjuvants:

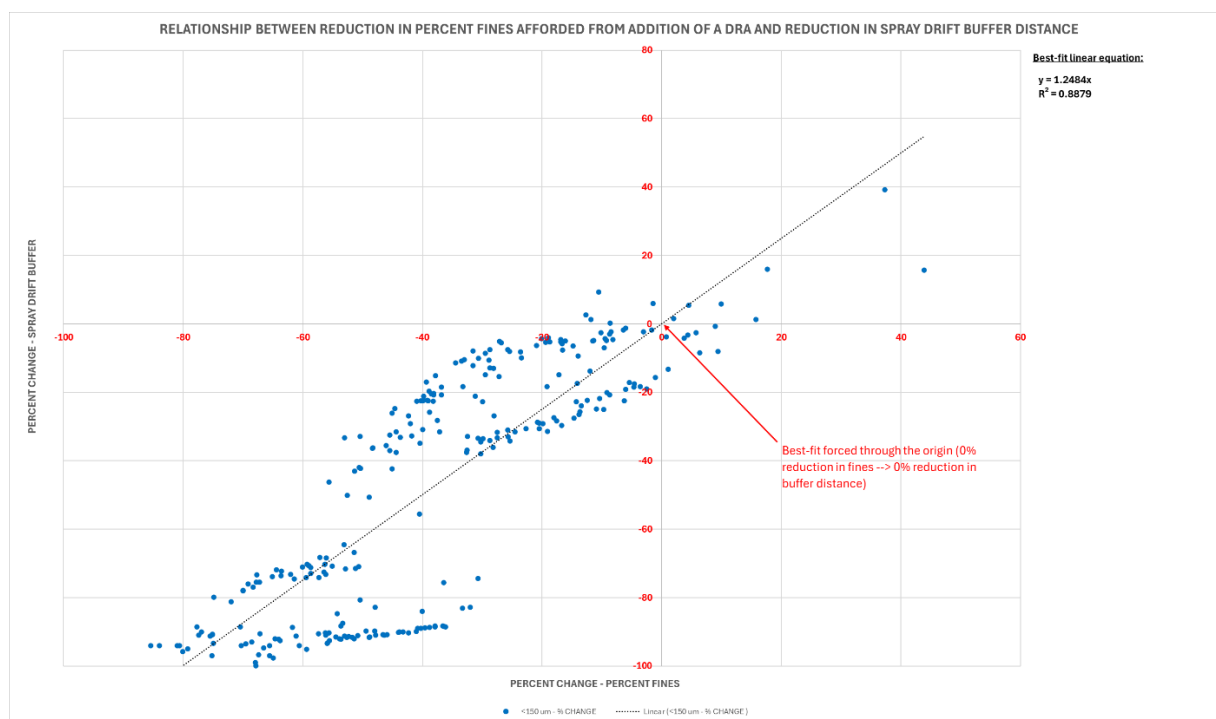
APVMA (2022) Spray Drift Data Guideline. https://www.apvma.gov.au/sites/default/files/publication/28766-spray_drift_data_guideline.docx and

ASTM Standard Test Method E2798 for Characterization Performance of Pesticide Spray Drift Reduction Adjuvants for Ground Application.

In context, droplet size data can be classified into categories based on size using the standard currently used for nozzle catalogues and pesticide labels, as follows:

ASABE (2020) Standard S572.3 Spray Nozzle Classification by Droplet Size Spectra. American Society for Agricultural and Biological Engineers.

⁹ EPA (2020) Registration Notice for Engenia Herbicide. Registration No. 7969-472



A best-fit linear regression forcing the statistical analysis through the origin where 0% reduction in “Fines” gives 0% reduction in buffer zone shows that hundreds of drift reduction adjuvants from oil emulsion and polymer chemistry types can be shown, with droplet size test data, to reduce the no spray buffer zones by on average 1.24% for each 1% reduction in “Fines”.

The EPA strategy buffer zone reductions for all Coarse through Ultra Coarse droplet size classes, and also for low boom Medium sprays can be paired with drift reduction adjuvants that reduce “Fines” by at least 30% to give 100% total buffer zone reduction. The EPA strategy document should reflect this combined best practice of coarser nozzle and effective drift reduction adjuvant offering a cumulative 100% buffer zone reduction by increasing the tabled values for adjuvants to 35% for Medium low boom, and Coarse through Ultra Coarse low and high boom applications. To capture Medium sprays applied with a high boom, this 30% Fines reduction target would increase to 40%.

CPDA also intends submitting data to EPA for the support of adjuvants for the Insecticide and Fungicide strategies in addition to data already submitted that support the use of polymer and guar gums for the reduction of Fines and subsequent off-target movement of pesticides.

In conclusion, we appreciate the opportunity to provide these comments and urge the agency to reconsider its approach in regard to the concerns raised above. Ensuring that farmers have access to critical crop protection tools while protecting the environment is paramount for the long-term sustainability of U.S. agriculture.

Respectfully Submitted,

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