

**Comment of Monsanto Company
Re: Proposed Dicamba Rule Amendment for 2019
Submitted: February 5, 2019**

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I. INTRODUCTION AND OVERVIEW

Monsanto Company (“Monsanto”) supports the Plant Board’s decision to permit in-crop applications of the new low-volatility dicamba herbicides in Arkansas in 2019 and is fully committed to doing its part to ensure that growers have a successful season with these products.

The scientific evidence and decisions of the U.S. Environmental Protection Agency (“EPA”) overwhelmingly support the Plant Board’s decision to permit in-crop use of these products. The scientific evidence and experience in the field conclusively demonstrate that these products can be used safely and effectively when applied according to label directions. After considering all of the available evidence, on October 31, 2018, EPA announced its decision to issue a new superseding federal registration for these products -- XtendiMax[®] with VaporGrip[®] Technology (“XtendiMax”), Engenia, and FeXapan -- for two years.¹ And every other soybean- and cotton-producing state in the nation will continue to permit their in-crop use in 2019.

At the same time, there is no evidence to support the three significant restrictions on the in-crop use of these products that were added to the proposed regulation at the Plant Board’s December 6, 2018 meeting: (1) the 1-mile buffer requirement; (2) the May 20 cut-off date; and (3) the prohibition on all glyphosate tank-mixes. Nor are any of these restrictions consistent with EPA’s assessment, the science, or the regulatory decisions of any other state. Because the Plant Board is statutorily required to regulate based on the best available science, and to be guided by the decisions of EPA, Monsanto respectfully requests that the Plant Board make three changes to the text of the draft regulation:

- (1) eliminate the additional buffer requirements from the proposed regulation and accept EPA’s determination that the 110-foot downwind buffer and prohibition against spraying when sensitive crops are downwind are sufficient;
- (2) accept EPA’s determination that date restrictions are not necessary to avoid off-target movement and eliminate any cut-off date or, in the alternative, at least permit dicamba applications through June 15, as requested by the farmer petitioners and initially approved by the Plant Board; and
- (3) eliminate the prohibition on glyphosate tank mixes that are permitted by EPA.

These requested changes are supported by the best available science, are consistent with the regulatory decisions of EPA and, thus, are required by Arkansas law.

II. THE BEST AVAILABLE SCIENCE AND EPA FINDINGS PROVIDE ROBUST SUPPORT FOR THE PLANT BOARD’S DECISION TO ALLOW IN-CROP USE OF THE NEW LOW-VOLATILITY DICAMBA HERBICIDES IN 2019.

The Plant Board’s decision to permit in-crop applications of the new low-volatility dicamba herbicides in 2019 is overwhelmingly supported by the best available scientific evidence and by growers’ experience with these products in the field. The evidence supporting EPA’s initial

¹ EPA’s initial registration of XtendiMax contained an expiration date of November 9, 2018.

registration decision for these products continues to robustly support allowing their in-crop use, as does additional evidence that has become available since the Plant Board last amended the regulations applicable to these products. Since that time:

- The Plant Board has completed its investigation of the pesticide complaints received in 2017, and found a low-volatility dicamba herbicide implicated in less than 15% of the complaints, and a potentially *properly-applied* low-volatility dicamba herbicide involved in less than 1% of the complaints the Plant Board received in 2017;
- Farmers using the new low-volatility dicamba herbicides have reported excellent weed control, and a University of Arkansas weed scientist has confirmed that the new dicamba herbicides are highly effective in combating hard-to-control weeds that cost farmers millions of dollars in lost yield each year;
- Arkansas yield data for 2017 has become available and it demonstrates that the mild symptomology widely reported in 2017 did not reduce soybean yields (whether or not it was caused by dicamba);
- EPA has approved the registrants' request to make the new low-volatility dicamba herbicides "Restricted Use Pesticides" and imposed new training and record-keeping requirements on applicators;
- EPA also approved label enhancements for 2018 that were designed to further support on-target applications;
- The herbicide registrants have enhanced their training programs to address the most common label compliance issues seen in 2017;
- Reports of possible off-target movement have decreased dramatically, with some states reporting 80% fewer complaints in 2018;
- Several new drift and volatility research studies have been completed that further confirm EPA's earlier determination that volatility is not a major contributor to off-target movement of these products;
- And perhaps most significantly, after careful evaluation of the available science and experience in the field, EPA announced its decision to issue new federal registrations in 2018 for the low-volatility dicamba herbicides until December 20, 2020, with label enhancements for 2019 designed to further promote on-target applications.

Together, these factors confirm that the Plant Board's decision to allow in-crop use of the new dicamba herbicides in Arkansas in 2019 is supported by the best available science, the regulatory determinations of EPA, and the available evidence regarding experience with these products in the field.

A. The Plant Board Found a Low-Volatility Dicamba Herbicide Involved in Less Than 15% of the Pesticide Complaints Received in 2017.

The results of the Plant Board's investigation of the pesticide complaints it received in 2017 fully support the Board's decision to allow in-crop applications of the new low-volatility dicamba herbicides in 2019.² After investigating those complaints, the Plant Board found a low-volatility dicamba herbicide involved in less than 15% of the cases. The Plant Board also found a label or regulatory violation in over 90% of the cases that did involve a low-volatility dicamba herbicide. Overall, only 12 of the more than 1,300 pesticide complaints received in 2017 -- less than 1% of all 2017 pesticide complaints -- were found to involve an application of Engenia that may have complied with both label and regulatory requirements. Those results demonstrate that the new low-volatility dicamba herbicides can be used safely and effectively *when applied according to the label*.

In 2017, the Plant Board received 1,312 pesticide complaints, many of which named dicamba as the suspected pesticide. But as the Plant Board's website explains, "the complaints may name a suspected chemical, but until inspectors are able to get on site and diagnose based on symptomology and collect records, there is no way to make a determination on the chemicals used."³ The Plant Board has since investigated the complaints it received in 2017, and those completed investigations reveal the following:⁴

- Monsanto's low-volatility dicamba herbicide XtendiMax was not involved in any of the 2017 complaints;⁵
- The Plant Board found BASF's new low-volatility dicamba herbicide Engenia was involved in only 193 of the 1312 cases, or less than 15% of all complaints;
- Of the 167 completed Engenia investigations,⁶ the Plant Board found a label or other violation in 155 cases (nearly 93% of the cases involving Engenia).

² In-crop applications of the new low-volatility dicamba herbicides were not permitted in Arkansas in 2018, due to the April 15 cutoff date for applications of dicamba. While the Plant Board has reported receiving approximately 200 pesticide complaints in 2018, information regarding the Plant Board's investigation of those complaints has not been provided and those investigations may not be complete.

³ See <https://www.aad.arkansas.gov/arkansas-dicamba-information-updates> (last visited Feb. 4, 2019)

⁴ Monsanto obtained copies of the Plant Board's 1,276 completed investigation files through a FOIA request.

⁵ Monsanto has never sold XtendiMax in the state of Arkansas, because Plant Board regulations have always prohibited its in-crop use in the State.

⁶ The Plant Board did not complete its investigation in 26 of the cases involving Engenia, leaving 167 completed investigations involving off-target movement of Engenia.

- Only 12 of the 2017 pesticide complaints (or 0.9% of all 2017 pesticide complaints) were found to involve an application of Engenia that may have complied with both label and regulatory requirements.

These results confirm that the new low-volatility dicamba herbicides can be applied safely when label requirements are followed.

B. Farmers and Academics Agree that the New Low-Volatility Dicamba Herbicides Provide an Excellent and Much-Needed Weed Control Option.

The effectiveness of the new low-volatility dicamba herbicides in managing hard-to-control weeds like Palmer amaranth (“pigweed”) also provides important support for the Plant Board’s decision to allow in-crop use of these new dicamba herbicides in 2019. Pigweed is a persistent weed that costs farmers millions of dollars annually by significantly reducing crop yields.⁷ University of Arkansas weed scientists report that pigweed “is considered the most troublesome weed in Arkansas crop production,” and constitutes “a multimillion dollar pest each year.”⁸

The new low-volatility dicamba formulations are extremely effective in controlling pigweed and other troublesome weeds. Over the last two seasons, growers who used XtendiMax have reported 95 percent weed control satisfaction.⁹ And a University of Arkansas weed scientist has confirmed that “the dicamba system in the geography where I spent a lot of my time over the last several years is very effective.... [I]t works.”¹⁰

Thus, use of dicamba herbicides during the growing season has significant potential to curb Arkansas’s weed problems and provides growers with additional options for post-emergence control of Palmer amaranth and other resistant weeds. Without these dicamba herbicides, growers would be left with limited options for chemical control. It is well-established that using one herbicide with a single mode of action produces a “high risk” environment for accelerating weed resistance.¹¹

⁷ See C. Meyer, J. Norsworthy, et al., Herbicide Program Approaches for Managing Glyphosate-Resistant Palmer Amaranth (*Amaranthus palmeri*) and Waterhemp (*Amaranthus tuberculatus* and *Amaranthus rudis*) in Future Soybean-Trait Technologies, *Weed Technology*, 29:716-729, 717 (2015).

⁸ B. Scott and K. Smith, Prevention and Control of Glyphosate Resistant Pigweed in Soybean and Cotton, *Agriculture and Natural Resources*.

⁹ Based on XtendiMax[®] Herbicide with VaporGrip[®] Technology Grower Surveys from August 2017 and September 2018. All growers surveyed were required to have 50+ acres of Roundup Ready 2 Xtend[®] soybeans or cotton with XtendFlex[®] Technology and treat at least some acres with XtendiMax with VaporGrip Technology to participate. Average of 95% is based on results of 97% in 2017 and 93% in 2018.

¹⁰ See Audio Recording of Dec. 6, 2018 Plant Board Mtg. at 26:45-59.

¹¹ See Resistance Risk Assessment, Herbicide Resistance Action Committee, available at <https://hracglobal.com/prevention-management/best-management-practices> (last visited Feb. 1, 2019).

The significant benefit these new herbicides provide to farmers is a critical factor supporting the Plant Board's decision to allow their use in Arkansas in 2019.

C. Yield Data from Arkansas in 2017 Further Supports the Decision to Allow in-Crop Use of the New Dicamba Herbicides in 2019.

Arkansas yield data from 2017 also supports the Plant Board's decision to permit in-crop use of the new dicamba herbicides in 2019.

1. Arkansas Saw Record-High Soybean Yields in 2017, the Only Year in Which In-Crop Use of Dicamba Was Allowed.

While certain opponents of the new dicamba technology have contended that off-target movement from dicamba herbicides produced widespread yield loss in 2017, publicly available yield data demonstrates the opposite. In fact, Arkansas farmers saw record soybean yields in 2017, the only year Arkansas permitted in-crop use of a low-volatility dicamba herbicide.

Overall soybean yield for the State went from 145.7 million bushels in 2016 to 178.5 million bushels in 2017.¹² That 32.8-million-bushel increase reflects a 9.8% increase in bushels per acre over 2016. And those yield increases were not limited to counties with few pesticide complaints. To the contrary, even Mississippi County, Arkansas, the county responsible for more complaints of possible dicamba symptomology in 2017 than any other county, saw significant yield increases in 2017. In 2017, Mississippi County increased its soybean yield by more than 3 million bushels (from 13,345,000 bushels in 2016 to 16,442,000 bushels in 2017) with a 15.9% increase in soybean yields per acre over 2016.¹³

In fact, all ten of the Arkansas counties with the highest number of complaints of possible dicamba symptomology in 2017 saw increases in their soybean yields over 2016. In addition to the increase seen in Mississippi County,

- **Crittenden County** saw an increase in total soybean production from 8,872,000 bushels in 2016 to 12,165,000 bushels in 2017, and also saw a 20.6% increase in soybean yield per acre;
- **Craighead County** increased its total soybean production from 5,136,000 bushels in 2016 to 6,147,000 bushels in 2017, and also saw an 8.9% increase in bushels per acre;
- **Poinsett County** increased its total production from 9,153,000 bushels in 2016 to 11,240,000 in 2017, and had an 8.2% increase in soybean yield per acre;
- **Saint Francis County** and **Lee County** both increased their total soybean production in 2017 by more than 1 million bushels over 2016, and both also saw an 11.5% increase in soybean yield per acre in 2017;

¹² See Exhibit A, United States Department of Agriculture, National Agricultural Statistics Service, Delta Regional Office: Arkansas (available at <http://www.nass.usda.gov/ar/>).

¹³ See *id.*

- **Phillips County** increased its total soybean production by more than 2 million bushels in 2017 (from 10,325,000 bushels in 2016 to 12,340,000 bushels in 2017), and saw an 8.2% increase in bushels per acre;
- **Cross County** increased its total soybean production by more than 1 million bushels and saw a 7.1% increase in soybean yield per acre in 2017;
- **Monroe County** increased its total soybean production by more than 1 million bushels and saw a 9.2% increase in yield per acre; and
- **Clay County** increased its total soybean production by more than 1.5 million bushels and saw a 17.1% increase in soybean yield per acre in 2017.¹⁴

These results demonstrate that the symptomology reported in 2017, regardless of the cause, generally had no adverse impact on Arkansas soybean yields.

2. Arkansas Honey Production Hit a Ten-Year High in 2017.

Newly available data on honey production in Arkansas in 2017 also supports the Plant Board’s decision to permit in-crop use of the new dicamba herbicides in 2019. That data refutes claims that these herbicides are adversely affecting pollinators, such as honey bees, in the State.

According to the University of Arkansas’s Division of Agriculture, “Arkansas honey production leapt by 35 percent in 2017, reaching about 2.2 million lbs., a figure not seen in the state in at least a decade.”¹⁵ That increase exceeds the increase in the overall number of bee colonies in Arkansas, which increased only 21 percent in 2017. This yield data contradicts claims that the use of low-volatility dicamba herbicides in 2017 adversely affected pollinators in the State.

Claims that the new dicamba herbicides are adversely impacting pollinators are also not supported by science and are inconsistent with the findings of EPA. Regulatory authorities, including the EPA, conduct comprehensive evaluations to ensure pesticides can be used in a manner that is safe for the environment. As part of this process, they specifically evaluate the potential for effects on non-target organisms, including honey bees. EPA recently confirmed, in relation to its continued registration of dicamba for use on dicamba-tolerant crops that it expects dicamba to have no adverse impacts on bees and other pollinators. Specifically, EPA stated:

Conservative, screening-level risk assessments have determined that this use of dicamba on dicamba-tolerant cotton and soybean, when used according to label directions, does not exceed EPA’s level of concern for pollinators, including bees. *Therefore, we expect there will be no adverse impacts to bees or other pollinators.*¹⁶

¹⁴ See *id.*

¹⁵ See Exhibit B (March 30, 2018 University of Arkansas, Division of Agriculture report, *Arkansas Honey Production Jumps 35 Percent in One Year*).

¹⁶ See Exhibit C (EPA, Registration of Dicamba for Use on Dicamba-Tolerant Crops, Q&A, available at <https://www.epa.gov/ingredients-used-pesticide-products/registration-dicamba-use-dicamba-tolerant-crops#q5>) (emphasis added).

Those conclusions follow EPA's expansion of its risk assessment process for pollinators.¹⁷ In short, claims that the new dicamba herbicides are harming pollinators in Arkansas is contradicted by the 2017 Arkansas honey production data, is inconsistent with the applicable science, and cannot be reconciled with the expert analysis provided by EPA. Thus, those claims do not support restrictions on use of the new dicamba herbicides.

D. EPA Agreed to Make XtendiMax a Restricted Use Pesticide and Approved Enhancements to the Federal Label for 2018.

The enhancements made to the federal label after the 2017 growing season also support the Board's decision to allow in-crop use of the new low-volatility dicamba herbicides in 2019. Following the 2017 growing season, Monsanto requested that EPA make two changes to the registration of XtendiMax to promote label compliance and further assist farmers in making on-target applications in 2018: (a) designate XtendiMax a "restricted use pesticide;" and (b) amplify certain label requirements. EPA approved both requests. As a result, the following changes were implemented for the 2018 growing season:

- XtendiMax could be applied only by certified applicators or those working under their supervision;
- XtendiMax applicators were subject to recordkeeping requirements that allowed EPA and state regulators to better track when and where the new dicamba products were sprayed and under what conditions;
- XtendiMax applicators were required to complete dicamba or auxin-specific applicator training;
- XtendiMax could be applied only if wind speeds were between 3 and 10 miles per hour, reduced from a maximum of 15 miles per hour;
- XtendiMax could not be applied between sunset and sunrise, preventing applications when temperature inversions that increase the risk of off-site movement are more likely to occur;
- XtendiMax applicators received additional guidance about proper tank hygiene to prevent contamination; and
- XtendiMax applicators were required to identify and record the presence of sensitive crops near the application site to increase awareness of the risk to these crops.

In addition to these registration and label enhancements, in 2018 Monsanto also:

¹⁷ See Exhibit D (EPA, How We Assess Risks to Pollinators, available at <https://www.epa.gov/pollinator-protection/how-we-assess-risks-pollinators#data>) (last visited Jan. 28, 2019).

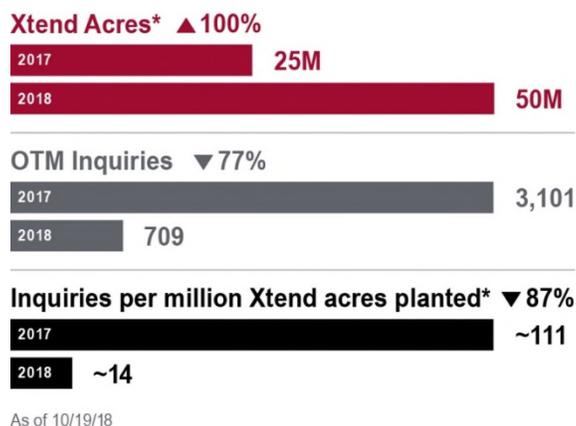
- Adjusted its training programs to address the most common misapplication issues reported in 2017 -- inadequate or incorrect buffers and improper tank mixes;
- Distributed label-compliant spray nozzles at no cost to farmers;
- Established a 1-844 technical support call center to help applicators easily access information on best practices and application requirements; and
- Developed a Spray App to help applicators avoid problematic weather conditions and achieve on-target applications.

The enhanced training, technical support call center, and new Spray App will all remain in place for 2019 and further support the Plant Board’s decision to permit in-crop applications of the new low-volatility dicamba herbicides in 2019.

E. Reports of Possible Off-Target Movement Decreased in 2018.

The significant reductions in the number of pesticide complaints received in 2018 also fully support the Board’s decision to allow in-crop applications of the new low-volatility dicamba herbicides in 2019. These reductions indicate that applicators are now having even greater success making on-target applications of these products. Reports made to Monsanto of possible off-target applications during the 2018 growing season decreased significantly as compared to 2017. The number of inquiries decreased from approximately 111 inquiries per million acres of Xtend crops planted in 2017 to 14 inquiries per million acres in 2018 -- an 87% reduction.¹⁸

Figure 1: Comparison of off-target movement inquiries by acres (2018 versus 2017)



According to EPA, reports of possible off-target movement made to state agencies also declined significantly in 2018. EPA reported that “[i]n 2017, over 2,700 official cases of crop damage

¹⁸ Acreage includes Roundup Ready 2 Xtend[®] soybeans and cotton with XtendFlex[®] Technology.

were reported to state departments of agriculture,”¹⁹ while “approximately 1,400 official complaints have been reported to state agencies” in 2018.²⁰ Those declines are even more striking given that the total number of Xtend acres planted in 2018 was nearly double the number planted in 2017. Individual states also reported dramatic decreases in the number of complaints received in 2018. Minnesota, for example, reported that it received 253 complaints of possible off-target movement in 2017, but only 53 in 2018 -- almost an 80% decrease.²¹

F. Several New Studies Were Completed in 2017 and 2018 that Provide Further Support for the Plant Board’s Decision to Allow In-Crop Use of the New Dicamba Herbicides in 2019.

The results of several new studies completed in 2017 and 2018 also support the Plant Board’s decision to allow in-crop applications of XtendiMax in 2019. All of these studies were considered by EPA and are discussed in its 2018 registration decision documents.²²

1. New Monsanto Studies

Since the initial registration of XtendiMax in November 2016, and for EPA’s fall 2018 registration decision, Monsanto conducted a total of five additional field volatility studies. These studies utilized the XtendiMax tank mix that is most commonly used by growers -- XtendiMax plus Roundup PowerMax[®] (a glyphosate potassium salt), and a drift reduction adjuvant.²³ These field studies mimic many “real world” commercial applications and capture the full range of potential conditions considered potential causes of volatility. These studies were conducted in Texas, Australia, Arizona, Missouri, and Nebraska.

The results of these studies confirm the results from the volatility studies EPA previously assessed in making its initial registration decision, and confirm that those earlier studies are representative of applications in a variety of other conditions and geographies. These and earlier volatility studies rebut any suggestion that the application of XtendiMax over particularly acidic soils (with pH levels between 5 and 6) can cause unanticipated volatility at levels greater than those previously determined in EPA’s regulatory analysis. Monsanto submitted all of these

¹⁹ See Exhibit E at 5 (Oct. 31, 2018, EPA, Registration Decision for the Continuation of Uses of Dicamba on Dicamba Tolerant Cotton and Soybean); and Exhibit G (EPA October 31, 2018 Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

²⁰ See *id.* at 10.

²¹ See Exhibit F (Minnesota announces dicamba use restriction, <https://www.leadertelegram.com/country-today/farm/farm-news/minnesota-announces-dicamba-use-restriction/article>) (last visited Jan. 28, 2019).

²² See Exhibit G (EPA October 31, 2018 Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

²³ A drift reduction agent such as Intact[™] is required by the XtendiMax label for application of XtendiMax-glyphosate tank mixes.

studies to EPA for its 2018 registration decision. They are described more fully in Exhibit H at 3-12 (Monsanto's Aug. 3, 2018 submission to EPA, The Scientific Basis for Understanding the Off-Target Movement Potential of XtendiMax).²⁴

Mass loss data from the recent field studies also confirm previously-submitted studies. For each field study, Monsanto calculated the mass of dicamba estimated to be volatilized during the duration of each study to understand the potential amount of dicamba that could be transported off-target. The calculated mass loss was consistent across all field studies described, regardless of geography, climate, or other application conditions and confirmed that only a small amount of dicamba is available to move off target due to volatility. These results further confirm EPA's previous risk assessment conclusions that volatility is a minor component of off-target movement and that the downwind buffer is sufficient to protect against potential effects due to volatility. They also confirm that mass loss does not increase significantly even over a larger application area (100 acres). The mass loss data from these recent field studies are detailed in Exhibit H at 12-13 (Monsanto's Aug. 3, 2018 submission to EPA, The Scientific Basis for Understanding the Off-Target Movement Potential of XtendiMax).

In 2017 and 2018, Monsanto also conducted new PERFUM and AERMOD modeling to supplement the modeling previously performed in 2015. The recent studies used the peak flux data from the post-registration Australia, Texas, and Arizona XtendiMax tank-mix field trials to calculate air concentration and deposition in the same three locations previously modeled (Raleigh, North Carolina; Lubbock, Texas; and Peoria, Illinois). The results of the new deposition and air concentration modeling further demonstrate that, across a wide range of weather conditions and geographies, the commercial-scale application of XtendiMax will not result in air concentrations that will impact plant height outside the treated field. Those studies are also summarized in Exhibit H at 15-20 (Monsanto's Aug. 3, 2018 submission to EPA, The Scientific Basis for Understanding the Off-Target Movement Potential of XtendiMax).

Following the 2016 registration, Monsanto also conducted an additional spray-drift field study in Arizona. This field study following Good Laboratory Practices (GLP) was conducted to measure off-target movement and plant effects to non-dicamba tolerant soybeans under extreme weather conditions (daytime air temperatures greater than 100° F and low relative humidity) and over large acreage representative of commercial applications. The results showed with a larger application area and extreme environmental conditions, volatility was not greater than previously observed and reported in other GLP field volatility studies. The study also showed: (1) "[r]elated to primary or physical drift at the time of application, visual symptomology downwind in the un-tarped area at 28 DAT [days after treatment] ranged from 30% at 5m from the treated area to 5% at 30m;" and (2) "[r]elated to secondary movement after application, including volatility, limited to no symptomology was observed under the tarped areas."²⁵ The study supports the conclusion that "[v]olatility is not a significant contributor to off-target movement

²⁴ See also Exhibit I (May 2018 Research Update: Australia Field Trial, Large-Scale Field Trial of XtendiMax with VaporGrip Technology Confirms Volatility is Not a Major Factor in Dicamba Off-Target Movement).

²⁵ See Exhibit J at 8 (L. Schuler, XtendiMax[®] with VaporGrip[®] Technology Arizona Field Trial Results).

as indicated by lack of observed visual symptomology in plants located under tarps. Observed downwind symptomology was primarily a result of exposure via spray drift, which did not result in significant plant height reductions.”²⁶ These results confirm EPA’s 2016 determination that no spray drift would occur outside the 110-ft. buffer area in amounts that could have an effect on plant height.

2. New Studies by Outside Researchers in 2017

In 2017, several new studies were conducted by outside researchers in various key soybean-producing states, including Arkansas, Tennessee and Indiana. Those studies confirm that visual symptomology would not occur more than 110 feet downwind of the application area at levels that would impact soybean yield.

A 2017 large scale study of primary and secondary drift conducted in Indiana by Professor Bryan Young of Purdue University found that the maximum distance to 5% visual symptomology was 110 feet from the application area 14 days after treatment, and 101 feet 24 days after treatment. Along the transects on the field, 5% visual symptomology ranged from 70 to 92 feet 14 days after treatment, and 24 to 58 feet 28 days after treatment.²⁷ The results of the study confirm that no impact on yield would occur at distances greater than 110 feet downwind from the application area, and there was no indication of drift upwind.²⁸

A 2017 study by Professor Larry Steckel of the University of Tennessee evaluated primary and secondary movement of a tank-mix of XtendiMax, PowerMax, and Intact (a DRA) on dicamba-sensitive soybeans in Sharon, Tennessee. The study showed that primary and secondary movement of dicamba from the study tank mix together caused less than 5% visual symptomology at 90 feet from the application area both 13 and 22 days after treatment. Again, there was no indication of upwind movement of dicamba following application.²⁹ The results from the study confirm that no impact on yield would occur at distances greater than 110 feet from the application area.

A 2017 large-scale study of primary and secondary drift was also conducted by Dr. Jason Norsworthy of the University of Arkansas. Unlike other researchers, Dr. Norsworthy reported 10% visual symptomology from primary and secondary drift combined at 160 feet from the treated area, and 5% visual symptomology at 220 feet from the treated area, 12 days after application. He also reported 5% plant height effects out to 55 m or 180 feet. But Dr. Norsworthy’s study is an outlier. As EPA recently explained:

²⁶ *See id.*

²⁷ The 5% visual symptomology standard is used to represent the furthest distances at which dicamba symptomology can be observed. Visual symptomology is not a relevant risk assessment apical endpoint such as survival, growth or reproduction. And visual symptomology at such low levels is not associated with yield reductions. *See* <https://www.missouriruralist.com/herbicide/does-dicamba-drift-cause-soybean-yield-loss>.

²⁸ *See* Exhibit K at 4-6 (Sept. 19, 2018 Monsanto submission to EPA, Summary of Confirmatory Spray Drift and Volatility Studies for XtendiMax Applications).

²⁹ *See id.* at 6-7.

The only study reporting 5% plant height effects from primary and secondary drift beyond 33.5 m is the Norsworthy 2017 study, which had a transect reporting plant height impacts out to 55 m. However, the average distance for this study was 24 m.³⁰

Because buckets can cause stress to soybean plants due to excessive heat buildup, the measurements of secondary movement in Dr. Norsworthy's study are likely exaggerated. Additionally, like the other researchers, Dr. Norsworthy reported no visual symptomology upwind.³¹

3. New Studies by Outside Researchers in 2018

Multiple outside research studies funded by unrestricted Monsanto grants were also conducted by academic researchers in 2018. Those studies were designed to test off-target movement via physical drift and volatility when a tank-mix of XtendiMax, PowerMax, and Intact was applied to large areas. These studies were conducted by the following academic researchers:³²

- Greg Kruger, University of Nebraska-Lincoln
- Bryan Young, Purdue University
- Christy Sprague, Michigan State University
- Rodrigo Werle, University of Wisconsin
- Jason Norsworthy, University of Arkansas

These researchers reported the following average distance from the treated area to 10% visual injury: Werle (15 m); Young (14 m); Sprague (16 m); Kruger (>15 m); and Norsworthy (34-136 m).³³ In short, with the exception of Dr. Norsworthy, all research results from the 2018 academic studies confirmed that 10% visual symptomology would not occur at distances greater than 55 feet beyond the treated area. Dr. Norsworthy's observation of 10% visual symptomology at 446 feet beyond the treated area is an outlier.

EPA considered the results of all of these studies in making its 2018 registration decision, in which it decided to continue with the 110-ft. downwind buffer requirement, and added an

³⁰ See Exhibit G at 45 (EPA, Oct. 31, 2018, Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean”).

³¹ See Exhibit K at 7-9 (Sept. 19, 2018 Monsanto submission to EPA, Summary of Confirmatory Spray Drift and Volatility Studies for XtendiMax Applications).

³² Two other academics (Dan Reynolds of Mississippi State University and Peter Sikema from University of Guelph, Canada) conducted similar studies, but their results were not available due to problems completing the studies.

³³ See Exhibit G at Appendix B.2, pages 86-87 (EPA, Oct. 31, 2018, Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

additional 57-ft. buffer on other sides of the field only in counties where endangered species might be present.³⁴ These studies and EPA’s decision provide broad support for the Plant Board’s decision to permit in-crop application of the new low-volatility dicamba herbicides in 2019.

G. EPA Recently Evaluated All of This New Information and Decided to Issue New Federal Registrations for these Products until December 20, 2020.

As noted above, EPA’s recent decision to issue new federal registrations for these products through December 2020 also provides strong support for the Board’s decision to allow their in-crop use in Arkansas in 2019. On October 31, 2018, EPA announced its decision to issue new federal registrations for the low-volatility dicamba herbicides, with additional label enhancements to further reduce the risk of off-target applications. According to EPA, “[t]his action was informed by input from and extensive collaboration between EPA, state regulators, farmers, academic researchers, pesticide manufacturers, and other stakeholders.”³⁵ In issuing its new decision, EPA explained:

The following label changes were made to ensure that these products can continue to be used effectively while addressing potential concerns to surrounding crops and plants:

- Only certified applicators may apply dicamba over the top (those working under the supervision of a certified applicator may no longer make applications)
- Prohibit over-the-top application of dicamba on soybeans 45 days after planting and cotton 60 days after planting
- For cotton, limit the number of over-the-top applications from 4 to 2 (soybeans remain at 2 OTT applications)
- Applications will be allowed only from 1 hour after sunrise to 2 hours before sunset
- In counties where endangered species may exist, the downwind buffer will remain at 110 feet and there will be a **new 57-foot buffer** around the other sides of the field (the 110-foot downwind buffer applies to all applications, not just in counties where endangered species may exist)
- Clarify training period for 2019 and beyond, ensuring consistency across all three products³⁶
- Enhanced tank clean out instructions for the entire system

³⁴ See *id.* at Appendix B, pages 82-87.

³⁵ See Exhibit L (Oct. 31, 2018 EPA News Release, EPA Announces Changes to Dicamba Registration).

³⁶ Specifically, EPA clarified that applicators must be trained annually.

- Enhanced label to improve applicator awareness on the impact of low pH's on the potential volatility of dicamba
- Label clean up and consistency to improve compliance and enforceability³⁷

EPA's recent decision to issue new registrations for these products clearly supports the Plant Board's decision to permit their in-crop use in Arkansas in 2019.

III. THE PLANT BOARD SHOULD ELIMINATE THE PROPOSED BUFFER, DATE AND TANK-MIX RESTRICTIONS FROM THE DRAFT REGULATION.

The Plant Board should eliminate the proposed buffer, date, and tank-mix restrictions that were added to the draft regulation during the Plant Board's December 6, 2018 meeting. Including these restrictions in the final regulation would violate Arkansas law, because they are not supported by the best available science, and they conflict with determinations made by EPA. Arkansas law requires the Plant Board to regulate based on the best available science³⁸ and to be guided by the decisions of EPA.³⁹ The buffer, date and tank-mix restrictions included in the current draft of the regulation do not meet either requirement.

A. Neither Science Nor EPA's Assessment Supports the 1-Mile Buffer Requirement.

The Plant Board's proposed dicamba regulation for 2019 would require applicators to maintain a 1-mile (or 5,280 feet) omnidirectional buffer around: (1) University and USDA research stations; (2) organic crops; (3) non-dicamba tolerant crops; (4) sensitive crops and areas as defined by the Engenia label; and (5) commercially grown specialty crops. The 1-mile buffer requirement should be eliminated from the draft regulation because it is not supported by science, or the determinations of EPA. There is no scientific study in the administrative record -- or anywhere else for that matter -- that supports the need for a 1-mile buffer around applications of the new low-volatility dicamba herbicides. And EPA has determined that such extensive buffers are unnecessary. As a result, imposition of a 1-mile buffer requirement would violate

³⁷ *See id.*

³⁸ The Arkansas Administrative Procedures Act provides: "An agency shall not adopt, amend, or repeal a rule unless the rule is based on the best reasonably obtainable scientific, technical, economic, or other evidence and information available concerning the need for, consequences of, and alternatives to the rule." Ark. Code Ann. § 25-15-204(b)(1).

³⁹ Arkansas law requires the Plant Board to be guided by the findings of EPA in regulating pesticides within the State. The section of the Arkansas Pesticide Control Act entitled "Powers of State Plant Board" specifically directs that, in determining whether a pesticide is injurious to the environment, the Plant Board "shall be guided by the United States Environmental Protection Agency regulations." Ark. Code Ann. § 2-16-406(a)(3). Similarly, in the Arkansas Pesticide Use and Application Act, the Arkansas legislature specifically directed that "[i]n issuing regulations, the board shall give consideration to pertinent research findings and recommendations of ... the federal government" Ark. Code Ann. § 20-20-206(a)(2).

Arkansas law. *See* Ark. Code Ann. § 25-15-204(b)(1); Ark. Code Ann. § 2-16-406(a)(3). The 1-mile buffer requirement should be eliminated from the draft regulation.

1. The 1-mile Buffer Requirement Is Inconsistent with EPA’s Regulatory Decisions.

The Plant Board’s proposed 1-mile (**5280-foot**) buffer requirement is almost 50 times greater than the buffer required by EPA for protection of endangered species. The new 2019 label EPA approved for XtendiMax prohibits applications of XtendiMax when sensitive crops are downwind, and requires applicators to maintain a **110-foot** unidirectional (downwind) buffer, and an additional **57-foot** buffer on all other sides of a field in counties where endangered species may exist. After looking at the available scientific data, EPA concluded that a 110-foot downwind buffer was sufficient to prevent plant height effects, when coupled with an instruction not to spray when the wind is blowing toward adjacent non-dicamba-tolerant crops.

The science overwhelmingly supports EPA’s determinations. EPA took into consideration a robust data set that included company-led GLP field trials, which require the highest level of rigor and standards to ensure data is sound and of high quality, as well as academic-led drift and volatility field trials. This data was extensively reviewed by EPA prior to issuing its new registration for XtendiMax and was utilized as the basis for the label requirements.

In its decision document, EPA confirmed its earlier conclusion that the new dicamba herbicides have “significantly lower volatility” than the other, older dicamba formulations:

Some pesticide products containing earlier formulations of dicamba have been known to be volatile (e.g., losing nearly half of the applied material due to volatility (Burnside et al., 1966)). Newer formulations of dicamba, such as the products being addressed in this decision approved for OTT uses, show significantly lower volatility.⁴⁰

After reviewing all of the available data and results from field trials, EPA determined: “Based on the majority of the studies, the 110 ft (33.5 m) in-field, unidirectional buffer appears to be sufficient to protect off-site plants from reductions in plant height due to primary drift.”⁴¹

2. There Is No Scientific Support for the 1-mile Buffer Requirement.

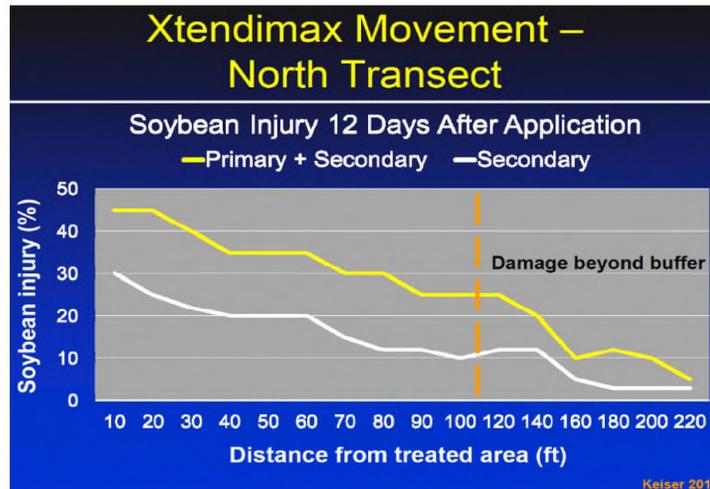
The 1-mile buffer requirement currently included in the draft regulation is not only inconsistent with EPA’s considered regulatory decisions, but it also lacks any scientific support. The 1-mile buffer requirement was added to the draft regulation by amendment late in the regulatory process, based on a presentation made at the Plant Board’s December 6, 2018 meeting. At that meeting, Dr. Jason Norsworthy suggested to the Plant Board that the new low-volatility dicamba

⁴⁰ *See* Exhibit E at 10 (Oct. 31, 2018, EPA, Registration Decision for the Continuation of Uses of Dicamba on Dicamba Tolerant Cotton and Soybean).

⁴¹ *See* Exhibit G at 45 (Oct. 31, 2018, EPA, Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

herbicides will move a mile or more off-target.⁴² But no scientific data supports that claim. In fact, even Dr. Norsworthy’s own studies demonstrate that the new low-volatility dicamba herbicides do not move anywhere near a mile or more off-target. In his 2017 study, visual symptomology dropped significantly after 110-120 feet, as shown in Figure 2 below, and after that point fell well below 20%. Even for soybeans, the plant most sensitive to dicamba, less than 40% visual symptomology from dicamba exposure generally does not result in any significant yield impact.⁴³

Figure 2: Dr. Norsworthy’s Slide Depicting Off-Target Movement Results from his 2017 Study



Dr. Norsworthy’s 2018 study similarly fails to support the claim that the new low-volatility dicamba herbicides may move a mile or more off-target. EPA examined Dr. Norsworthy’s study and found that it deviated from established protocol in several critical ways.⁴⁴ For example, EPA deemed the study’s finding that 40% visual injury extended to approximately 750 feet for the fields’ North Transect too unreliable to even evaluate because flood irrigation was employed seven to ten days after the dicamba application.⁴⁵ In addition, EPA pointed out that the tank-mix used, which included the product Warrant (a microencapsulation of acetochlor), was held for eight days prior to application. As a result, according to EPA, “the study might have been compromised because there is significant uncertainty as to whether the products were not properly mixed or could have degraded, potentially increasing the volatility of the tank-mix, especially given that the Warrant label explicitly states that ‘Applications made using spray

⁴² See Audio Recording of Dec. 6, 2018 Plant Board Mtg. at 1:43:22-34 (Dr. Norsworthy stating: “How far will it move is really a function of how many acres we spray One thing is for certain, we frequently see it beyond a mile.”); *id.* at 1:45:05-10 (Dr. Norsworthy stating: “Injury of soybean was routinely observed in excess of 2 miles from Xtend fields”).

⁴³ See <https://www.missouriruralist.com/herbicide/does-dicamba-drift-cause-soybean-yield-loss>.

⁴⁴ See Exhibit G at 26 (EPA October 31, 2018 Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean including Updated Effects Determination for Federally Listed Threatened and Endangered Species).

⁴⁵ *Id.* at 132.

solutions of this product which have been allowed to stand or have been stored in application equipment or the mix tank for an extended period of time *could result in crop injury*.”⁴⁶ Putting aside these significant issues with the study, there was no indication of visual injury at distances remotely approaching one mile.

The results of this study do not and cannot support the imposition of a 1-mile buffer requirement. To support a 1-mile buffer, the Plant Board would need research demonstrating plant effects some 5,280 feet (or 1,610 meters) from the application site. No such data exists. Imposition of the proposed 1-mile omnidirectional buffer therefore would violate Arkansas law’s requirement that the Plant Board regulated based on the best available science, because there is no science whatsoever to support it. The proposed 1-mile buffer should be stricken from the draft regulation.

B. Neither Science, Nor EPA’s Assessment, Nor the Plant Board’s Investigation of the 2017 Complaints Supports the May 20 Cut-off Date.

In their October 15, 2018 Petition for Rulemaking, the farmer petitioners requested “[t]he implementation of a June 15th cutoff date for the use of dicamba products, with further consideration for geography.”⁴⁷ The Plant Board approved the Petition to initiate rulemaking on that request, but later revised the proposed cut-off date (by nearly an entire month) to May 20. Depending on the weather in Arkansas in 2019, a May 20 cutoff date could effectively prohibit any in-crop applications of the new dicamba herbicides in at least some parts of the state in 2019.

The Plant Board should eliminate the May 20 cutoff date currently included in the draft regulation because it is not supported by science, the regulatory decisions of EPA, or the Plant Board’s investigations of the complaints it received during the 2017 season. Thus, the imposition of a May 20 cutoff date would violate Arkansas law and should be eliminated from the draft regulation.

1. Depending on Weather, a May 20 Cut-Off Date Might Effectively Ban In-Crop Applications for Some Arkansas Growers in 2019.

The proposed May 20 cut-off date could provide growers with an unreasonably small window in which to apply the new dicamba herbicides and, depending on weather conditions, could result in yet another year in which in-crop applications of the new herbicides are off limits for at least some Arkansas farmers.

The University of Arkansas has reported that the average date of soybean planting in the State in 2018 was May 7, and that the average date of emergence was May 14.⁴⁸ If those averages hold in 2019, the average Arkansas soybean producer would have *only six days* in which to make in-crop applications of the new dicamba herbicides. If planting and emergence are delayed only a

⁴⁶ *Id.* at 26.

⁴⁷ See Exhibit M at 2 (October 15, 2018 Fogleman Petition) .

⁴⁸ See Exhibit N (2019 Arkansas Soybean Quick Facts, University of Arkansas, Division of Agriculture, Research & Extension).

week in 2019, the proposed regulation could constitute a complete ban on the in-crop use of these new herbicides for at least some growers who again would be unable to use the new weed control technology available to growers in other states.

2. EPA Has Determined that Existing Science Does Not Support Imposition of a Cutoff Date to Prevent Off-Target Movement.

The May 20 cut-off date is not supported by the EPA assessment. The new XtendiMax label approved by EPA for 2019 includes no date restrictions designed to reduce or prevent off-target movement. Instead, the new label permits over-the-top applications of XtendiMax for 59 days after planting for cotton and 44 days after planting for soybeans. According to EPA, these time limitations are primarily to reduce the development of dicamba-resistant weeds.⁴⁹ Based on a soybean planting date of May 7 (the average in Arkansas in 2018), EPA's decision would permit over-the-top applications of XtendiMax through June 21. Thus, the regulatory decisions of EPA do not support the May 20 cutoff date.

3. The Proposed May 20 Cut-Off Date Is Not Supported by Science.

As noted above, the Plant Board changed the June 15 cutoff date requested in the Fogleman Petition to May 20, following a presentation at the December 6, 2018 Plant Board meeting. That change is not supported by science. During the meeting, the Plant Board was advised that the volatility of dicamba increases significantly at temperatures above 80 degrees.⁵⁰ Based on that claim, the Plant Board was told:

80 degrees, we're at 80 here again on May 14th, May 15th, less than 5% of the overall complaints would occur [with a May 14 or May 15 cutoff date]. If you had a June 1 cutoff, we would've been at 85 degrees - 32%. If you had a June 1st cutoff, 32% of the complaints would've occurred. And if you had a June 15th cutoff, 88 degrees Fahrenheit's where you'd be with 67% of the overall complaints. ... Now I'm also going to state that based on this data, based on [2017] and [2018], there would be minimal risk with a mid-May cutoff⁵¹

But the information provided to the Plant Board was incorrect in at least critical two respects. First, the temperature at which volatility begins to increase for dicamba is not 80° F. In its recent decision documents, EPA explained that an increase in the volatility of dicamba does not begin

⁴⁹ See Exhibit E at 21 (EPA, Oct. 31, 2018 Registration Decision for the Continuation of Uses of Dicamba on Dicamba Tolerant Cotton and Soybean). (“Repeated sub-lethal doses to herbicides are known to promote the development of resistance. For this reason, EPA recommends that dicamba OTT uses be used for early season applications rather than late season rescue treatments.”).

⁵⁰ See Audio Recording of Dec. 6, 2018 Plant Board Mtg. at 1:37:53-1:38:00 (“I conclude, distance moved is a function of air temperature for dicamba and that's really an issue when we start getting around 80 degrees Fahrenheit.”); *id.* at 1:38:30-40 (“what he saw was is right here around 79/80 degrees we start this rapid uptick in the accumulation of dicamba”).

⁵¹ See Audio Recording of Dec. 6, 2018 Plant Board Mtg. at 1:41:50-1:42:35.

until temperatures reach at least 90° F. To illustrate this effect, EPA provided the graph shown below in Figure 3.

Figure 3: EPA’s Graph Showing Temperature Effects on Vapor Pressure of Pure Dicamba

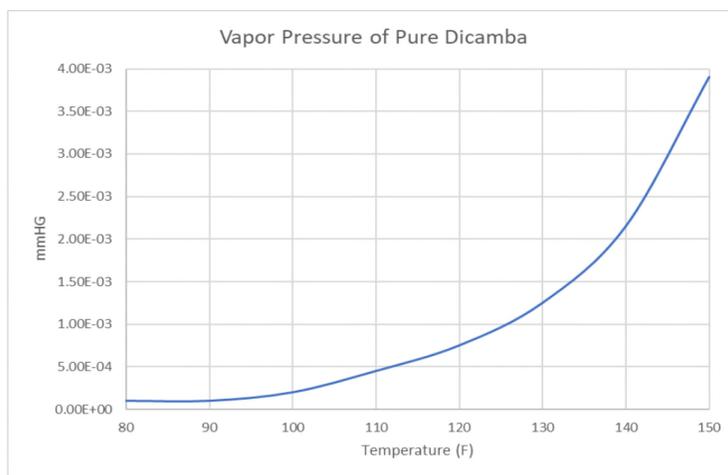


Figure H.1. Temperature Effects on the Vapor Pressure of Pure Dicamba

As EPA explained: “Based on this curve, the volatility of dicamba begins to move away from a flat line and begins to increase at approximately 90° F.”⁵²

Second, the suggestion that the new low-volatility dicamba herbicides like XtendiMax respond to temperature changes the same as pure dicamba is also incorrect. As EPA also noted, XtendiMax uses a buffering agent to help reduce vapor pressure of dicamba and prevent its movement from treated fields.⁵³ As a result of its buffering system, XtendiMax does not exhibit an increase in volatility at 90° F.⁵⁴ EPA provided the graph shown in Figure 4 below to illustrate this difference.

⁵² Exhibit G at 134 (Oct. 31, 2018, EPA, Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

⁵³ *Id.* at 135.

⁵⁴ *Id.* at 136, Figure H.2.

Figure 4: EPA’s Graph Showing Comparison of Temperature Effects on the Vapor Pressure of Pure Dicamba to Temperature Effects on the Vapor Pressure of XtendiMax

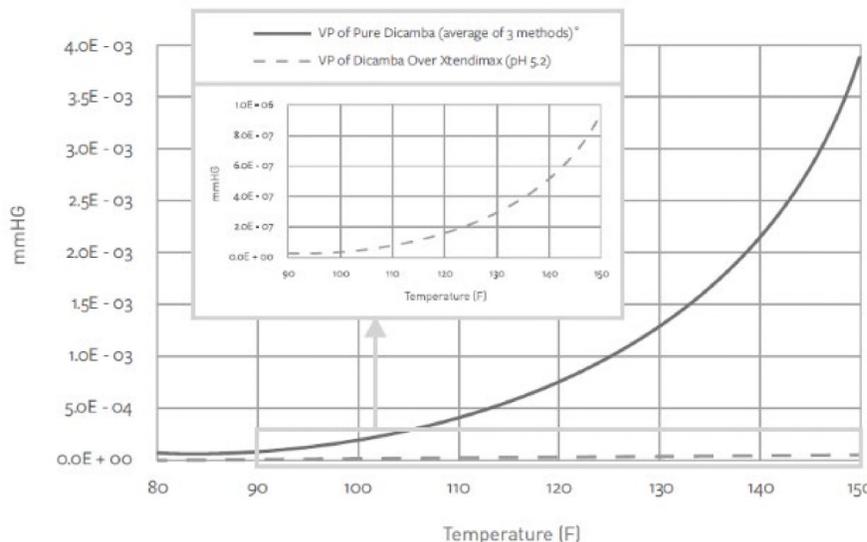


Figure H.2. Comparison of Vapor Pressures for Pure Dicamba and Xtendimax

As depicted in Figure 4, the dotted line showing vapor pressure for XtendiMax is essentially flat with increasing temperature. The nearly imperceptible increase that begins for XtendiMax around 100° F cannot even be seen on the larger graph. Rather, it can be seen only in the inset which represents a blow-up of the bottom half of the very bottom row of the larger graph. As the graph shows, volatility for XtendiMax shows no meaningful increase with increased temperature. In fact, XtendiMax has a lower vapor pressure at 150° F, than pure dicamba has at 75° F.⁵⁵

But even if XtendiMax did show increased volatility at 90° F like pure dicamba, which it does not, that fact would not support a May 20 cutoff date for applications. In Arkansas the average high temperature does not reach 90° F until July.⁵⁶ Thus, the science simply does not support the May 20 date restriction.

4. The Plant Board’s Investigation of the 2017 Complaints Demonstrates that a May 20 Cut-Off Date Is Unnecessary.

The Plant Board’s own findings from the complaints received during the 2017 growing season also demonstrate that the May 20 date restriction is without support. EPA has reported that

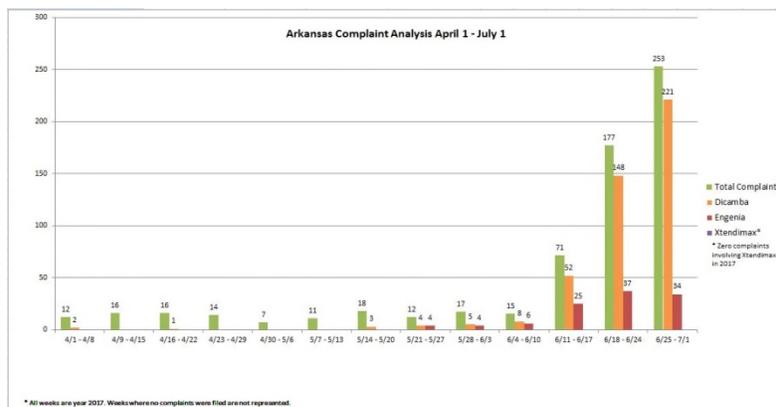
⁵⁵ See Exhibit O at 3 (William Abraham, *The Other Dicamba Story: Chemistry innovations that reduce the volatility potential of an extremely effective herbicide*, June 1, 2018, American Chemistry Matters, A Blog of the American Chemistry Council).

⁵⁶ See Exhibit P (showing average temperatures for Little Rock, Arkansas); and Exhibit Q (showing average temperatures for Arkansas).

visual symptomology from dicamba exposure appears within 5-10 days of application.⁵⁷ Based on that information, complaint data from the Plant Board shows that *only approximately 6% of all complaints made in 2017 related to applications of a low-volatility dicamba herbicide made before June 15.*

As shown below in Figure 5, in 2017, the Plant Board found a low-volatility dicamba herbicide was involved in zero (0) of the pesticide complaints received before May 20. Additionally, the Plant Board found a low-volatility dicamba herbicide involved in only 14 of the pesticide complaints received by June 10, 2017, and in only 39 pesticide complaints received before June 18. Those findings alone demonstrate that the imposition of a May 20 cut-off date is unnecessary and unsupported.

Figure 5



The Plant Board’s findings also demonstrate that the pesticide complaints involving a low-volatility dicamba herbicide before July 1 were caused principally by non-compliance with the label requirements, not volatilization due to heat / late application. Indeed, the Plant Board found that Engenia was involved in 110 of the pesticide complaints received by July 1, 2017, and that at least 83 of those cases involved a label or buffer zone violation.

The results from other states are similar. As EPA has reported: “In the vast majority of 2017 investigations, the Indiana State Chemist determined that there were label violations. The Indiana State Chemist found that 95 percent of the incidents involved documented label violations”⁵⁸ Date restrictions will not correct those applicator errors. Instead, the applicator errors seen in 2017 have been and are being addressed through additional training, experience with the products, and label enhancements.

Arkansas law requires the Plant Board to be guided by EPA’s decision regarding the lack of need for a date restriction to address potential off-target movement. It also requires the Plant Board to base any date restriction on the best available evidence. Here, there is no evidence to support the

⁵⁷ See Exhibit R at 7 (EPA, Oct. 31, 2018, Over-the-Top Dicamba Products for Genetically Modified Cotton and Soybeans: Benefits and Impacts).

⁵⁸ See *id.* at 9.

imposition of a May 20 date restriction on use of the new low-volatility dicamba herbicides. Monsanto respectfully requests that the May 20 cut-off date be eliminated from the proposed rule. If any date restriction is imposed, the Plant Board should revert to the June 15 date requested by the farmer petitioners and previously approved by the Plant Board.

C. Neither Science Nor EPA Supports the Prohibition on All Glyphosate Tank-Mixes.

As currently drafted, the proposed Arkansas regulation would prohibit all tank-mixes that include XtendiMax and any glyphosate-based herbicide. Neither the regulatory decisions of EPA nor the available science supports this restriction. The Plant Board should eliminate the proposed tank-mix restriction from the draft regulation.

1. EPA Permits XtendiMax to be Tank-Mixed with Specified Glyphosate-Based Herbicides when a Drift Reducing Adjuvant Is Also Included in the Tank-Mix.

EPA permits XtendiMax to be tank-mixed with specified glyphosate-based herbicides when a drift reducing adjuvant (“DRA”) is also included in the tank-mix. The new 2019 label EPA approved for XtendiMax states:

XtendiMax[®] With VaporGrip[®] Technology may only be tank-mixed with products that have been tested and found not to adversely affect the offsite movement potential of XtendiMax[®] With VaporGrip[®] Technology. The applicator must check the website found at www.xtendimaxapplicationrequirements.com no more than 7 days before applying XtendiMax[®] With VaporGrip[®] Technology.⁵⁹

The tank-mix section of the referenced website begins with an explanation of “REQUIRED DRIFT REDUCING ADJUVANTS (DRAs),” stating: “Certain products, as specified below, CANNOT be tank mixed with XtendiMax[®] With VaporGrip[®] Technology UNLESS those products are tank mixed with one of the following DRAs:” and then goes on to list a number of DRAs, including Intact[™]. The referenced website then lists approved tank-mix partners for XtendiMax, and includes certain glyphosate-based herbicides when combined with a DRA, such as:

- “Roundup PowerMAX[®] (max use rate of 32 fl oz per acre for each application) AND ONE OF THE REQUIRED DRAs SPECIFIED ABOVE.”⁶⁰

In connection with its decision to issue a new registration for XtendiMax, EPA made clear its requirements for testing and approving tank-mixes for XtendiMax. Those testing requirements are set forth in Appendix A to EPA’s recent Notice of Pesticide Reregistration of XtendiMax,

⁵⁹ See Exhibit S at Master Label page 16 (Nov. 1, 2018 Notice of Pesticide Registration).

⁶⁰ See <http://www.xtendimaxapplicationrequirements.com/Pages/tankmix.aspx> (last visited Jan. 16, 2019).

which provides Monsanto with the following directions regarding approval for tank-mix partners for XtendiMax:

You must maintain a website at <http://Xtendimaxapplicationrequirements.com>. That website will include a list of products that have been tested pursuant to Appendix A and found, based upon such testing, not to adversely affect the spray drift properties of Xtendimax with VaporGrip Technology. The website will identify a testing protocol, consistent with Appendix A, that is appropriate for determining whether the tested product will adversely affect the drift properties of Xtendimax with VaporGrip Technology. The website must state that any person seeking to have a product added to the list must perform a study either pursuant to the testing protocol identified on the website or another protocol that has been approved for the particular purpose by EPA, and must submit the test results, along with a certification that the studies were performed either pursuant to the testing protocols identified on the website or pursuant to another protocol(s) approved by EPA and that the results of the testing support adding the product to the list of products tested and found not to adversely affect the spray drift properties of XtendiMax with VaporGrip Technology, to EPA. EPA will notify you when the Agency determines that a product has been certified to be appropriately added to the list, and you will add appropriately certified products to the list no more than 90 days after you receive such notice from EPA. Testing of Tank-Mix Products must be conducted in compliance with procedures as stated [sic] forth in Appendix A.⁶¹

Under that protocol, certain glyphosate-based herbicides meet EPA's requirements for tank-mixing with XtendiMax, when a DRA is also included in the tank mix. For example, XtendiMax plus PowerMax plus Intact meets EPA requirements for a permissible tank-mix.

2. There Is No Science that Supports Banning the Glyphosate Tank-Mixes Permitted by EPA.

There is no evidence in the administrative record that supports the proposed prohibition against tank-mixing XtendiMax with both a glyphosate-based herbicide *and a DRA*, as permitted by EPA. The only evidence presented to the Plant Board involved tank mixes that did not include a DRA as required by EPA. Thus, the referenced studies considered tank mixes that are already prohibited by the federal label.

The addition of VaporGrip technology to Monsanto's new low-volatility dicamba herbicide prevents the formation of the volatile dicamba acid. As William Abraham, a physical chemist and Bayer scientist, has explained:

The [VaporGrip] technology in Xtendimax[®] formulation uses an acetic acid-acetate buffering system to scavenge any extraneous protons that could be

⁶¹ See Exhibit S at 4 (Nov. 1, 2018 Notice of Pesticide Registration).

brought into the system from the tank mixtures, or on the surface of foliage or soil as the spray droplets dry, thus preventing the formation of volatile dicamba acid.

When [dicamba] is mixed with co-herbicides such as glyphosate, the pH of the spray solution could drop close to 4 owing to the buffering capacity of glyphosate. Xtendimax[®] with [VaporGrip] is designed to enable tank mixing of potassium glyphosate formulations and maintain the pH close the starting pH of 5.⁶²

In addition, as EPA has explained, “[i]t also appears that when Intact is used, some of the impact of glyphosate on reducing pH is suppressed.”⁶³

For both of these reasons, XtendiMax can be tank-mixed with potassium glyphosate formulations and a DRA without resulting in impacts outside the treated field, as has been demonstrated in several field studies. For example, as noted above, all but one of the large-scale drift and volatility studies conducted by academic researchers in 2018 were done using a tank-mix of XtendiMax, PowerMax (a glyphosate-based herbicide), and Intact (a DRA). Those studies showed that 5% visual symptomology was not observed beyond the 110-ft. downwind buffer required by EPA.

It does not appear that any of the studies mentioned at the Plant Board meeting tested an approved tank-mix that included a glyphosate-based herbicide. Thus, they are not relevant in assessing the tank mixes permitted by EPA that include glyphosate, and cannot provide a basis for banning those federally-approved tank-mixes. Rather, many of the studies cited at the Plant Board meeting included tank-mixes of various dicamba herbicides and various glyphosate herbicides, but no DRA.⁶⁴ These are not approved tank-mixes. One referenced study involved a tank-mix of XtendiMax, Roundup PowerMax (a glyphosate-based herbicide), Quadris (a fungicide) and possibly Intact (a DRA).⁶⁵ But XtendiMax + PowerMax + Quadris is not an approved tank-mix, because Quadris is not listed as an approved tank-mix partner for

⁶² See Exhibit O at 2 (William Abraham, *The Other Dicamba Story*).

⁶³ See Exhibit G at 137 (Oct. 31, 2018, EPA, Summary of New Information and Analysis of Dicamba Use on Dicamba-Tolerant (DT) Cotton and Soybean Including Updated Effects Determinations for Federally Listed Threatened and Endangered Species).

⁶⁴ For example, the Plant Board was provided with a slide summarizing results from the 2018 Lonoke Low Tunnel Study and a slide summarizing results from the 2018 Tillar Low Tunnel Study, both of which provided injury ratings for the following two tank-mixes that include XtendiMax and a glyphosate-based herbicide: (1) XtendiMax + Roundup + AMS; and (2) XtendiMax + Roundup. Both of these tank-mixes are prohibited by the federal label. AMS cannot be used with XtendiMax, period, and the XtendiMax + Roundup tank-mix is prohibited without the addition of a DRA.

⁶⁵ The oral summary of this study provided at the Plant Board meeting did not reference the inclusion of Intact (a DRA) in the tank-mix. See Audio Recording of Dec. 6, 2018 Plant Board Mtg. at 1:03:33-1:04:21. However, a slide referencing the study indicates that Intact was included. Notably, that slide includes a disclaimer that “This information is preliminary and subject to further research and revision.”

XtendiMax. In short, all of the tank-mixes in the studies presented to the Plant Board are already prohibited by the federal label. Thus, they cannot support further tank-mix restrictions.

Allowing the proposed tank-mix restriction to take effect would unnecessarily burden Arkansas producers and limit their weed management options. The use of multiple sites of action is a critical component of an integrated weed management system. One of the primary tank-mix partners for application to dicamba-tolerant crops is glyphosate, specifically, potassium-salt formulations. EPA permits potassium-salt of glyphosate based formulations to be tank-mixed with XtendiMax. The Plant Board should not second-guess the scientific and regulatory judgments of EPA, and certainly should not do so based on the studies provided.

D. No Other State Has Adopted the Buffer, Date or Tank-Mix Restrictions Currently Contained in the Draft Regulation.

As explained above, in its October 31, 2018 registration decision, EPA: (1) concluded that, when coupled with the prohibition against spraying when sensitive crops are downwind, a 110-foot downwind buffer is sufficient to protect off-site plants from reductions in plant height due to primary drift, but added a requirement that a 57-foot buffer also be maintained on other sides of the field in counties in which endangered species might be present; (2) determined that in-crop applications of XtendiMax should be allowed for 44 days post-planting for soybeans, and for 59 days post-planting for cotton; and (3) decided to permit certain glyphosate-based herbicides to be tank-mixed with XtendiMax when a drift reducing adjuvant was also included in the tank mix. Those decisions are based on EPA's thorough review of the available science.

Virtually every other soybean- and cotton-producing state has determined that the application restrictions contained in EPA's new federal label for these products are sufficient for 2019. And no state has decided to impose any of the three additional restrictions currently included in the proposed Arkansas regulation for 2019. Since EPA announced its decision to issue a new federal registration for XtendiMax, 31 of the 34 relevant states have registered XtendiMax for in-crop use in 2019 with no additional date, buffer or tank-mix restrictions. The only three remaining states -- Minnesota, North Dakota and South Dakota -- will not impose any additional buffer or tank-mix restrictions, but have announced that they will impose late-June date restrictions. No state has concluded that a May 20 cut-off date is needed. Like those other states, the Plant Board should be guided by EPA's determinations and adopt the same approach as EPA.

1. Many states are imposing no additional restrictions for 2019.

Several states have announced that they will not pursue Special Local Needs 24(c) labels for the use of these dicamba herbicides for the 2019 growing season. Missouri, Illinois, Indiana, and Tennessee have all reported that they will not be pursuing 24(c) label restrictions for 2019. For example, the Missouri Department of Agriculture website explains: "The Missouri Department of Agriculture announced it will not pursue Special Local Needs (24c) labels for the use of these

three products for the 2019 growing season.”⁶⁶ The Tennessee Agriculture Commissioner has explained:

We have reviewed EPA’s new label requirements and have determined that they address -- and in some cases, exceed -- the steps we have taken in Tennessee to help farmers use these products responsibly.... We will not seek additional restrictions.⁶⁷

These states are not imposing any additional restrictions on use of the new low-volatility dicamba herbicides for 2019.

2. No state has imposed buffer requirements for 2019 in addition to those imposed by EPA.

No state has adopted buffer requirements for the new low-volatility dicamba herbicides that are different from those imposed by EPA for 2019.⁶⁸ Arkansas would be the only state to expand the buffers. And the proposed buffer requirement currently included in the regulation is not a modest expansion of the federal requirements. Rather, it would drastically expand the required buffers from the unidirectional 110’ buffer required by the federal label (along with its prohibition against spraying when sensitive crops are downwind) to an omnidirectional 1-mile [5,280 feet] buffer. In other words, the regulation would expand the federal buffer requirement nearly 50 fold.

3. No state has adopted a May 20 cut-off.

Only three states have determined that they will impose a cut-off date restricting the use of these products in 2019. Minnesota has announced that it will impose a June 20 cut-off date as the only additional restriction on use of the products in the state.⁶⁹ North Dakota has retained the same June 30 cut-off it imposed last year.⁷⁰ And South Dakota has decided to impose a June 30 cut-off date as well. Notably, both Minnesota and South Dakota have decided to drop a previous 24(c) restriction on spraying when temperatures exceed 85° F. No state has suggested that it would impose a cut-off date anywhere near the date included in the proposed regulation. In fact,

⁶⁶ See Exhibit T (<https://agriculture.mo.gov/plants/pesticides/dicamba-facts.php>) (last visited Jan. 28, 2019).

⁶⁷ See Exhibit U (<https://agfax.com/2019/01/03/tennessee-dicamba-no-state-restrictions-follow-federal-guidelines/>) (last visited Jan. 31, 2019).

⁶⁸ An old Florida regulation adopted more than 30 years ago (in 1986) requires various buffers for organo-auxin herbicides, including dicamba herbicides, that range from 5 feet to 1/2 mile. Fla. Rule 5E-2.033. The regulation was adopted long before the new low-volatility dicamba herbicides were registered for in-crop use and has not been updated.

⁶⁹ See Exhibit V (<https://www.agweb.com/article/minnesota-enacts-june-20-dicamba-cutoff-for-2019/>) (last visited Jan. 31, 2019)).

⁷⁰ See Exhibit W (News Release: North Dakota-Specific Label Announced for Dicamba, available at <https://www.nd.gov/ndda/news/news-release-north-dakota-specific-label-announced-dicamba> (last visited Jan. 28, 2019)) or (<https://www.sfgate.com/news/article/North-Dakota-dicamba-cutoff-date-to-remain-for-13508304.php> (last visited Jan. 4, 2019)).

the proposed May 20 cut-off date is a full month *earlier* than the *earliest* cut-off date adopted in any other state.

4. No state has imposed additional tank-mix restrictions.

Similarly, no other state has suggested that it will prohibit the use of glyphosate-based herbicides in tank mixes with the new low-volatility dicamba herbicides. EPA requires that tank-mix partners be tested according to a specified protocol and the new federal label for 2019 expressly permits certain glyphosate-based herbicides to be tank-mixed with XtendiMax, so long as a drift reducing adjuvant is also included in the tank mix. Under the proposed regulation, Arkansas would stand alone as the only state prohibiting these EPA-allowed tank mixes and unnecessarily burdening its farmers with the need to make a separate application of glyphosate-based herbicides.

* * *

Because the proposed buffer, date and tank-mix restrictions currently included in the draft regulation are contrary to determinations of EPA and not supported by the science or the regulatory decision of any other state, these restrictions should be eliminated from the draft regulation. Including these restrictions in the regulation would violate Arkansas law.

IV. IN THE ALTERNATIVE, IF THE PLANT BOARD DECIDES TO RETAIN THE ADDITIONAL RESTRICTIONS, IT SHOULD MODIFY THEM TO ASSIST WITH COMPLIANCE AND INCREASE CLARITY.

A. If the Buffer Requirement Is Retained, It Should Require Buffers Only Around Crops Registered by a Specified Date.

As show above, the 1-mile omnidirectional buffer requirement contained in the draft regulation should be eliminated because it is entirely without scientific and regulatory support. In the alternative, if the Plant Board elects to retain the proposed 1-mile buffer requirement, Monsanto respectfully requests that the Plant Board (a) establish a deadline by which growers must register -- on a publicly accessible registry -- the location of crops for which a buffer is required, and (b) specify that buffers are required only around *registered* crops. This modification would assist farmers in locating fields requiring a buffer and support compliance with the regulation.

As currently drafted, the proposed regulation provides no mechanism through which herbicide applicators can determine the location of crops around which the required buffers must be maintained. Thus, if the Plant Board elects to retain the 1-mile buffer requirement, it should append the following language to the end of paragraph 2.a, to assist farmers with compliance and provide sufficient definiteness to the requirement:

“the locations of which have been registered with the Plant Board, or on a Plant Board-approved publicly-accessible registry, no later than March 15.”

There are various options for publicly registering crops, including Field Watch and Crop Check. As the University of Arkansas, Division of Agriculture website explains:

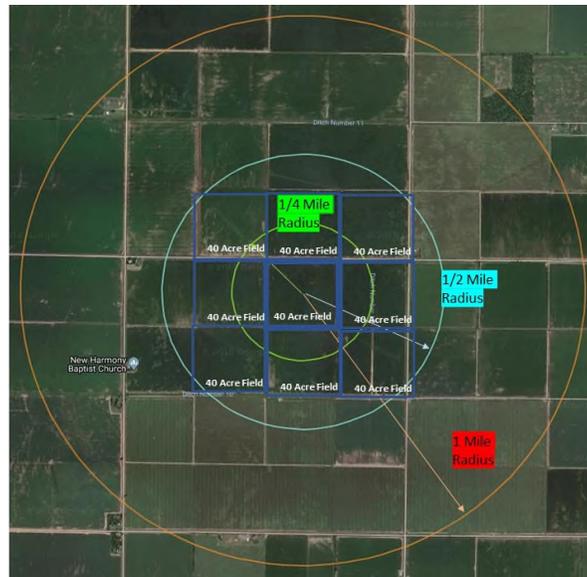
Arkansas pesticide applicators working row and field crops will be able to identify herbicide-sensitive crops and adjust their spraying accordingly thanks to a unique online platform called CropCheck™ -- a pilot program being offered in partnership between FieldWatch® and the University of Arkansas System Division of Agriculture.

FieldWatch is a not-for-profit company that hosts registries that map locations of pesticide-sensitive crops and bee hives. The effort is meant to help farmers prevent damage to their neighbors. The partnership between FieldWatch and the Division of Agriculture's Cooperative Extension Service will also enable Arkansas producers to have access to two other FieldWatch products, Driftwatch™ and BeeCheck™.⁷¹

If the 1-mile buffer is retained, the Plant Board should establish a deadline by which growers must register the location of crops for which a buffer is required on a publicly-accessible site.

In Figure 6 below, taken from Mississippi County, Arkansas, 40 acres of protected (organic, specialty, or non-dicamba tolerant) acres would dictate what could be planted in the nearly 2,000 surrounding acres. In this example, without a public registry, a grower would have to communicate with the owners or operators of between 40 and 52 separate parcels of land to determine how to comply with the 1-mile buffer requirement. A crop registry with deadlines for registration would eliminate that problem. Without such a registration and deadline, it also remains unclear how the Plant Board might ensure that buffer requirements are not enforced in an arbitrary manner.

Figure 6: Map Illustrating the Impact of a 1-Mile Buffer Requirement



Map developed utilizing real-world coordinates of a field in Mississippi County, Arkansas, the highest soybean-producing county in Arkansas in 2017, with 16,442,000 bushels produced in 2017.

⁷¹ See <https://www.uaex.edu/farm-ranch/crops-commercial-horticulture/cropcheck-fieldwatch.aspx> (last visited Jan. 30, 2019).

To meet constitutional requirements, statutes and regulations must provide individuals with sufficient notice of the specific conduct that is prohibited. *Trice v. City of Pine Bluff*, 279 Ark. 125, 129 (1983); *State v. Torres*, 309 Ark. 422, 423-25 (1992). With its proposed buffer restrictions and no crop registration requirement, the current draft of the regulation fails to meet this requirement. Thus, if the Plant Board retains the 1-mile buffer requirement, it should modify it to include a registration and date requirement.

B. If the Additional Restrictions Are Retained, the Plant Board Should Make Certain Clarifying Language Changes.

If the Plant Board elects to retain the existing restrictions, it also should make the following changes to the text of the proposed rule to avoid confusion and enhance the regulation's clarity:

1. Paragraph 2(a)

Two changes should be made to Paragraph 2(a). First, in paragraph 2(a), instead of "sensitive crops and areas as defined by *the Engenia label*" the rule should state "sensitive crops and areas as defined by *the product label*." Both XtendiMax and Engenia provide the necessary definition of sensitive crops and, thus, referring XtendiMax applicators to the Engenia label is confusing and unnecessary. Applicators should be referred to the label of the product they are applying to avoid any unnecessary confusion.

Second, in Paragraph 2(a), the phrase "non-tolerant dicamba crops" should be changed to "non-dicamba-tolerant crops," to convey the intended meaning.

2. Section III. Definitions

The Plant Board should define "organic crops" to mean "USDA-certified organic crops." The vague phrasing of "organic crops" leaves open to interpretation what crops qualify as such, would permit the over-registration of crops as "organic" and creates even more uncertainty for growers attempting to plan out their seasons in compliance with the regulation.

V. CONCLUSION

Monsanto fully supports the decision of the Plant Board to permit in-crop applications of the new low-volatility dicamba herbicides in 2019. At the same time, Monsanto respectfully requests that the Plant Board make three changes to the text of the proposed new dicamba regulations: (1) eliminate the additional buffer requirements from the proposed regulation, and rely on the buffer requirements adopted by EPA for 2019; (2) accept EPA's determination that date restrictions are not necessary to avoid off-target movement and eliminate any cut-off date or, in the alternative, permit dicamba applications through June 15, as requested by the farmer petitioners and initially approved by the Plant Board; and (3) eliminate the prohibition on glyphosate tank mixes that are permitted by EPA. These changes are supported by the best available science, and are consistent with the regulatory decisions of EPA and of all other states.

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Respectfully Submitted:



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