Case No. 17-70196

**UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT**

NATIONAL FAMILY FARM COALITION, *et al.*,
Petitioners,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,
Respondent,

and

MONSANTO COMPANY,
Intervenor-Respondent.

REVIEW
of an order of the U.S. Environmental Protection Agency

BRIEF OF *AMICUS CURIAE* DR. DAVID A. MORTENSEN, DISTINGUISHED PROFESSOR, WEED AND APPLIED PLANT ECOLOGY, PLANT SCIENCES DEPARTMENT, THE PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PENNSYLVANIA

IN SUPPORT OF PETITIONERS SEEKING REVIEW and IN SUPPORT OF VACATUR AND REMAND OF AGENCY'S APPROVAL

(ALL PARTIES HAVE CONSENTED TO THE FILING OF THIS BRIEF)

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Dated: February 16, 2018

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INTEREST OF *AMICUS CURIAE*[1]

David A. Mortensen, Ph.D., is a Distinguished Professor of Weed and Applied Plant Ecology in the Plant Sciences Department at The Pennsylvania State University. Dr. Mortensen applies his background in applied plant ecology and ecologically-based pest management to improve the sustainability of land resource management. His work explores the landscape-level interplay between the ecology of agricultural fields, field edges, and forest fragments. An example of this work involves assessing approaches to integrating weed management with the goal of reducing reliance on herbicide use. Dr. Mortensen has a long-standing interest in making weedy plant management more sustainable through understanding how management tactics interact. Dr. Mortensen balances his research interests with teaching such courses as: *Principles of Weed Management, Flora of the Central Appalachian Region,* and *Ecology of Agricultural Systems*. He received the *Outstanding Research Award* and *Fellow* from the Weed Science Society of America, and has chaired the USDA national competitive grants program in the Weed Science Field. He received his Ph.D. in Crop Science from North Carolina

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[1] Pursuant to Fed. R. App. P. 29(a)(2), all parties have consented to the filing of this brief. Pursuant to Fed. R. App. P. 29(a)(4)(E), the *Amicus* states that no party or counsel in this case and no person except counsel of record for *Amicus* authored or contributed money to fund the preparation of this brief.

State University, his M.S. in Botany from Duke University, and his B.S. in Botany from Drew University.

A decade ago, Dr. Mortensen was the first Weed Scientist to call attention to a number of concerns regarding EPA's proposed registration of dicamba formulations for use on dicamba-resistant crops. Since that time, and as explained in his brief, he has published and spoken on the subject numerous times. He also participated in the public comment portions of the EPA's decision-making process that led to this case. As an academic stakeholder whose professional interests will be adversely affected by the EPA's approval of the dicamba product XtendiMax, Dr. Mortensen has a strong interest in presenting his concerns to the Court.

ARGUMENT

A. Introduction.

I was trained as a weed scientist at North Carolina State University, where I completed my doctoral degree in 1986. At the time, North Carolina State University's Weed Science program was considered one of the top two or three programs in the country. I rose to the rank of Full Professor at the University of Nebraska, then moved from the University of Nebraska in 2001 to take a similar position at The Pennsylvania State University, where I continue to work today. In the past month, I was honored with the title Distinguished Professor. These two university work assignments, coupled with my graduate work in North Carolina and an extended collaboration at the Jamie Whitten Research Center in Stoneville, Mississippi, have made it possible for me to conduct applied weed science work on some 300 practicing commodity crop farms in North Carolina, Nebraska, Iowa, Pennsylvania, New York and Mississippi during the course of my career.

I was the first Weed Scientist to call attention to a number of concerns regarding EPA's approval of dicamba formulations for use on dicamba-resistant crops. From the beginning, a principal concern was non-target damage to crops and non-crop plant communities – so-called non-target injury – resulting from dicamba vapor drift. I was invited to speak on the subject at the 2009 International Integrated Pest Management conference, where I presented a paper entitled *Unintended consequences of stacking herbicide tolerance traits in soybean.*[2] Given the 4.3 million acres of dicamba-injured soybeans reported for the 2017 field season, and given that I am fairly certain a similar problem will repeat itself in the 2018 field season, my words in that 2009 abstract are particularly forward looking:

> Widespread adoption of glyphosate tolerant soybeans has increased the number of weedy species resistant to this herbicide. To address

[2] David A. Mortensen *et al.*, *Unintended consequences of stacking herbicide tolerance traits in soybean*, Paper presented at the 6th International IPM Symposium, Portland OR (March 2009).

> this problem, the industry is commercializing soybeans that are resistant to glyphosate and to dicamba. Dicamba, a broadleaf herbicide, is highly volatile and extremely active on many broadleaf crop and field edge plants. The high risk of injuring soybean not carrying the dicamba trait will drive adoption of these new cultivars. This practice has a high potential of injuring other broadleaf crops and of significantly reducing floristic biodiversity in field edges and nearby non-crop habitat and the ecosystem services they provide.[3]

I made that statement in a published abstract in 2009, and that's exactly what occurred in the 2017 field season.

B. Background work on the issue.

I have strongly opposed widespread adoption of crops with dicamba resistance traits in soybean and cotton because of the increased use of dicamba they entail since first learning about the trait in the mid 1990's when then Dr. Donald Weeks was interviewing for the directorship of the newly constructed Biotechnology Center at the University of Nebraska. Dr. Weeks was coming from a private research lab and during his interview seminar spoke excitedly about the dicamba resistance gene he and his colleagues had isolated. I remember exiting his seminar with a long-time farmer and extension specialist friend, Dr. Alex Martin, who remarked that a dicamba resistance trait in soybean "is the most

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[3] *Id.*; J. Franklin Egan, Eric Bohnenblust, Sarah Goslee, David A. Mortensen & John Tooker, *Herbicide drift can affect plant and arthropod communities,* 185 Agriculture, Ecosystems, and Environment 77-87 (2014).

knuckleheaded idea I've ever heard of." Dr. Martin was a knowledgeable field weed scientist and farmer in eastern Nebraska. I valued his views highly. What Dr. Martin was referring to was the incredibly high potential to damage adjacent, non-transformed plants (plants without the dicamba-resistance trait) with this, one of the most drift (particularly vapor drift) prone herbicides. Dr. Martin's concerns are reflected in the pesticide drift enforcement surveys conducted by the Association of American Pesticide Control Officials (AAPCO) that have found dicamba to be among the top three herbicides implicated in pesticide drift episodes, despite its limited use.[4]

In my view, USDA should not have deregulated dicamba-resistant crops nor should EPA have approved post-emergence application of dicamba to them. I strongly argued in public comments to both agencies and in numerous public presentations and peer-reviewed papers[5] that this transformed crop and herbicide package wouldn't address the herbicide resistance problem in a sustainable way and that there were significant gaps in our understanding of the non-target risk of

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[4] Association of American Pesticide Control Officials (AAPCO), *1999 Pesticide Drift Enforcement Survey: 1996 to 1998*, AAPCO (1999); Association of American Pesticide Control Officials (AAPCO), *2005 Pesticide Drift Enforcement Survey: 2002 to 2004*, AAPCO (2005).

[5] David A. Mortensen *et al., Navigating a Critical Juncture for Sustainable Weed Management,* 62 BioScience 75-84 (2012).

widespread, landscape scale use of dicamba (I address this point more fully later in the brief).

My colleagues and I visited the US EPA to share our concerns about dicamba drift in 2010. During that visit, our seminar and the ensuing discussion was transmitted live to US EPA laboratories across the country. In 2012, I submitted comments to US EPA on Monsanto's first application to register dicamba for use on dicamba-resistant soybeans.[6] In my 2016 public comment to the US EPA on the new uses of dicamba on herbicide-tolerant cotton and soybeans, I argued that we had critical data gaps having to do with the frequency and impact of off-site movement of dicamba herbicide.[7] I went on to state that approval of these new dicamba uses "poses PROFOUND risks to broadleaf crop growers as the risk of physical and vapor drift of dicamba is large (we've spent six years studying the problem). Recent multi-year assessments of how farmers co-

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[6] See https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0545-0025.

[7] David A. Mortensen, *Public participation for dicamba: New use on herbicide-resistant cotton and soybean*, Comments to EPA, Docket No. EPA-HQ-OPP-2016-0187-0838 (2016), *available at*: https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0187-0838

exist when divergent practices are used on their farms concluded that pesticide drift should be reduced wherever possible."[8]

In those public comments, I argued that deregulation of dicamba-resistant soybean and EPA approval of dicamba use on that transformed crop increases the risk of chemical trespass through herbicide drift by virtue of the fact that spray and vapor drift are extremely common with dicamba, and increasing its use 5-7 fold[9] at times of the year when drift is highest and when adjacent plants are most susceptible[10] would dramatically increase injury of adjacent crops and field-edge plants. I also argued that the drift injury would dramatically decrease plant diversity and the important provisioning of natural enemies and pollinators.[11]

I just returned (January 30, 2018) from the Weed Science Society of America meeting in Arlington, Virginia, where dicamba drift and the resulting

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[8] *Id.* at 1.

[9] Mortensen *et al.* (2012).

[10] J. Franklin Egan, Kathryn B. Barlow & David A. Mortensen, *A meta-analysis on the effects of 2,4-D and dicamba on soybean and cotton*, 62 Weed Science 193-206 (2014).

[11] Eric W. Bohnenblust, Anthony D. Vaudo, J. Franklin Egan, David A. Mortensen & John F. Tooker, *Effects of the herbicide dicamba on non-target plants and pollinator visitation,* 35 Environmental Toxicology and Chemistry, Journal of Pest Science 144-151 (2016); Melanie A. Kammerer, David J. Biddinger, Edwin G. Rajotte & David A. Mortensen, *Local plant diversity across multiple habitats supports a diverse apple pollinator community*, 45 Environmental Entomology 32-48 (2016).

injury were discussed for much of the meeting. Based on those presentations and on estimates I've read about in the farm press, approximately 25 million acres of dicamba-resistant soybean and cotton were planted in the US in 2017,[12] and most of those acres received one or more applications of XtendiMax or another dicamba formulation approved for use on dicamba-resistant crops. As a result of that practice, 4.3 million acres of non-transformed soybeans were injured by dicamba drift. The extent of crop injury in response to this crop and herbicide use practice is unprecedented. It is also a significant under- representation of the plant injury that occurred. Importantly, the 4.3 million acres only addresses injury to soybean and doesn't include other broadleaf crops nor does it include non-crop broadleaf flowering plants.

C. EPA should have foreseen the substantial dicamba drift injury.

This unprecedented extent of damage begs the question: *Should the EPA have foreseen substantial dicamba drift injury resulting from the use of XtendiMax?* I strongly believe that this sort of injury should have been anticipated. During the EPA's review, several important factors were missed, and/or

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[12] Greg D. Horstmeier, *Dicamba's PTFE Problem*, DTN The Progressive Farmer (8/29/2017), https://www.dtnpf.com/agriculture/web/ag/perspectives/blogs/editors-notebook/blog-post/2017/08/29/dicambas-ptfe-problem.

misunderstood, and surprisingly naïve assumptions were made or overlooked entirely when extrapolating from laboratory tests and small field plot studies to field and farmstead scales. First, dicamba is highly phytotoxic to broadleaf plants, with some plant families being hypersensitive to the herbicide. Plants in the legume family (e.g. peas, soybean) are extremely sensitive to dicamba. Because dicamba is a growth regulator herbicide, it is most active on plants when they are actively growing. For most summer grown arable crop plants, that period of rapid growth occurs at the very same time XtendiMax herbicide is applied for postemergence weed control in the dicamba-resistant crop. This is the very time when many summer arable crop plants and field edge flowers enter their exponential growth stage, or their stage of most rapid growth, and therefore when they would be most susceptible to injury. This point was borne out in a peer-reviewed meta-analysis we published in a prominent weed science journal in 2014, and for which we received the *Outstanding Paper Award* from the Weed Science Society of America.[13]

Second, in addition to the fact that the neighboring plants are at a particularly sensitive stage of development, these new, widespread postemergence

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[13] Egan *et al.* (2014).

applications of XtendiMax are made during the hottest months of the summer. While it is true that other formulations of dicamba have been used before dicamba-resistant soybean was deregulated in 2015, that use was on a small fraction of the acres and importantly, in the spring when summer crops haven't emerged and when field and soil temperatures are 30-65 degrees F. cooler. Why does temperature matter so much? Dicamba is a volatile herbicide. This means it is prone to volatilize (vaporize) from soil and plant surfaces, which can occur hours to days after dicamba is sprayed. To volatilize means to undergo a phase change from a liquid to a gas or a solid to a gas. The amount of dicamba (or any substance) that volatilizes increases with temperature. It should be clear, we're not talking about subtle differences in temperature here. The springtime soil surface temperature varies from 40-65 degrees while a mid-summer application is typically made when soils are 75 to as much as 180 degrees at the soil surface.[14] This difference in temperature is both large in absolute terms and very important to the problems that resulted with XtendiMax use. EPA's registration of XtendiMax for use as a postemergence herbicide – which would therefore by applied in the summer months – guaranteed that XtendiMax would sprayed on fields when the

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[14] Thomas J. Monaco *et al., Weed Science: Principles and Practices* 148-160 (4th ed. 2002).

soil and air temperatures would be much warmer and the risk of volatilization much higher.

Finally, it is well understood that as the area treated (land area) and amount of a chemical applied (mass) increases, the risk of finding that chemical in unwanted places increases. A careful review of the peer-reviewed environmental chemistry literature indicates that amount of herbicide used is positively correlated with the appearance of herbicides in surface and ground water.[15] Auxinic herbicides like 2,4-D and dicamba have historically been linked to a high frequency of drift injury events.[16] By many practitioners in the field they are referred to as "the bad actors" – not a little more drift-prone, but much more drift-prone than most pesticides. All of this was well understood and well known well before USDA moved to deregulate dicamba-resistant crops and EPA approved XtendiMax herbicide for use on them. Taken together, these spillover effects would be small in the absence of the transformed crop and associated agronomic practices. In addition to concerns about compromised environmental quality, herbicide spillover of the kind that occurred with XtendiMax use should have been

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[15] Jack E. Barbash *et al.*, *Major herbicides in ground water: Results from the National Water Quality Assessment*, 30 Journal of Environmental Quality 831-845 (2001).

[16] AAPCO 1999; AAPCO 2005; Egan *et al.* (2014).

foreseen. Again, I raised these issues in my public comments and apparently, they went unheeded.

D. My academic studies on the issue.

I began this brief by stating I was the first weed scientist to call attention to the potential for significant and widespread drift problems with auxinic herbicides like dicamba if we proceeded to develop and use dicamba-resistant crops. I put my credentials on the line when I called this "new" direction of weed science into question. While my credentials in this field of study attest to my deep understanding of this problem – I've received the *Outstanding Research Award* and *Fellow* from the Weed Science Society of America, as recently as 2016 chaired the USDA national competitive grants program in the Weed Science field, and just learned that I've received the title of *Distinguished Professor* – many weed scientists were reluctant to join me (early on) in questioning the risks of dicamba-resistant crops and the resulting widespread use of dicamba. Weed scientists finally caught on to the risks of adjacent crop injury when in 2014 many Extension Weed Scientists flatly stated dicamba-resistant soybean was a non-starter, simply too dangerous from a vapor and from a spray drift perspective.

My concerns about the potential for drift injury led my lab to initiate a series of field studies exploring the drift dynamics of dicamba herbicide. I will begin by stating, studies of this kind are difficult to conduct and almost any approach taken has limitations associated with the methods used. Our approach was to conduct plot scale experiments with the goal of estimating the drift potential of two commercially available formulations of dicamba (diglycolamine and dimethylamine) with the goal of informing our understanding of how far dicamba could move under a simulated field application. The study was thoughtfully designed and carefully executed and concluded that the dimethylamine formulation was more drift-prone than the newer diglycolamine formulation.[17] However, we observed a significant amount of drift with both formulations. Our study was carefully designed to focus on vapor drift as the "target" bioindicator plants were placed in the field (they were potted and growing in the greenhouse) after the herbicide had been applied, thus minimizing the likelihood of spray drift injury.

The most striking result from the study was the degree to which vapor drift was correlated with temperature. During my career I've worked in soybean fields in Pennsylvania, Nebraska, Iowa, Mississippi and North Carolina. The summertime temperatures in Pennsylvania are far cooler than any other place I've

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[17] J. Franklin Egan & David A. Mortensen, *Quantifying vapor drift of dicamba herbicides applied to soybean*, 31 Environmental Toxicology and Chemistry 1-9 (2012).

worked, and even in the cool summers of the Central Appalachian Mountains we saw a striking influence of temperature. Since the drift studies were replicated five times, we were able to determine the degree to which drift was correlated with temperature and relative humidity for the dimethylamine salt of dicamba. The maximum temperature during the study window was 82 degrees while most days were in the mid 70's. Over this narrow and cooler range of temperatures the extent of crop injury and distance of herbicide movement was highly correlated with temperature, with drift distance doubling over a range of 75 to 82 degrees. While the experiment was thoughtfully designed, it had its limitations. First, the newer diglycolamine formulation was only tested in one field season (2010) while the older dimethylamine formulation was tested in 2009 and 2010. Therefore, our ability to infer to temperatures outside the range we experienced was highly constrained. The fact that the weather was cooler than normal during the 2010 window was something we had to live with given the complexities of conducting field studies like this. Those complexities included treating the plants at the right growth stage and fitting the experiments in between rains and other inclement weather. In spite of less than ideal, cooler weather, we saw and reported a strong temperature effect on vapor drift and highlighted this finding in the paper.

The study described above was a "small" plot study, a study that revealed some worrying realities. While the newer formulation reduced vapor drift, vapor drift was observed for new and old formulations AND while the experiments were conducted under cooler conditions, we saw a strong positive correlation between vapor drift and temperature. Why do I highlight "small" plot study in the first sentence of this paragraph? I do so because while they have their place in controlled component research, there are serious scaling deficiencies associated with small plot work. What follows is an attempt to describe the challenges associated with scaling results from a small plot to a typical farm field, a farmstead and a matrix of farms. As plots go, our experimental plot was fairly large compared to "tiny" lab-based humidome experimental systems. The treated area of our plots was 60 feet by 60 feet. That is to say we sprayed a square patch of soybean field measuring 60 feet by 60 feet or 3,600 square feet. A typical Midwestern soybean field would fill a quarter section of land (a section is 640 acres, a quarter section is 160 acres). An acre is 43,560 square feet, so a typical field is 6,969,600 square feet. Thus, our treated area was 0.052% of a typical field size in area. Why does this present a scaling problem? Imagine the application of an herbicide to a field as a 3-dimensional plume (pesticide movement modelers make this assumption all the time). The volume of the dicamba plume over a typical field would be nearly 2,000 times greater than that over a small plot. Why do I highlight this constraint of small plots? The probability of the plume moving much further and at phytotoxically damaging concentrations is a function of the plume size. Therefore, in order to understand the risk of dicamba injury at a scale relevant to modern soybean farming in the US you would need to follow our work up with a replicated series of field studies where many whole fields were treated with dicamba over a broad range of temperature, soil moisture and relative humidity conditions and where injury to adjacent plants was carefully monitored.

E. Problems with EPA's assessment.

To my knowledge such work was never done and therefore couldn't have been used in the EPA assessment of XtendiMax vapor drift. My understanding is that EPA based its assessment of XtendiMax vapor drift primarily on two Monsanto field studies, each of which involved just one application of dicamba to fields 3.4 and 9.6 acres in size.[18] This is shockingly insufficient. As I indicated above, the weather at the time of application matters as does the weather that

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[18] Monsanto Company, *Field Volatility of Dicamba Formulation MON 119096 Following a Pre-Emerge Application Under Field Conditions in the Southeastern USA*, Monsanto Company submission to USEPA, 49888501, p. 12 (03/30/2016), *available at* https://monsanto.com/app/ uploads/2017/09/Ex.-26-1.pdf; Monsanto Company, *Field Volatility of Dicamba Formulation MON 119096 Following a Post-Emerge Application Under Field Conditions in Texas*, Monsanto Company submission to US EPA, 49888503, p. 12 (03/30/2016), *available at* https://monsanto.com/app/uploads/2017/09/Ex.-27-1.pdf.

follows over the days and weeks after application. What should have been done is a sufficient number of experimental fields the size of real farm fields should have been treated and the after-effects studied. Anyone who has conducted field research would know that to tackle a multidimensional problem like this (where the response variable vapor drift is dependent on a number of landscape position and weather factors) would require landscape-scale studies involving field tests on between 60 and 100 fields. Not having taken this step to conduct and analyze these studies was irresponsible on the part of the company. The fact that such work wasn't required by EPA to inform its decision on whether or under what conditions to register XtendiMax was a fatal flaw in the Agency's review process.

The point I raise about the size of the treated area is profoundly important, particularly if the practice is to be widely adopted by farmers. I just walked through the issue of scaling from a small plot to a field, but it really only starts there. Imagine a farmer who is treating an entire farm with dicamba instead of one field. With a compressed planting period and herbicide spray window, the reality is that many hundreds to thousands of acres on one farm will be sprayed in a compressed window of time, say days to a week, and many neighboring farmers are doing the same. All of a sudden it's not a plume arising from one 160 acre field; rather, it is the aggregate of many, many fields. Some describe this phenomenon as atmospheric loading.[19] Effectively, it is the cumulative effects of the large-scale application of a pesticide. Remember, 25 million acres of dicamba-resistant crops were planted last year, and many millions of acres were treated with Xtendimax herbicide. My lab is just concluding a spatial analysis of the Midwest arable cropping region. Imagine, many counties in soybean growing country are comprised of 80% or more corn and/or soybean. That is to say that 80% of the land area is planted to corn or soybean. The point is that the spatial extent of this practice and therefore the spatial loading of the herbicide is enormous. When the herbicide drifts, the drift arises from a very large treated area. I come back to a point I raised earlier in the brief: increasing the area treated and amount of herbicide applied increases the likelihood that herbicides appear in in non-target sites.[20] We've known this for nearly twenty years.

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[19] *E.g.* Tom Barber, as quoted in David Bennett, *Dicamba tests showing similar results from scattered locations,* Delta Farm Press (Sept. 6, 2017), http://www.deltafarmpress.com/soybeans/dicamba-tests-showing-similar-results-scattered-locations; *see also* Ludovic Tuduri *et al.*, *A review of currently used pesticides (CUPS) in Canadian air and precipitation. Part 2: Regional information and perspectives.* 40 Atmospheric Environment 1579–1589 (2006).

[20] Jack E. Barbash *et al.*, *Distribution of Major Herbicides in Ground Water of the United States,* U.S. Geological Survey Water-Resources Investigations Report 98-4245 (1999).

F. It is nearly impossible to follow EPA's XtendiMax label.

One final point. I have grave concerns about EPA's practice of developing/approving herbicide labels like the XtendiMax label when it's nearly impossible to follow the label instructions. EPA scientists should know better. To expect farmers and commercial applicators to adhere to the narrowly defined combinations of wind speed and temperature restrictions laid out in the 2017 and proposed 2018 XtendiMax labels is entirely unrealistic and irresponsible. In much of the soybean and corn growing regions in the US, strictly following this matrix of temperature, wind speed and direction rules and fitting the applications in between rains and other constraints limit application opportunities by 60-80%. In carefully reading and rereading the XtendiMax label constraints, I continue to be surprised at the unrealistic assumptions that must have been made while drafting the label. Given the current structure of the crop production system, it's not possible to cover the ground necessary to effectively do dicamba weed control yet conform with the weather constraints of the label. The implementation of such unrealistic labels sets farmers and applicators up to fail. In addition to the unrealistically constrained wind speed restrictions, the notion that rules could be based on a "prevailing" wind direction as a means of minimizing adjacent susceptible crop injury is deeply flawed. We saw this first hand in a series of studies we conducted measuring and modeling the direction of wind dispersed seed dispersal. In a paper touted by the journal editors to be the most comprehensive ever published, we documented that while there is a prevailing wind direction, 30% of the time (in our replicated studies) the wind blew in exactly the opposite direction.[21] Here again, to base safe buffer distances on an assumption about "prevailing" wind direction sets farmers up for failure.

G. EPA should not have approved XtendiMax, and the 2018 label will not fix the problem.

Taken together, XtendiMax should never have been registered for use on dicamba-resistant crops in 2017. The necessary experiments to assess the risk of vapor drift were never conducted. Frankly, Monsanto prohibited drift-related testing of XtendiMax prior to commercialization in 2017, and EPA registered the herbicide without the data needed to adequately assess the risk of adjacent crop injury (or other plants). The scaling issue is widely known to modelers and quantitative agronomists and is an issue that should have been addressed prior to labeling. There was every reason to believe there was a significant risk of widespread vapor and spray drift with XtendiMax and yet the label was granted.

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[21] Joseph T. Dauer, David A. Mortensen & Mark J. VanGessel, *Temporal and spatial dynamics of long-distance* Conyza canadensis *seed dispersal*, 44 Journal of Applied Ecology 105-114 (2007).

Frankly, it's my view that market forces encouraged the "let's see how it goes the first time around and we can tweak the label later if we have a problem" approach to labeling and stewarding XtendiMax. Unfortunately, EPA supported the approach by granting the label. The 2018 label is unlikely to improve things. I say this first because the needed field and farmstead-scale studies still have not been conducted, and second because I see no label amendments that address the critical issue of XtendiMax vapor drift. Even if it were the case that this dicamba-based weed management was a robust solution to the widespread glyphosate-resistant weed problem – which it is clearly not[22] – the risks associated with non-target crop and non-crop plant injury were far too great to have proceeded to register XtendiMax for the 2017 field season, and I feel the same about the 2018 field season for the same reasons.

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[22] Mortensen *et al*. (2012); J. Franklin Egan, Bruce D. Maxwell, David A. Mortensen, Matthew R. Ryan & Richard G. Smith, *2,4-Dichlorophenoxyacetic acid (2,4-D)-resistant crops and the potential for the evolution of 2,4-D-resistant weeds,* 108 PNAS E38 (2011).

CONCLUSION

XtendiMax should never have been approved for use on dicamba-resistant crops in 2017. The EPA approved the herbicide without the necessary data, and the resulting drift-related injuries during the first crop season were disastrous. Therefore, I support the Petitioners' request for declarations that the EPA violated FIFRA and the ESA. Further, the EPA's approval of XtendiMax should be vacated, with a remand for further proceedings.

Respectfully submitted,

s/ David A. Mortensen
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CERTIFICATE OF COMPLIANCE

Pursuant to Federal Rules of Appellate Procedure 29(a)(4)(G) and 32(g)(1), I certify that the foregoing Brief of *Amicus Curiae* complies with the type volume limitation and typeface requirements contained in Federal Rules of Appellate Procedure 29(a)(4) and (5) and Circuit Rule 32-3(2), because it is proportionally spaced, has typeface of 14 points, and contains 4,246 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(a)(7)(B)(iii).

DATED: February 16, 2018.

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CERTIFICATE OF SERVICE

I hereby certify that on February 16, 2018, I electronically filed the foregoing brief with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit by using the appellate CM/ECF system. All participants in the case are registered CM/ECF users and will be served by the appellate CM/ECF system.

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