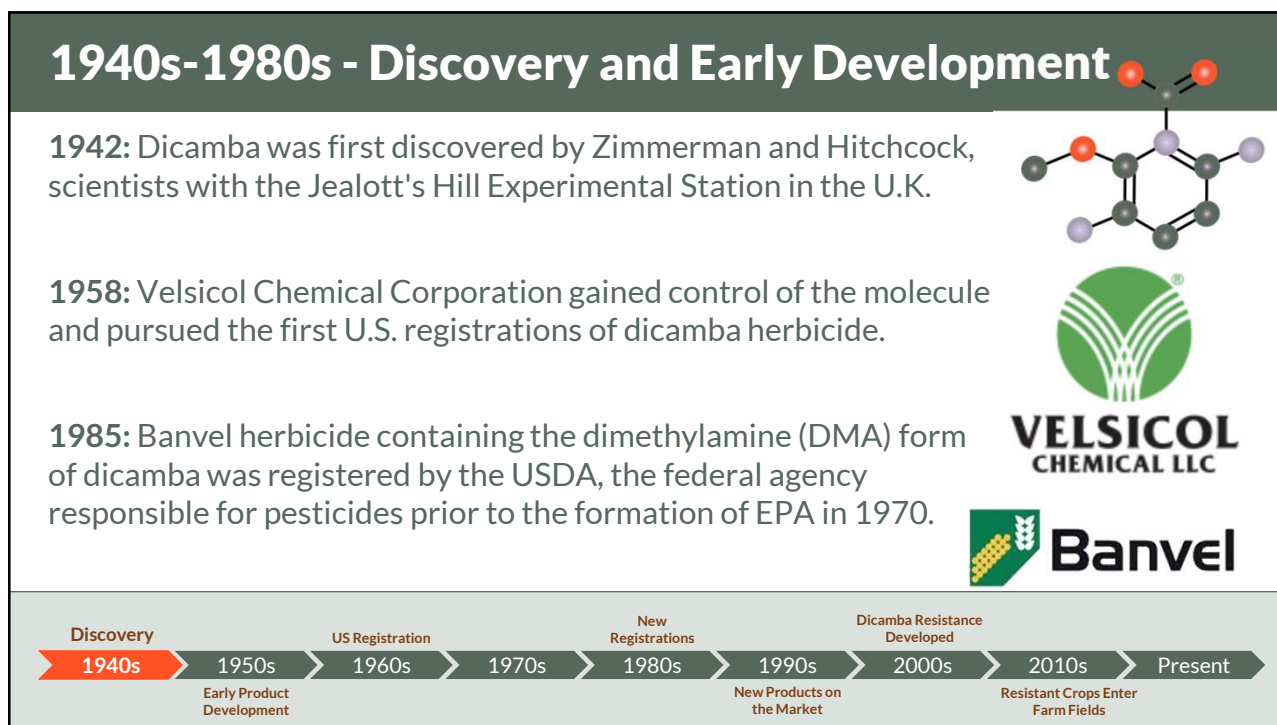


1





2

1960s

1967: First known government action set a temporary tolerance petition for grain sorghum, at 2.0 parts per million (ppm).

1968: First toxicology review of dicamba.

3

1985-1996 – New Registrations

1985: Herbicide Velsicol registered Marksman herbicide, containing the potassium form of dicamba plus atrazine.


1986: Sandoz purchased the ag business of Velsicol, taking over dicamba registrations, development, and regulatory support.

Marksman®
Herbicide

Marksman® Herbicide	
ACTIVE INGREDIENTS:	
Potassium Salt of dicamba*	13.42%
Potassium Salt of related acid	3.35%
Atrazine**	22.23%
INERT INGREDIENTS:	61.00%
TOTAL	100.00%
*Equivalent to 11.45% 3, 6-dichloro-2-anisic acid (dicamba), or 1.1 lbs./gal.	
**Equivalent to 22.23% 2-chloro-4-ethylamino-6-isopropylamino-s-triazine (atrazine), or 2.1 lbs./gal.	
Roll or shake before using.	
KEEP OUT OF REACH OF CHILDREN	
CAUTION	

See an early Marksman label here:
https://www3.epa.gov/pesticides/chem_search/ppls/000876-00451-19850909.pdf

SANDOZ



4

1992 – Clarity Wins EPA Approval

Clarity herbicide was registered with the EPA, containing the diglycolamine (DGA) form of dicamba.

See the Clarity label here:

<https://hh-ra.org/bibliographies/basf-1992/>



5

1996

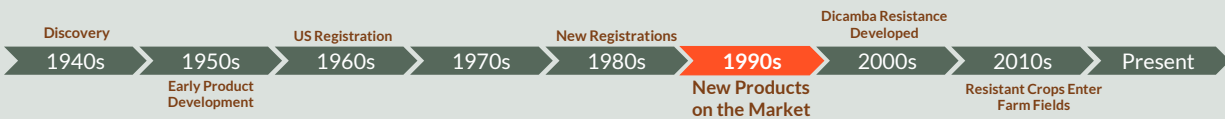
Dicamba Tolerances as of 1996	
Soybean grain	Soybean hay and forage
0.05 ppm	1.0 ppm

Source: EPA's comprehensive listing of tolerances issued as part of Food Quality Protection Act (FQPA) implementation (EPA, 1999)

6

1996 – Monumental Merger

Ciba-Geigy and Sandoz merged to form Novartis (that would later morph into today's Syngenta). The U.S. FTC required Novartis to sell certain corn market products, including dicamba, which was purchased by BASF.



7

1996 - FQPA

The Food Quality Protection Act (FQPA) was signed into law by Bill Clinton on August 3, 1996.

This seminal legislation was designed to more fully protect pregnant women, infants, and children from the developmental effects of pesticides.

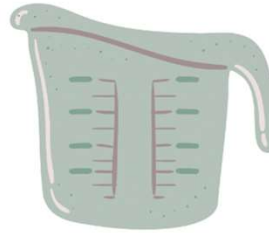


8

The “Risk Cup” Shall Not Runeth Over

EPA introduced the concept of the “risk cup” in implementing the FQPA. The volume, or size, of the “risk cup” for a given pesticide is set by the pesticide’s maximum acceptable daily intake, AKA its chronic Reference Dose (cRfD).

The more toxic the pesticide, the smaller the allowed “risk cup.”



Pre-10x Safety
Factor Risk Cup



Extra 10x Safety
Factor Risk Cup

9

The “Risk Cup”

The FQPA included a provision requiring EPA to **apply an additional 10-fold safety factor when setting cRfDs and evaluating tolerances, to more assuredly protect vulnerable populations** (i.e. pregnant women, infants and children).

The EPA Administrator can reduce or drop the added safety factor if developmental risks are well characterized, pose little risk, and the agency has solid data to estimate exposures.




10

1998

EPA determines that dicamba cancer risk is "not classifiable" because the maximum tolerable dose was not achieved in required cancer studies in mice and rats.

The agency also acknowledges it lacks data to quantify drinking water exposures -- usually the most significant source of herbicide exposure.



Discovery	US Registration	New Registrations	Dicamba Resistance Developed
1940s	1950s	1960s	1970s
1980s	1990s	2000s	2010s
	Early Product Development	New Products on the Market	Resistant Crops Enter Farm Fields
Present			

11

1999

January 6, 1999:

Final rule published establishing, revoking, and revising various dicamba tolerances:

(EPA, 1999)

EPA Dicamba Tolerances			
Soybean	Soybean Forage	Soybean Hay	Aspirated Grain Fractions
10 ppm	125 ppm	200 ppm	5,100 ppm
x200 increase	x10,000 increase	x10,000 increase	

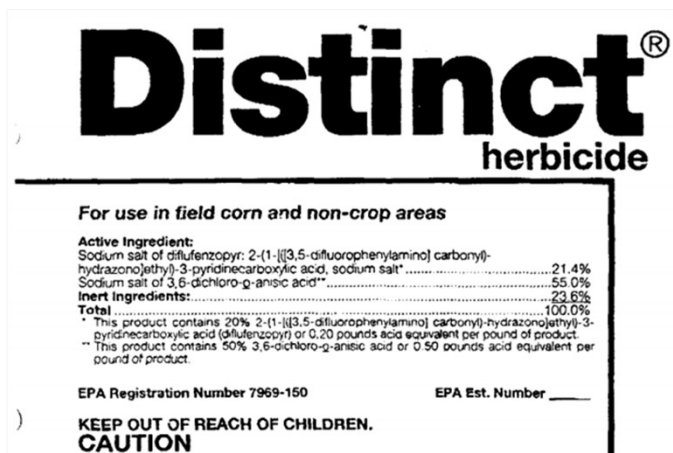
12

1999 – Distinct Herbicide Hits the Market

BASF registers Distinct herbicide containing sodium dicamba plus diflufenzopyr (DFFP) in the hope that if the right one does not kill the weed, the left one will.

See the Distinct label here:

<https://hh-ra.org/bibliographies/basf-1998/>



13

1999: EPA Applies FQPA 10-X

Dicamba cRfD is based on a very high NOAEL (No Observable Adverse Effect Level) of 45 mg/kg/day in a multi-generation rat reproduction study.

Key Action: EPA applies the added, FQPA 10-X safety factor, lowering the dicamba cRfD from 0.45 mg/kg/day, to 0.045 mg/kg/day.

What is cRfD?

cRfD = chronic Reference Dose, the maximum amount of daily, dietary exposure deemed acceptable by EPA

[\(EPA, 1999\)](#)



14

Trouble on the Horizon

71.1% of this new, lower dicamba cRfD/cPAD* was taken up by existing uses/dietary exposure for non-nursing infants <1 year old, and 54.8% for children 6 years old

Most of dicamba's risk cup is taken up ten years BEFORE the huge increase in dicamba use that began around 2010.

*When an added safety factor called for by the FQPA is applied, a cRfD becomes a cPAD = chronic **Population Adjusted Dose**.

(EPA, 1999)



15

2000s - EPA reissues all 60 dicamba tolerances

EPA Dicamba Tolerances				
Corn grain and Forage	Barley grain	Barley Straw	Soybean Hulls	Aspirated Grain Fractions
0.5 ppm	6 ppm	15 ppm	13 ppm	5,100 ppm*

(EPA, 2000)

*5,100 ppm = 5.1 parts per 1,000 = 0.51 part per 100, or ½ of 1%.

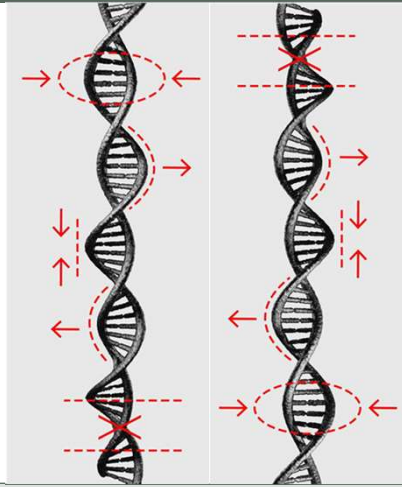


16

2005 – Dicamba-Tolerant Trait

The dicamba-resistant trait is developed at the University of Nebraska and licensed to Monsanto in 2005. Public ag research investment creates the trait, Monsanto positions itself to reap the benefits (if any).

Under the terms of the licensing agreement, Monsanto has *exclusive license* to integrate the trait into commercial crop lines.



17

2005 – Risk to Broadleaf Plants



(Monsanto, 2005b)

“[It is] effective against most broadleaf weeds, including weeds that are hard to control. However, it is harmful to crops such as soybeans, canola and cotton, which also are broadleaf plants. The new technology will allow the development of soybean and other broadleaf crops that are highly tolerant to treatment with dicamba.”

2005 Monsanto press release on dicamba



18

2006 – Keeping the Dicamba Flowing

June 6, 2006: EPA issued Reregistration Eligibility Document on dicamba.

- 434 dicamba products registered
- Multiple methods of application approved
- Application rate range is 0.5-2.8 lbs active ingredient per acre



The typical rate on most field crops = ~0.2 pound/acre. Rate on corn has been between 0.15 and 0.35 lbs/acre over the last 20 years.

(EPA, 2006)



19

Justification for Dropping Dicamba’s 10-X Safety Factor

“The FQPA Safety Factor has not been retained for dicamba because acceptable developmental and reproduction studies have been submitted and reviewed, there is a low concern and no residual uncertainties for pre- and postnatal toxicity, and the dietary and the residential assessments are not expected to underestimate exposure.”

But in 2022 a strong case can be made for restoring the FQPA 10-X safety factor based on uncertainty in EPA’s exposure estimates, recent dicamba drift and damage episodes, and peer-reviewed studies linking dicamba exposure to human reproductive problems.

(EPA, 2006)

EPA in the 2006 RED



20

Impact of Dropping the 10-X Safety Factor

Adding the 10-X would lead to a cPAD of 0.045 mg/kg/day -- leaving little room for growth in dicamba uses and exposure.

Without this 2006 EPA action, Monsanto would likely not have invested billions in development of Xtend, dicamba-resistant crop technology, nor in the new chemical plants needed to manufacture dicamba herbicide.

In 2005, Monsanto completed the deal with the University of Nebraska, gaining exclusive, global rights to apply the University's dicamba-resistant technology to crops.

21

2007

Status herbicide registered, containing sodium salts of dicamba, BASF's DFFP (diflufenzopyr) and a safener.

See the label here:

<https://hh-ra.org/bibliographies/basf-2007/>



Status[®]
Herbicide



22

2010s – Monsanto Pushes De-Regulation

For the first half of the decade, Monsanto works with USDA to de-regulate dicamba-resistant crops:

De-regulation petitions:

- Soybeans: Filed July 2012, granted January 2015
- Cotton: Filed February 2013, granted January 2015
- Corn: Filed August 2015, granted March 2016



23

2010-2013

Dicamba is very prone to **volatilization and drift** and can cause extensive damage to sensitive crops including soybeans and specialty crops like tomatoes and wine grapes.

As Monsanto pursues EPA approval of dicamba-resistant crops, farmers, scientists, and public interests group warn that increased use of dicamba will result in extensive damage to non-target crops.

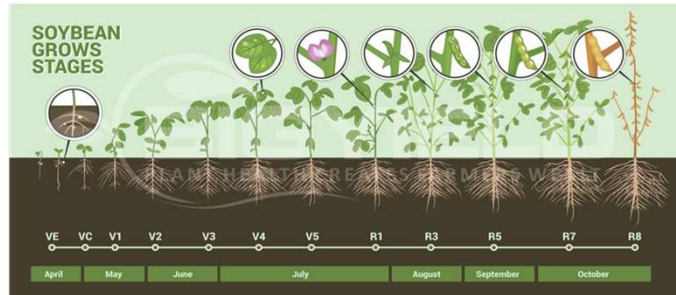


24

Big Push to Get Over-the-Top Labels Approved ASAP...

...but issues linger and first approvals come in late 2016. XtendiMax and Engenia dicamba herbicides can be applied from before planting for burndown of early weeds, through soybean stage R1 (beginning bloom, mid-June through July).

The EPA-approved label allows applications over 4-month period, more than three times longer than the typical dicamba spray season.



25

Off-Target Movement and Damage Occurs as Predicted

Applications in the summer are much more likely to move off target and cause crop damage and human exposures.

Maximum risk (i.e. the "perfect storm"): hot and humid conditions, coupled with temperature inversions and wind.



26

2010 - Farmers and the Food Industry Raise Concerns

In 2010, Steve Smith, R+D Director of Red Gold tomatoes testifies before Congress.

His testimony draws on years of bad experiences when dicamba was sprayed near Red Gold tomato fields. He explains that dicamba-resistant soybeans is "the single most serious threat to the future of the specialty crop industry," valued at \$254 million in his home state of Indiana alone.



"The widespread use of dicamba is incompatible with Midwestern agriculture."

(Smith, 2010)

Steve Smith, Red Gold



27

"One of America's Most Dangerous Herbicides"

The Save Our Crops Coalition (SOCC) also submits formal comments.

SOCC stresses that dicamba "has proven to be one of America's most dangerous herbicides for drift damage."

*(Smith, 2013);
(AAPCO, 2005)*



Although dicamba is not one of the top 15 most used herbicides in the country, it was one of the most cited for drift complaints, appearing on 70% of top-5 lists in 10 Midwestern states.

28

2012 - Scientists Raise Concerns

In a seminal 2012 paper in the journal *BioScience*, Dave Mortensen et al. point out the high volatility of dicamba and warn of "frequent incidents of significant injury or yield loss to susceptible crops."

"Agronomic drivers suggest that once an initial number of growers in a region adopt the resistant traits, the remaining growers may be compelled to follow suit in order to reduce the risk of crop injury and yield loss."

Navigating a Critical Juncture for Sustainable Weed Management

DAVID A. MORTENSEN, J. FRANKLIN EGAN, BRUCE D. MAXWELL, MATTHEW R. RYAN, AND RICHARD G. SMITH

[\(Mortensen et al., 2012\)](#)



29

Public Interest Groups Raise Concerns

NGOs submit comments to EPA about the pending approval of dicamba-resistant soybeans:

The Center for Food Safety warns of a "huge increase in the use of dicamba herbicide in American agriculture," resulting in rapid development of resistant weeds, expanded risk of human and environmental exposure, and "much increased crop damage" from drift.



Summary of
Center for Food Safety's Science Comments to EPA on Monsanto's Request to Register Dicamba Herbicide for Use on Monsanto's Dicamba-Resistant MON 87708 Soybean

[\(Center for Food Safety, 2012\)](#)



30

Spring 2015 – Jumping the Gun

Farmers plant the first dicamba-resistant crop, Monsanto's Bollgard II XtendFlex Cotton (also resistant to glyphosate and glufosinate).

Yet *no dicamba formulations* have been approved for over-the-top use with the new cotton seeds. Some farmers make off-label dicamba applications anyway. Officials register the first complaints of damage to near-by crops not containing the dicamba-resistance gene.



31

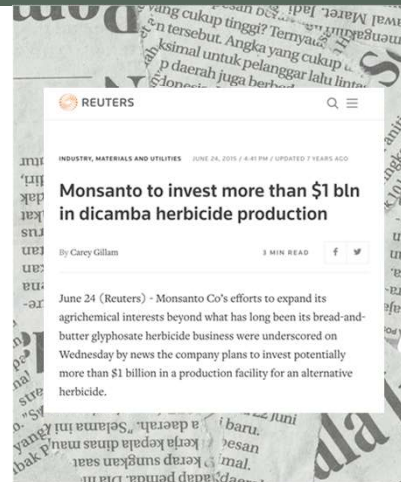
June 2015 – Monsanto Goes All-In With Xtend

June 24, 2015 story by Reuters:

“Monsanto to invest more than \$1bln in dicamba herbicide production”

- Major plant expansion underway in Luling, Louisiana to meet rising demand for dicamba.
- Monsanto tells Reuters it sees “a 200 million acre ‘practical fit’ for its Roundup Ready Xtend system for soybeans and cotton in the Americas.”

(Gillam, 2015)



32

2015

July 23: EPA approves DuPont FeXapan dicamba containing DGA dicamba and inert ingredients intended to reduce volatility and drift (BASF, 2015). The new formulation will not be readily available to farmers until 2017.



GROUP 4 HERBICIDE	
For weed control in asparagus, conservation reserve programs, corn, cotton, fallow croplands, general farmstead (noncropland), sorghum, grass grown for seed, hay, proso millet, pasture, rangeland, small grains, sod farms and farmstead turf, soybean, and sugarcane.	
Active Ingredient	By Weight
Diglycolamine salt of dicamba (3,6-dichloro-o-anisic acid)*	42.8%
Other Ingredients	57.2%
TOTAL	100.0%
* contains 29.0% 3,6-dichloro-o-anisic acid (2.9 pounds acid equivalent per U.S. gallon or 350 grams per liter).	
EPA Reg. No. 352-XXX	EPA Est. No. _____
Nonrefillable Container	
Net:	
GR	
Refillable Container	
Net:	

ACCEPTED
07/23/2015

Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 352-913



33

2015 and 2016 – Stage Set for Illegal Spraying

About 100 seed companies sell dicamba-resistant soybeans for the first time, via licenses from Monsanto and DuPont Pioneer.



Seed is sold in 2015-2016 despite NO approved registrations for the new, supposedly “low-volatility” dicamba. Post-emergence applications of dicamba on dicamba-resistant soybeans or cotton would be off-label and illegal.

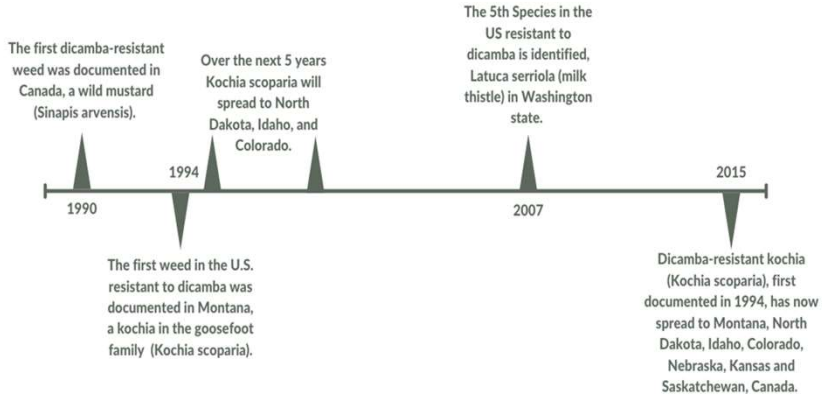


34

A Bright Future Looms for Dicamba-Resistant Weeds

Dicamba-resistant weeds have been found in farm fields since the 1990s. As of 2015, dicamba-resistant kochia had been found in seven US states.

Weed scientists warn that resistance will soon undermine dicamba efficacy and Xtend technology.



35

2016: Dicamba-Resistant Crops

Monsanto's new dicamba-resistant soybean seeds are first sold and planted in the spring of 2016...

...but EPA did not approve the new dicamba formulations allowing over-the-top applications on dicamba-tolerant soybeans until late 2016. Monsanto's XtendiMax formulation was registered in November and BASF's Engenia in December.



36

2016 – A Rocky Cart-Before-Horse Product Launch

Monsanto projects 2016 sales of seed sufficient to plant 3-4 million acres of soybeans.

Because dicamba is NOT approved for post-emergence applications on any crop, Monsanto discounts the price of seed by \$5 per unit (140,000 seeds, or enough for ~ 1 acre



37

2016 – Warnings from Weed Scientists

Tom Barber, University of Arkansas Extension Weed Scientist, posts a chilling overview of the dicamba-drift damage he has observed in several parts of the state.



Tom Barber, "Dicamba Drift and Potential Effects on Soybean Yield"

"We have observed a 10% [soybean] yield loss from dicamba at rates as low as 1/1024X of the labeled rate."

This is a very low level of drift following volatilization. Higher levels of drift present even greater threat.



38

Dicamba Symptoms on Non-Tolerant Crops

Damage symptoms include cupped and wrinkled leaves. Drift may cause yield loss on sensitive non dicamba-tolerant crops, like soybeans.

Non dicamba-resistant soybeans



Dicamba-resistant soybeans



(Begemann, 2017).

39

Impacts of Dicamba

In one study, even very low doses of dicamba was found to be 75-400 times more toxic to off-target plants than glyphosate.



Just a minute amount of dicamba can cause damage and loss of yields in highly susceptible crops like soybeans.

(Dewey, 2017).

40

2016 – Warnings from Weed Scientists

Barber also warns that low rates of dicamba drift/movement onto soybeans, especially later in the crop’s growth cycle (i.e. R3-R5), can result in carryover of dicamba in the seed

This triggers problems if the soybeans are used for seed in the next year and increasing dietary exposure levels.

[\(Barber, 2017\).](#)



41

Spring and Summer 2016 – Signs of Drift

The first dicamba-resistant soybeans are planted in 2016, despite lack of any dicamba formulation approved for post-emergence use.

Tens of thousands of soybean acres are damaged by drift from illegal, post-emergent applications of dicamba.

State pesticide regulatory authorities deal with a first flush of dicamba-driven crop-damage reports.



42

2016 – Citizen’s Petition

Citing damage to non-target crops from dicamba drift. The Save Our Crops Coalition (SOCC) petitions EPA to conduct a review of dicamba herbicides, calling for restrictions.

In many specialty crops, no established tolerance exists for dicamba so **any residues will "render crops unmarketable."** Dicamba amounts as low as 1/300th of the soybean application rate cause significant loss in tomatoes.

(Smith, 2016)

RE: CITIZEN'S PETITION TO CLASSIFY PESTICIDES WITH THE ACTIVE INGREDIENT DICAMBA AS RESTRICTED USE

The Save Our Crops Coalition (SOCC) is a grassroots coalition of farm interests organized for the specific purpose of preventing injury to non-target crops from exposure to 2,4-D and dicamba. SOCC does not oppose advances in plant technology, particularly genetic modification, but does oppose actions that would result in substantial injury to non-target crops and to the habitats necessary for their pollinators.

Non-target plant damage associated with herbicide spray drift and volatilization is a major concern for specialty crop growers and processors. Credible estimates project significant increases in the amount of dicamba that will be applied upon the introduction of dicamba-tolerant crops, and, dicamba, because of its potential to drift and volatilize, has proven to be one of America's most dangerous herbicides for non-target plant damage.

Thus, SOCC respectfully submits the following petition requesting EPA conduct a classification review of products with the active ingredient dicamba to determine whether any or all such products should be classified for restricted use.



43

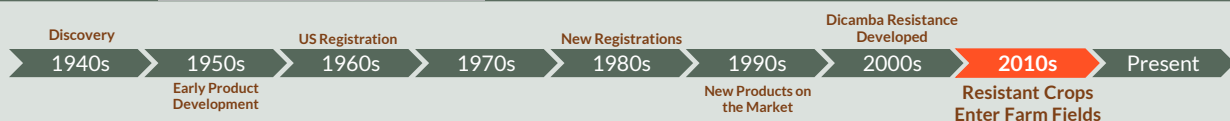
2016 – A letter to Monsanto

August 9, 2016: In an open letter to Monsanto, SOCC urges the company to address the problems stemming from the new dicamba-resistant crops, claiming that the rise in drift incidents confirmed their concerns.



(Smith, 2016)

"That unscrupulous applicators will apply non-labeled generic forms of dicamba that are prone to off-target movement if such generic forms cost less and that dicamba application later and later in the growing season is especially hazardous given dicamba's propensity to volatilize and drift as temperatures rise."



44

2016 – Specialty Crops Impacted by Drift

Based in Indiana, Red Gold Tomatoes is the largest tomato processor in the world and purchases 80% of those produced in the Midwest.

Tomatoes are one of many high-value, specialty crops that are super-sensitive to dicamba.



(Kaskey and Mulvany, 2016a)



45

2016 - “Save Our Crops Coalition” Speaks Out

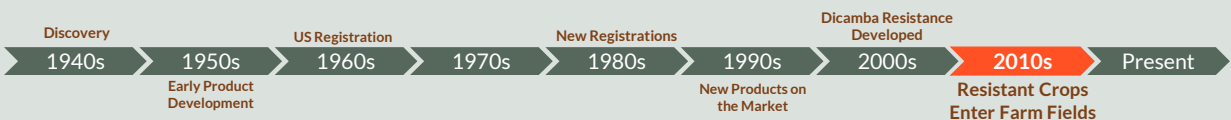
“It’s like getting run over by an SUV rather than an 18-wheeler. It doesn’t really matter if you’re dead.”

Steve Smith
Red Gold Tomatoes Agriculture Director and founder and Chairman of the “Save Our Crops Coalition.”

On the difference between old dicamba herbicides and the new, low-volatility formulations



(Kaskey and Mulvany, 2016a)



46

2016 - Monsanto Ramps Up Marketing and Thinks Big

August 17: Day one of “Whistle Stop Tour” for major investors and Wall Street analysts.

- Lengthy, on the record presentations made by top Monsanto executives.
- Bullish projections shared on the expected market penetration of XtendiMax, dicamba-tolerant soybeans and cotton.
- Technology will be incorporated in *250 million acres of crops globally* within just a few years and dicamba will become the #2 selling herbicide after Roundup.

(Monsanto, 2016a).



47

2016 - Unintended Consequences

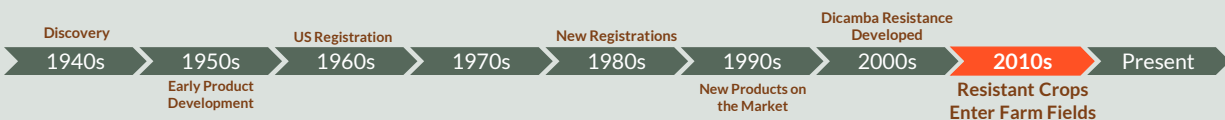
September 1: Bloomberg News Releases an article describing crop damage from dicamba.

Farmers tell Bloomberg they feel “compelled to buy the engineered Monsanto seed to avoid injury next season.” Wall Street analysts make the same point.

“Monsanto Seeds Unleash Unintended Consequences Across U.S. Farms.”
Jack Kaskey and Lydia Mulvany,
Bloomberg News

(Kaskey and Mulvany, 2016a).

“There’s just something about the herbicide dicamba that’s always made it hell on soybean and cotton crops.”



48

2016 – Shots Fired

October 27: A farmer confronts a neighbor over illegal dicamba use, which drifted onto his land and caused extensive damage. An argument leads to the murder of Mike Wallace, a longtime Arkansas soybean farmer.

(Demillo, 2017)

”He could not understand why people would spray things that would hurt others.”

Mr. Wallace's sister

Arkansas farm worker gets 24 years for murdering farmer in dicamba dispute

A Pesticide, A Pigweed And A Farmer's Murder

Pesticide Drift Leads to Alleged Murder

A Killing Season: Dicamba herbicide upends the agriculture industry, pitting neighbor against neighbor in a struggle for survival

Discovery 1940s → 1950s (Early Product Development) → US Registration 1960s → New Registrations 1970s → 1980s → 1990s (New Products on the Market) → Dicamba Resistance Developed 2000s → 2010s (Resistant Crops Enter Farm Fields) → Present

49

2016-2017: Dicamba Drift Damage

Complaints of damage from dicamba drift rise in 2016 and 2017.

Date	Complaints	Acres damaged
July 19, 2017	1,400	2.5 million
August 10, 2017	2,242	3.1 million

(Bradley, 2017); (American Soybean Association, 2017).

Discovery 1940s → 1950s (Early Product Development) → US Registration 1960s → New Registrations 1970s → 1980s → 1990s (New Products on the Market) → Dicamba Resistance Developed 2000s → 2010s (Resistant Crops Enter Farm Fields) → Present

50

November – December 2016

November: Long-past the harvest of the 2016 soybean crop, Monsanto’s XtendiMax and BASF’s Engenia form of dicamba are registered for post-emergent use on dicamba-resistant crops:

- Both formulated to (hopefully) reduce volatility and off-target movement
- BASF claims 70% reduction of volatility in Engenia dicamba compared to DGA-based dicamba
- Independent tests show lower reductions



([BASF, 2016a](#); [Monsanto, 2016b](#))



51

2016

December 8: EPA completes “Dicamba and Dicamba BAPMA Salt: Human Health Risk Assessment for Proposed Section 3 New Uses on Dicamba-tolerant Cotton and Soybean.”

The assessment establishes a new dicamba cRfD at 0.04 mg/kg/day.

([EPA, 2016](#))

Why a Third Change in Dicamba cRfD Since 1999?

- New rat reproduction study on DCSA form of dicamba (MRID #47899517) submitted to EPA.
- NOAEL of 4.0 mg/kg/day based on reduced rat pup weight.
- EPA drops the added 10-X FQPA safety factor.
- EPA estimates that residues in food and water from current uses utilize 42% of the cRfD for children 1-2 years old



52

2016: Dicamba Application Rates on Soybeans

Maximum one-time rate of application	Maximum number of applications	Maximum applied per crop season
0.5 pounds dicamba per acre	4 per acre per year	2 pounds dicamba per acre



53

2016 – EPA Acts to Cover Higher Residues

December 8: Final rule establishes new and increases some existing dicamba tolerances, in response to 2010 and 2012 tolerance petitions from Monsanto to cover higher food and animal feed residues in Xtend crops.

- Petition requests soybean forage tolerance of 45 ppm and soybean hay at 70 ppm.



(EPA, 2016)



54

Old Data and Flawed Assumptions Mask Risks

EPA did not include exposure from newly approved uses of dicamba on dicamba-tolerant soybeans.

EPA assumed only 10% of corn treated with dicamba, while USDA data showed 15% corn acres treated in 2016.



55

Low-Balling Rising Risks

EPA's late-2016 dicamba dietary exposure assessment underestimates use in corn, soybeans, and cotton, and also exposures and risks.

Uncertainty in exposure estimates is one of two major reasons in the FQPA statute for imposing the added, 10-X FQPA safety factor. EPA had no basis for estimating Xtend impacts on dietary exposures.



56

Compliance With the FQPA Could Curtail, If Not End, Xtend Technology

The added, FQPA 10-X safety factor would now lower dicamba's cPAD to 0.004 mg/kg/day.

The strongest statutory reason to do so – major uncertainty in EPA's dietary exposure estimates - has not changed. HHRA data confirms a large increase in exposures.

Updated exposure data based on vastly rising use on corn, soybeans and cotton would likely put estimated exposures in children – and for pregnant women - over EPA's "level of concern," even after EPA "refines" its estimates of exposure.

cPAD

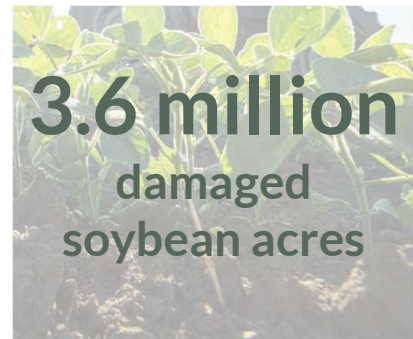


0.004
mg/kg/day

57

2017: Dicamba Drift Damage

Final tallies of 2017 dicamba damage were released by the University of Missouri:



[\(Bradley, 2017c\).](#)



58

2017: Dicamba-Resistant Crops

Dicamba-Resistant Soybeans:

- Planted on 20 million acres
- 1/4 of national crop

Dicamba-Resistant Cotton:

- Planted on 5 million acres
- 1/2 of national crop



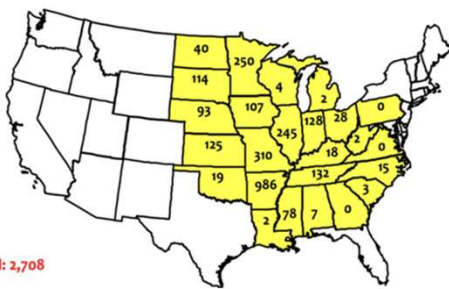
(Parker, 2017).



59

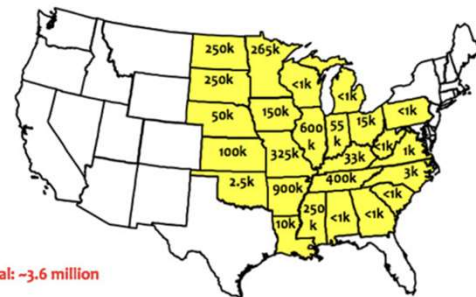
2017: Dicamba Drift Damage

These maps, from a report by Kevin Bradley of the University of Missouri, illustrate a stark picture of millions of damaged soybean acres and thousands of farmers impacted by dicamba in 2017.



*Total: 2,708

Dicamba drift complaints (left) and estimated acres of soybeans damaged (right) as of 10/15/17.

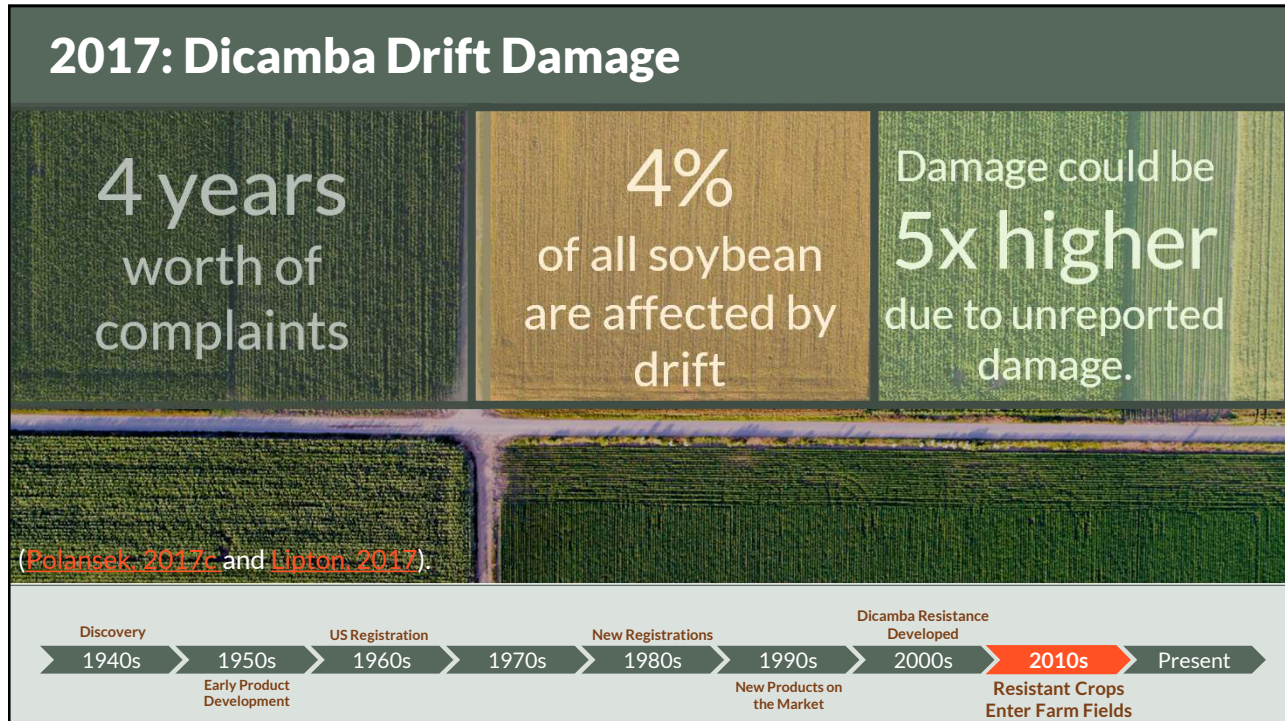


*Total: ~3.6 million

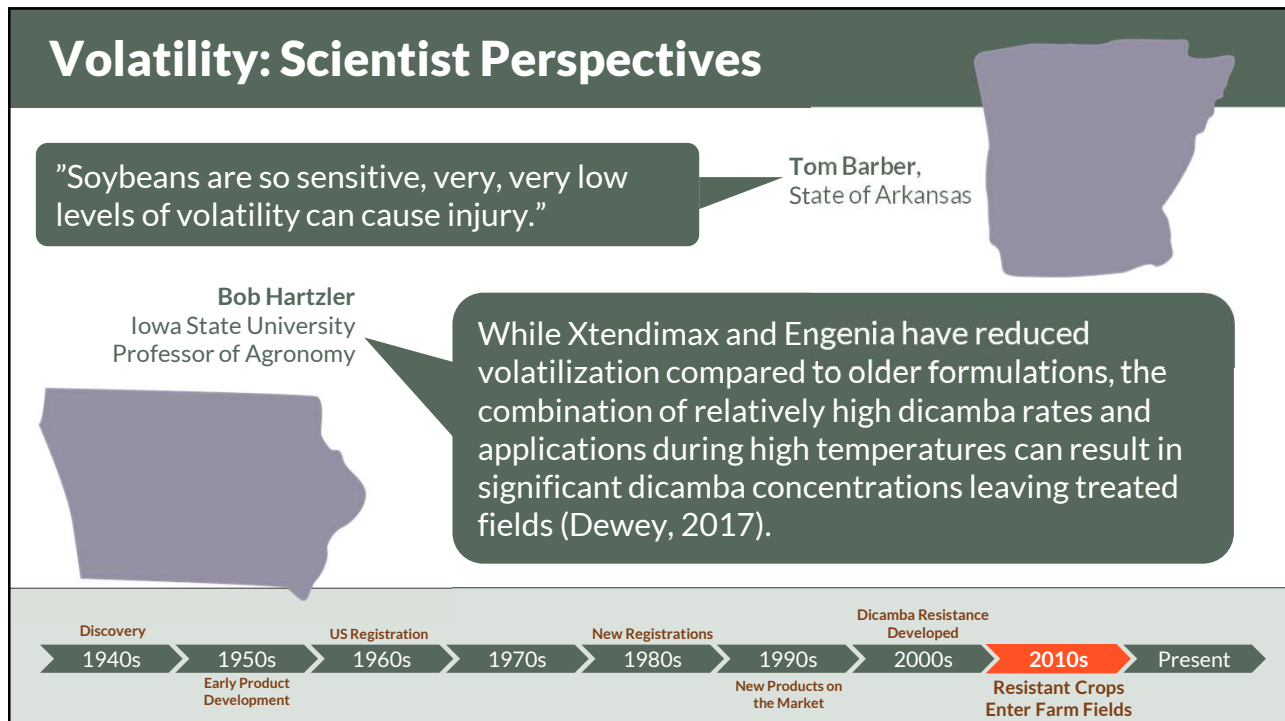
(Bradley, 2017c).



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Volatility: Scientist Perspectives

Independent trials found that while the new formulations had lower volatility right after spraying, they continue to volatilize for 36-72 hours following application.

“Over time, the amount of volatility between old and new formulations was not statistically different.”



Jason Norsworthy,
University of Arkansas

([Hightower, 2017](#)); (Horstmeier, 2017).

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Volatility: Scientist Perspectives

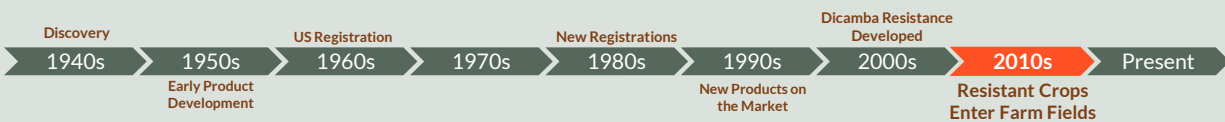
Arkansas State weed scientists report that under realistic, field growing conditions:

“differences in volatility between older dicamba products such as Clarity and newer ones including Engenia and Xtendimax are not as evident [as claimed by the manufacturers].”

Jason Norsworthy
University of Arkansas



([Hightower, 2017](#))



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Industry Response

In response to criticism that volatility was not adequately studied, the company releases a statement on August 23rd touting extensive and "historic testing" of the new formulations and claim a 90% reduction in volatility.

No explanation is offered for the ongoing drift and non-target crop damage crisis.

(Monsanto, 2017b).



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2017 – Shifting Blame to Farmers and Applicators

Late August 2017: Monsanto's chief technology officer calls dicamba a "tremendous success" for most farmers and touts the company's plan to have enough dicamba-resistant seed available for half the soybean acreage in the U.S. next year.

(Abbott, 2017)

In dozens of media interviews, Monsanto suggests applicator error, or other possible causes of reported soybean damage (disease, drought, drift of other herbicides).

The company regards any damage triggered by dicamba drift "*just part of the learning curve.*"



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Industry Allies Push the Spin

The ASA chimes in in late September 2017. They support the new dicamba formulations, but want drift damage investigated and addressed.

Association president Ron Moore calls for more research by independent and industry scientists, citing the "good neighbor aspect...ASA has a duty to ensure that we are successfully coexisting with other crops."



(American Soybean Association, 2017).

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EPA (Non) Response

Though the fall of 2017, the EPA expressed concerns and considered regulatory changes ahead of the 2018 season, The agency ultimately opted not to ban dicamba for the 2018 season.



The acting chief of the herbicide branch states that "ensuring the technology is available" is the agency's top priority, but that it needs to be "used responsibly."

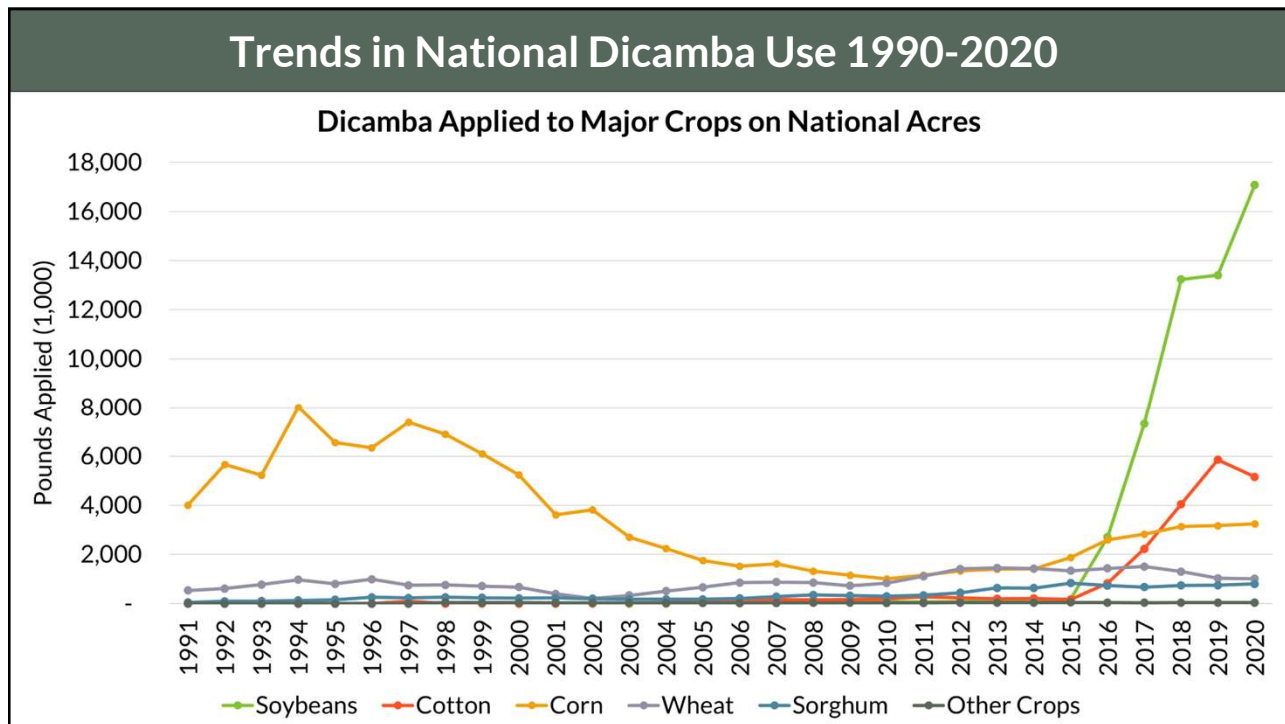
EPA Herbicide
Regulatory Official

"We don't consider this to be normal growing pains for a new technology."

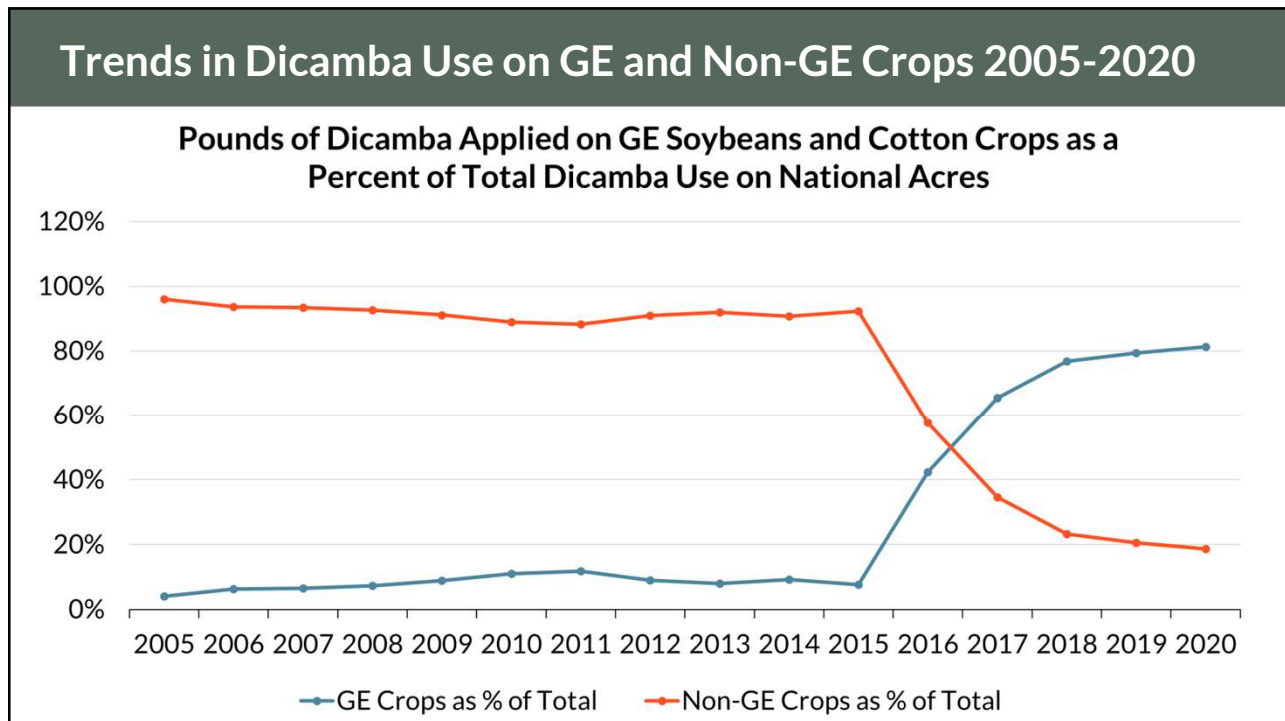
(Polansek and Flitter, 2017)



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Access information on dicamba and 2,4-D use by state and efforts to address dicamba drift and crop damage in the "**State-specific Use and Actions**" section.

Information on dicamba litigation is presented in the "**Dicamba's Many Days in Court**" section.

See published papers on dicamba and 2,4-D health effects in the **HHRA Bibliography**

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*See published papers on dicamba and 2,4-D health effects in the **HHRA Bibliography***

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