

Trials and Tribulations in Arkansas: Dealing with Auxin Herbicides

PLES SPRADLEY

ASSOCIATE PROFESSOR – PESTICIDE ASSESSMENT SPECIALIST

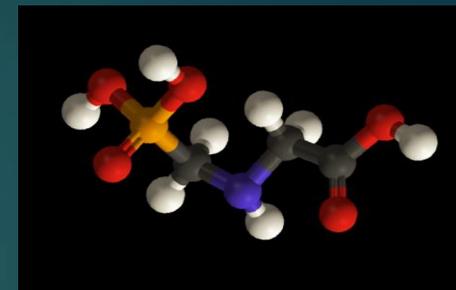


2,4-D

- ▶ Arkansas has a long history of regulating 2,4-D because of its effects on cotton.
- ▶ May not be applied in 10 counties of NE Arkansas from April 16 to Sept. 15 of each year.
- ▶ A buffer zone of four (4) miles for aerial application and one (1) mile for ground application shall be maintained from cotton, unless wind is blowing away from cotton.
- ▶ Temperature restrictions to avoid temperature inversions.
- ▶ Enlist is exempt from some of these restrictions

Dicamba

- ▶ The common name of a broad-spectrum, broadleaf herbicide.
- ▶ An **auxin** - plant growth regulator herbicide
- ▶ First registered in 1967.
- ▶ **Volatility** of the acid compound is well known and **has been a continuing issue.**



Dicamba

4

- ▶ Valuable herbicide in corn, especially in upper mid-west.
- ▶ Also significant uses in pastures, lawns, turf, and forestry.
- ▶ Typically applied in early spring, before temperatures climb.



Dicamba

- ▶ Non-Dicamba tolerant soybean is by far the most sensitive crop, but it can affect most broadleaf plants.
- ▶ Monsanto recently incorporated dicamba resistance into soybean and cotton plants because of glyphosate resistant weeds.



Glyphosate Resistant Crops

- ▶ **Roundup Ready** crops introduced in 1996
- ▶ **Revolutionized weed control** in certain crops.
 - ▶ Lower environmental impact
 - ▶ Less overall herbicide use
 - ▶ Almost total weed control with one product – unprecedented.

Glyphosate Resistant Crops

- ▶ But **glyphosate resistant** weeds started appearing in mid-south in early 2000, just like the weed scientists predicted.
- ▶ Weed scientists had emphasized resistance management for years, but the **RR technology was hard to abandon.**

- ▶ Monsanto, a leader in GMO seed technology, developed dicamba resistant crops as one answer to glyphosate resistant weeds.
- ▶ Good potential as long as the volatility of dicamba could be reduced.
- ▶ Initially, both BASF and Monsanto worked on new dicamba formulations **to reduce volatility**.

The First Problems with Dicamba in Arkansas

- ▶ Monsanto's dicamba tolerant (DT) crops were first released before 2015 growing season.
- ▶ But the new less-volatile dicamba formulations weren't registered until late 2016.

- ▶ Older, more volatile formulations were **illegally** used on some DT crops in 2015 and 2016.
 - ▶ Significant **off-target** movement.
 - ▶ Finger-pointing and hard feelings.
 - ▶ The **murder** of Mike Wallace in NE Arkansas in October 2016.

Farmer vs. farmer

The fight over the herbicide dicamba has cost one man his life and turned neighbor against neighbor in East Arkansas.

By David Koon

Plant Board's Issues with this New Technology

- ▶ University research on volatility was not allowed before registering.
- ▶ “Reduced” volatility claim based on lab & limited field testing.

Plant Board's Issues and Actions

- ▶ **Penalties** for misuse in 2015 and 2016 **did not** seem to **deter** use of older formulations.
- ▶ Predictions from weed scientists that even new low-volatility formulations could be a significant issue when a **million-plus acres** sprayed in AR.

2016/2017

13

- ▶ Arkansas conducted very extensive educational efforts on dicamba after what happened in 2016.
 - ▶ **Grower meetings** (100s of individuals)
 - ▶ **Field days** (100s)
 - ▶ **Pigposium** (400+)
 - ▶ **Spray clinics** (775+)
 - ▶ **Mandatory online training and testing** (1,084)
 - ▶ **Pesticide Applicator Training** sessions (>1,300)

Some of the Steps the ASPB took before 2017 Growing Season.

- ▶ After the murder of Mike Wallace and the off-target issues of 2015 and 2016 (32 complaints) the ASPB decided new regulations were needed.
 - ▶ Proposed regulations for 2017 to **restrict** (not a ban) the use of dicamba **after April 15**.
 - ▶ **Only** BASF's **Engenia** could be used after 4/15 because of perceived **problems with Monsanto**.

Actions by ASPB for 2017 Growing Season

15

- ▶ All applicators required to take online training and testing by UA Extension – only state to require training and testing.
- ▶ Increased fines from \$1000 to \$25,000 per offense, but final legislation prevented fines from being applied to 2017 applications.
- ▶ 100 ft buffers on all sides with ¼ mile buffer downwind. 10 mph wind restriction. VMD>400 microns. Un-researched tank mixes prohibited.

- ▶ By mid-June 2017 the dicamba complaints were taking off in **unprecedented** numbers.
- ▶ **At first** symptoms appeared as **drift**, but soon it appeared that symptoms could only be explained by **volatility and vapor drift**.
 - ▶ No drift pattern
 - ▶ Consistent symptoms from edge to edge
 - ▶ **“Every field of non-DT soybeans in NE Arkansas showing symptoms.”**

- ▶ ASPB voted to **ban dicamba on June 23, 2017** because of complaints.
- ▶ **120 day ban took effect on July 11** because of required governor and legislature approvals.
 - ▶ Exemptions for forage and pastures.

2017

18

- ▶ Almost 1000 dicamba complaints in Arkansas 2017. Annual average is usually 100 -150 total for all pesticides.
- ▶ 3.6 million acres of soybeans affected nationally and over 2700 complaints.

Volatility and Vapor Drift

19

- ▶ Recent research (2017) in Arkansas, Missouri, Tennessee, Indiana, and Nebraska has shown that the **reduced volatility** of the new dicamba formulations **has not eliminated** the volatility or the potential for vapor drift.



- ▶ Research showed that these products may volatilize over a period of days and the vapor drift can move in unexpected directions due to changing wind direction, temperature inversions, etc.

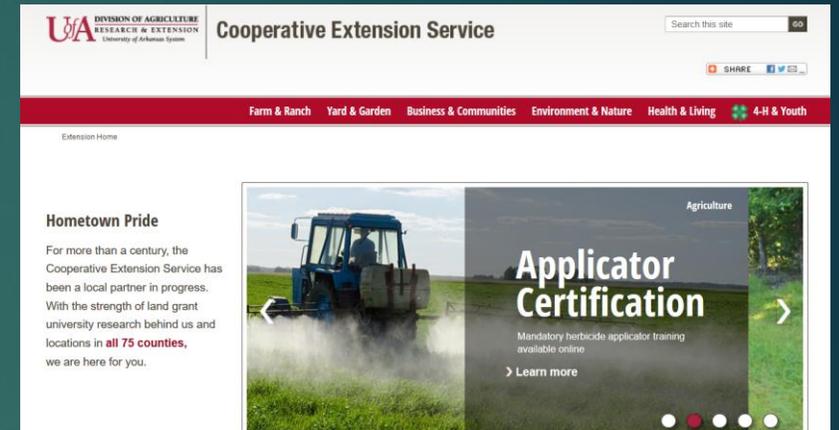


- ▶ Some folks said it was everything **except** volatility.
 - ▶ They said our educational program was inadequate
 - ▶ Doesn't account for what happened in other states.
 - ▶ Was it all due to applicator error and label violations?

2018 Regulations in Arkansas

22

- ▶ In Arkansas, **all ground applications** of dicamba for agricultural use were **prohibited from April 16 to October 31** of each year.
 - ▶ Exemptions for pasture/rangeland, turf, ornamentals, forestry injections, and home use.
- ▶ All applicators making ground applications of dicamba had to take the UACES online training and pass the required exam (passing grade of 90%)



You cannot educate away problems with volatility!

- ▶ 200 dicamba complaints in 2018 – an 80% reduction from 2017, but still way too many.

Why Was Arkansas a Focal Point?

24

- ▶ Public and private **disparagement of ASPB, UA personnel, and applicators.**
- ▶ AR has had a long history of regulating problematic herbicides
- ▶ **Public hearings** allowed for open discussion from both sides.
 - ▶ Over **26,000 public comments** received on dicamba and the proposed regulations.

FOOD FOR THOUGHT

Monsanto Attacks Scientists After Studies Show Trouble For Weedkiller Dicamba

October 26, 2017 · 4:57 AM ET
Heard on Morning Edition

Why So Many Off-Target Cases in Arkansas 2017?

- ▶ Both **cotton and soybean** acres treated and non-DT soybeans extremely sensitive to dicamba.
- ▶ **Long soybean planting season** in Arkansas.
- ▶ **Topography** of the Delta.
- ▶ **Temperature inversions**.

Latitude (degrees)

36
35
34
33

Ozark Mountains

Arkansas Valley

Ouachita Mountains

Crowley's Ridge

Mississippi Alluvial Plain

West Gulf Coastal Plain

Fort Smith



2017 and 2018: Total number over-the-top dicamba-related complaints.

2017 fb 2018

- ▶ South Carolina, 3/1
- ▶ Iowa, 107/138
- ▶ Nebraska, 93/104
- ▶ North Carolina, 15/10
- ▶ Ohio, 28/52
- ▶ Missouri, 310/212
- ▶ Minnesota, 250/28
- ▶ Arkansas, 967/184
- ▶ Michigan, 2/6

2017 fb 2018

- ▶ Alabama, 7/14
- ▶ Louisiana, 2/35
- ▶ Mississippi, 78/60
- ▶ South Dakota, 114/45
- ▶ Illinois, 245/326
- ▶ Indiana, 128/130
- ▶ North Dakota, 40/45
- ▶ Kansas, 125/105
- ▶ Tennessee, 132/49

EPA Label Changes in fall of 2017

28

- ▶ Classification as **Restricted Use Pesticide** and permitted use only by certified applicators (**AR had already done this**)
- ▶ **Dicamba training** for applicators to reinforce product stewardship (**AR had already done this**)
- ▶ Limit application to conditions where maximum wind speed is below 10 mph (**AR had already done this**)

Label Changes in fall of 2017

29

- ▶ Applications made only between sunrise and sunset
- ▶ **Tank clean-out** in a manner that prevents cross contamination
- ▶ **Susceptible crop** language and **sensitive crop/area** registries to increase awareness of risk to especially sensitive vegetation nearby.

2018 Labels for Dicamba Products

- ▶ Many restrictions for particle drift makes label difficult to follow.
 - ▶ No rainfall in next 24 hours
 - ▶ Specific spray tips
 - ▶ Wind speed and direction, as well and equipment speed
 - ▶ Detailed, specific buffers
 - ▶ Make visual inspection of field borders
 - ▶ Must visit website for more information on nozzles, sensitive crops, etc.
 - ▶ Boom height
 - ▶ Gallons per acre of water
 - ▶ Sensitive area and susceptible crop restrictions
- ▶ **BUT VOLATILITY BARELY ADDRESSED ON LABELS.**

2019 Labels for Dicamba Products

31

- ▶ Only certified applicators may purchase and apply the products
 - ▶ Those operating under the supervision of a certified applicator may no longer purchase or apply.
 - ▶ Anyone who mixes, loads or cleans dicamba application equipment must become licensed.
- ▶ Applicators must complete dicamba-specific training (also required in 2017 and 2018)
- ▶ Increased recordkeeping requirements
- ▶ Additional wind speed restrictions
- ▶ Additional temperature inversion restrictions
- ▶ Additional spray system equipment clean-out

- ▶ Three different labels- “enhanced” is the language used by the registrants – in three years seems to indicate there is a problem somewhere. Unprecedented.
- ▶ Most weed scientists and state regulators think the problem is with the formulation.



- ▶ Largest, off-target problem ever for a pesticide in the U.S.
- ▶ Impacts well beyond the “cupping” of soybean.
 - ▶ Organics, non-GMO proponents, home gardens, ornamentals, etc.
 - ▶ Human health from atmospheric loading?



- ▶ Herbicide resistant weeds are an extremely serious problem but we have to be careful about our approach – seed technology may not be the best way to control weeds in the long run.
- ▶ Chemical trespass may generate some very tough discussions about off-target movement of pesticides.

For More Information

- ▶ Dicamba in Arkansas – Research and FAQs
 - ▶ <https://www.uaex.edu/farm-ranch/pest-management/weed/2017-dicamba.aspx>
- ▶ Association of American Pest Control Officials – Dicamba
 - ▶ <https://aapco.org/2015/07/02/dicamba/>

QUESTIONS?