Why Drift? Why Now?

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Dicamba, Monsanto, and the Dangers of Pesticide Drift: A Modern Farmer Explainer

UPDATE: Drift Dispute Leaves One Dead, One in Custody

Dicamba drift stirs pot of farm trouble

What caused widespread dicamba drift in Missouri?

Timeline of 2,4-D & Dicamba in USA

- 2,4-D introduced shortly after WW II
- Lawsuits for drift damage to grape, cotton and tomato documented in Akesson & Yates (1964)
- Bans in many states
- Dicamba introduced in 1960s
- Drift claims related Banvel use soon after registration
- 1990’s 2,4-D subject of major international toxicology studies

Herbicide Use in the United States (in acres)

Source: HRAC of WSSA

Figure 1: Recent estimated acreage of crops sprayed with 2,4-D or dicamba. Data from www.24d.org, and D. Pepitone, BASF.
• Use will shift to the corn belt
• Annual applications will increase from typically 1 to as many as 3
• Application rate will increase

Off Site Movement (DRIFT)

- 1700 drift incidents reported nationally (AAPCO 2005)
- Estimated 5-10% actual (SDEN 2012)
- Average of 30 in Ohio
- 15% confirmed and action taken
- 2,4-D most common pesticide, dicamba in top seven

2,4-D & dicamba, respectively estimated 75X and 100X riskier to some terrestrial plants than glyphosate

57/63 Vineyards visited in 2013 showed symptoms of 2,4-D drift.
Diagnostic Symptoms

Figure 1. Common leaf injury symptoms observed in vines 42 d after being treated with (a) glyphosate at 8.4 g ha⁻¹, (b) 2,4-D at 8.4 g ha⁻¹, (c) dicamba at 5.6 g ha⁻¹, (d) and (d) nontreated control.
Fig. 1. Tomato response (9 WAT) to herbicide rate was similar regardless of treatment.

Fig. 3. Characteristic formative effects of 2,4-D on tomato foliage, and callus formation on stems.

Fig. 4. Glyphosate, and 2,4-D + glyphosate mixture reduced tomato main stem (MS) height but not total plant (TP) height because lateral shoots grew profusely. Herbicides injured tomato MS, frequently killed the growing point, and reduced MS dry weight (data not reported).
Yield of What?

Here you could use Combo and some Abbreviations for Pre, Full and Post that you have set up with the audience previously.

Doug Doohan, 11/17/2011
Fig. 2. Characteristic basal chlorosis of tomato leaflets caused by glyphosate, and occasional ‘auxin-mimic’ symptom.

1/100 Glyphosate: auxin-type symptoms

Pursuit tomatoes (21 DAT)

Control and 1x (field rate)

Control and 1/100x

Control and 1/300x

Control and 1/1000x

Auxin & 2,4-D are only transiently located on plant surfaces

- Auxin/2,4-D lands on a plant leaf or stem
  - Quickly moved to the roots
  - Also metabolized in the plant
  - Broken down into smaller molecules
- Result: 2,4-D is mobilized/broken down within 72 hours post-deposition
  - Problem: By the time 2,4-D damage is observed, it is difficult to detect

Rep 2 Flowers - Pursuit tomatoes (21 DAT)

Control

Field rate (1x)

1/10 x

1/100 x

1/300x

1/1000x
Effect of 2,4-D Drift on Tomato

<table>
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<th>Distance from Boom End</th>
<th>DAT*</th>
<th>UUP*</th>
<th>0 ft</th>
<th>3 ft</th>
<th>9 ft</th>
<th>18 ft</th>
<th>30 ft</th>
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<tr>
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<td>7.0</td>
<td>6.3</td>
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<td>2.0</td>
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</tr>
</tbody>
</table>

DAT=days after treatment, UUP=upwind of boom, DW=dry weight of plant

Field tests of 2,4-D detectors

- Deployed in field in Wooster, OH
- Deployed with tomato plants
- Plants monitored for damage
- Detectors stored for 2-5 months and analyzed for 2,4-D levels
- 2,4-D detected at significant levels at both 18 and 30 ft. from boom arm
- Across all 4 test-sprays
- Wind speed at 6-8 mph

Field test #2: Samples sprayed in Wooster, OH; detectors were stored in the dark at 4°C, in sealed plastic bags, for approximately 2 months prior to analysis.

OSUE Fact Sheet – HYG 6105-15

Reducing 2,4-D and Dicamba Drift Risk to Fruits, Vegetables and Landscape Plants

Atmospheric Inversion

Vapor

Drift

Non-Target Sensitive Crop

Registry of Pesticide-sensitive Areas

driftwatch™ is a tool to help protect pesticide-sensitive crops and habitats from the drift that sometimes occurs during spray operations.

Select your state: District of Columbia, Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, or use the map.
To Do List

- Inform Commercial Applicators & Adjacent Property Owners
  - Annual Exercise
- Prevent Drift & Compromise at Home
- Register with Sensitive Crop Registry
- Keep Excellent Records
  - Know symptoms of injury and check crops regularly
  - Act quickly
- Deploy Biological Detection Systems
  - Sentinel Plants

What if this happens to you

- Document, document, document
- Contact Department of Ag & Extension
- Symptoms may be diagnostic
  - Take lots of photos
- Samples may be crucial
  - First 3 days are important
- Look for evidence of a trail of symptoms
  - Wild grape, dogwood, hickory, locust

Projected Use

- 2,4-D in 2012 ca 50 million acres (pasture, grain, turf)
- 2,4-D tolerant corn, soybean = 160 million acres
- 30% of 160 million acres = 53 million acres for total of 103 million acres treated
- 3 applications/ season
  - More like 300 million acres
- 17000 drift incidents/ year with 50 million acres
- What will it be with 100-300 million treated acres?

Drift Will Happen – Protection is Needed
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  - Act quickly
- Deploy Biological Detection Systems
- Future
  - Deploy Mobile Detection System

Acknowledgements

- Doohan Lab
- Farms
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- Syngenta Crop Protection
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Herbicide Drift: What’s a farmer to do?

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