Alison Mackinnon, TCM 2010

Concentration and Plant Injury

Results and Relations Between Vapor - Dichamba Volatility Measurements -
How real of an issue is volatility?

- Formulations
- Drift and contamination are issues for all herbicide
- Active ingredient volatility
- Tank contamination
- Spray drift

Concern about off-site movement of Dicamba

Dicamba review
See Hannah Smith poster
University of Tennessee tests
Stoltie Farm tests
Field tests
See Julie Webb and Alison MacIntyre poster for methods
Humidrome tests
Centrifuge tube tests
Laboratory tests

Dicamba Volatility Tests
Injury data on sensitive plants

Comparison of volatility at different temperatures

Comparison of volatility from different surfaces

Monosanto is the only company directly measuring Dicamba

Direct measurement of Dicamba in the air

Data Generated in the Humidome Test
Factors that affect volatility:

- Injury related to length of exposure
- Length of exposure
- Range of temperatures 27°C and 35°C
- Temperature
- Moisture content of soil
- Type of soil
- Soil vs. canopy surface
Volatility from soybean canopy vs soil
At 27°C more volatility is detected from a soybean canopy vs. soil.
Comparison of 1% a.e. Dicamba + 3% a.e. PowerMAX canopy vs soil at 35C

Surface vs canopy

At 35°C more volatility is detected from soil
The effect of temperature on volatility

7x more volatility from soil vs 2x more volatility from canopy with the increase
Closed System Test

1. DAT injury data on soybeans
2. PUF extracted and analyzed by LC-MS
3. Volume of air removed through the PUF
4. Placed in growth chamber at 35°C for 24 hours
5. Soybeans placed in the humic dome
6. 20ml of Dicamba acid solution placed in a Petri dish
II. DAT Injury to Soybeans after a 24 hour exposure at 35°C in a closed system

At or below the level of detection on LC-MS

| % | 
|---|---|
| 0.0039% | 16% |
| 0.0078% | 21% |
| 0.0156% | 25% |
| 0.0313% | 27% |
| 0.0625% | 32% |
| 0.1250% | 33% |
| 0.2500% | 42% |
| 0.5000% | 68% |
| 161.9 | |
Air pulled through PUF at 2 LPM for 24 hours
Humidome placed in growth chamber
Indicator plants placed onto soil, root protecting the roots
Tank mix sprayed onto 50/50 soil at 10 CPM
PowerMAX™
Dicamba formulation tank mixed with Roundup®

Comparison of Volatility of Dicamba Formulations
The injury remains constant at 30%.
The level of Dicamba in the air is much higher at 35°C vs 27°C but formulations. 30% injury is observed in soybeans after 24 hour exposure to Dicamba Dicamba detected in the air.
Velvetleaf plants show a dose response.
Future plans in the humidomes...
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