Case Studies on Dicamba Movement to Soybeans

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Background

Dicamba: 232,000 lb applied to 0.95 million acres in Wisconsin in 2002

Real potential for dicamba drift or tank contamination to injure soybeans

Alternatives hypotheses:

- A physiological response to adverse growing conditions
- The new high yielding soybean varieties are responding to environmental stresses.
- Nitrogen additives such as the biuret concentration in 28% UAN cause leaf distortion.
- Glyphosate causes a hormonal response in Roundup Ready soybeans

Sources of dicamba

Volatility

- Factors to consider (described in proceedings)
  - Distance
  - Time
  - Temperature
  - Salt of dicamba
  - Foliage or soil
  - Rainfall

Sources of dicamba

Drift

8004 flat fan nozzles, 20” height, 40 psi, 8 mph wind

Distance	Drift
25 ft	0.5%
100 ft	0.2%
200 ft	0.125%

Drift increases with increasing boom height or smaller droplet size

Sources of dicamba

Tank Contamination

Soybean injury from as little as 0.01% of 0.5 lb ae/a dicamba

Incomplete clean-out

0.01% = 6.4 oz left after 1 pt/a Clarity in 500 gal spray tank

0.1% = 2 quarts left after 1 pt/a in a 500 gallon spray tank

= 2 gallons left after 5 oz/a NorthStar

Contaminated jugs or equipment

0.01% = 0.05 oz or 1.5 ml Clarity in 500-gallon load

Dicamba injury in soybeans

1. 4 fields tested for dicamba drift and volatility

2. Spray tank tested for residues after clean-out

3. Tested puckered soybeans for growers

Lab analysis by DATCP

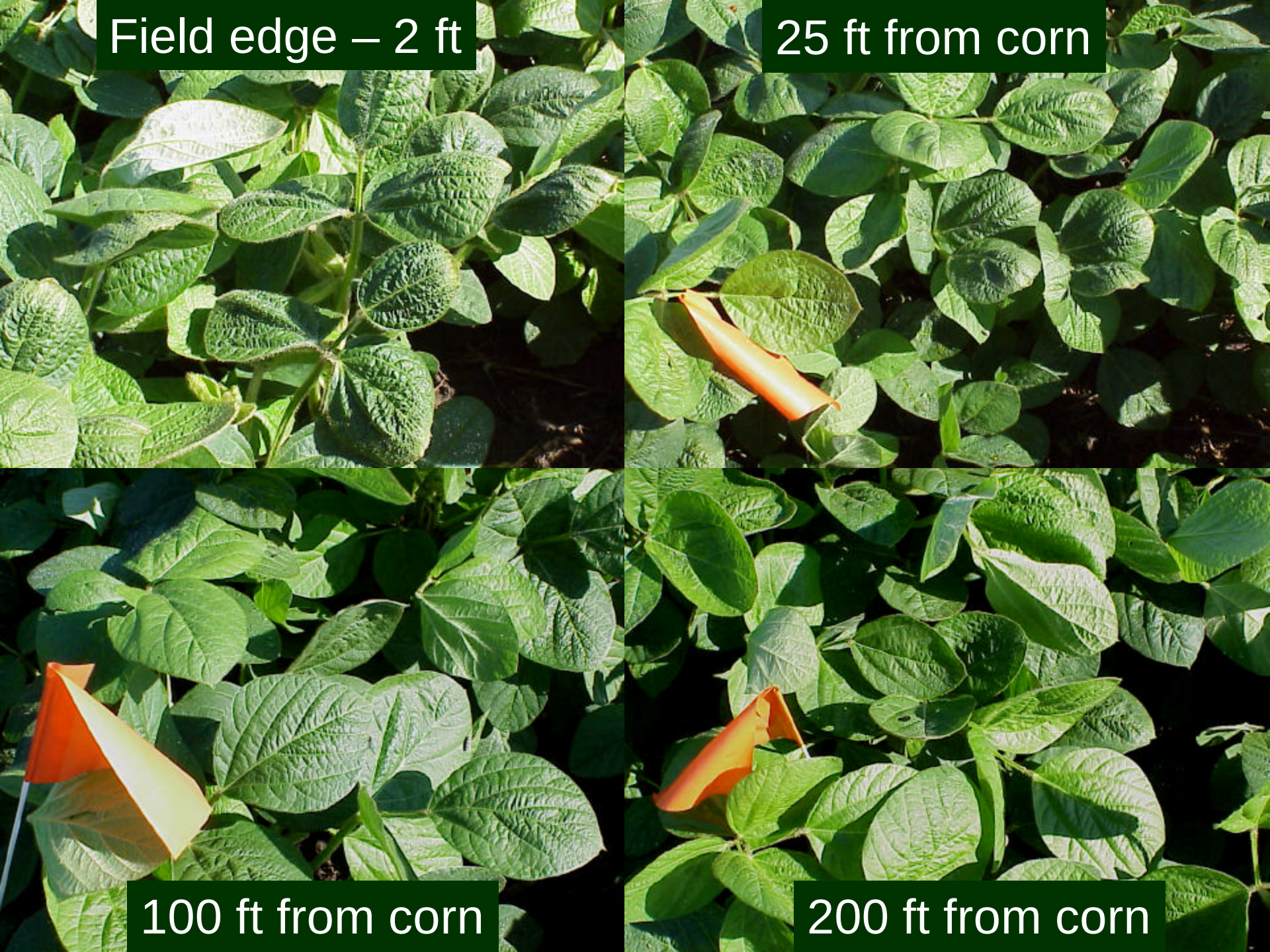
Support by WI Soybean Marketing Board

Field conditions and results of drift/volatility case studies

Field	Date	Wind (mph)	Location of soybean	Herbicide	Rate (oz/a)	Soybean injury 25 (ft)	100 (ft)	200 (ft)
A	6/16	1.5-6 variable	to east	NorthStar	5	VS-S	N-S	N-S
B	6/17	0-3 E-SE	to north to west	Distinct	5	S S	VS N	N N
C	6/27	13-15 WSW	to east	Distinct	5	S-M	N	N

No dicamba residues detected at 50 ppb

Time	Speed	Wind direction
2:10	2-3	
2:15	2-3	
2:19	5-6	
2:23	2-3	
2:25	1.5-4	
2:27	1.5-2	
2:29	1-1.5	
2:32	2	
2:34	1.5	
2:37	2-3	
2:39	1-2	
2:42	3-4	
2:44	4-5	
2:47	4-6	
2:49	4-5	


Field edge – 2 ft
25 ft from corn
100 ft from corn
200 ft from corn

Tank residue case study

Water source	Dicamba (ppb)	Percent of use rate[a]
From spray tank	945	0.024%
From spray tank after overnight	822	0.021%
From spray boom	24,800	0.63%
From spray tank after overnight	1320	0.034%

Based on 1 pt/a Clarity applied in 15 gal/a.

Grower case studies of dicamba residues

10 Grower samples submitted

All displayed “classic” dicamba symptoms

No dicamba residues detected at 50 ppb

60% of field samples had SMV

2,4-D injured and control samples had SMV

Hypothetical dicamba concentrations in soybean after exposure to different dicamba sources

		Full rate	Low rate	
		1% drift or	1%	0.25%
	Dicamba	1% tank cont.	tank cont.	drift
Day	metabolism	Dicamba conc. in soybean		
	(%)		(ppb)	
0	0	1,000	250	63
3	33	670	170	40
6	67	330	80	20
12	83	170	40	10
24	95	50	10	3

Dicamba conclusions

- Dicamba can be a source of leaf puckering on soybeans; virus also needs to be considered
- These case studies likely did not detect dicamba residues in soybean because low doses can cause symptoms and dicamba metabolism
- Dicamba residues can be detected in cleaned spray tanks
- Leaf puckering during vegetative stages is not likely to cause significant yield loss

Acknowledgments

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Wisconsin Soybean Marketing Board