Our Experiences with Off-Target Movement of Dicamba in Missouri: Where do we go from here?

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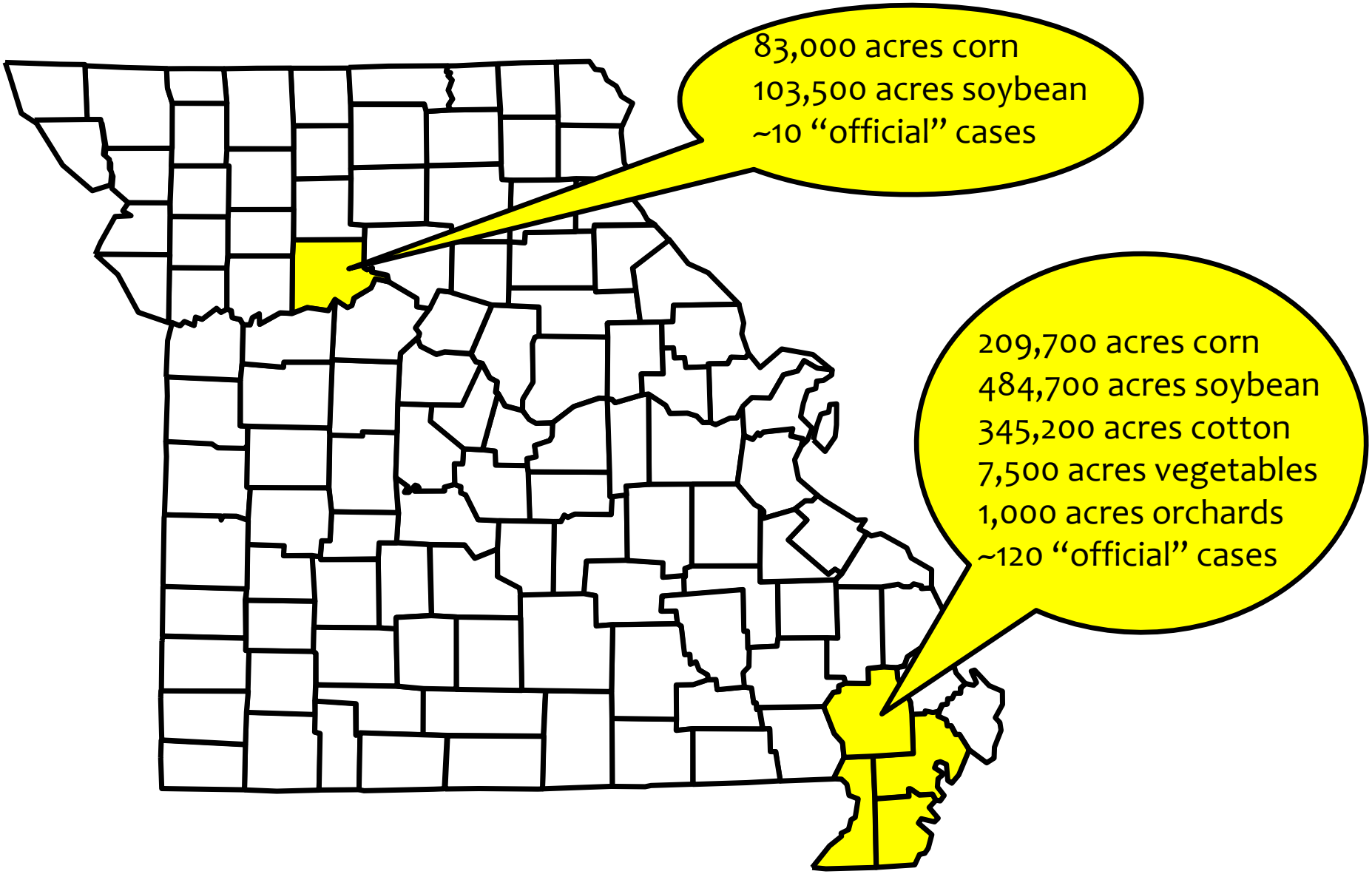
University of Missouri

2 Distinct Geographies




~45,000 acres soybean
“officially” damaged
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How about "unofficial"damage?

~ 100,000 acres ???

2 acres fresh market tomatoes


9 acres cantaloupe
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32 acres watermelon

400 acres purple hull peas

~900 acres of peaches


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And many, many homeowner gardens, trees, ornamental bushes, etc.
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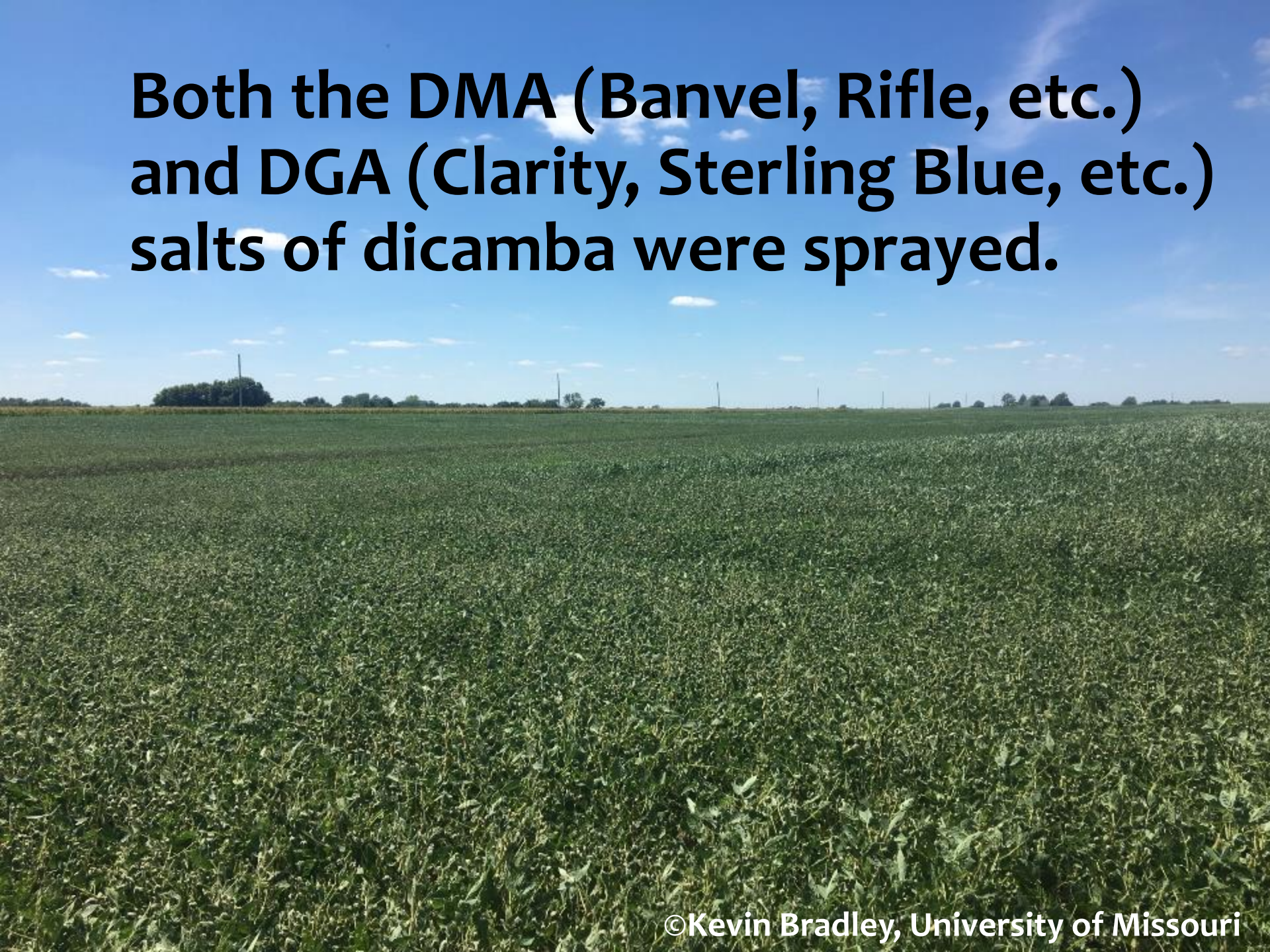
Some common themes in the off-site movement of dicamba in Missouri.


Both the DMA (Banvel, Rifle, etc.) and DGA (Clarity, Sterling Blue, etc.) salts of dicamba were sprayed.
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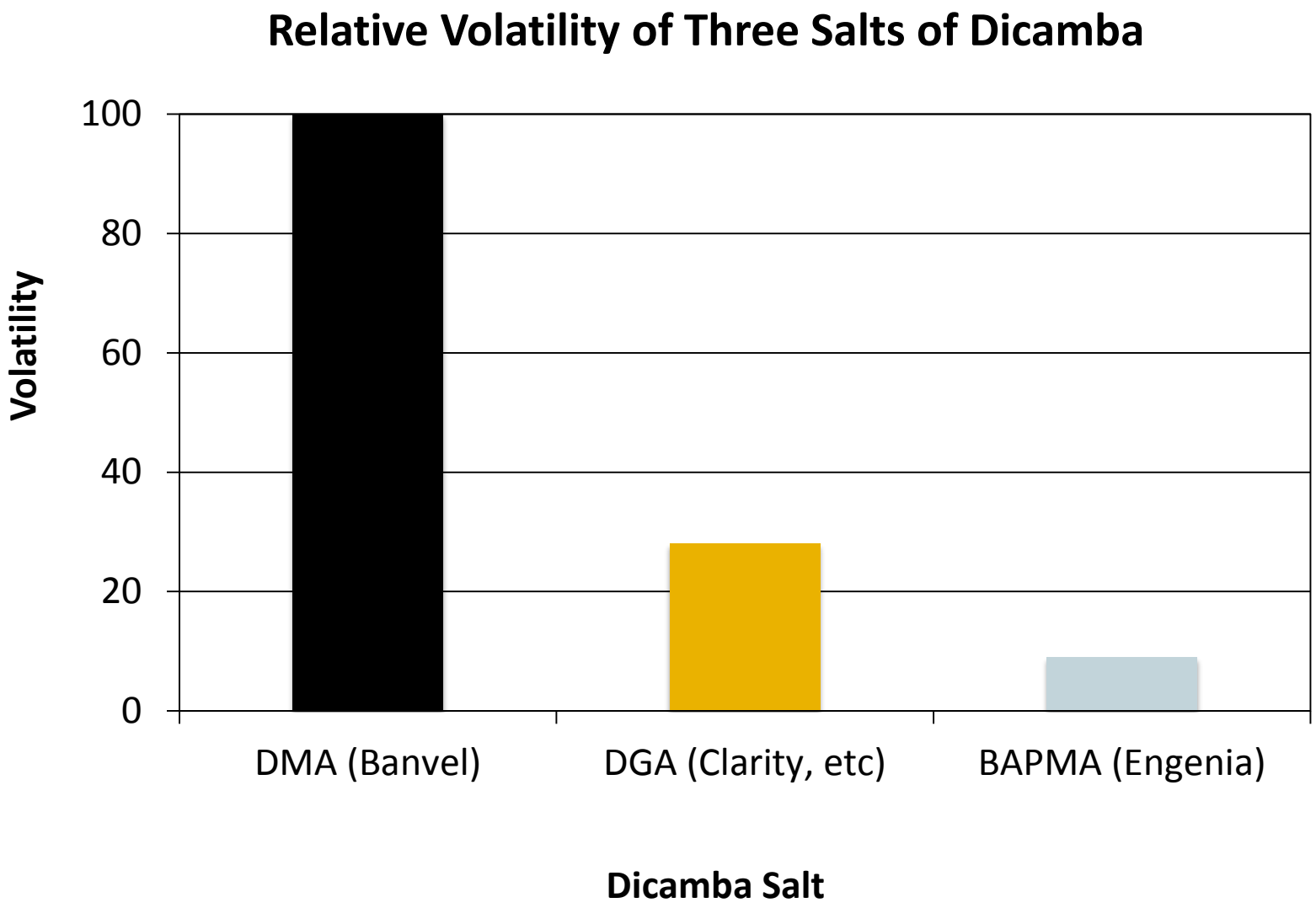
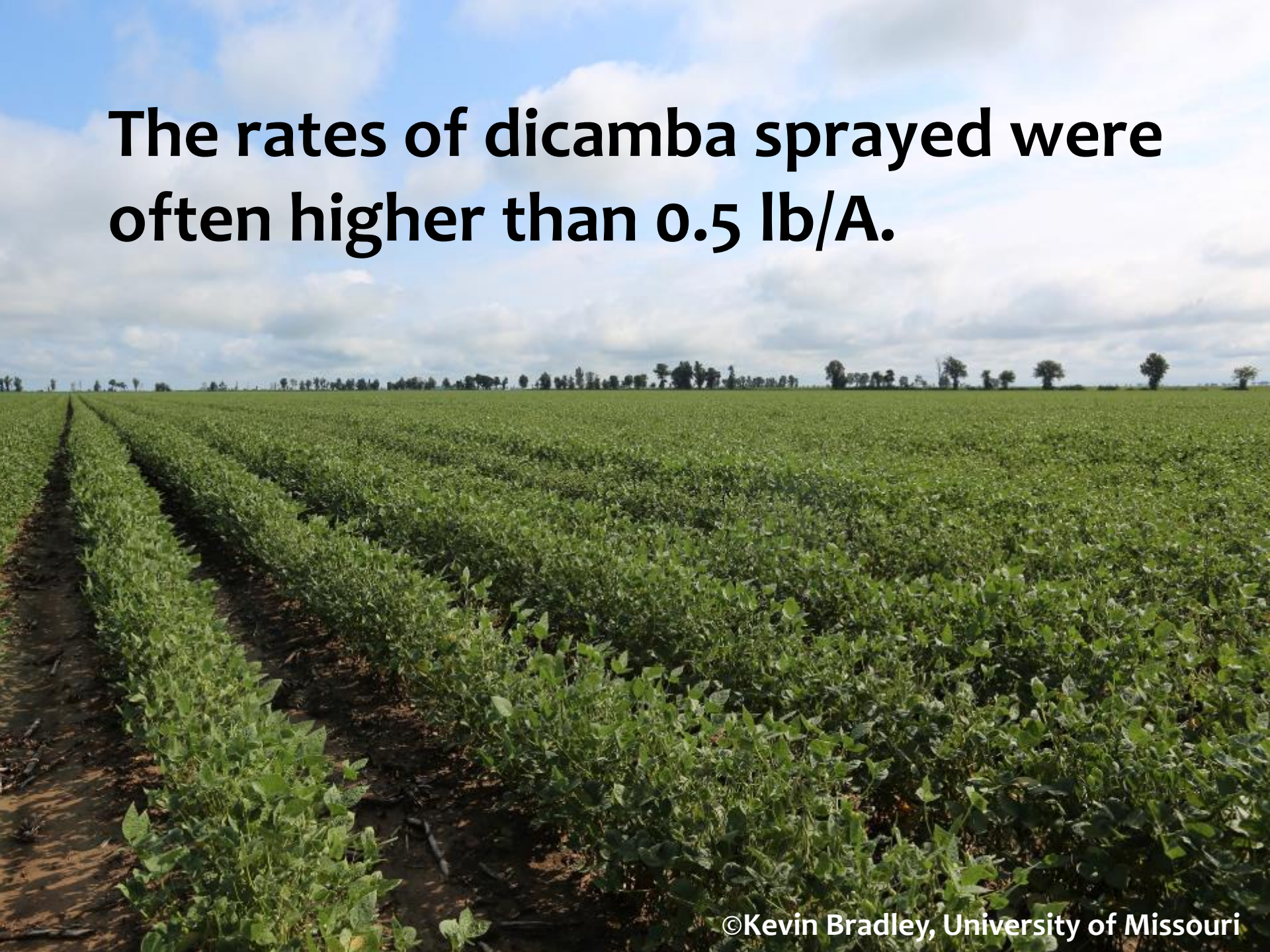
The Dicamba Salt Matters…



The rates of dicamba sprayed were often higher than 0.5 lb/A.



Factors that Contributed to the Problem

- Various crops/traits/herbicides that are in very close proximity and don't necessarily play well together

#1 Factor that Contributed to the Herbicide Injury Problems Observed in 2016

A lack of appreciation for the inherent sensitivity of soybean to *extremely* low concentrations of dicamba.

Non-treated Control – 14 days after V3 application

1/20,000th of the 1x Use Rate (0.000025 lb ae/A dicamba) – 14 days after V3 application

Non-treated Control - 14 days after R2 Application

1/200th of the 1x Use Rate (0.0025 lb ae/A dicamba) – 14 days after R2 application

1/20th of the 1x Use Rate (0.025 lb ae/A dicamba) – 14 days after R2 application

So was it physical drift, volatility, temperature inversions, or what?

Some fields with no discernable patterns and consistent injury across the entire acreage.

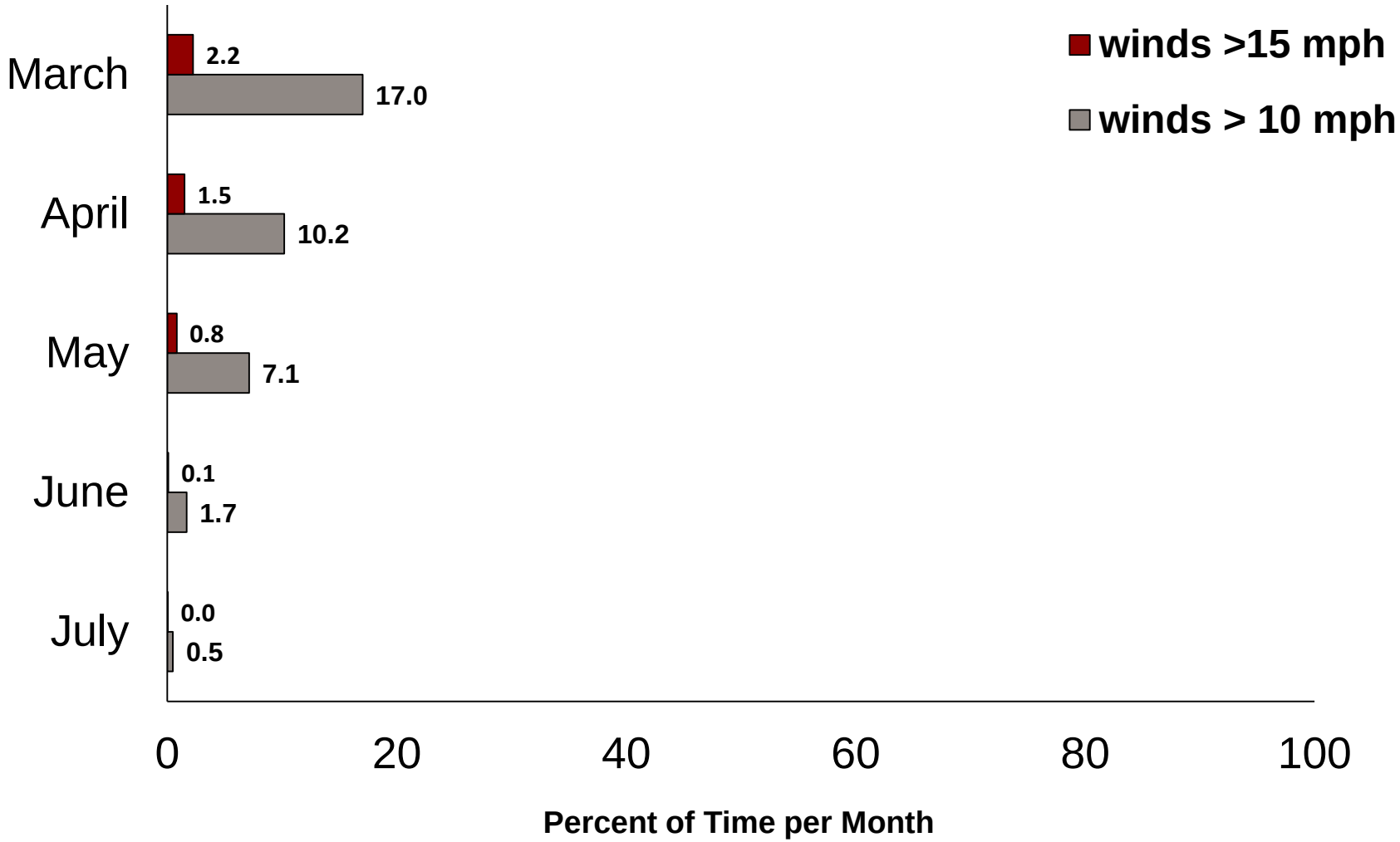
My ESTIMATE: 40%

Other fields with clear patterns of injury more consistent with physical drift .

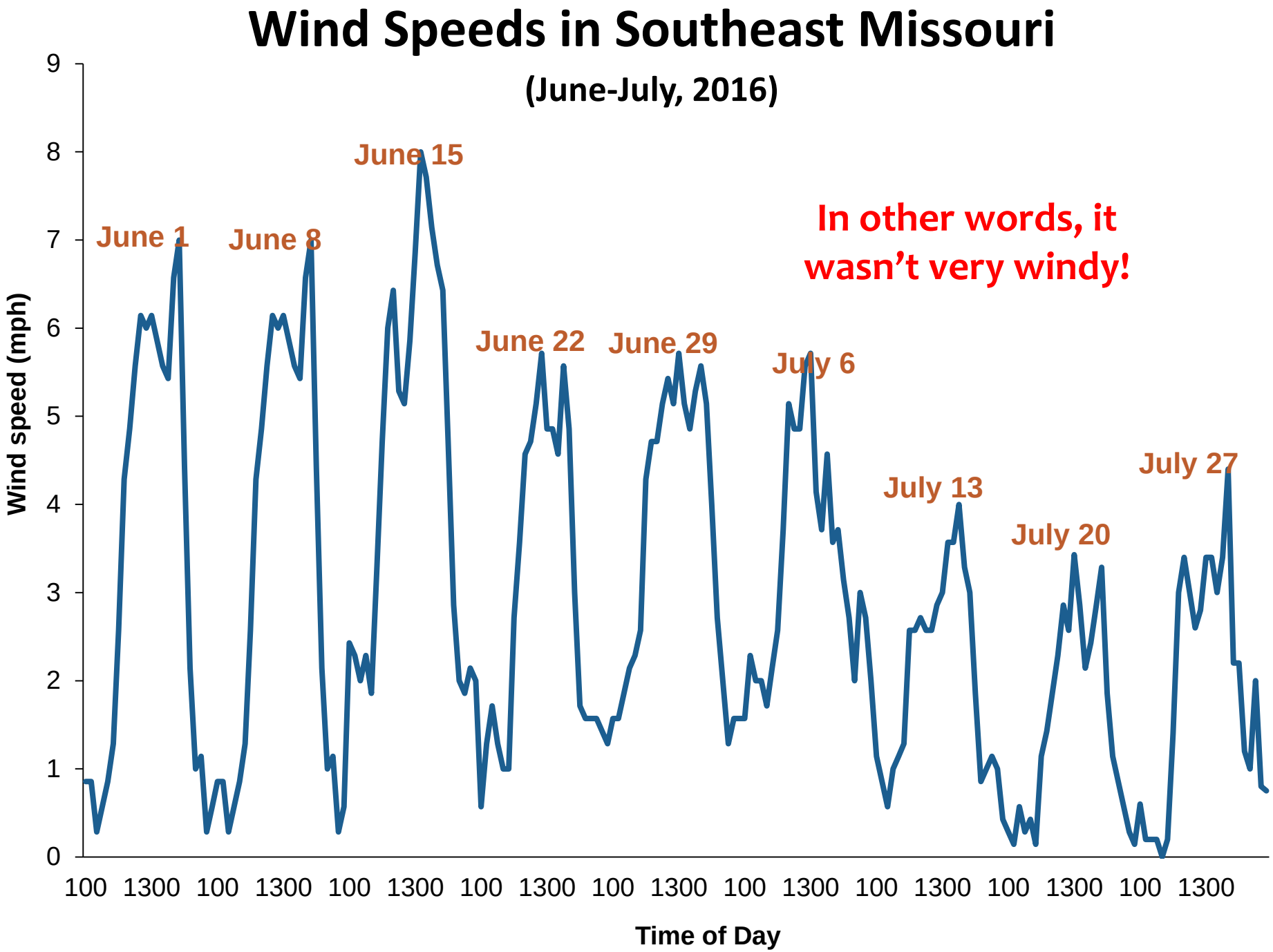
My ESTIMATE: 60%

How Often were Wind Speeds too High to Spray?

Wind Speeds in Southeast Missouri (Portageville), 2016

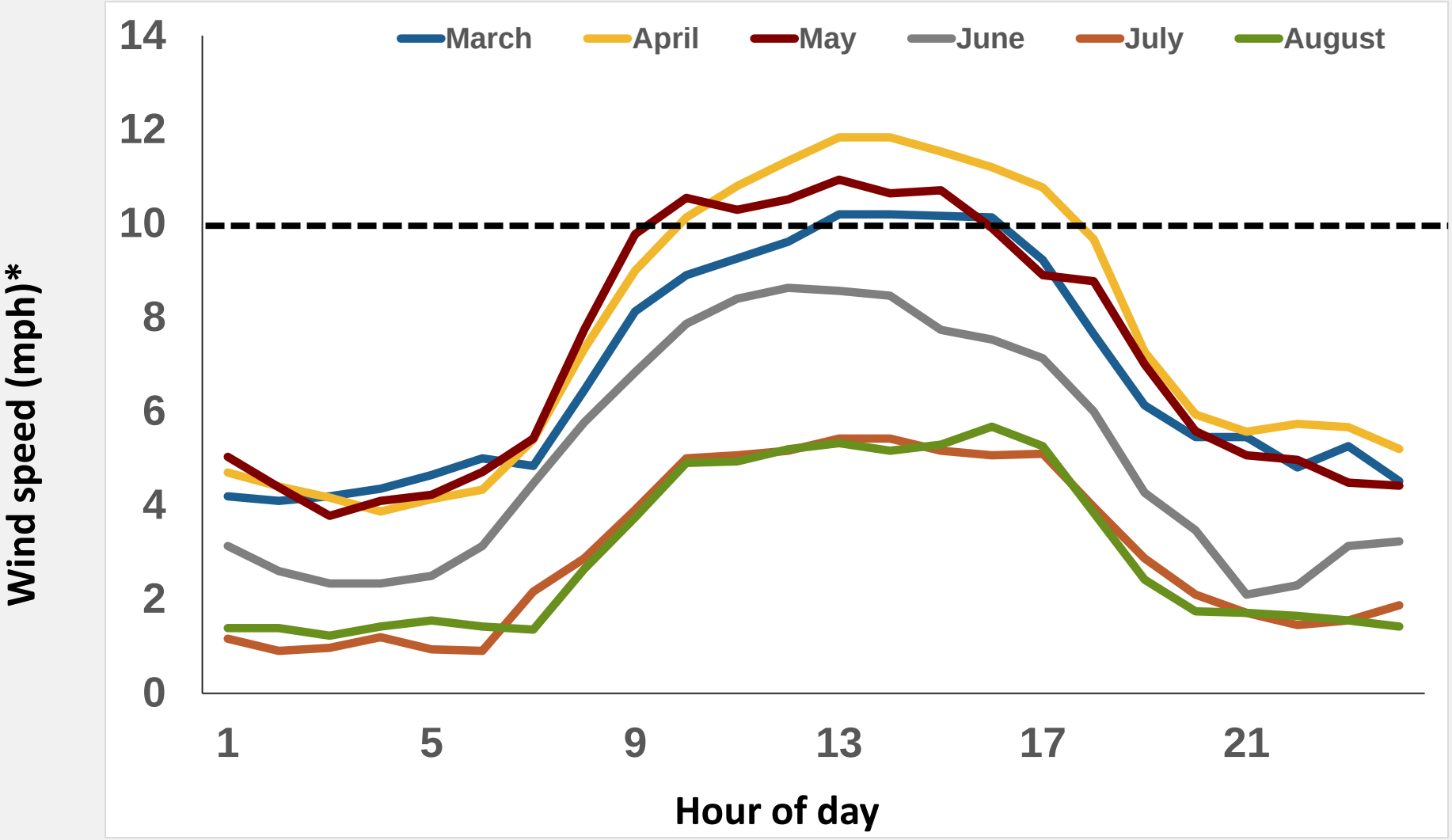


[a]Measurements taken at 3-second intervals and averaged over 5 minutes.
The 5-minute data was used for analysis.


Wind Speeds in Southeast Missouri
(June-July, 2016)
Wind speed (mph)
Time of Day
June 1
June 8
June 15
June 22
June 29
July 6
July 13
July 20
July 27
In other words, it wasn't very windy!
0
1
2
3
4
5
6
7
8
9
100
1300

Historical Wind Speeds

Southeast Missouri

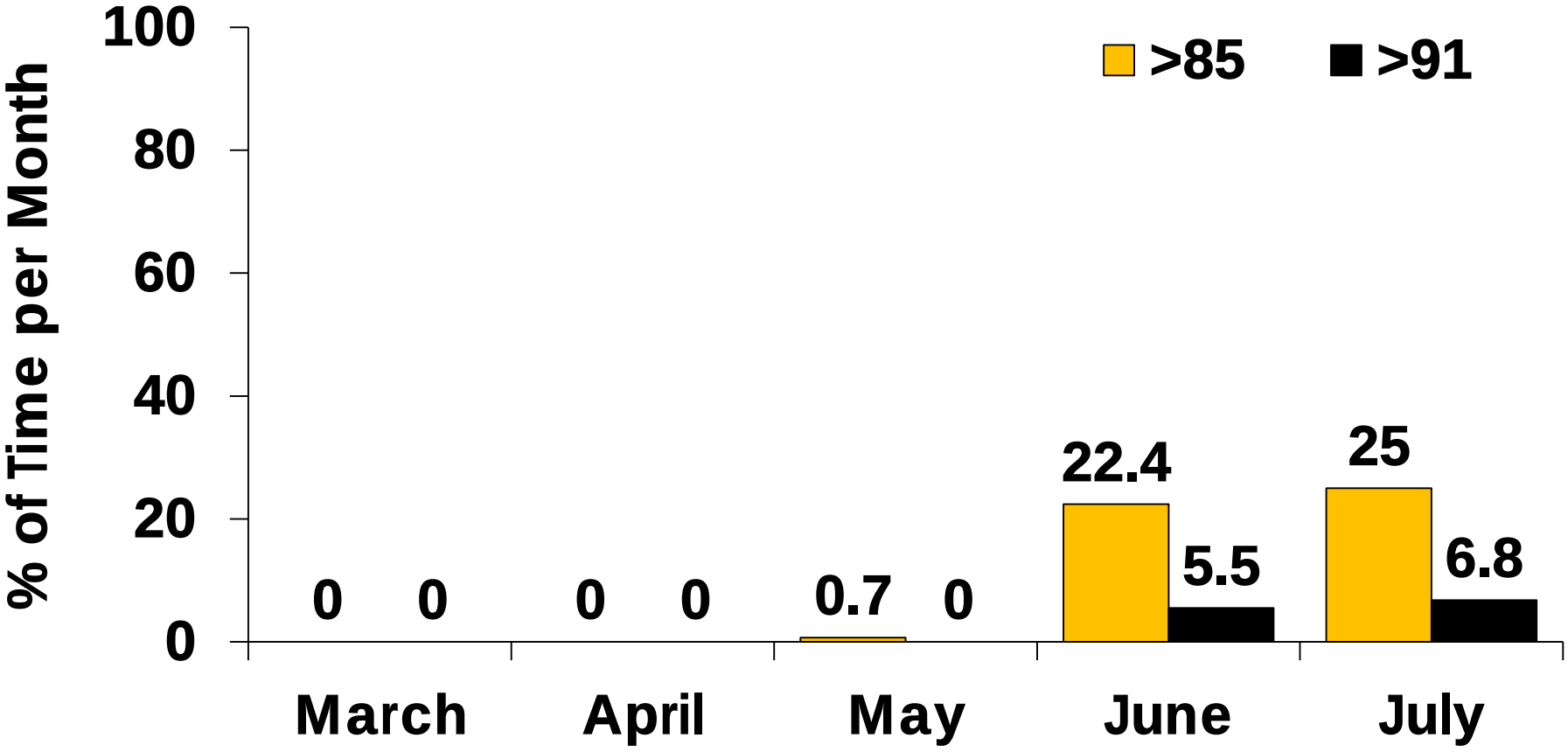


*Hourly wind-speed averaged from the years 2000 to 2015

New dicamba formulations will not minimize physical drift!

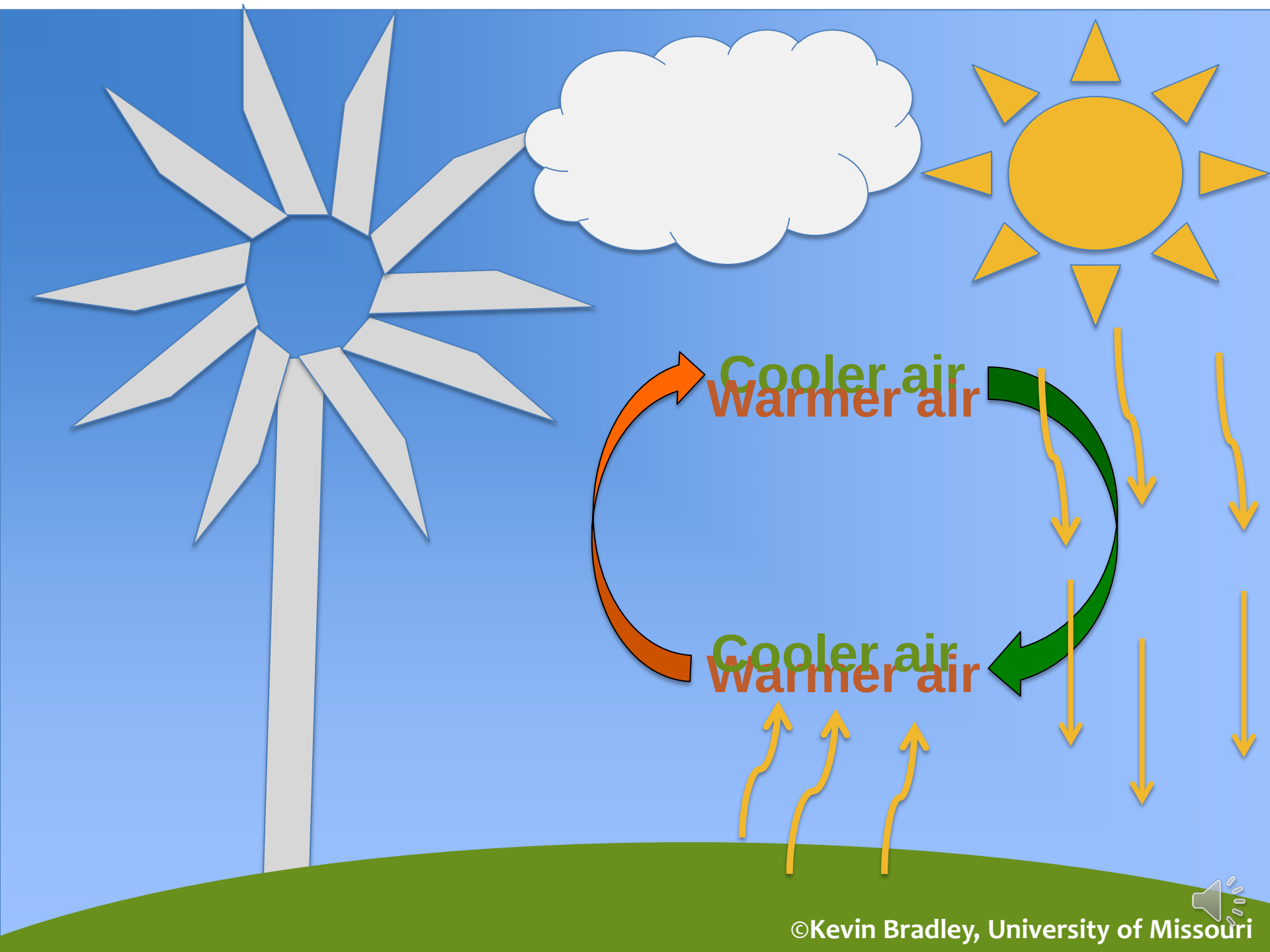
How Often did Temperatures Favor Volatility?

Time that air temperatures exceeded 85 or 91°F in Southeast MO in 2016.

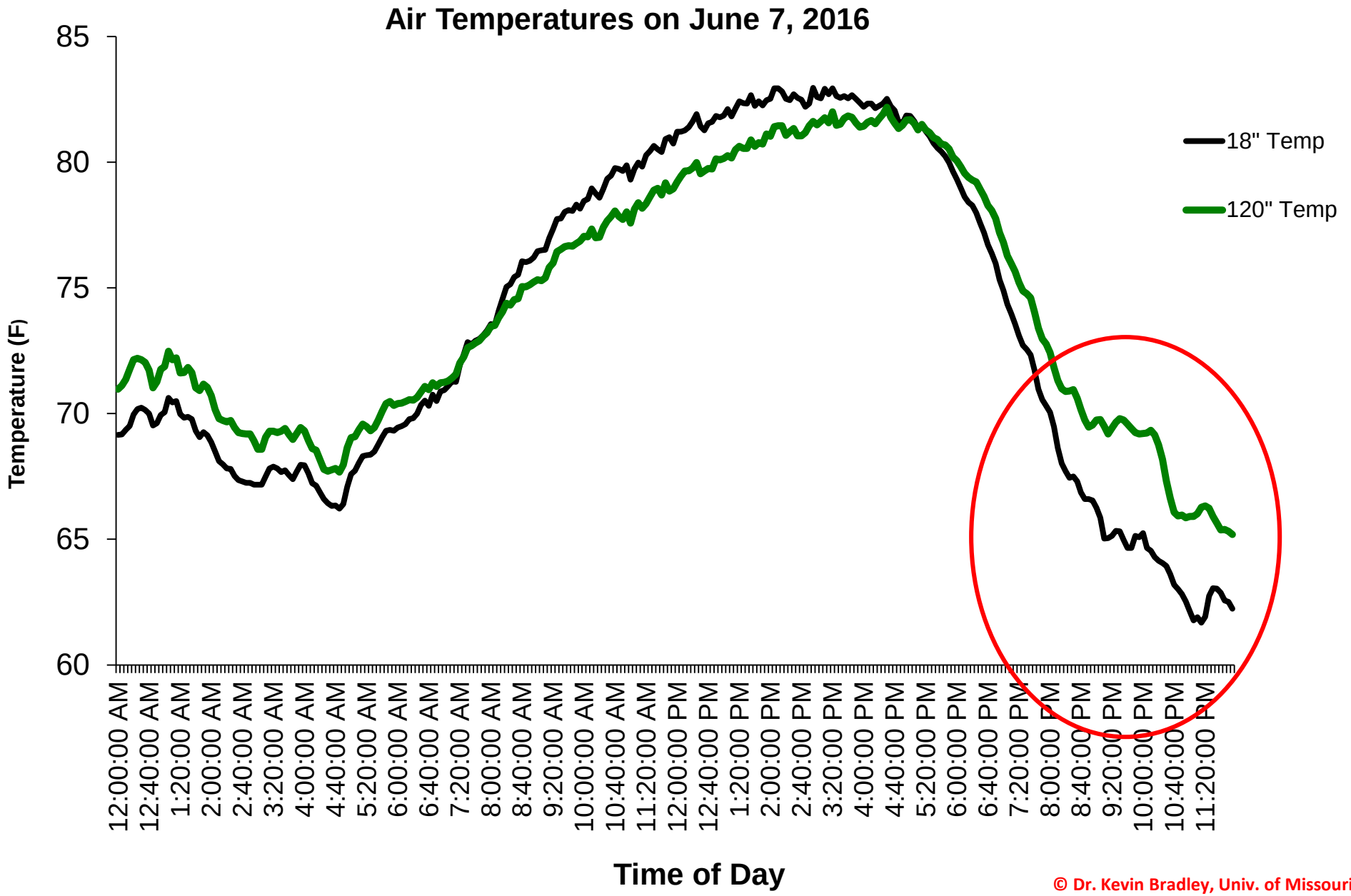


[a]Measurements were taken at 3-second intervals and averaged over 5 minutes. The 5-minute data was used for analysis.

What about temperature inversions?



An Example Temperature Inversion in Southeast Missouri in 2016



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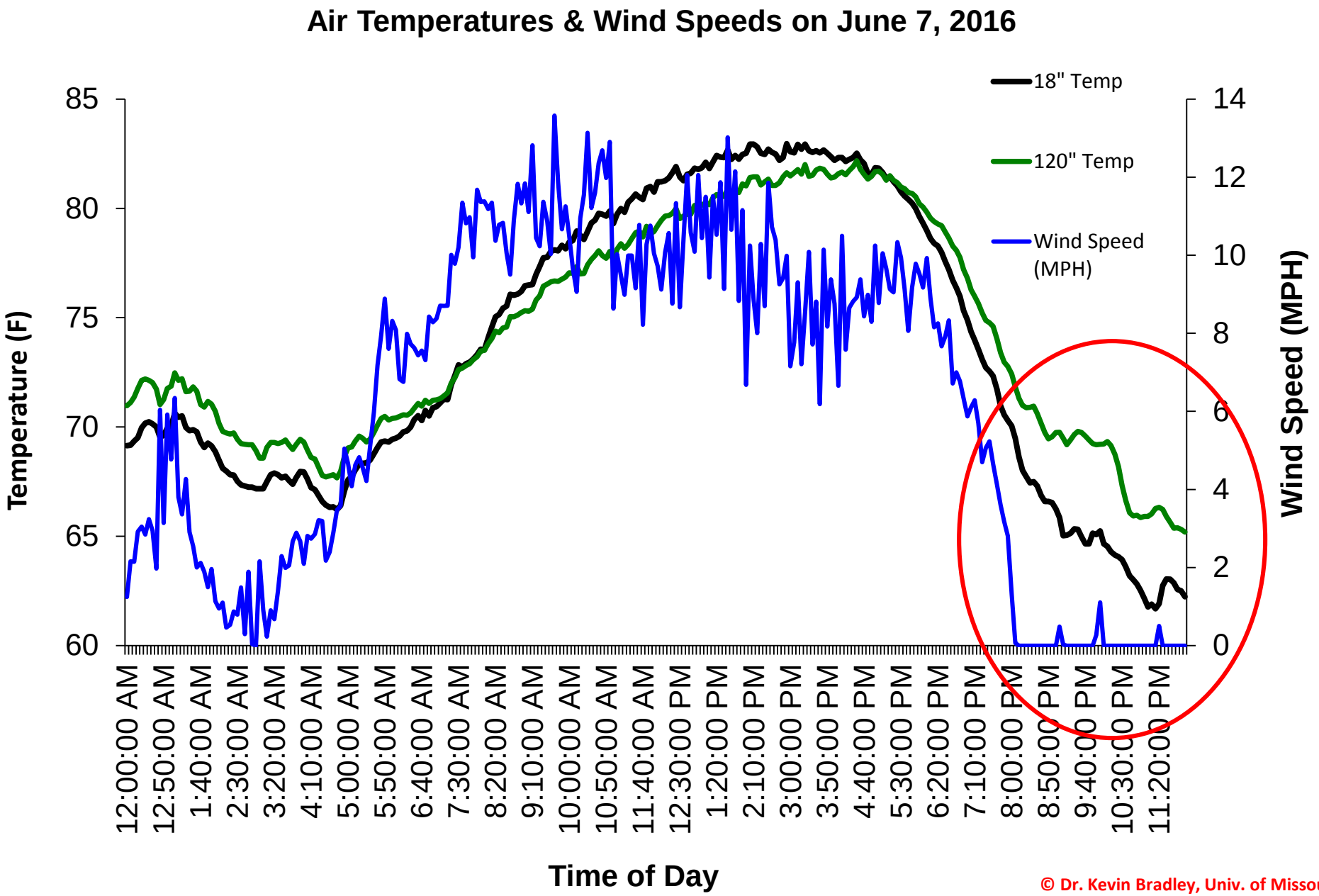

How Common were Surface Temperature Inversions?

Southeast Missouri

	Number of Inversions[a]		Typical Start Time	
	2015	2016	2015	2016
March	21	22	4:00-5:00 p.m.	5:00-6:00 p.m.
April	23	27	4:00-5:00 p.m.	5:00-6:00 p.m.
May	17	25	4:00-6:00 p.m.	6:00-7:00 p.m.
June	16	24	5:00-6:00 p.m.	6:00-7:00 p.m.
July	22	20	6:00-7:00 p.m.	7:00-8:00 p.m.

[a]Inversions were classified as air temp at 46 cm above surface < air temp at 168 cm < air temp at 305 cm; temperature differences had to occur for > 1 hour in duration and intensity had to be > 1.0°C between 305 and 46 cm air temperatures.

So how can we use the Xtend technology successfully in 2017?

There are only 2 dicamba products labeled for use in Xtend Soybean and Cotton

- XtendiMax with VaporGrip (DGA salt of dicamba, Monsanto)
- Engenia (BAPMA salt of dicamba, BASF)

Factor	Enlist Duo	Xtendimax	Engenia
Herbicide formulation	Glyphosate + 2,4-D (Colex D)	Dicamba (DGA salt+VaporGrip)	Dicamba (BAPMA salt)
GPA	10 to 15 GPA	≥10 GPA	≥10 GPA
Nozzle types	23 On Label	TTI11004, max 63PSI	TTI1004
Droplet category[a]	Coarse to extremely coarse	Extremely coarse to ultra-coarse	Extremely coarse to ultra-coarse
Tank mixtures	With ACCase herbicides EnlistTankmix.com	www.xtednimaxapplicationrequirements.com	www.engeniatankmix.com
Wind speed	<15 MPH	3 to 10 mph (optimal) 10 to 15 mph if all other requirements are met	3 to 10 mph (optimal) 10 to 15 mph if all other requirements are met
Sprayer speed	???	<15mph	<15mph
Boom height above canopy	Nozzle Manufacturer Recommendation	<24”	<24”
Environment	30 ft downwind buffer; DO NOT APPLY when wind is blowing toward adjacent commercial grown fruiting vegetables	110 to 220 downwind buffer depending on application rate; DO NOT APPLY when wind is blowing toward adjacent commercial grown, dicamba-sensitive crop	110 ft downwind buffer; DO NOT APPLY when wind is blowing in the direction of a neighboring specialty crop
Weed size	3 - 6”	<4”	<4”
Tank rinsing	Triple rinse	Triple rinse	Triple rinse
Tank cleaner	May be used	Yes	Yes

[a]Specific droplet size has been estimated by author if not specified by company.

Our farmers have to communicate with one another! Who's planting what and where?

. *Extreme*
n.

soybeans.[1]

TE
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cide.

TEAL
indicates tolerance to both 2,4-D and FOP (Accase) herbicides or the Enlist® technology. The white stripes indicate tolerance to glyphosate. For Enlist cotton and soybean fields, a green flag should be added to denote tolerance to glufosinate (Liberty).

Enlist

HT GREEN
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technology.
echnology
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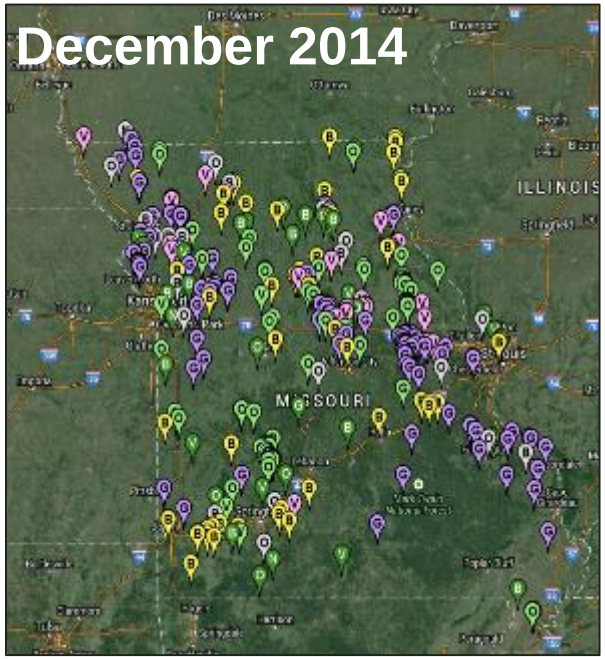
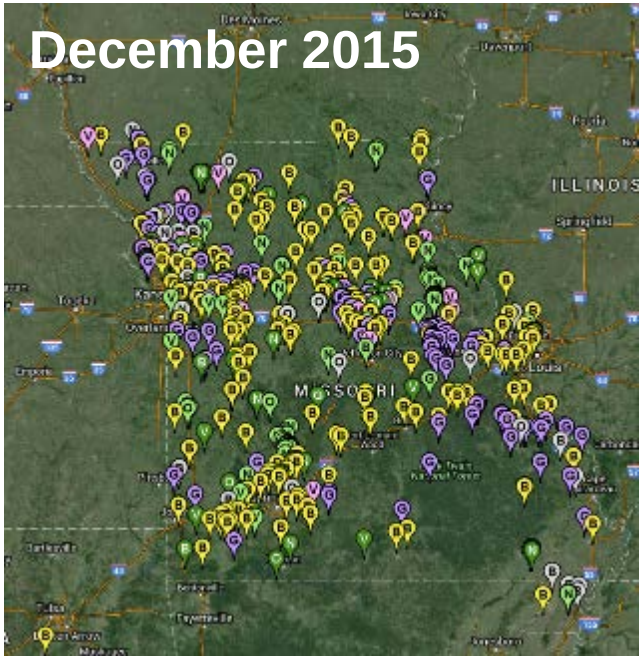
inate (Liberty®)
cide.

BLACK
indicates tolerance to dicamba herbicide or Xtend®. The black and white checks indicate tolerance to both dicamba and glyphosate

DriftWatch: Identifying Sensitive Areas

- **What sensitive crops are near by?**
- **Which direction is the wind blowing?**





https://mo.driftwatch.org/map

Constantly re-emphasize yield impacts and the extremely sensitive nature of soybean…

How much is too much?

8 fl ozs of solution in a 1,200 gallon spray tank would result in **significant foliar injury** to a non-DT soybean field… **but not necessarily yield loss!**

~ 1 gallon of solution in the tank would result in **significant yield loss** to a non DT soybean field

The societal impacts of off-target injury cannot be underestimated.

Mizzou weed science

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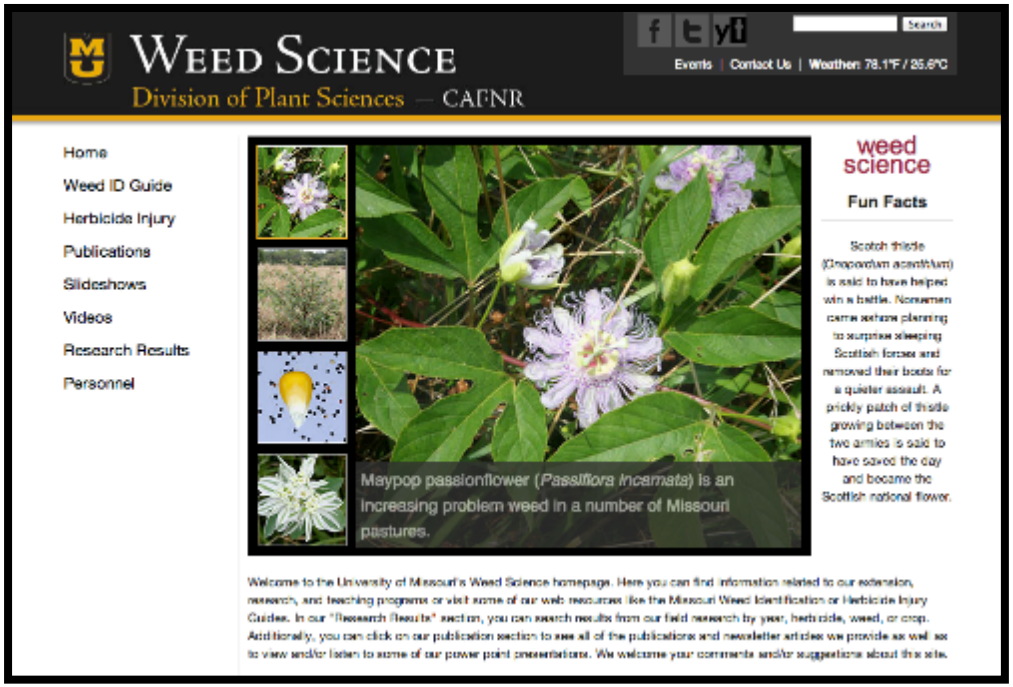

App: ID Weeds (free download)

id weeds

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