

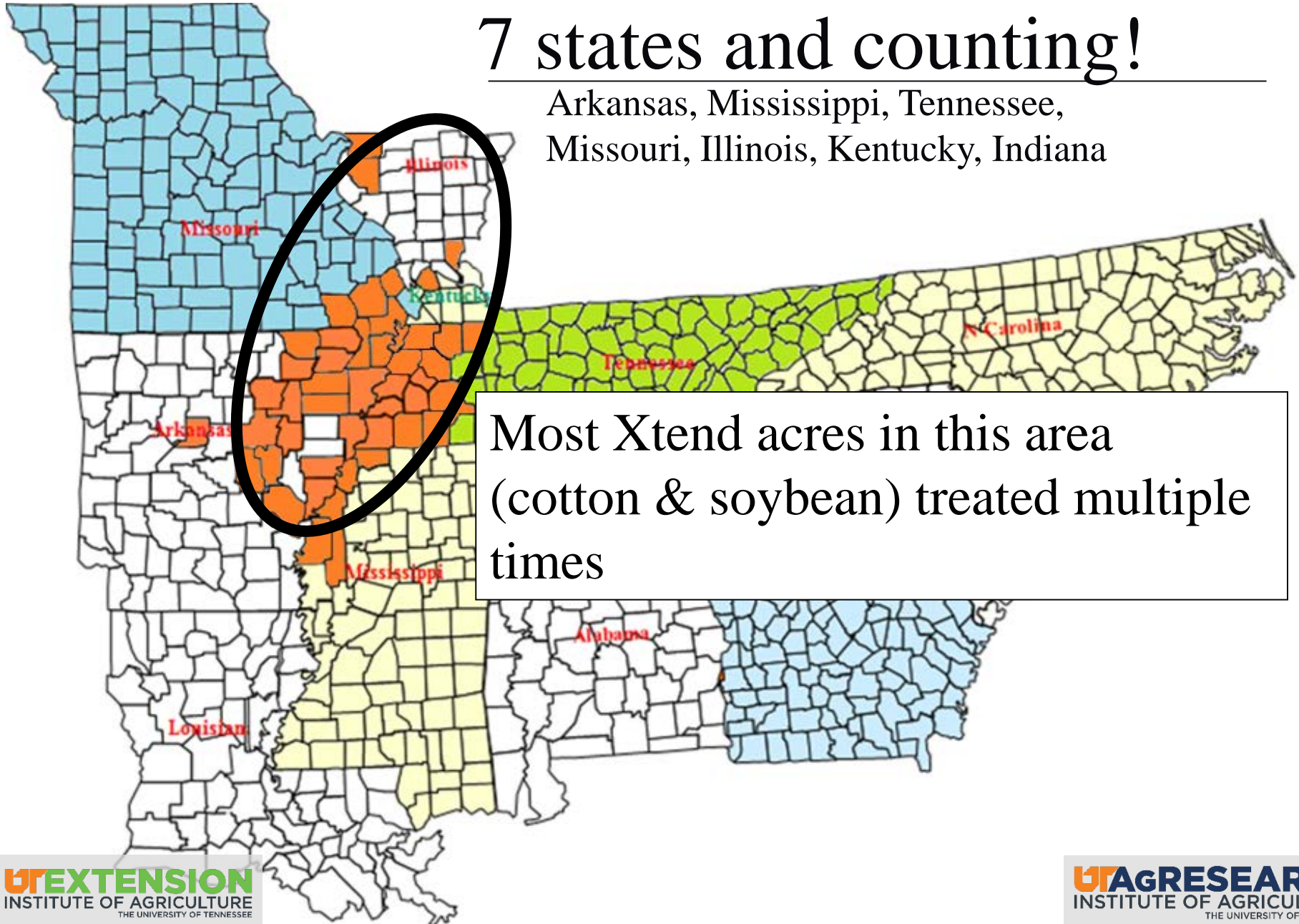
Future of Auxin Crops: Looking Into the Crystal Ball

Larry Steckel

PPO-Resistant Palmer amaranth

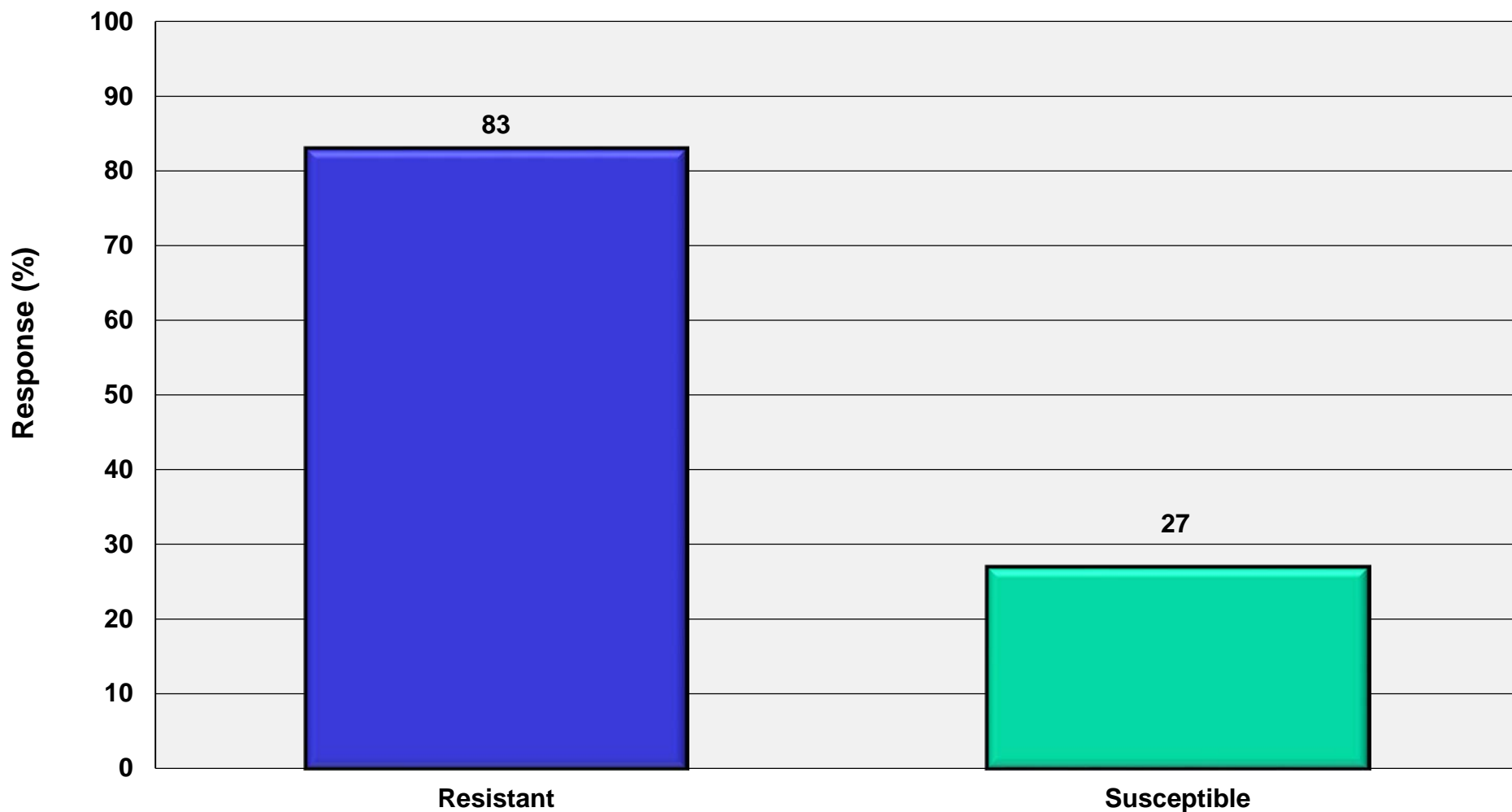
7 states and counting!

Arkansas, Mississippi, Tennessee,
Missouri, Illinois, Kentucky, Indiana



Most Xtend acres in this area
(cotton & soybean) treated multiple
times

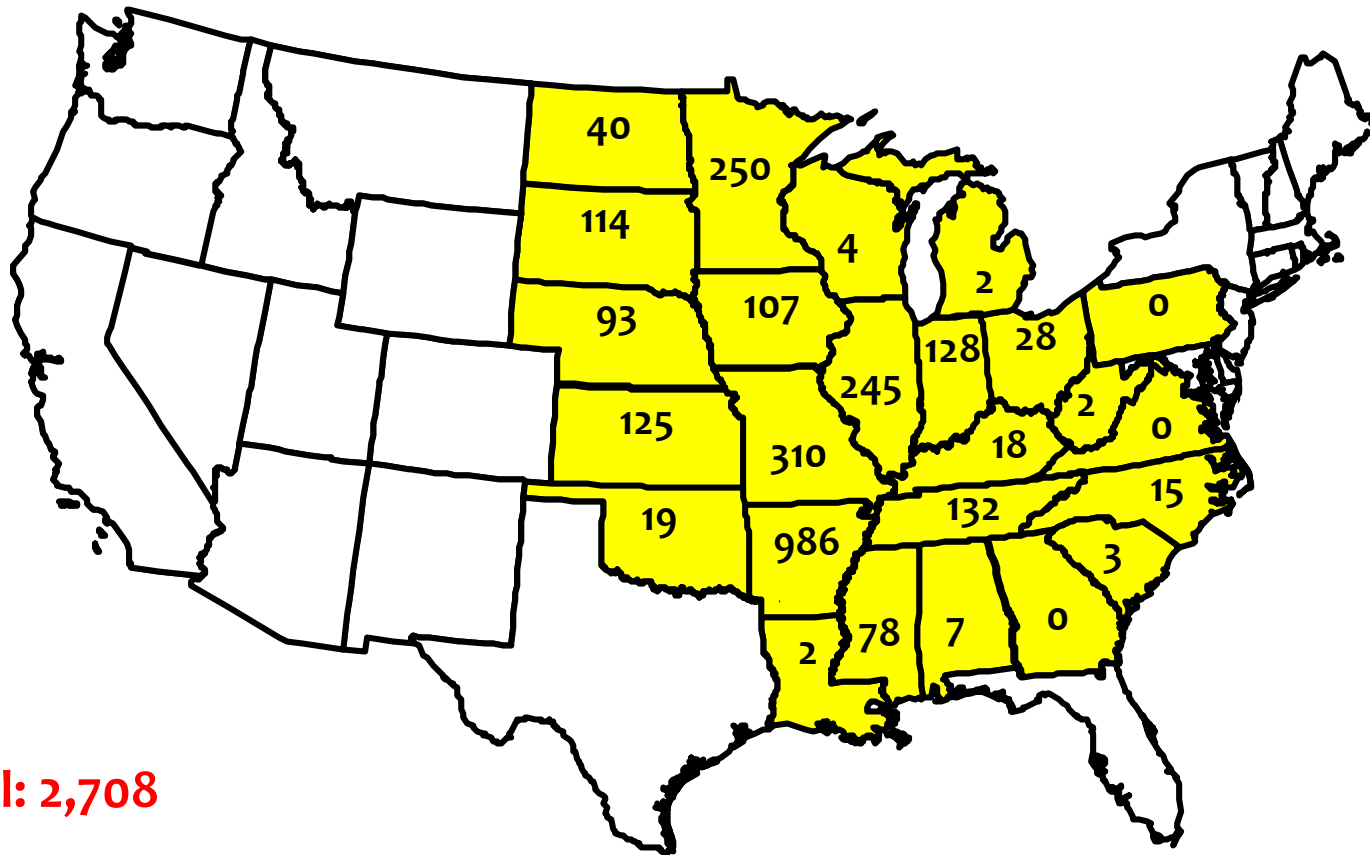
Survey for PPO-Resistance in West Tennessee Palmer Amaranth



Herbicide Technology Mix in Tennessee

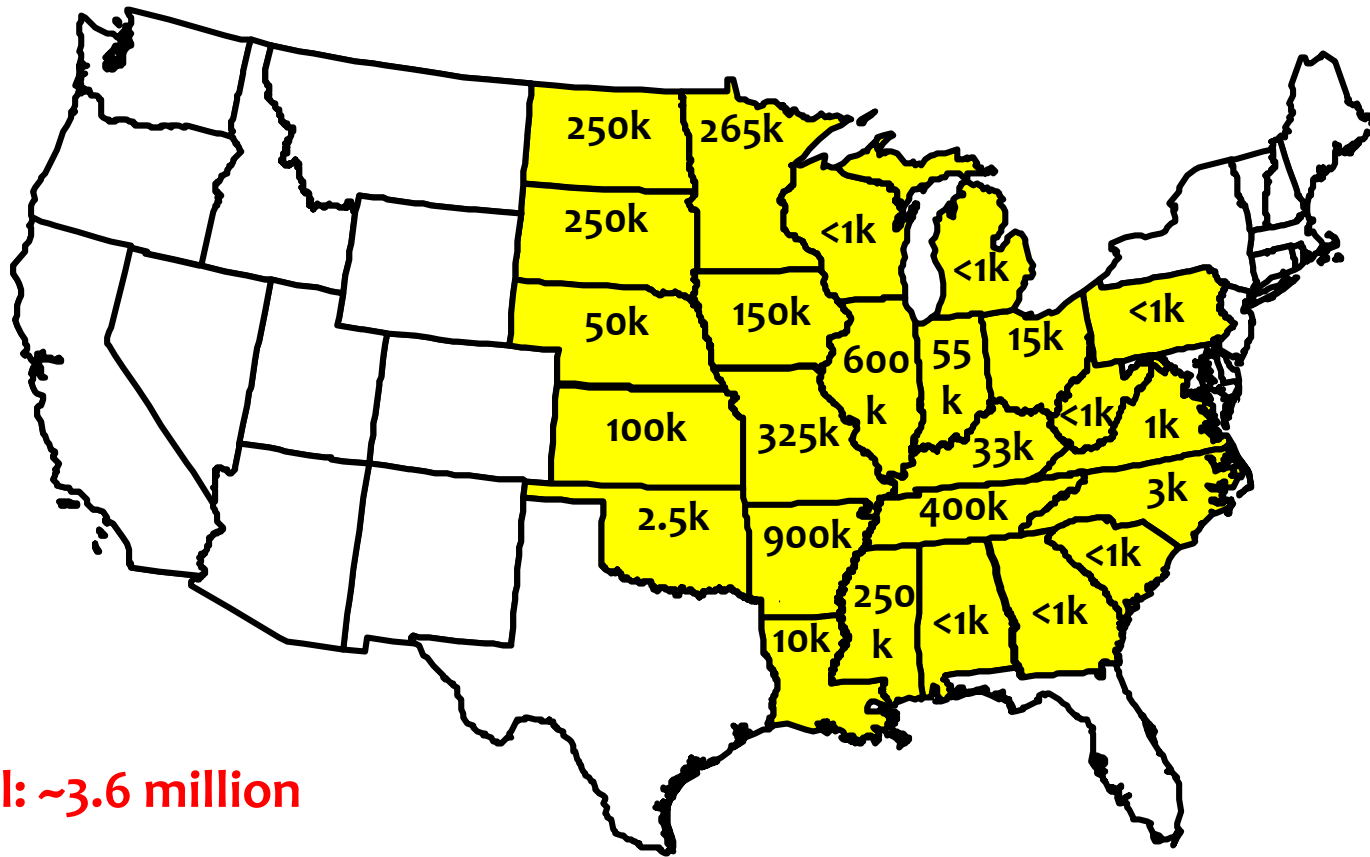
- **Xtend soybean 60%**
- **LL soybean 30%**
- **RR and Conventional soybean 10%**
- **Xtend cotton 85%**
- **Enlist cotton 12%**
- **LL and Conventional cotton 3%**

Official Dicamba-related Injury Investigations as Reported by State Departments of Agriculture (*as of October 15, 2017)



***Total: 2,708**

Estimates of Dicamba-injured Soybean Acreage in the U.S. as Reported by State Extension Weed Scientists (*as of October 15, 2017)



***Total: ~3.6 million**

The Exceptions to the Rule

AL, GA had fewer drift reports

➤ **Why?**

- ❖ **Few soybean acres in GA and AL?**
- ❖ **In-person training GA and AL?**
- ❖ **Environment/Timing in southeast?**
- ❖ **Some combination of factors?**

26,000 acres of Enlist Cotton in TN

- **Very few drift issues..**
 - ❖ **Same applicators**
 - ❖ **Same sprayers**
 - ❖ **Is Enlist Duo less volatile than Engenia and Xtendimax?**
 - ❖ **2018 will be the telling year on Enlist**

First Drift Calls Came June 6



Most Was Landscape Level Dicamba Symptomology

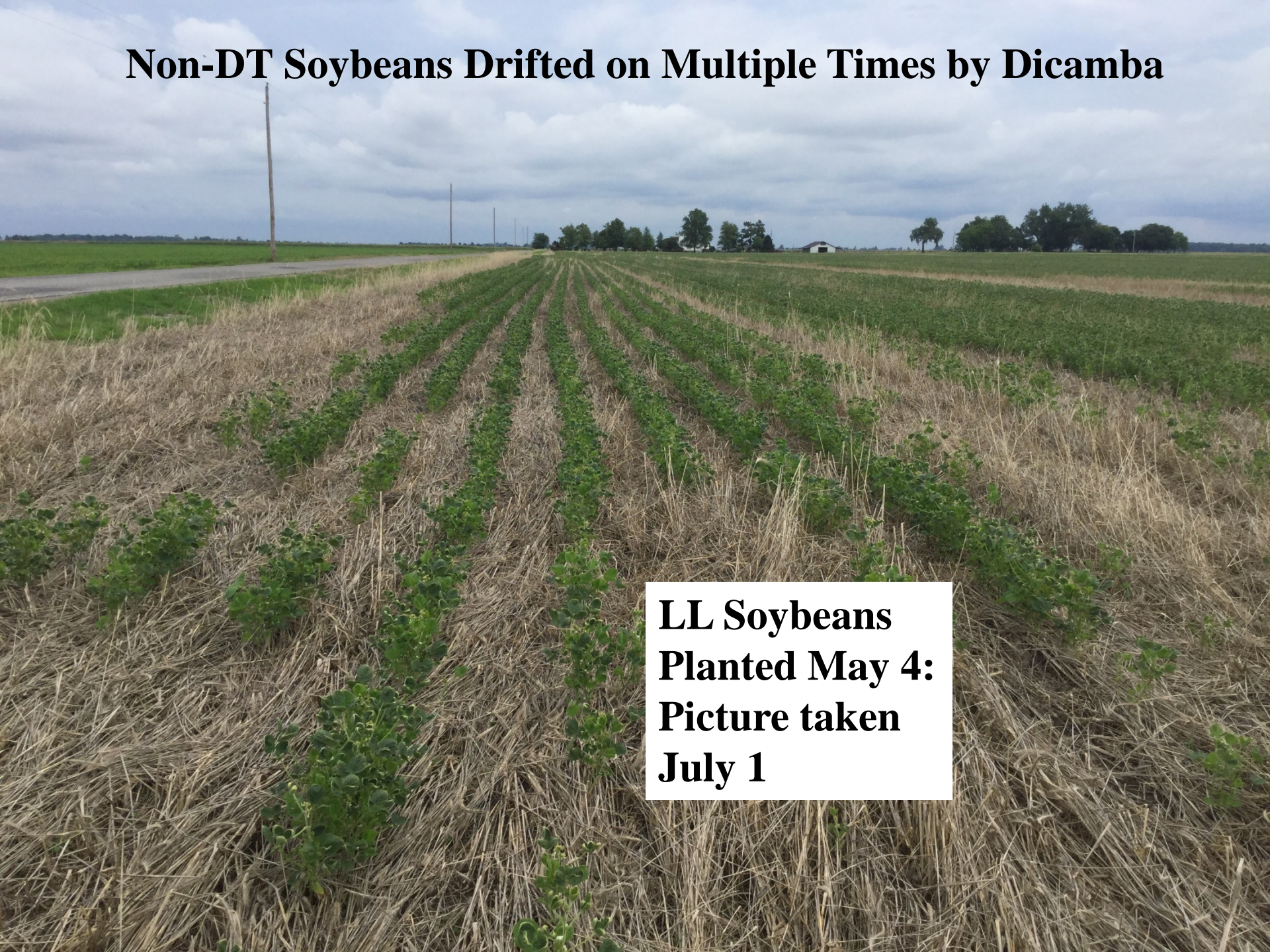


July Applications Resulted in the Most Issues



Non-DT Soybeans Drifted on Multiple Times by Dicamba

**LL Soybeans
Planted May 4:
Picture taken
July 1**



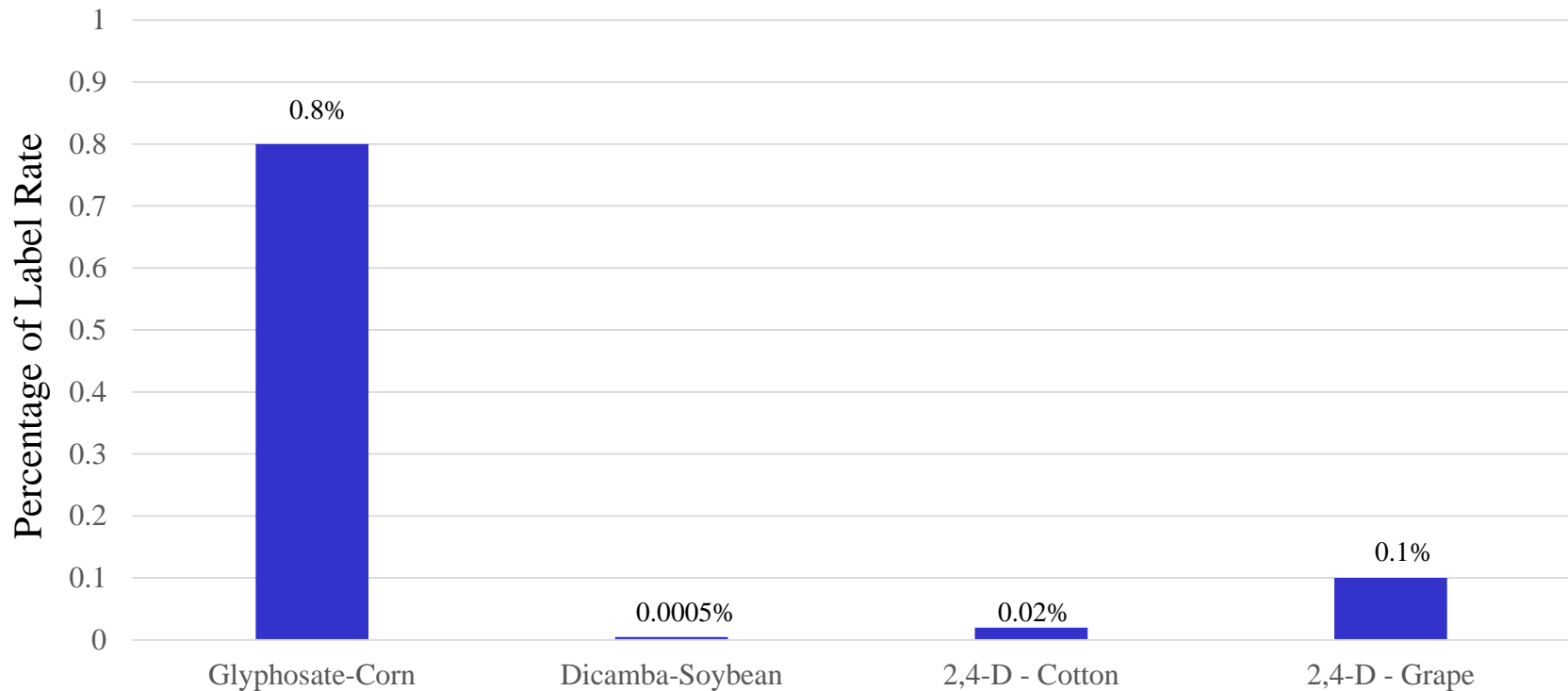
Soybean Suffering from Dicamba Drift in Early June and again in Late June and a third time in Mid-July

Picture Taken August 8

**Xtend Soybeans
Planted May 10**

**LL Soybeans
Planted May 4**

Lowest Observed Dose Causing Consistent Significant Visual Crop Response



Bhatti, M.A. et al. 1996. Wine grape response to repeated exposure of selected sulfonylurea herbicides and 2,4-D. *Weed Technol.* 10:951-956.

Ellis, J.M. et al. 2003. Rice and corn response to simulated drift of glyphosate and glufosinate. *Weed Technol.* 17:452-460.

Everitt, J.D. and J.W. Keeling. 2009. Cotton growth and yield response to simulated 2,4-D and dicamba drift. *Weed Technol.* 23:503-506.

Solomon, C.B. and K.W. Bradley. 2014. Influence of application timings and sublethal rates of synthetic auxin herbicides on soybean. *Weed Technol.* 454-464.

Tobacco in Middle TN



Largest Vineyard in State



Home Owner Trees Dicamba Drift Damage



Sawtooth Oak



Ginkgo



Home Owner
Drift Damage

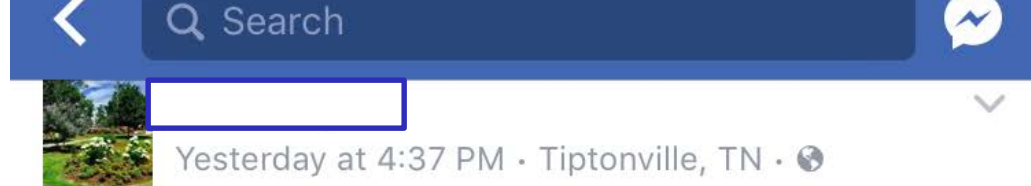
Sycamore

Paulinao
Tree

Redbud



Social Media Reports



The test came back from the state and it was positive for Dicamba [redacted] that effected hundreds of trees on Reelfoot. The State Ag Commission will come to Reelfoot Monday to view the damages.

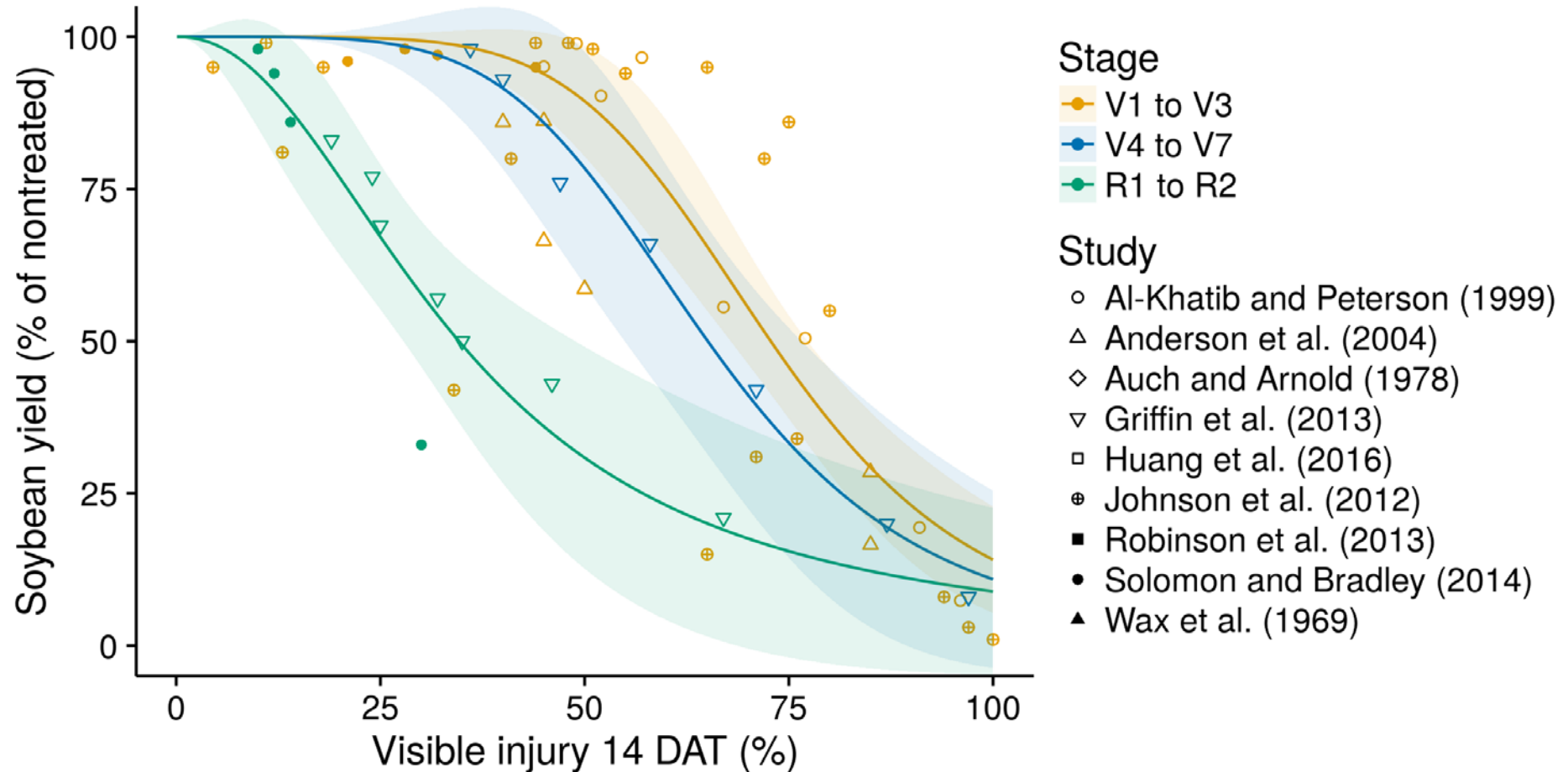


Yield Reports

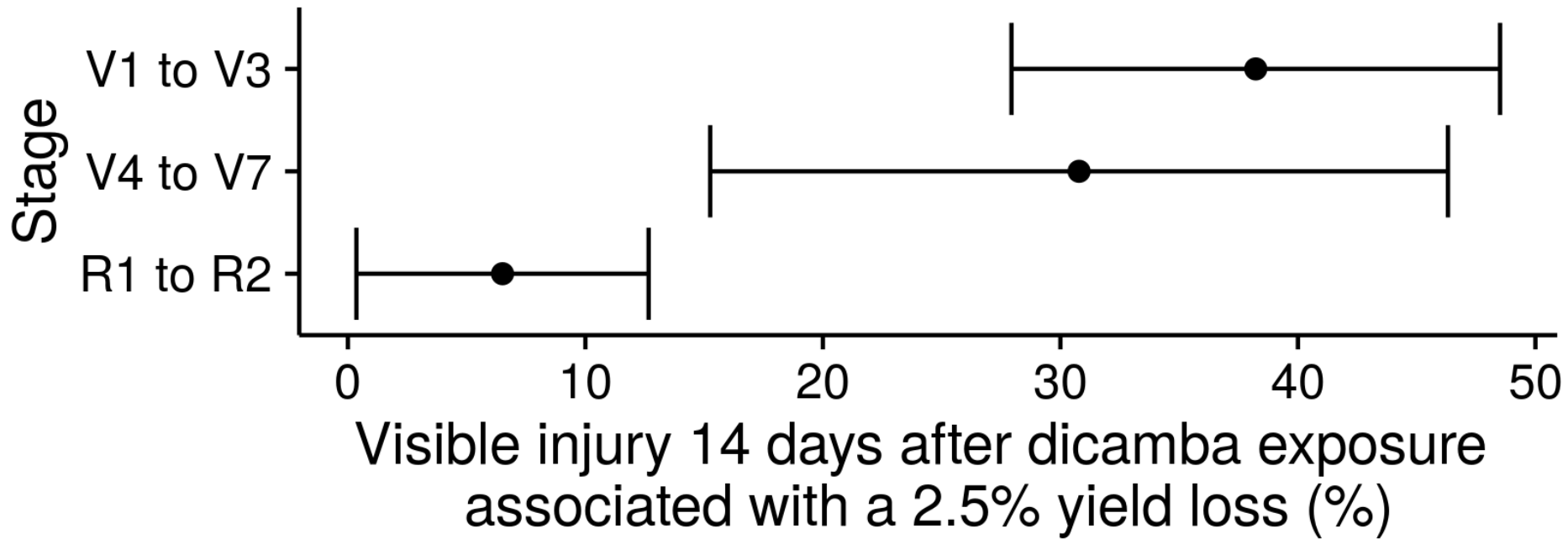
- **Very good yields across the state**
 - ❑ **Most have felt little to no yield loss from drift**
 - ❑ **About 20% of fields so far report 10 to 20% yield loss**
 - ❑ **Soybeans hit multiple times reported higher yield loss**
 - ❑ **A few of these fields show soybeans not maturing, having few pods with most of them deformed**



Meta-Analysis of Dicamba Exposure Effect on Soybean Yield

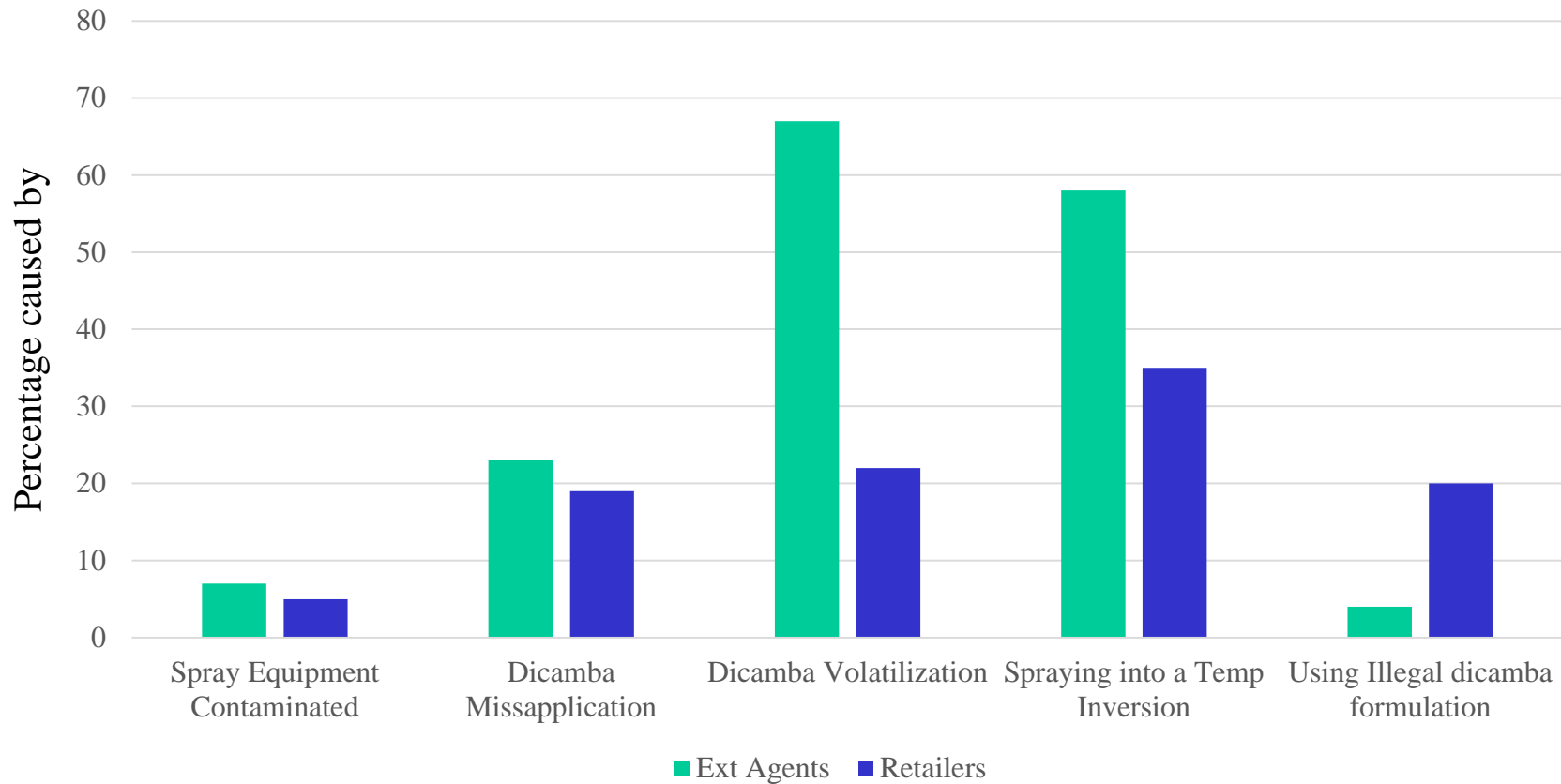


Meta-Analysis of Dicamba Exposure Effect on Soybean Yield



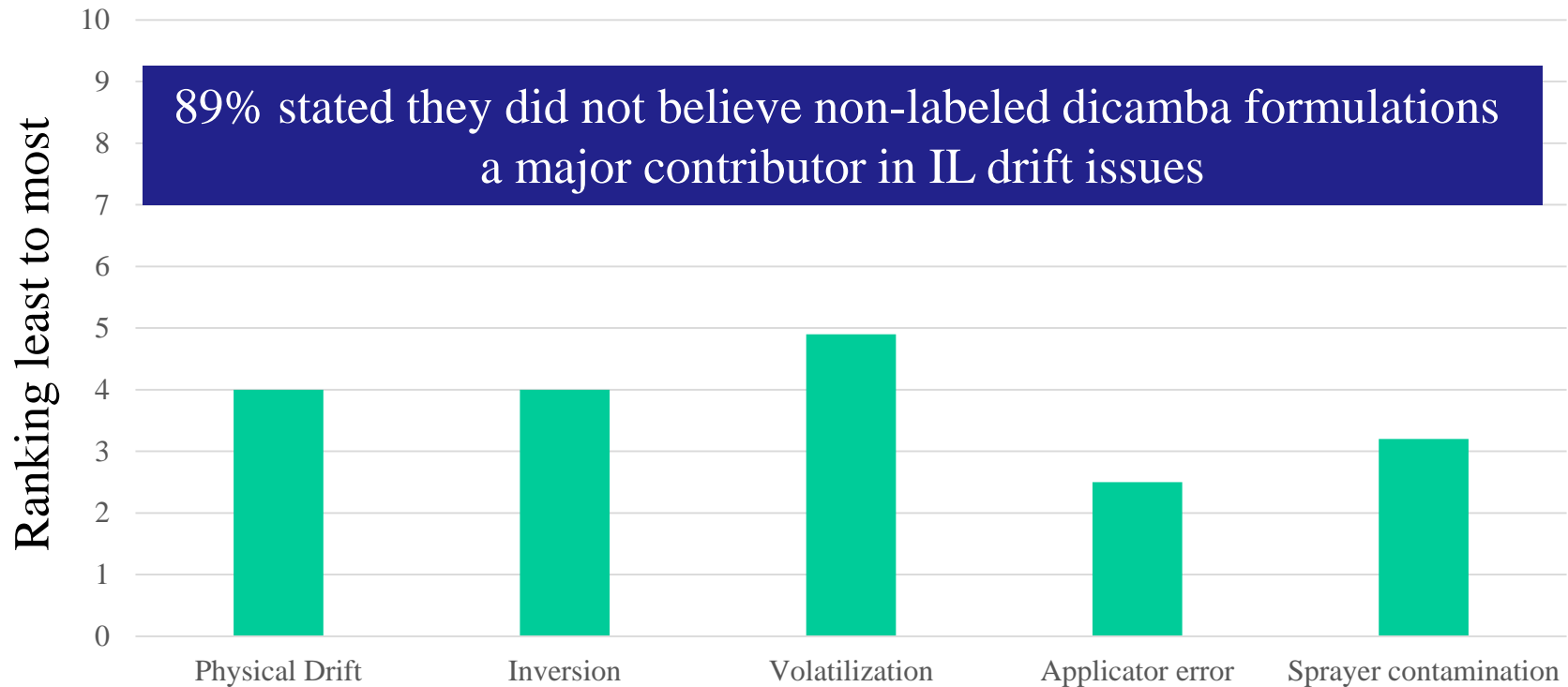
Tennessee Extension Ag Agents and Retailers Estimates of Causes for Off-Target Dicamba

Survey of 25 Retailers and 24 Extension Agents
Estimated 386,000 acres of Off-Target Dicamba



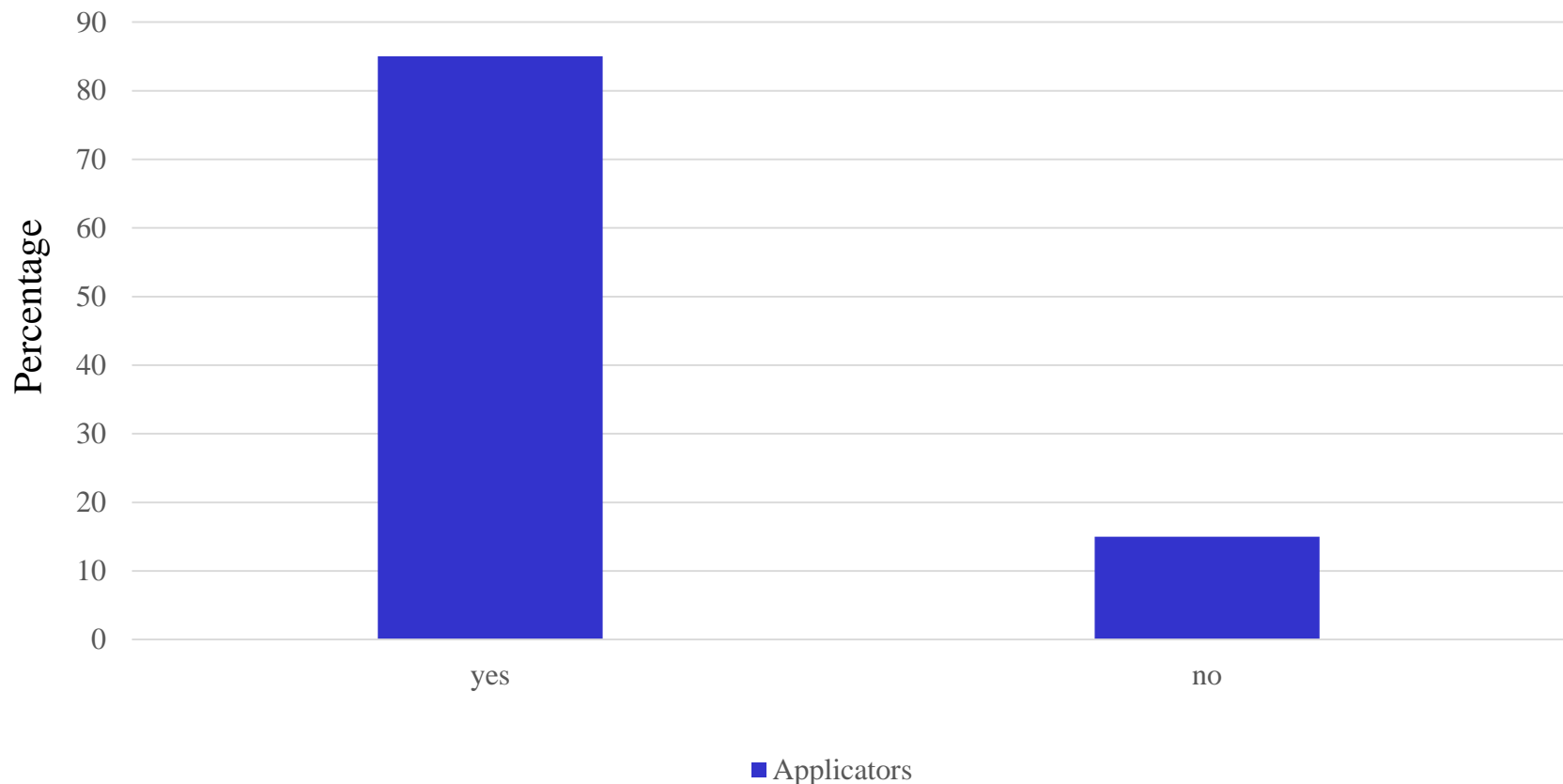
Illinois Fertilizer and Chemical Association Survey of Members

Illinois Retailer Applicator Survey
124 response out of 178 members



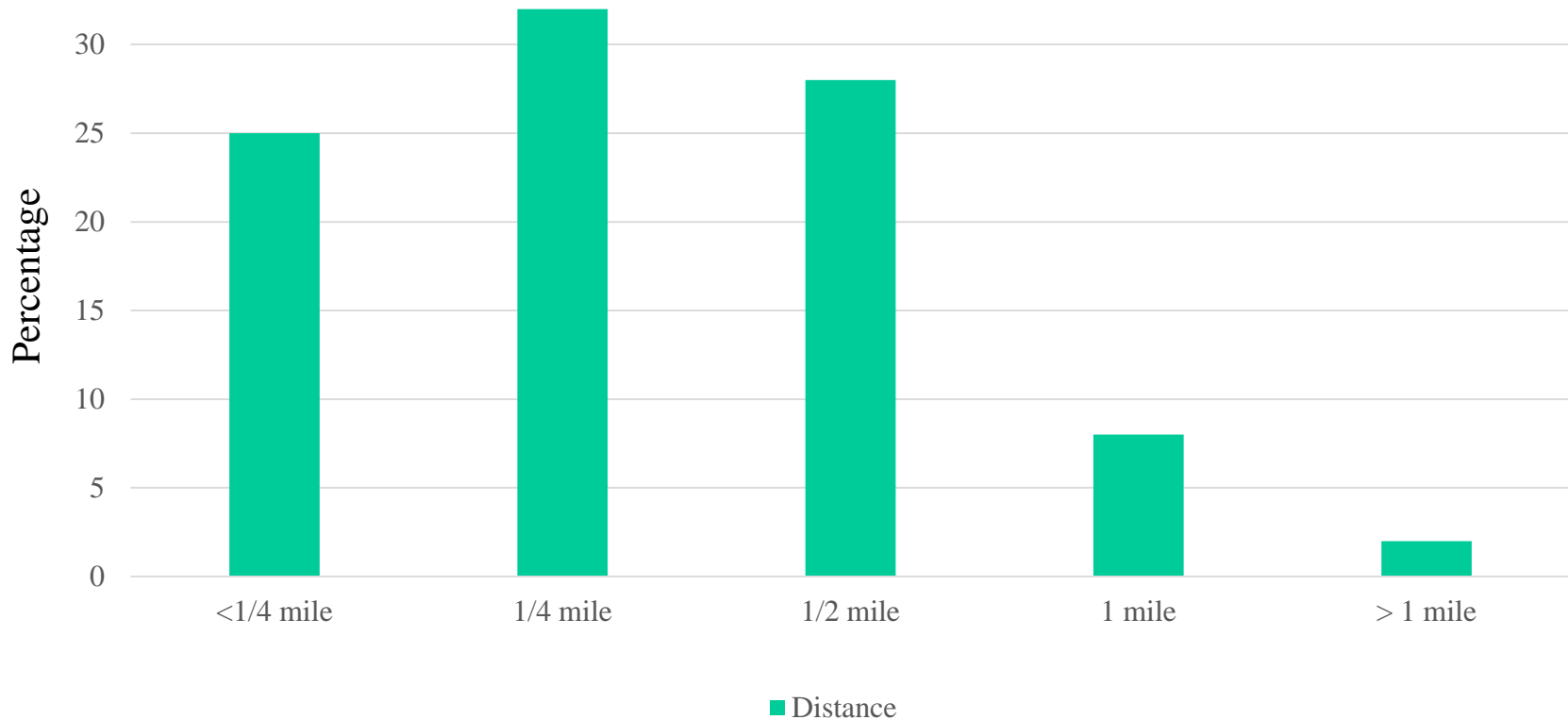
Did you see dicamba injury symptoms to non-DT soybeans even when the wind was not blowing toward the field during the time of application?

Illinois Retailer Applicator Survey
124 response out of 178 members



If you saw symptoms in non-DT soybeans, even when product was applied according to label, at what distance did you note symptoms?

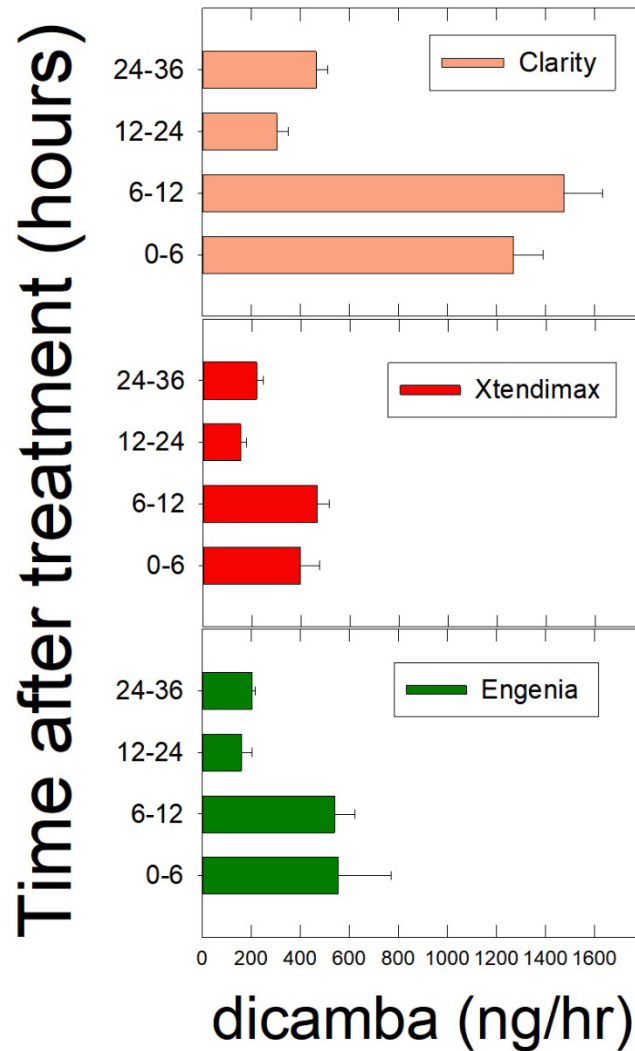
Most stated that 50% of non-DT soybean fields near an Xtend field that received a dicamba application showed symptoms



Volatility Research



Dicamba Volatility After Application to an acre of Soil



Slides used courtesy of Tom Mueller,
UTIA

Engenia/XtendiMax BMPs

- **Communicate with your neighbors:**
 - ❑ **Do not plant Xtend soybeans anywhere near high value sensitive crops**
- **Use a minimum of 15 GPA:**
 - ❑ **Sprayer speed Maximum 12 mph**
- **Keep the boom DOWN!**
 - ❑ **24" above the target!!!**
- **Keep precise record of application as required by label:**
 - ❑ **Document the crop and the nearby crops BEFORE application**

Tennessee 2017 Education Efforts

- **5,523 applicators took 30 minute stewardship module**
- **13 blog posts on stewardship/mgt. accessed >3,600 times**
- **16 in-season YouTube videos on stewardship/mgt. viewed >13,500 times**
- **Monsanto/BASF conducted numerous stewardship trainings**
 - ❖ **Captains of Monsanto have stated “increased training will fix this issue”???**

One can follow the label to the letter and still get drift because:

- **Engenia and Xtendimax are not a ZERO volatility**
- **Some evidence dicamba can stick to dust and move**
- **Fine spray particles can get caught in inversions**
- **Dicamba can move with runoff water after heavy rainfall events**

Next Year?

➤ **More EPA regulation**

- **Additional dicamba training; only spray dawn to dusk; etc.**

➤ **Other State regulations**

- **Many states adding regulations: AR, IN, MO, MN, ND, TN, etc.....Cut off dates April 15, June 1, temperature cut off; Shorter day light hours to spray; No dicamba applications; Much stiffer fines for label violations;**

Good Chance this Does not End Well

- **Likely fewer dicamba injured soybeans in Midsouth: AR – Banned in-season; MO, MS and TN much fewer non-DT soybeans planted**
- **Even less concern for BMP?**
 - ❖ **Some growers have stated: “everyone is growing Xtend so why worry?”**
- **Those few acres of non-DT soybeans (Yikes!)**
- **The rest of the broadleaf world will be more at risk: homeowners, vineyards, tobacco, truck patches, etc.**
- **Next year 1/2 the soybean acres in the IA, IL and IN will likely be planted to Xtend soybean varieties – That means 1/2 the soybean acres will be in harms way...**

Auxin Trait Regulatory Status

Trait	Crop	Trait Deregulated	Herbicide Registration	Herbicide Registration Renewal
Enlist	Corn	2014	2014	January 2022
	Cotton	2015	2017	January 2022
	Soybean	2014	2014	January 2022
Xtend	Cotton	2015	2016	November 2018
	Soybean	2016	2016	November 2018

“What we’re going to be looking at over the next two years is are the off-sight dicamba drift incidents continuing? To what degree are they continuing? Are they getting worse or are they getting better?”

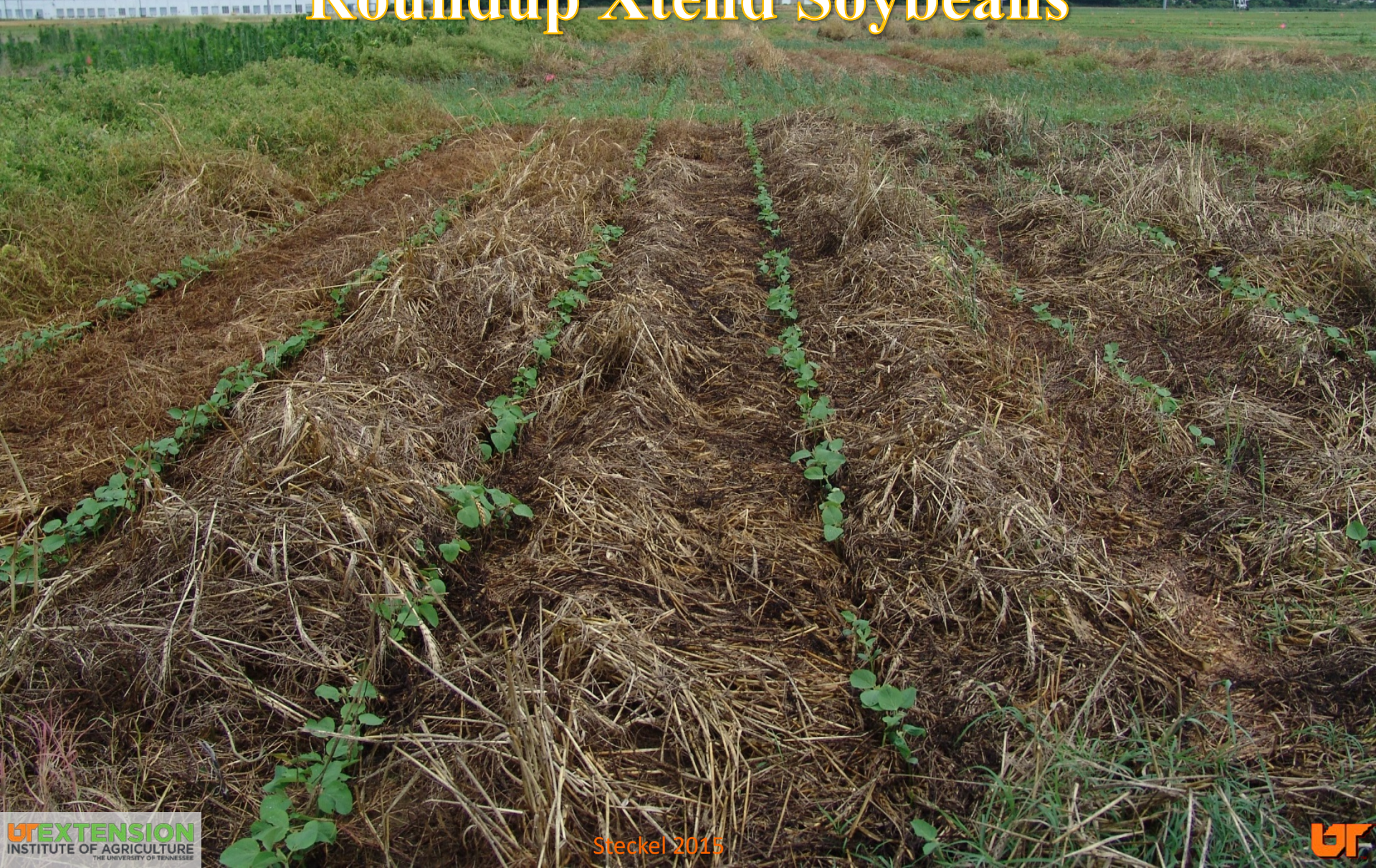
...and if we determine that the frequency of drift events is unacceptable...*the registrations go away.*”

*Rick Kegwin, Director
Office of Pesticide Programs at EPA
Jan 23, 2017*

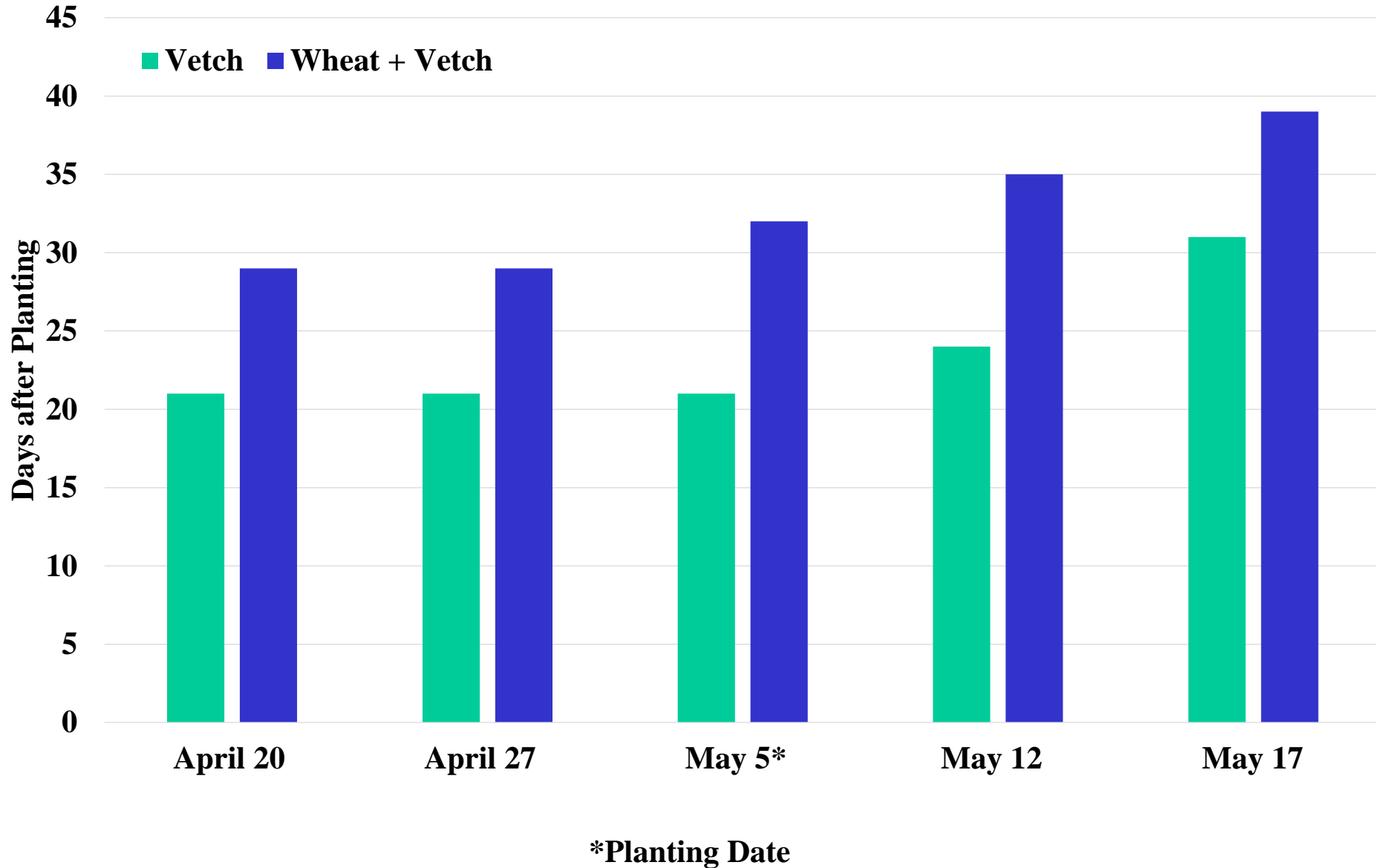
“Planting Green”



Cover Terminated 14 DAP Roundup Xtend Soybeans



Days Until 4" Palmer amaranth



Off-Target!



Questions?