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🚜 From South to North: Tracking Indiana's Planting Progress

(Jeferson Pimentel), (Dan Quinn) & (Betsy Bower)

Nationwide, planting is starting to pick up, with USDA-NASS reporting 24% of corn planted across the U.S. as of April 27, just slightly ahead of the 5-year average of 2% (Table 1). States like Texas (74%), Kansas (39%), and Missouri (47%) are leading the way, while much of the Corn Belt, including Iowa (34%) and Illinois (16%), is still in the early stages. The recent rain events have slowed progress in several areas, but as fields dry out, we expect planting activity to ramp up quickly!

The USDA-NASS report shows that 10% of Indiana's corn acres had been planted (Figure 1), an 8%-point jump from last week. Although we expect less than one inch of rain this week, recent rainfall and wet soil conditions have continued to delay fieldwork across much of the eastern and southern portions of the state.

Despite Indiana's slow start, there's reason for optimism. The forecast indicates warmer, drier conditions, and planting progress is expected to ramp up significantly in the coming weeks as fields dry and planters get to work. In previous years, corn planting in Indiana typically spiked in late April and early May, especially when farmers faced a limited weather window. Although the current pace is slow, momentum can shift quickly once field conditions improve for next week.

➡️ Let us know if we can help.

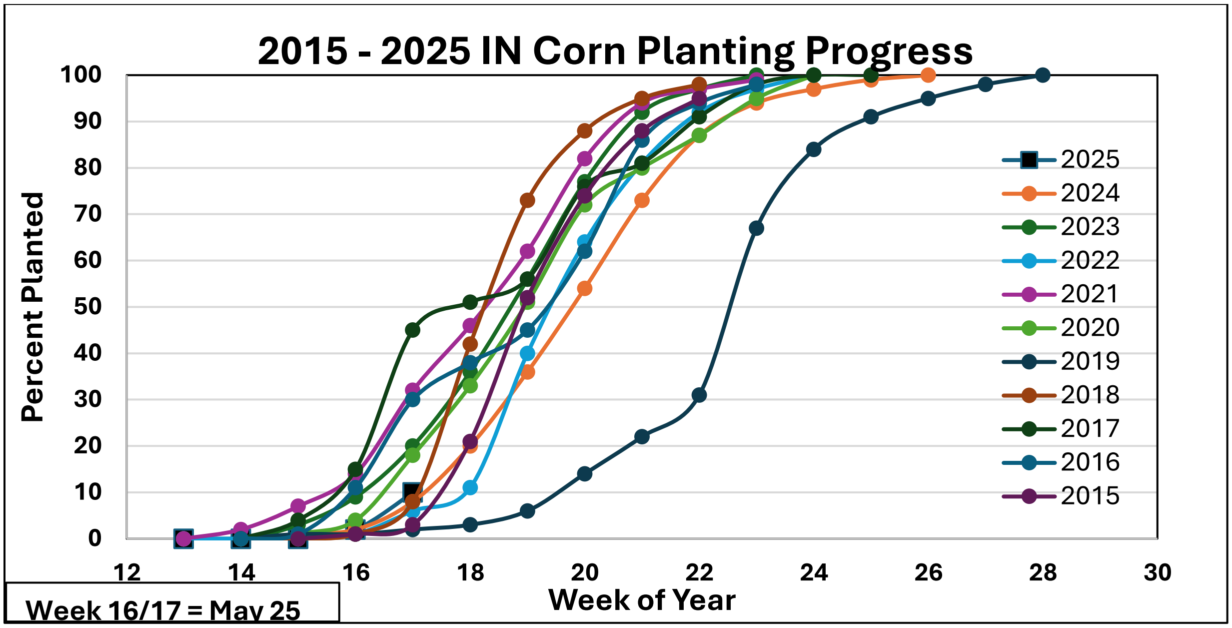


Figure 1. 2015-2025 Indiana corn planting progress by week (USDA-NASS)

Table 1. U.S. Corn Planting Progress (USDA-NASS)

State	Week ending			
	April 27, 2024 (percent)	April 20, 2025 (percent)	April 27, 2025 (percent)	2020-2024 Average (percent)
Colorado	7	9	**18**	11
Illinois	23	7	**16**	26
Indiana	7	2	**10**	13
Iowa	35	18	**34**	28
Kansas	37	27	**39**	29
Kentucky	33	12	**25**	38
Michigan	4	1	**6**	4
Minnesota	27	9	**26**	21
Missouri	61	33	**47**	41
Nebraska	20	8	**21**	20
North Carolina	67	42	**60**	66
North Dakota	5	-	**7**	2
Ohio	5	2	**8**	6
Pennsylvania	2	1	**2**	5
South Dakota	12	7	**23**	7
Tennessee	46	25	**41**	44
Texas	71	69	**74**	70
Wisconsin	9	1	**4**	7
U.S Total	25	12	**24**	22

🌽 Corn Plant Population and the Potential for Reducing Seed Costs

(Dan Quinn)

Seed represents one of the largest variable input costs for Indiana corn growers—second only to fertilizer. As such, selecting the correct seeding rate is not only essential for maximizing yield but also for maximizing economic return. This decision hinges on several factors: seed cost, expected grain prices, and, just as importantly, how corn yield responds to final plant population in the field.

A common assumption persists that increasing corn seeding rates and plant populations is necessary to drive higher yields. However, research suggests this is not always the case. Purdue University's current corn plant population recommendations, based on nearly 100 field-scale experiments across Indiana, offer a robust dataset that helps guide optimal plant population decisions for both yield and economic return (Corny News - Optimum Plant Populations for Corn in Indiana). One key insight from this research is that corn yields remained within one bushel of each other across a wide range of final plant populations—specifically, **from 28,000 to 35,000 plants per acre.** Recent trials in Indiana further support this, showing minimal to no yield differences among final plant populations below 30,000 plants/acre and those above 40,000 plants/acre, even when evaluating different hybrid types grown within the same environment and the same management treatments (Figure 1).

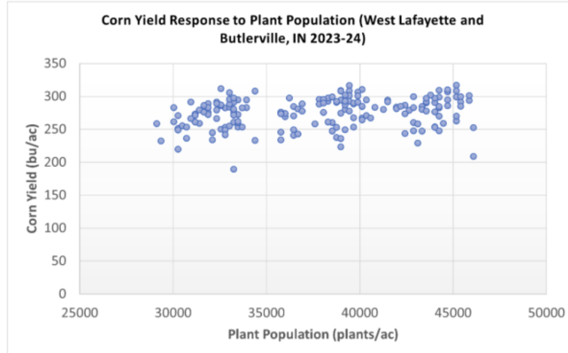


Figure 1. Relationship of corn yield response to final plant populations. Data was collected from multiple research trials in West Lafayette, IN and Butlerville, IN in 2023 and 2024. Research trials encompassed 4 different hybrids planted at different seeding rates (32,000 – 44,000 seeds/ac) within the same environment.

These results are due in large part to the increased "plasticity" of modern corn hybrids—the ability to adapt and perform across a broader range of environmental and management conditions. Compared to hybrids from 20–30 years ago, today's hybrids not only have a higher agronomic optimum plant population (i.e., the plant population needed to achieve maximum yield), but they also can achieve maximum yield across a wider range of plant populations. This result is also reflected in state-level trends. For example, since 1956, Indiana's average corn yields have continued to increase linearly at a rate of about 2 bushels per acre per year, with no sign of slowing. Yet, the average corn harvest plant population hasn't followed the same trajectory (Figure 2). Between 1982 and 2012, plant populations rose by about 300 plants/acre/year. However, from 2013 to 2024, that increase has plateaued, despite continued gains in yield.

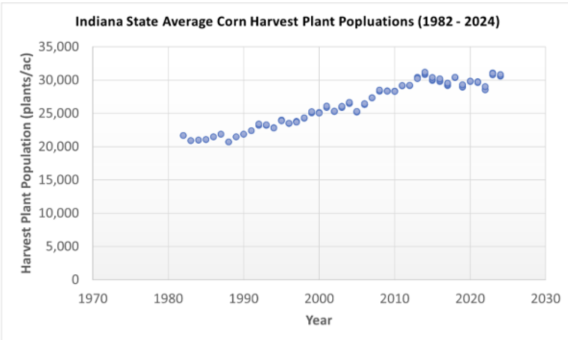


Figure 2. Indiana state average corn harvest plant populations from 1982 – 2024. Data was compiled from the USDA National Agricultural Statistics Service.

The takeaway? Modern hybrids can achieve high yields at lower seeding rates and lower plant populations in a similar way that they can also achieve high yields at higher seeding rates and higher plant populations. With seed prices on the rise and grain markets remaining volatile, re-evaluation of corn seeding strategies may be important. Therefore, reviewing current university recommendations or conducting on-farm trials with multiple seeding rates can be useful tools to help identify the sweet spot—not just for yield, but for also for profitability.

🌽 🔬 Corn Research Updates: Balancing Corn Stover Removal for Farmer Profitability and Soil Nutrient Levels

(Bruno Paulus Scheffer) & (Dan Quinn)

With that in mind, Purdue researchers are studying stover removal rates (0%, 25%, 50%, 75%, 100%) to find the optimal balance between profitability and sustainability. The ongoing research is located at two Purdue Agriculture Centers locations (Figure 2), and preliminary findings (Table 1) indicate:

Figure 1. Harvesting corn stover. Source: Sheaffer, 2024.

- More stover removed = more nutrients taken off the field. For example, removing 100% of stover from a tall-stature hybrid can remove up to 73 lbs/acre of potassium, a critical nutrient for crop health.
- New short-stature hybrids (PR112/PR116) showed higher levels of potassium in the stover in comparison to current, full-stature hybrids (DKC62-70).
- At moderate removal levels (25–50%), nutrient loss is significantly lower, possibly striking a better balance between economic return and soil health.

Figure 2. Location of the two corn field trials evaluated

Table 1. Corn stover nutrient composition between different hybrid types and stover removal rates following grain harvest. Data combined across both locations (West Lafayette, IN and Butlerville, IN. 2024)

Hybrid	Nutrient	Stover Nutrient Total		Removal rate (%)			
		lb/ton (DM)	lb/acre	25	50	75	100
DKC62-70 (Tall)	C	886.3	4447	1112	2224	3335	4447
	N	16.3	83.6	20.9	41.8	62.7	83.6
	P	2.3	11.8	3.0	5.9	8.9	11.8
	K	**14.3**	**73.3**	**18.3**	**36.7**	**55.0**	**73.3**
PR112 and PR116 (Short)	C	875.6	4395	1099	2198	3296	4395
	N	16.1	80.8	20.2	40.4	60.6	80.8
	P	2.3	11.5	2.9	5.8	8.6	11.5
	K	**16.0**	**80.3**	**20.1**	**40.2**	**60.2**	**80.3**

This preliminary data helps us begin to answer the key question: How much stover can be removed before we start impacting soil nutrient levels and long-term productivity? These insights will guide recommendations that help maximize returns while protecting your soil investment. In addition, these trials will be expanded upon and repeated over the next two years for further data examination.

🌽 Residual Herbicides: Precipitation Requirements for Activation and the Likelihood to Receive It

(Tommy Butts), (Austin Pearson), (Maria Souza), & (Emmanuel Cooper)

Planting season is getting fully underway across the state, and with that we should all be getting our residual herbicides applied. Residuals are critical to successful season-long weed control as we have less documented herbicide resistance to these chemistries compared to postemergence products, as well as generally we see more consistent control from these herbicides because we're targeting weeds before they're even out of the ground. However, for residual herbicides to be successful, they require precipitation to be activated. I frequently get asked how much rainfall is required to fully activate these herbicides, how long can the herbicide wait until we'd receive this rainfall, and if a shallow tillage event would help the situation. These answers can be highly variable across herbicides (Tables 2 and 3), as they are normally dependent on water solubility and soil adsorption of the active ingredients; however, there are some general estimates that can be made.

1. Generally, 0.5” of rainfall is required for many of our residual herbicides to be fully activated. Some herbicide formulations, such as encapsulations, will often require greater amounts of rainfall than non-encapsulated counterparts for activation.
2. Most labels indicate activating rainfall should occur within 7 to 10 days following the application. In most situations, this is not necessarily due to the herbicide breaking down within this timeframe, but rather it is expected that if no activation has occurred within 7 to 10 days, weeds have already emerged and will not be controlled from a residual herbicide.
3. Shallow (<2”) cultivation is often recommended on many labels between 7 to 14 days after application if an activating rainfall did not occur; however, in few situations does this truly aid activation of the residual herbicide. Rather the shallow cultivation is typically recommended to control emerged weeds and hopefully buy more time for an activating rainfall for the residual herbicide

Table 3. List of commonly used soybean herbicides with the precipitation required for activation, days in which the precipitation needs to occur, and whether cultivation can be used for activation according to their respective labels.

Herbicide (active ingredient)	Herbicide (Trade name)	Precipitation Needed for Activation	Days Required for Activation	Is cultivation recommended?
chlorimuron	Classic	0.5" - 1" for wet soil and 1" - 2" for dry soil	Not specified.	Only if herbicide is not activated. Do not cultivate within 7 days of application.
cloransulam	FirstRate	0.5"	Not specified.	Shallow incorporation can be used preplant (1-3").
dimethenamid	Outlook	0.5" - 1"	Within 10 days.	Shallow (<2") incorporation can be used.
flumetsulam	Python	0.5" - 1"	Within 10 days.	Preplant incorporation at 2-3". Shallow incorporation can be used if herbicide is not activated.
flumioxazin	Valor	> 0.25"	Not specified.	Not recommended.
fomesafen	Flexstar	> 0.25"	Not specified.	Not specified.
imazethapyr	Pursuit	Not specified.	Within 7 days.	Shallow (<2") incorporation can be used if the herbicide is not activated.
metribuzin	Tricor	0.25" - 0.5"	Within 10 days.	Not recommended.
pendimethalin	Prowl H2O	Not specified.	Not specified.	Recommended.
pyroxasulfone	Zidua	0.5"	Not specified.	Shallow (<2") incorporation can be used.
saflufenacil	Sharpen	0.5"	Before weed seedling emergence.	Shallow incorporation (<2") can be used.
sulfentrazone	Spartan	0.5" - 1"	Within 10 days.	Shallow (<2") incorporation can be used.
S-metolachlor	Dual Magnum	0.5" - 1"	Within 10 days.	Shallow (<2") incorporation can be used.

Figure 3. Corn PRE *versus* NO-PRE herbicide application.

In addition to understanding these activation concepts, it is also important to have an idea of our chances at getting these residual herbicides activated. Figures 1 and 2 present the likelihood of receiving 0.5” of rainfall within 7 days for each calendar day within the months of April, May, June, and July, based on 20 years of weather data (2004-2024) from the Throckmorton Purdue Agricultural Center (TPAC). Similarly, Figures 5 and 6 present the same information for the Southeast Purdue Agricultural Center (SEPAC). Overall, as the summer progresses, our likelihood of receiving an activating rainfall within a week of application decreases significantly. This may be an indication that earlier planting dates, at least within April, could aid our weed management by providing a greater likelihood of activating residual herbicides both in our preemergence application and in an overlapping residual pass.

Based on the historical data, SEPAC and southern Indiana has a greater likelihood of receiving an activating rainfall with monthly averages above 64% for April, May, and June. In contrast, TPAC and central-northern Indiana never exceeded a 63% likelihood of activation even in April. Even more interestingly at TPAC, in the second half of May (blue bar and arrow, Fig. 3) and beginning half of June (yellow bar and arrow, Fig. 4), the likelihood of receiving 0.5” of rainfall within a week drops at or below 50%. This means that for an entire month (mid-May to mid-June), it is a coin toss on whether we can receive an activating rainfall for our residual herbicides.

With these reduced likelihoods for activation, it can be difficult to effectively use our residual herbicides. But here are a few recommendations to give us our best shot at activation.

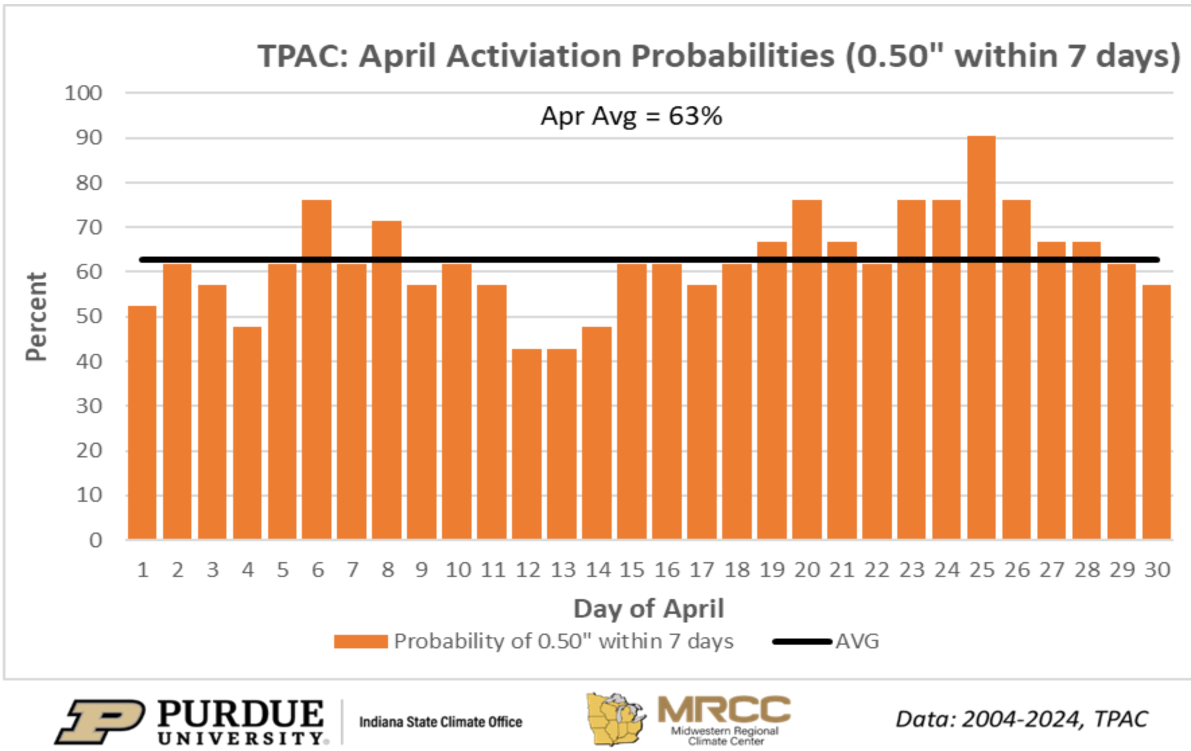
1. April planting dates will increase our chances for an activating rainfall, particularly if we can make an overlapping residual application at the beginning of May.
2. If you have pivot irrigation, use that to your advantage to activate residual herbicides following an application.
3. Pay close attention to the weather forecasts. Although forecasts often shift and change on us, if we can try to target an application close to projected rainfall events, we may just get lucky.
4. Get selective in the order that you might apply your residuals. What I mean by this, since some herbicides require less moisture for activation, these herbicides may be candidates for your overlapping residual pass later in the growing season when the likelihood of receiving a greater rainfall event decreases. For example, since *S*-metolachlor requires more than 0.5” particularly on medium to fine soils, but pyroxasulfone only requires 0.5” at a maximum, it may be wise to apply *S*-metolachlor earlier in the season (greater chance at receiving a higher activating rainfall) and overlapping with pyroxasulfone.

Overall, residuals continue to be a powerful tool in our weed management toolbox. If we put the little things together mentioned above, we can hopefully maximize our use of this tool. And who knows? Maybe this will be the year that we all receive the perfect amount of rainfall at just the right time for success. We can hope, right?

With that, please let us know if we can help, and good luck out there!

Table 4. List of commonly used corn herbicides with the precipitation required for activation, days in which the precipitation needs to occur, and whether cultivation can be used for activation according to their respective labels.

Herbicide (active ingredient)	Herbicide (Trade name)	Precipitation Needed for Activation	Days Required for Activation	Is cultivation recommended?
acetochlor	Harness	0.25" to 0.75"	Within 7 days.	Shallow (1" to 2") incorporation within 14 days.
acetochlor (encapsulated)	Warrant	0.5" to 0.75"	Not specified.	Not recommended.
atrazine	Aatrex	Not specified.	Within 10 days.	Shallow (not specified) incorporation within 14 days.
flufenacet	Flufenacet 4SC	Not specified.	7 to 10 days.	Shallow (<2") incorporation can be used.
halosulfuron	Permit	0.25" to 0.5"	7 to 14 days.	Not recommended.
isoxaflutole	Balance Flexx	Not specified.	Within 14 days.	Shallow (<2") incorporation can be used.
mesotrione	Callisto	0.25"	7 to 10 days.	Rotary hoeing is suggested to activate product 7 to 10 days after application if no rainfall is received.
simazine	Princep	Not specified.	Not specified.	Shallow cultivation suggested especially under relatively dry conditions and if weeds emerge.
rimsulfuron + others	Steadfast Q/Realm Q	0.5"	5 to 7 days.	Cultivation recommended 7 to 14 days after application to control emerged weeds.
saflufenacil (encapsulated) + pyroxasulfone	Surtain	0.5"	Before weed seedling emergence.	Shallow (1" to 2") incorporation can be used.
thiencarbazone-methyl + tembotrione	Capreno	Not specified.	7 to 14 days.	Not recommended.



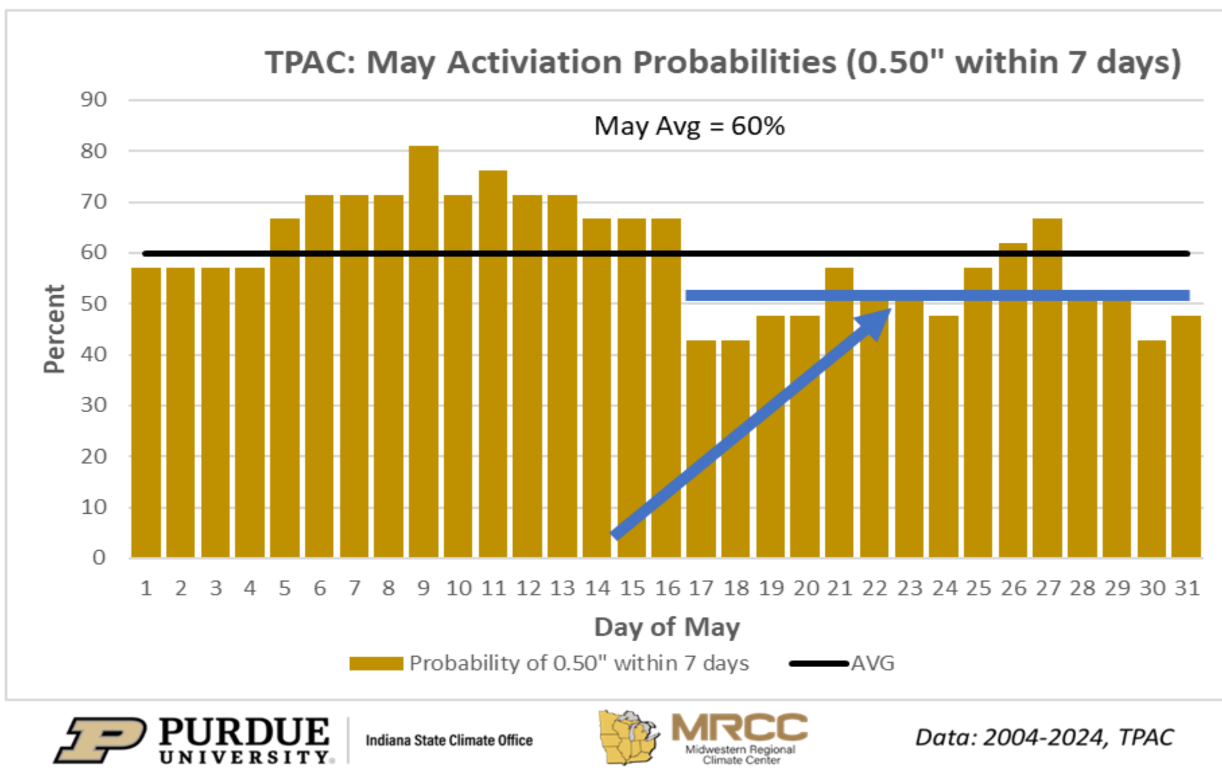
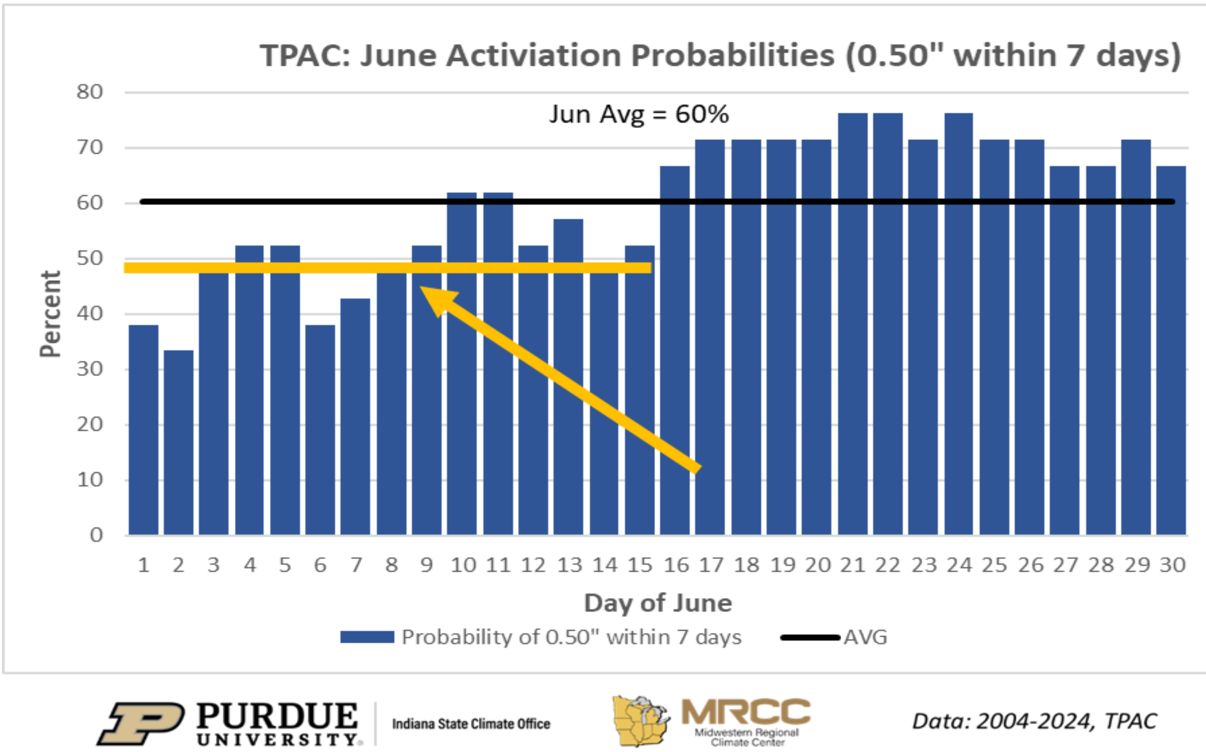


Figure 4.Probability of receiving 0.5” of rainfall within 7 days for April (top) and May (bottom) from 20 years of historical weather data at the Throckmorton-PAC located outside of Lafayette, IN.



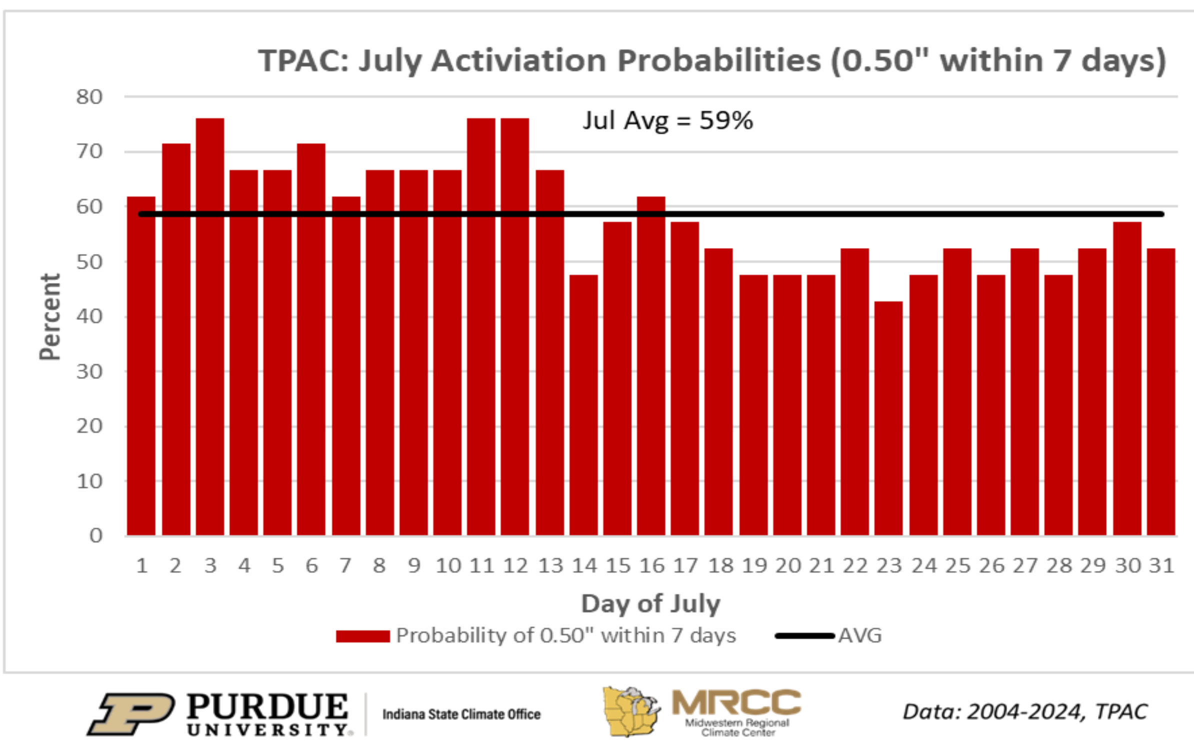
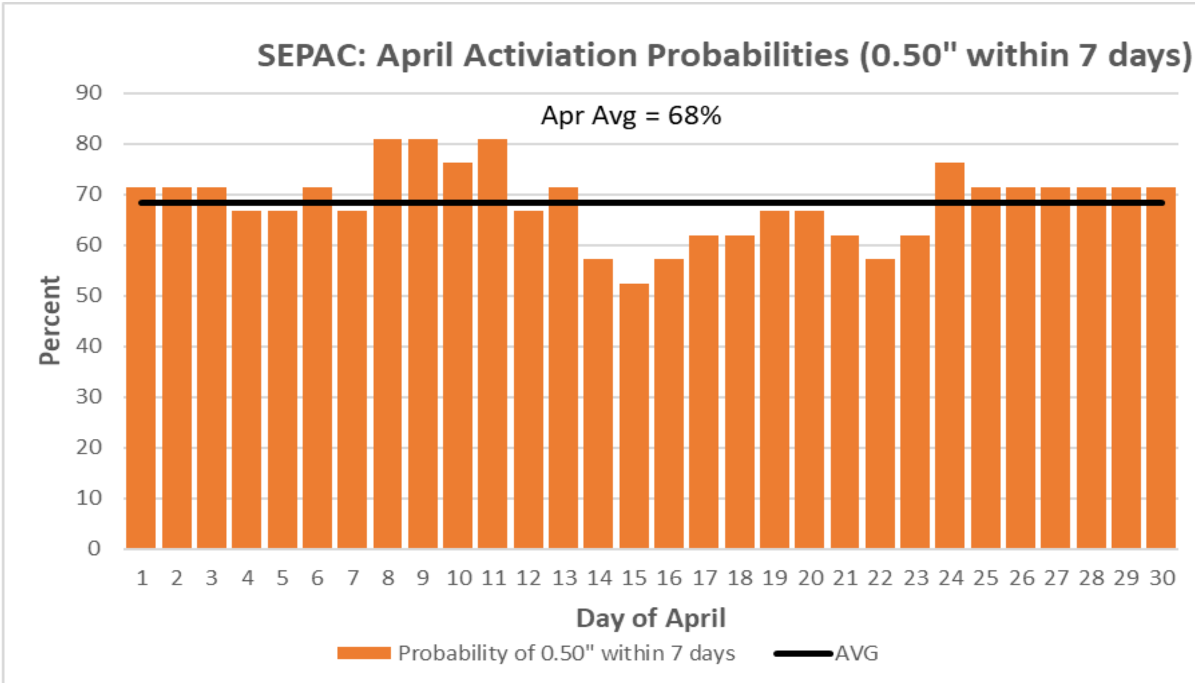
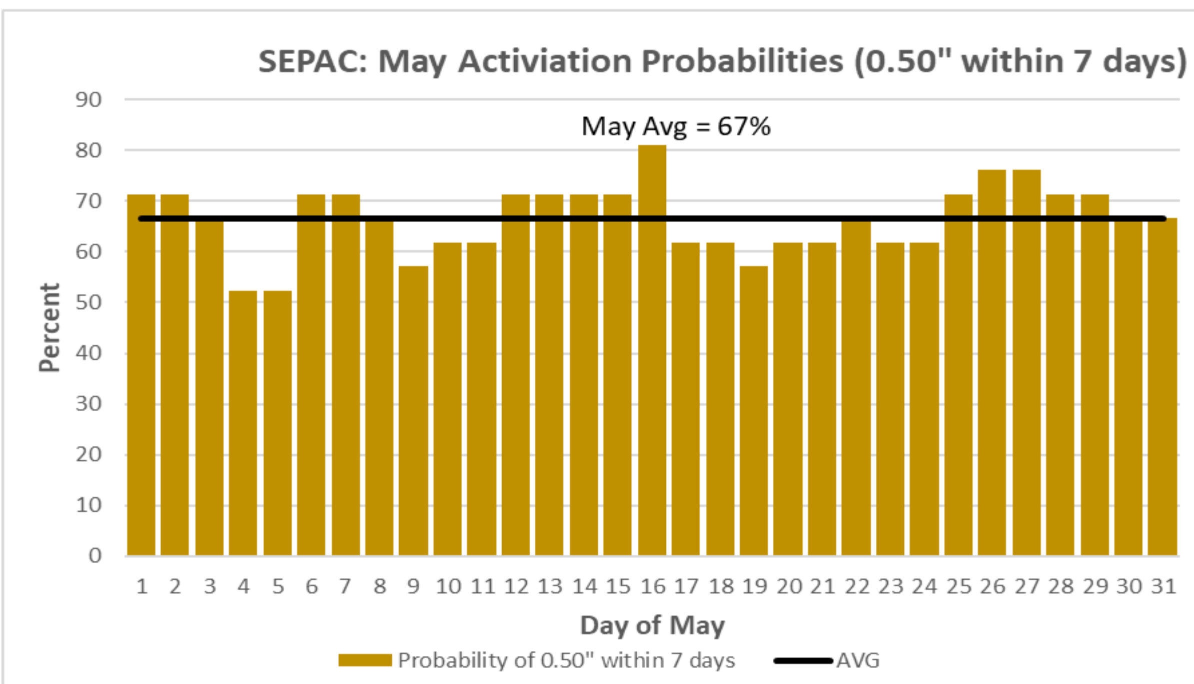


Figure 5. Probability of receiving 0.5" of rainfall within 7 days for June (top) and July (bottom) from 20 years of historical weather data at the Throckmorton-PAC located outside of Lafayette, IN.

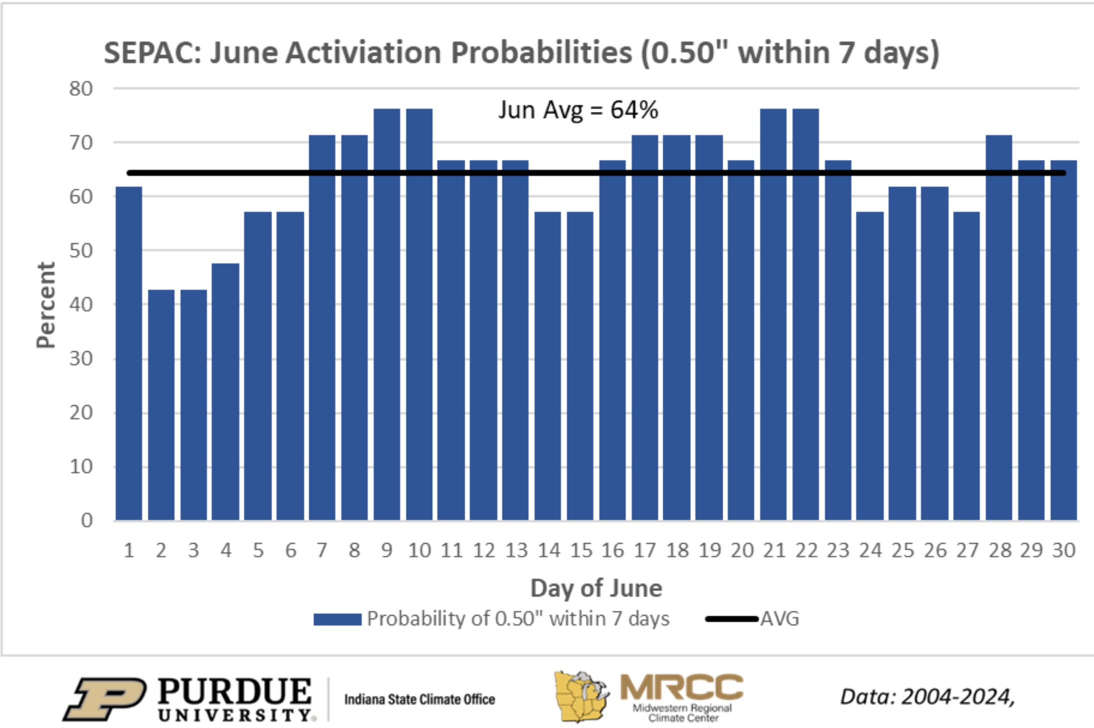


PURDUE UNIVERSITY | Indiana State Climate Office MRCC Midwestern Regional Climate Center *Data: 2004-2024,*



PURDUE UNIVERSITY | Indiana State Climate Office MRCC Midwestern Regional Climate Center *Data: 2004-2024,*

Figure 6. Probability of receiving 0.5” of rainfall within 7 days for April (top) and May (bottom) from 20 years of historical weather data at the Southeast-PAC located outside of Butlerville, IN.



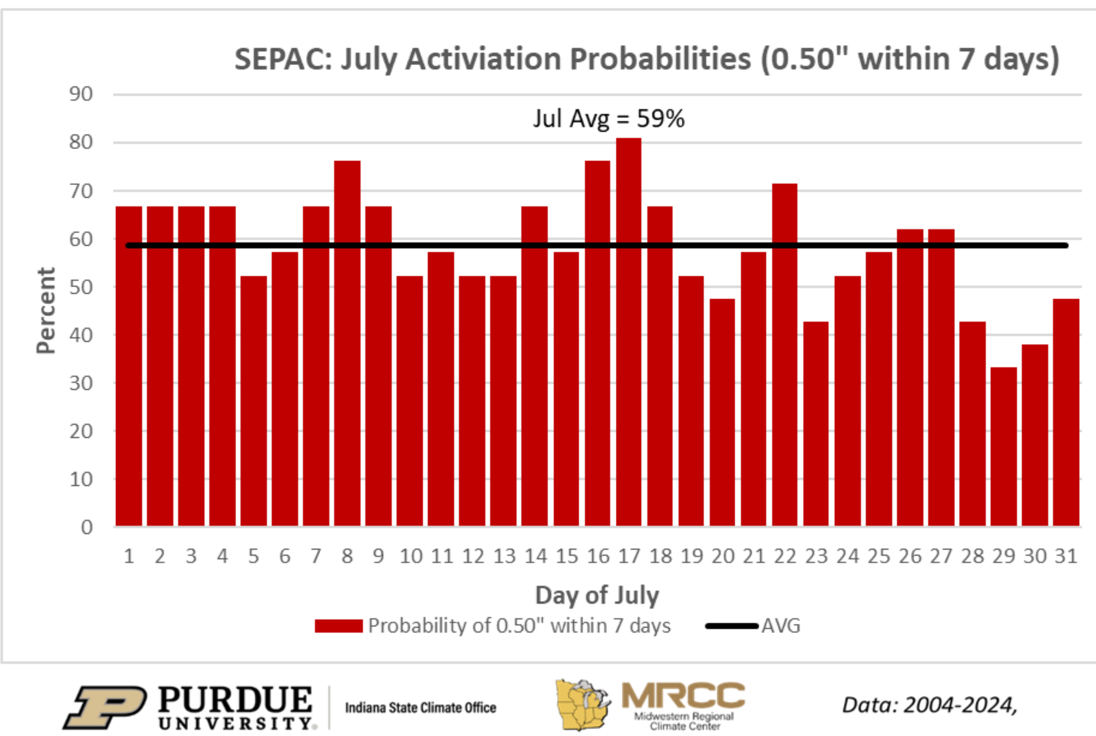


Figure 7. Probability of receiving 0.5” of rainfall within 7 days for June (top) and July (bottom) from 20 years of historical weather data at the Southeast-PAC located outside of Butlerville, IN.

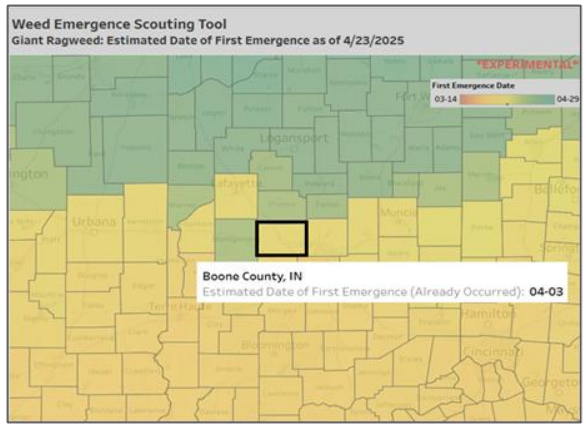
Midwestern Regional Climate Center Launches New Experimental Weed Emergence Scouting Tool

(Austin Pearson) & (Beth Hall)

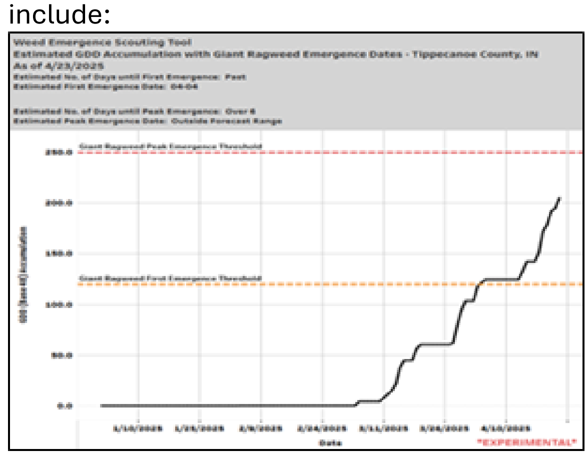
Midwestern farmers have faced a buildup of pesticide resistance in pigweeds (waterhemp and Palmer amaranth), highlighting the importance of scouting to detect weeds early in their growth stages. Otherwise, weed escapes are a common issue as herbicides lose their efficacy when weeds are allowed to grow long enough into their growth cycle. The Midwestern Regional Climate Center (MRCC), supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2022-70006-38001), has developed the experimental Weed Emergence Scouting Tool (W.E.S.T.) to help farmers estimate when agronomic weeds are likely first to emerge and reach peak emergence based on growing degree day (GDD) models. The tool is currently limited to two weeds: waterhemp and giant ragweed. The MRCC hopes to expand its focus to other weeds with future funding

The current version allows users to:

- Track GDD (base 48°F) accumulations over the current year (January 1 to the current date) for any Midwest County.
- Based on forecast data, determine whether giant ragweed or water hemp is expected to reach its peak emergence within six days and, if so, in how many days.
- Review the current season's emergence dates for giant ragweed or water hemp in specific Midwest counties.



them to the previous day's total. Forecast maximum, minimum, and average temperatures from NOAA are adjusted to the county level and are then used to calculate daily GDD accumulations over the subsequent six-day period. Research from Iowa State University indicates that giant ragweed typically emerges with fewer than 150 GDD, while waterhemp requires more than 350 GDD. To refine these estimates, Purdue Extension Educators collected field data across Indiana in 2023. Findings include:



- Giant ragweed first emerges at about 120 GDD (base 48°F) and reaches peak emergence between 200 and 300 GDD.
- Waterhemp first emerges at about 425 GDD (base 48°F) and peaks between 500 and 600 GDD.

This tool would benefit from your giant ragweed and waterhemp observations to better refine this product. Email **mrcc@purdue.edu** if you want to provide weed emergence observations to assist in tool validation and refinement.

Acknowledgments

The authors greatly appreciate the feedback and contributions of all growers, county agents, consultants, and corn industry stakeholders.

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