Issue #20 – September 5, 2025

In This Issue:

🌾 🚜 From South to North: Indiana's Corn Progress Update

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

Corn Condition

Indiana's crop condition ratings held steady: **50% good, 11% excellent, and 28% fair**, with 11% rated poor-to-very-poor. The 18-state average is nearly the same for good (50%) but stronger in excellent (19%). Iowa continues to lead with 58% good and 26% excellent. See more in **interactive maps 1.**

Corn Dough

Indiana's crop has reached **90% in the dough stage**, moving up from last week's 82% and right on par with the 18-state average (90%). Illinois (96%) and Iowa (92%) are also nearly complete, reflecting a steady pace across the Corn Belt. See more in **interactive maps 2**

Corn Dented

Denting is progressing quickly, with Indiana at **47%**, up from 34% last week but slightly behind the 5-year average (52%). The 18-state average stands at **58%**, with Illinois at 72% and Iowa at 63%. Southern states remain furthest ahead. See more in **interactive maps 3**

Corn Maturity

Indiana reports **5% mature**, a modest rise from 1% last week, but still below its 5-year average of 8%. Across the 18 states, maturity reached **15%**, led by North Carolina (82%) and Texas (91%). See more in **interactive maps 4.**

Indiana's corn crop is tracking just behind its 5-year averages: dough development is nearly complete, denting is accelerating, and maturity has begun. Crop conditions remain stable, suggesting that, with favorable weather, yield potential should hold steady heading into harvest.

➡️ Let us know if we can help.

Interactive Maps 1. U.S. Corn **Condition** (USDA-NASS)
Click on the categories below to see the corn condition at each U.S. state on Aug 31st.

Very Poor	Poor	Fair	Good	Excellent

Interactive Maps 2. U.S. Corn **Dough** Progress (USDA-NASS)
Click on the dates below to see the corn emerged progress over time and the average:

Aug 31, 2024	Aug 24, 2025	Aug 31, 2025	Average (2020-2024)

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Purdue Corn Team Research Update

(Jeferson Pimentel, Betsy Bower & Daniel Quinn)

During the R5 stage, monitor for diseases like gray leaf spot, northern corn leaf blight, leaf spot, southern rust, and tar spot. The Kernel team visited three Purdue research stations this week: ACRE, PPAC, and TPAC for disease ratings.

Most of the diseases identified in our research trials at ACRE were common ones listed above, but we also detected Curvalaria. At R5.5, we are likely too late to apply a fungicide and get a positive ROI. However, knowing what diseases you have and the level of infestation in your field may explain low-yielding areas as potential diseases in the coming corn years.

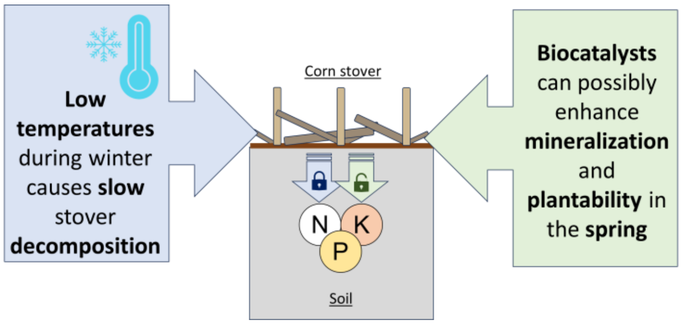
Figure 1. Corn with Southern Rust at Rice Farm PPAC.

Can Biocatalyst Technology Help Break Down Corn Residue in Indiana?

(Bruno Scheffer & Daniel Quinn)

Corn residue (Figure 1) management continues to be a significant challenge for Midwest farmers. As corn yields continue to increase, stover levels also continue to increase and can negatively impact **succeeding cash crop planting conditions** and soil nutrient availability. With high stover quanities, high carbon levels, and reduced breakdown, valuable nutrients such as nitrogen, phosphorus, potassium, sulfur can become immobilized, instead of being available for the next crop (e.g., soybean).

Figure 1: Corn stover during winter at Lafayette, IN.



Because of these challenges, there has been growing interest in products that claim to speed up residue breakdown, such as **biocatalysts**. These products are marketed to enhance microbial activity, **mineralization**, and ultimately improve spring planting conditions. But do they really work under Indiana conditions? With that in mind, our study set out to test whether a biocatalyst spray application following harvest could speed up corn residue decomposition and improve nutrient release for the following crop.

The research was conducted at two locations in Indiana: West Lafayette, at the Agronomic Center for Research and Education (ACRE) and; Lafayette, at the Throckmorton-Purdue Agricultural Center (TPAC). We used a randomized block design (Figure 2) with four replications. Each plot measured 15 × 40 feet and was planted with the same corn hybrid at uniform seed and fertilizer rates.

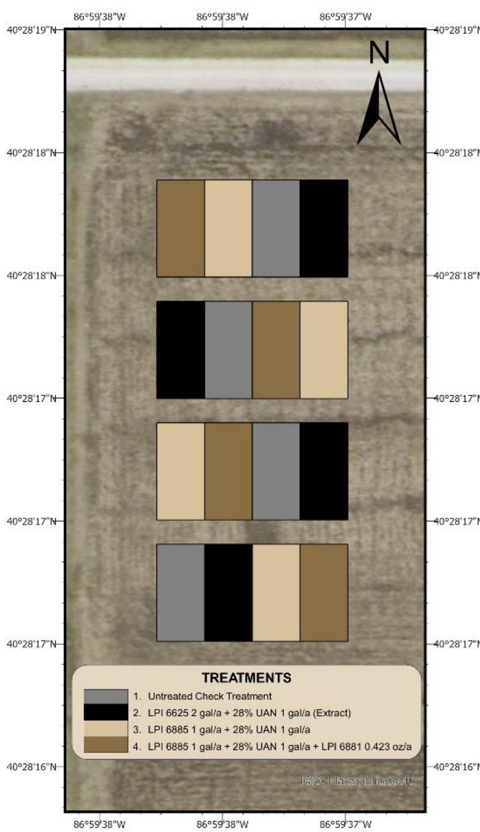


Figure 2: Randomized block design used at West Lafayette, IN.

Treatments

1. Nontreated check (control).
2. LPI 6625 2 gal/a + 28% UAN 1 gal/a.
3. LPI 6885 1 gal/a + 28% UAN 1 gal/a.
4. LPI 6885 1 gal/a + 28% UAN 1 gal/a + LPI 6881 0.423 oz/a.

The methodology steps in the trial consisted in: **application**, where the treatments were sprayed onto corn residue shortly after harvest using a CO_2 backpack sprayer; **residue preparation**, when residue was collected from the field, dried, and subsampled into mesh bags that were placed back in the plots; also, **residue collection**, when the bags were removed at 30, 60, 90, and 120 days after treatment to track decomposition over time (Figure 3).

Figure 3: Sample collection from: 0 (A), 30 (B), 60 (C), 90 (D) and 120 (E) days after application at West Lafayette, IN.

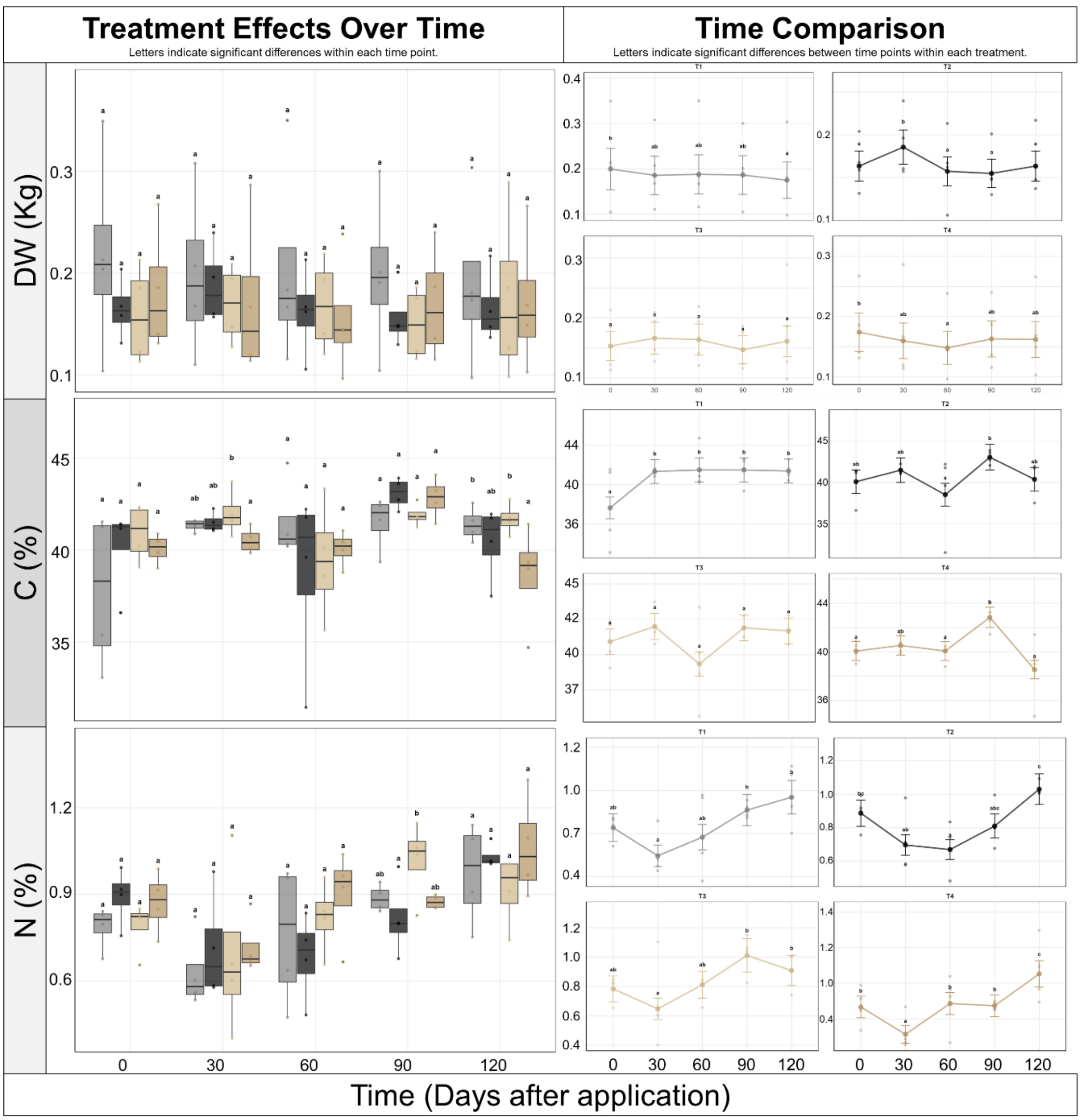


Figure 4: Changes in corn residue dry weight (DW), carbon (C), and nitrogen (N) over 120 days after harvest. Different colors show the treatments tested: grey (T1 - untreated), black (T2), light gold (T3), and dark gold (T4).

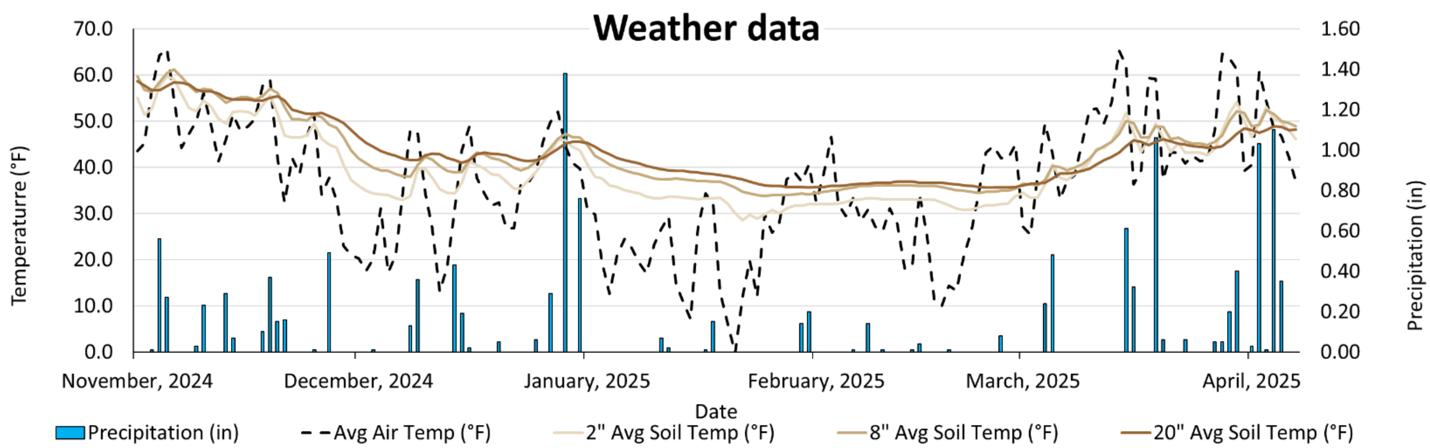


Figure 5: Weather conditions at the West Lafayette from Nov 2024 through Apr 2025. The blue bars represent precipitation (inches), while the dashed black line shows average daily air temperature (°F). Solid lines represent soil temperatures at different depths: light brown = 2 inches, medium brown = 8 inches, and dark brown = 20 inches.

Results - What Did We See?

The figures in this article (Figure 4) show how residue weight and nutrient concentration changed over time.

- **Residue Dry Weight (DW)** – Across treatments, residue weight declined slowly during the winter months. However, the decline was **similar between treated and untreated plots**, meaning the biocatalyst applications did not significantly speed up decomposition compared to natural breakdown.
- **Carbon (C) and Nitrogen (N) Content** – The carbon and nitrogen levels in residue also decreased gradually, but again, there was no consistent advantage for the treated plots.
- **Weather Data** – As expected, cold winter temperatures (Figure 5) slowed decomposition across all treatments. Warmer spring conditions led to more noticeable residue breakdown, regardless of treatment.

In short, the graphs suggest that under Indiana's winter conditions, residue breakdown was driven more by temperature and moisture than by the biocatalyst applications.

Conclusions

- Corn residue decomposition is **naturally limited by cold winter conditions** in Indiana.
- The tested **biocatalyst products did not consistently enhance residue breakdown** or nutrient release compared to nontreated controls.
- Residue management will likely continue to depend on long-term practices such as crop rotation, tillage decisions, and cover crops, rather than short-term product applications. However, further research is required.

Take-Home Message for Farmers

Biocatalyst technologies sound **promising**, but in our preliminary Indiana field trials, they did **not significantly** change **how quickly residue broke down** over winter. Farmers may want to be cautious about relying on these products for residue management **until more consistent evidence is available**.

🌧️ ENSO Update: La Niña Watch for Fall/Winter 2025

(Jeferson Pimentel & Daniel Quinn)

The latest outlook from NOAA shows that the Pacific Ocean is currently in **ENSO-neutral conditions**. Sea surface temperatures are near normal across much of the equatorial Pacific, with only a slight warming in the far east. Subsurface waters, however, have started to cool, and trade winds are expected to strengthen, both signs that a **shift toward La Niña is possible**.

Here's the timeline:

- **Now through late summer (Aug–Oct 2025):** ENSO-neutral remains most likely (about a 56% chance).
- **Fall and early winter (2025–26):** A **brief La Niña** is favored, though forecasters note it may not last long enough to meet NOAA's formal definition.
- **Winter into spring (2026):** Conditions are expected to drift back to neutral.

While some models (like the North American Multi-Model Ensemble) lean toward La Niña forming, others keep the Pacific neutral. This split indicates moderate forecast confidence.

What this could mean for Indiana & the Corn Belt

If La Niña develops this fall, even briefly, here's what farmers should be watching:

- **Wetter winters:** La Niña often shifts storm tracks toward the Ohio Valley and Great Lakes, bringing **above-normal precipitation** to Indiana. That could recharge soil moisture but also raise **runoff and tile drainage pressure**.
- **Temperature swings:** Indiana can expect **more cold snaps** during La Niña winters, even if the season as a whole isn't colder. Watch for freeze–thaw impacts on soils and livestock stress.
- **Harvest outlook:** A fall La Niña could mean **more frequent rain delays** during harvest 2025. Plan for potential slowdowns and drying costs.
- **Spring 2026 prep:** Wetter winters can lead to **slower soil warm-up** and **delayed early planting windows**.
- **Yield history:** While the bigger yield risks come when La Niña stretches into the summer (not expected here), wetter harvests and soggy springs can still **add costs and management challenges**.

🌾 3 Things to Watch: La Niña & Indiana Farmers

1. **Harvest 2025:**
    - A brief La Niña could bring **more frequent rain events** in fall.
    - Be ready for **harvest delays** and **extra drying costs**.
2. **Winter Weather:**
    - Expect the potential for **wetter-than-normal conditions** across Indiana.
    - **Cold snaps** may hit harder, with impacts on soils and livestock.
3. **Spring 2026 Prep:**
    - Wetter winter soils could mean a **slower warm-up** and **delayed fieldwork**.
    - Check tile outlets, plan for alternative **N timing**, and manage compaction risks.

📅 Next NOAA update: September 11, 2025

A Faster Way to Predict Corn Yields using ear images before harvest

(Pedro Cisdeli, Gustavo Santiago, German Mandrini, Ignacio Ciampitti)

Farmers want to predict corn yields before harvest as this can help with management decisions, from application of late-season inputs (e.g., fungicides) to planning harvest logistics. Traditionally, corn yield estimates are obtained by walking fields, shucking ears, and counting kernels, which are both time- and labor-intensive.

Our team at Purdue tested a new approach, using field images of corn ears in husk during the late part of the growing season (R4-R6?) to estimate ear size and yield. This could save time in the field and give corn farmers yield insights earlier in the growing season.

Field Imaging

To test this idea, we captured pictures of corn ears in husk using both a smartphone camera and a depth camera. The smartphone provides a regular photo, while the depth camera adds distance information, which helps describe the shape of the ear, and calculate its length, diameter and volume.

The depth sensing is available in many modern smartphones and tablets. This means that regular devices can be used in the field and cameras can be easily mounted on farm machinery, which opens the door for scaling this method into automated scouting and real-time monitoring during field operations. Figure 1 shows an example of the imaging system used on this project.

Detecting and Isolating the Ear

A computer vision software was trained to automatically find the ear in the image and remove the background (Figure 2). Once the corn ear is isolated, the depth data can be cropped to show only the ear (Figure 2). This helps to build a clean 3D-like representation that can be measured.

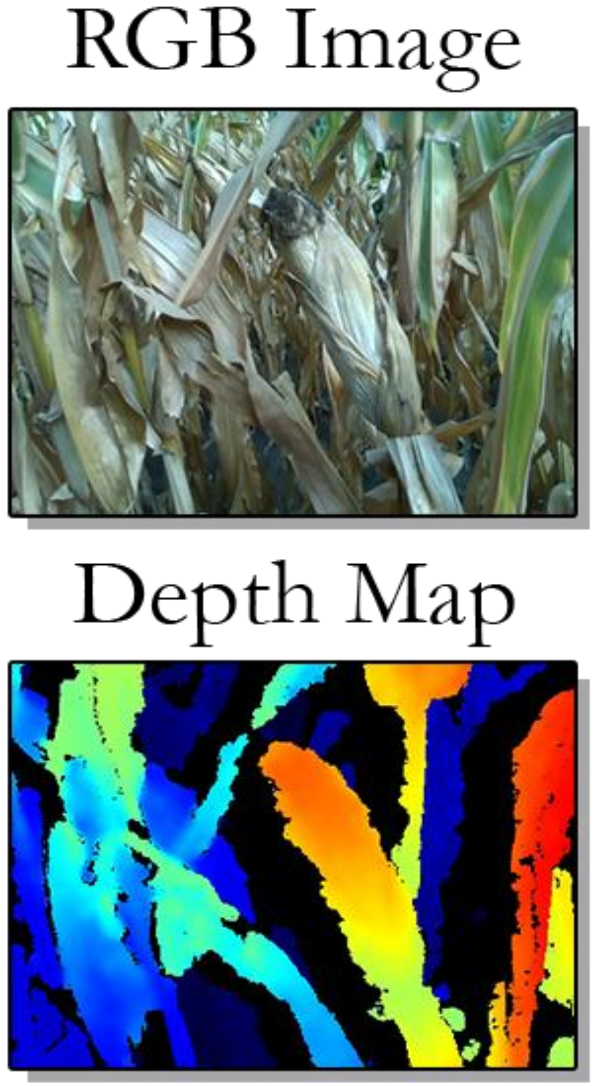


Figure 1. Example of a maize ear in the field. Top shows a photo taken with a regular camera, Bottom shows the corresponding depth map. Depth information is what allows us to calculate the ear's size directly in the field.

Robustness in the Field

Capturing images inside the corn canopy is not easy. Leaves and shadows often block the view, and sunlight can create glare or over-exposure. Despite these challenges, the system was able to consistently find and segment ears (Figure 3). This is important because it means the method is effective under the conditions encountered during scouting.

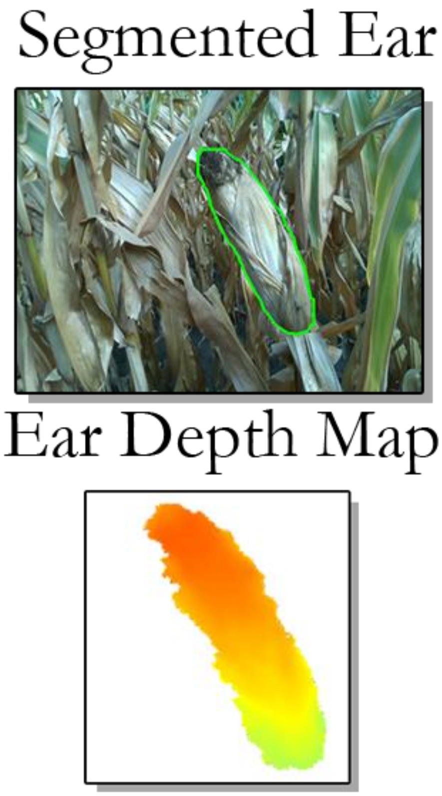


Figure 2. Computer vision automatically identifies the maize ear (top) and removes the background, leaving a clean depth map of the ear only (bottom).

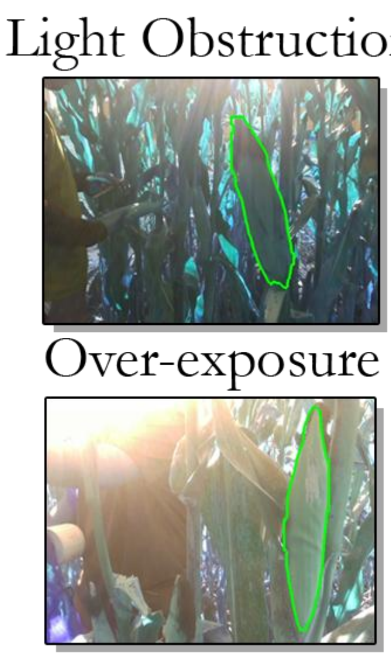


Figure 3. Examples of maize ears segmented successfully under difficult conditions. The top image shows an ear identified despite light obstruction from surrounding leaves. The image on the bottom shows an ear segmented correctly even under strong sunlight and over-exposure.

Yield Forecasting

The final step is to forecast yield. Our corn ear estimation approach predicted grain yield per ear with strong accuracy compared to the observed harvested yield data (Figure 4).

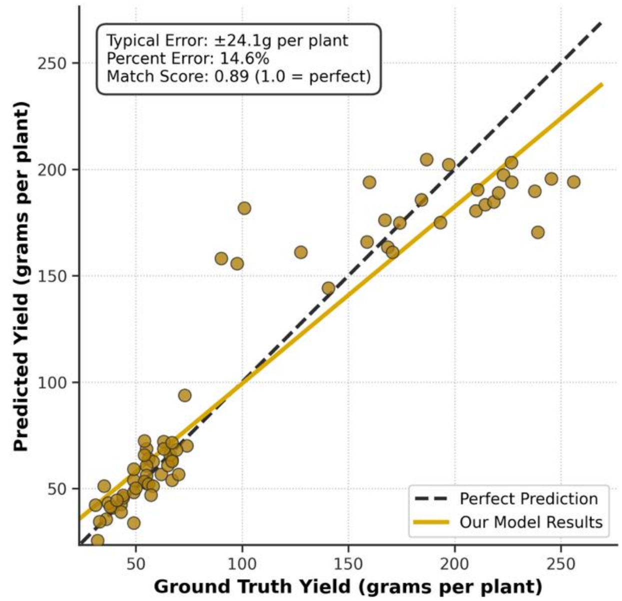


Figure 4. Actual corn ear yield compared with the predicted yield. The dashed line shows perfect agreement, and the yellow regression line shows that predictions closely follow measured values, highlighting that ear traits from field images can be used for early yield forecasting.

Looking Ahead

In the near future, corn farmers will be able to use a smartphone-based digital tool to scout their fields and take photos of ears, reducing labor and obtaining yield information earlier in the season. This data will help them to plan for use of inputs considering their potential return of investment (ROI), and develop better plans for harvest logistics.

From the research side, our next steps are to expand testing to include earlier stages (R1-R6), closer to flowering time, and across more corn hybrids.

To learn more, visit: https://ciampitti-lab.github.io/projects/maize-ear-sensing

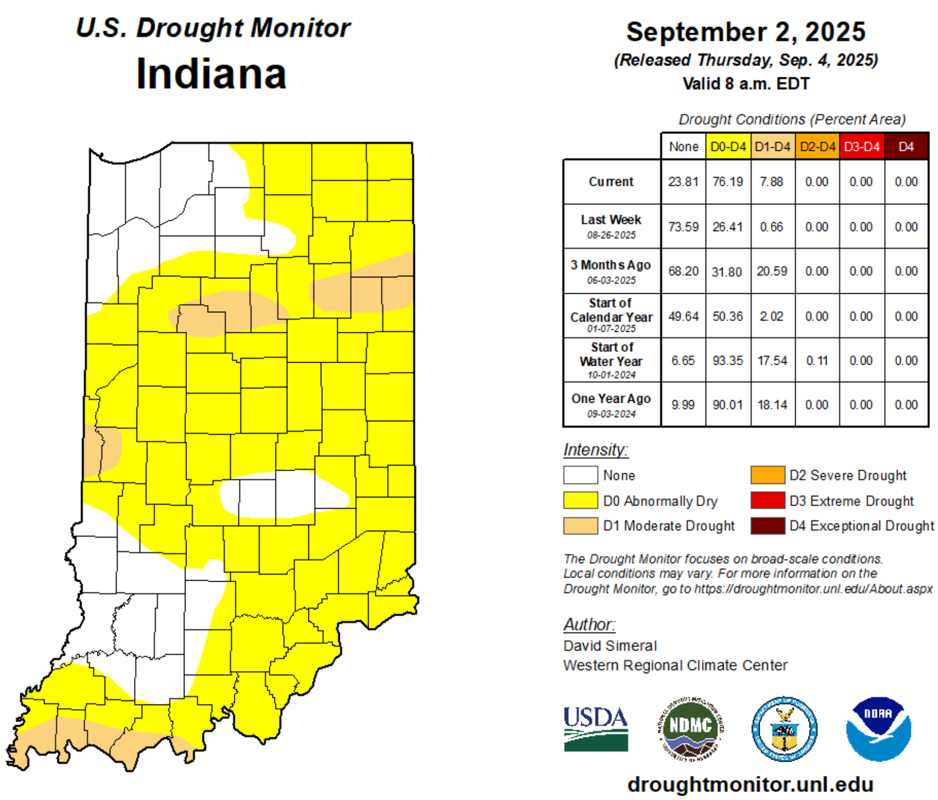
Abnormally Dry and Drought Conditions Are On The Rise

(Jacob Dolinger)

If you have any stakes in agriculture, you may have noticed a fairly rapid drying trend as summer has come to a close. According to the U.S. Drought Monitor on September 2, 76 percent of Indiana is considered abnormally dry—up from just 26 percent one week earlier. Moderate drought conditions have also expanded from less than 1 percent on August 26 to over 7 percent on September 2. The driest conditions are in several counties along the Ohio River in southwestern Indiana, as well as sporadically across northern Indiana and along the Illinois-Indiana border.

Meanwhile, 30-day precipitation is fairly lacking—especially across northern Indiana. Several counties around Indianapolis and to the north and east have seen less than 25 percent of their normal precipitation totals since August 4. Even across southeastern Indiana, conditions have rapidly become drier over the course of the final weeks of August. Only a few counties across southwestern Indiana and Northwest Indiana have observed near to above normal precipitation.

Soil moisture forecasts do not bode well for improving conditions. Anomalies are at least 40-80mm below normal across northern Indiana in the coming weeks. The 8–14-day precipitation outlook for the September 11-17 period is leaning toward below normal precipitation, especially for eastern Indiana, and equal chances for above normal and below normal precipitation through the end of the month. The U.S. Drought Monitor has accounted for this, with drought development likely across almost the entire state into September. Precipitation totals across Indiana tend to decrease slightly in September before increasing again in October and November, so it will be crucial to monitor soil conditions as we head through the Fall months.



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	23.81	76.19	7.88	0.00	0.00	0.00
Last Week 08-26-2025	73.59	26.41	0.66	0.00	0.00	0.00
3 Months Ago 06-03-2025	68.20	31.80	20.59	0.00	0.00	0.00
Start of Calendar Year 01-07-2025	49.64	50.36	2.02	0.00	0.00	0.00
Start of Water Year 10-01-2024	6.65	93.35	17.54	0.11	0.00	0.00
One Year Ago 09-03-2024	9.99	90.01	18.14	0.00	0.00	0.00

Figure 1. Three-fourths of the state are now abnormally dry, while several counties are also dealing with moderate drought conditions, as indicated by tan shading.

Acknowledgments

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

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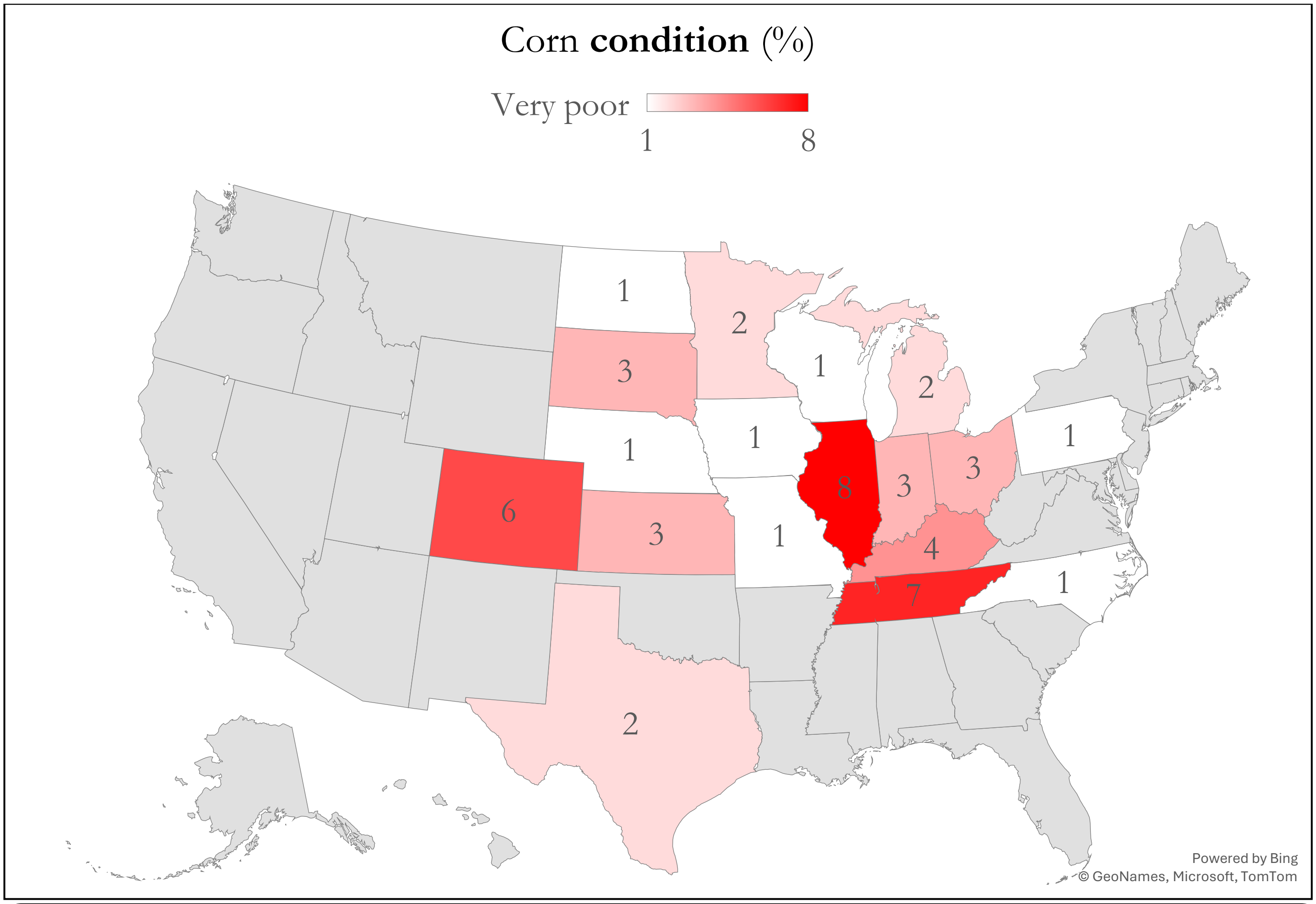

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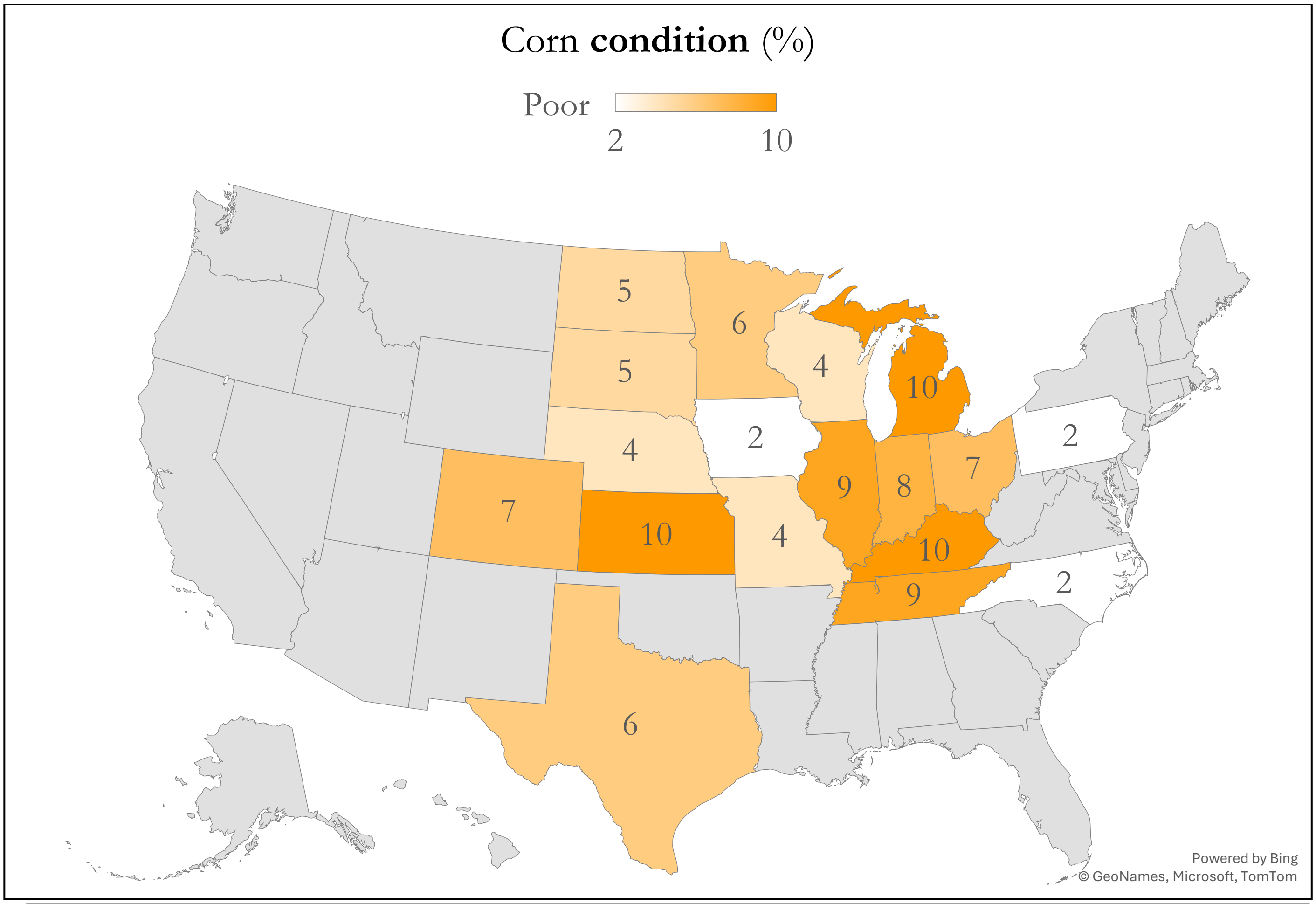
Very Poor	Poor	Fair	Good	Excellent	Back to page 2



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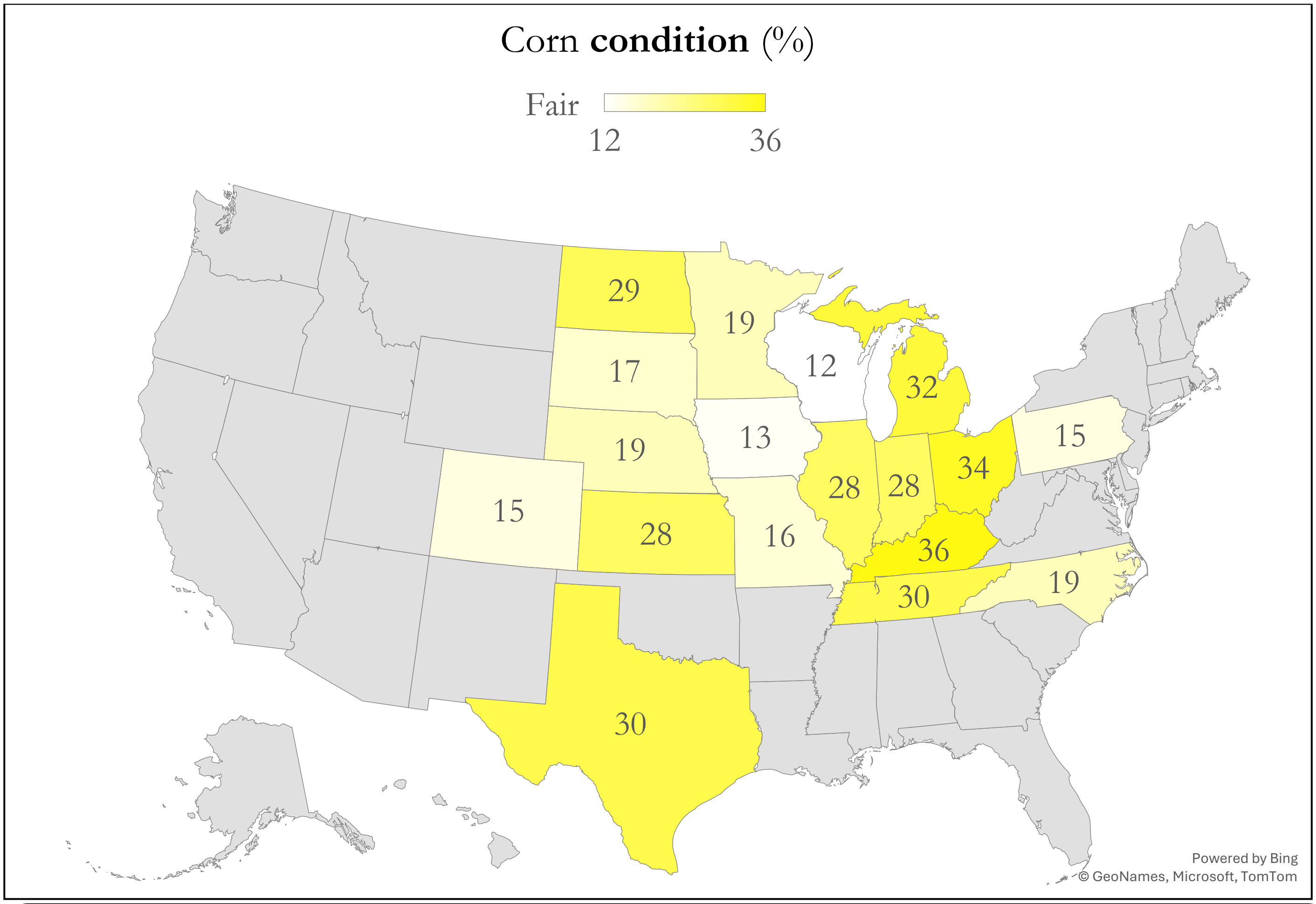

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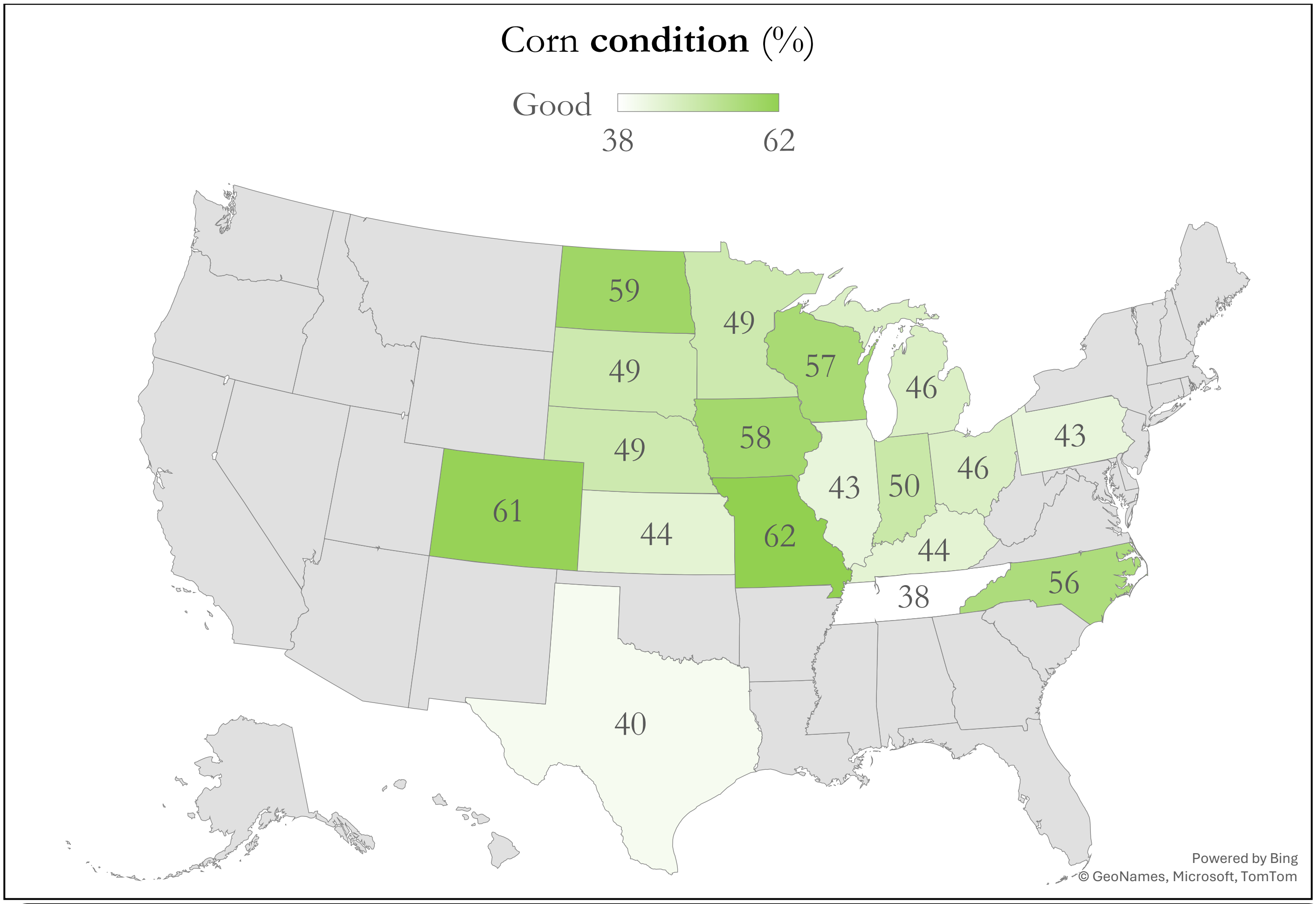

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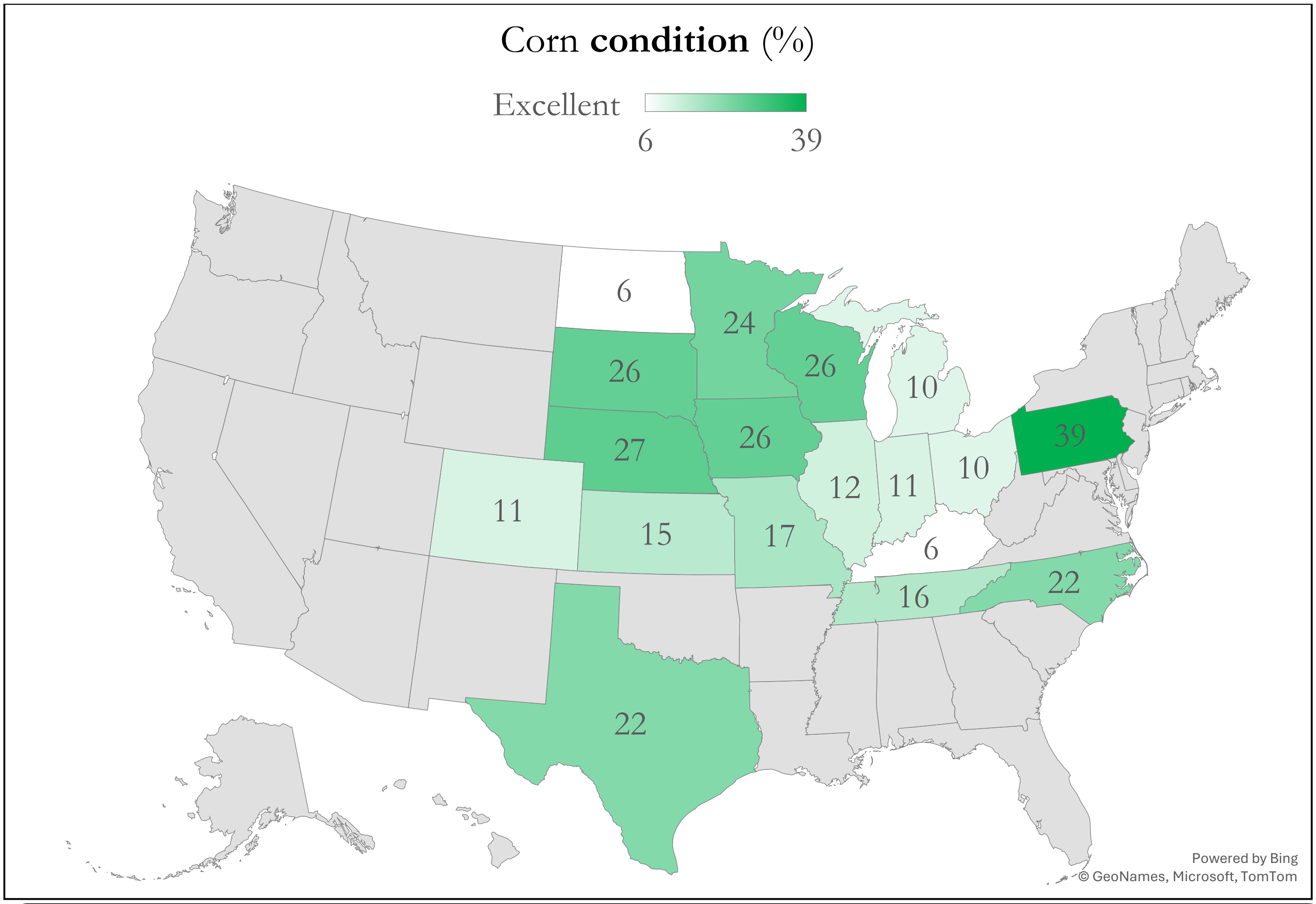

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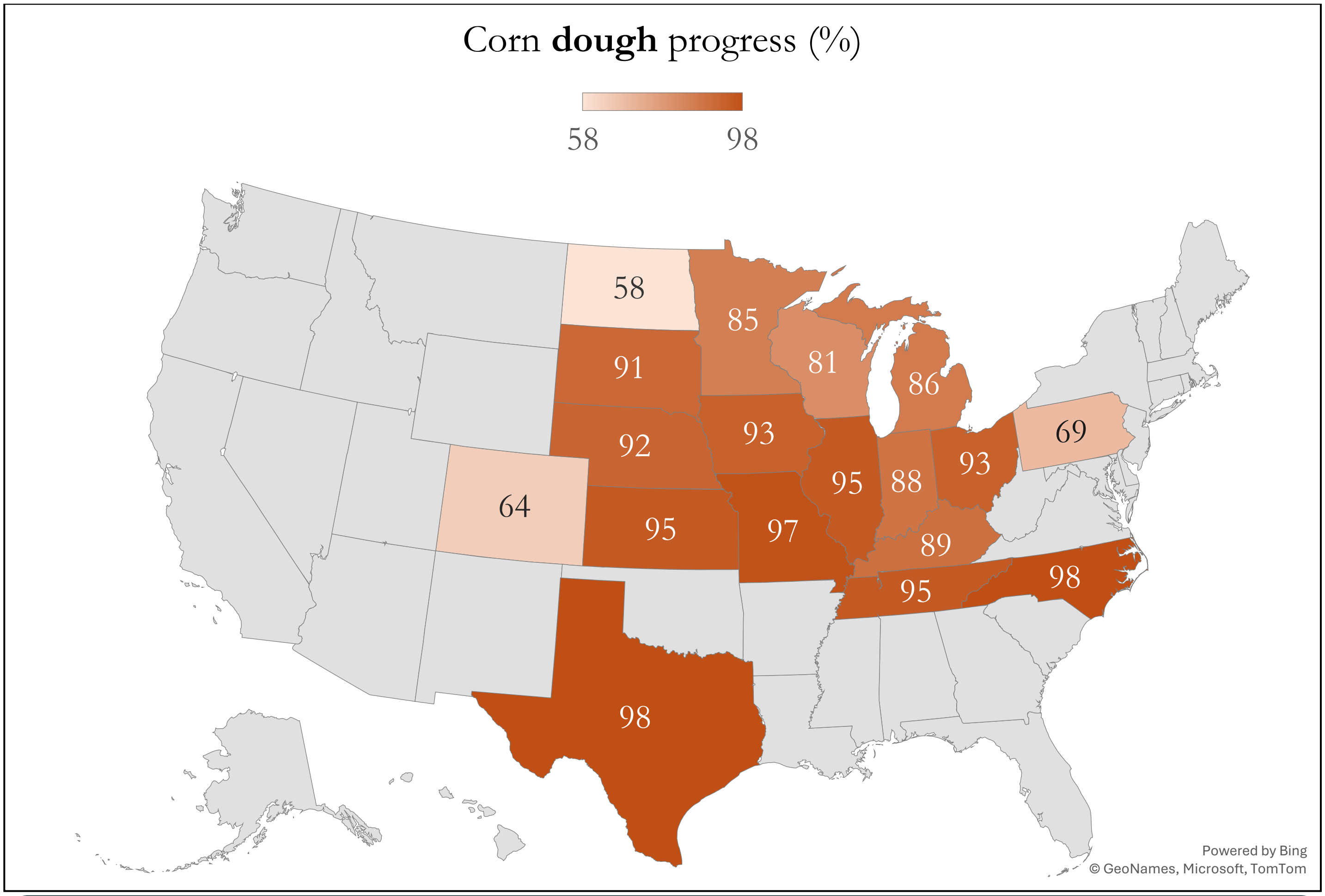

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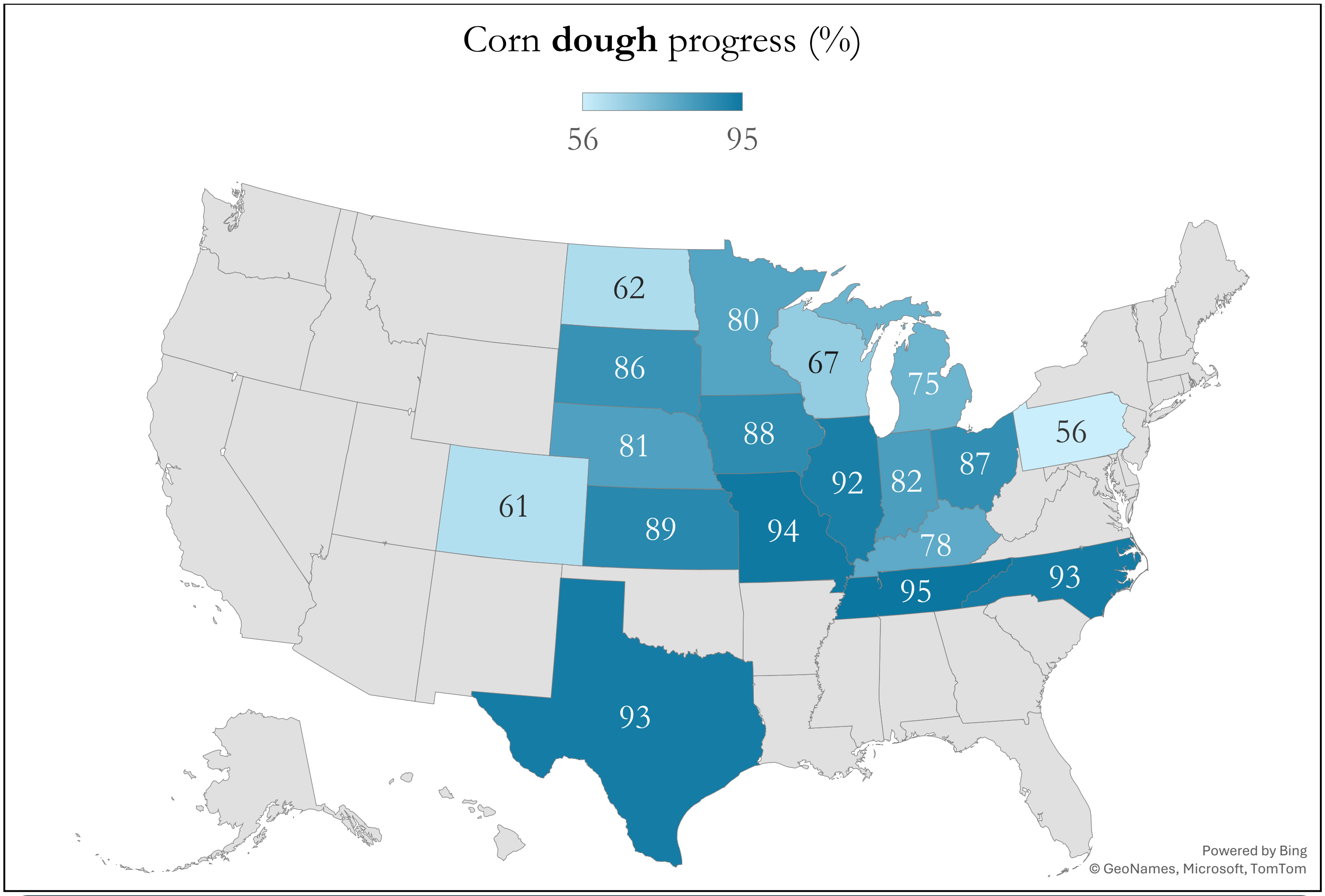

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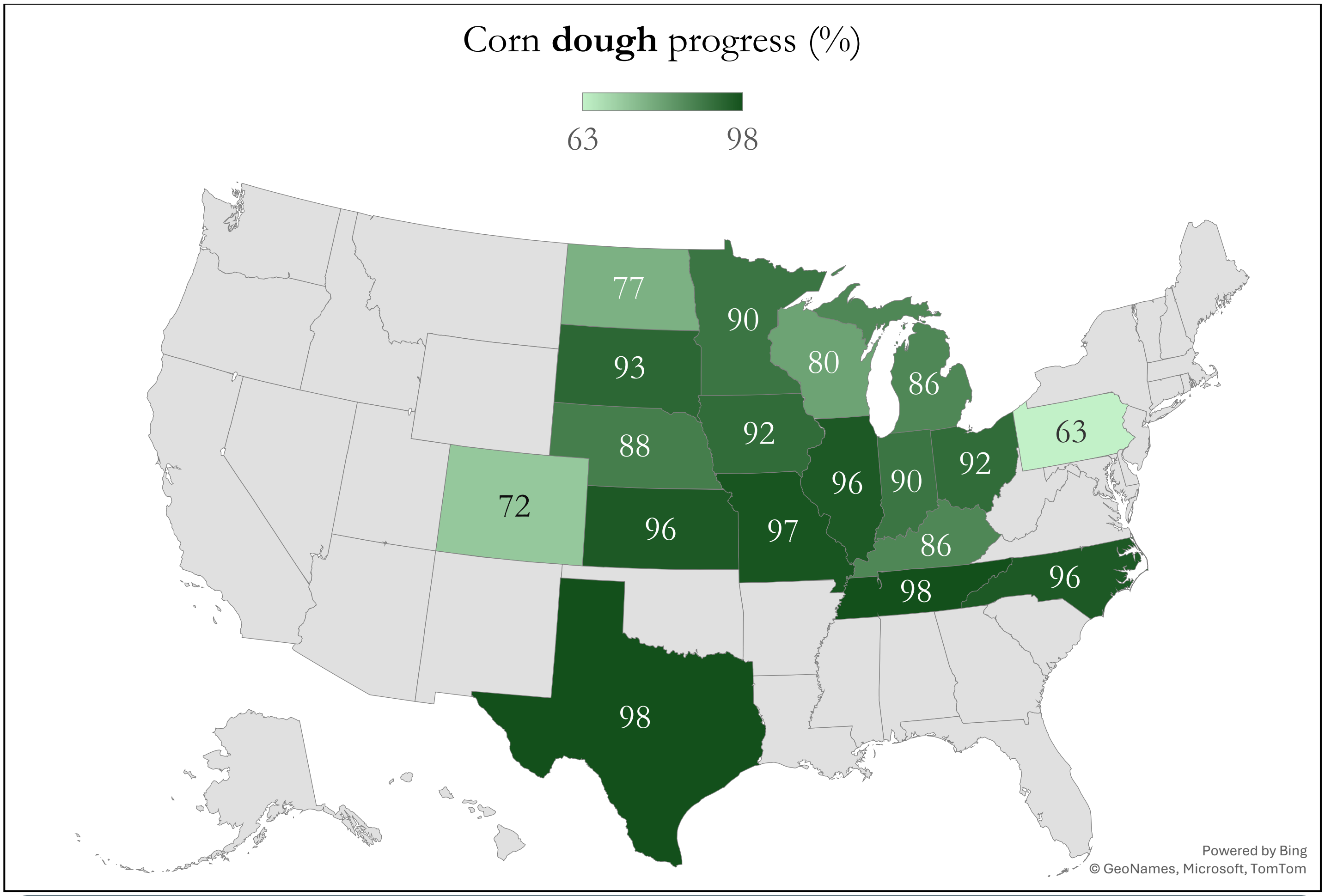

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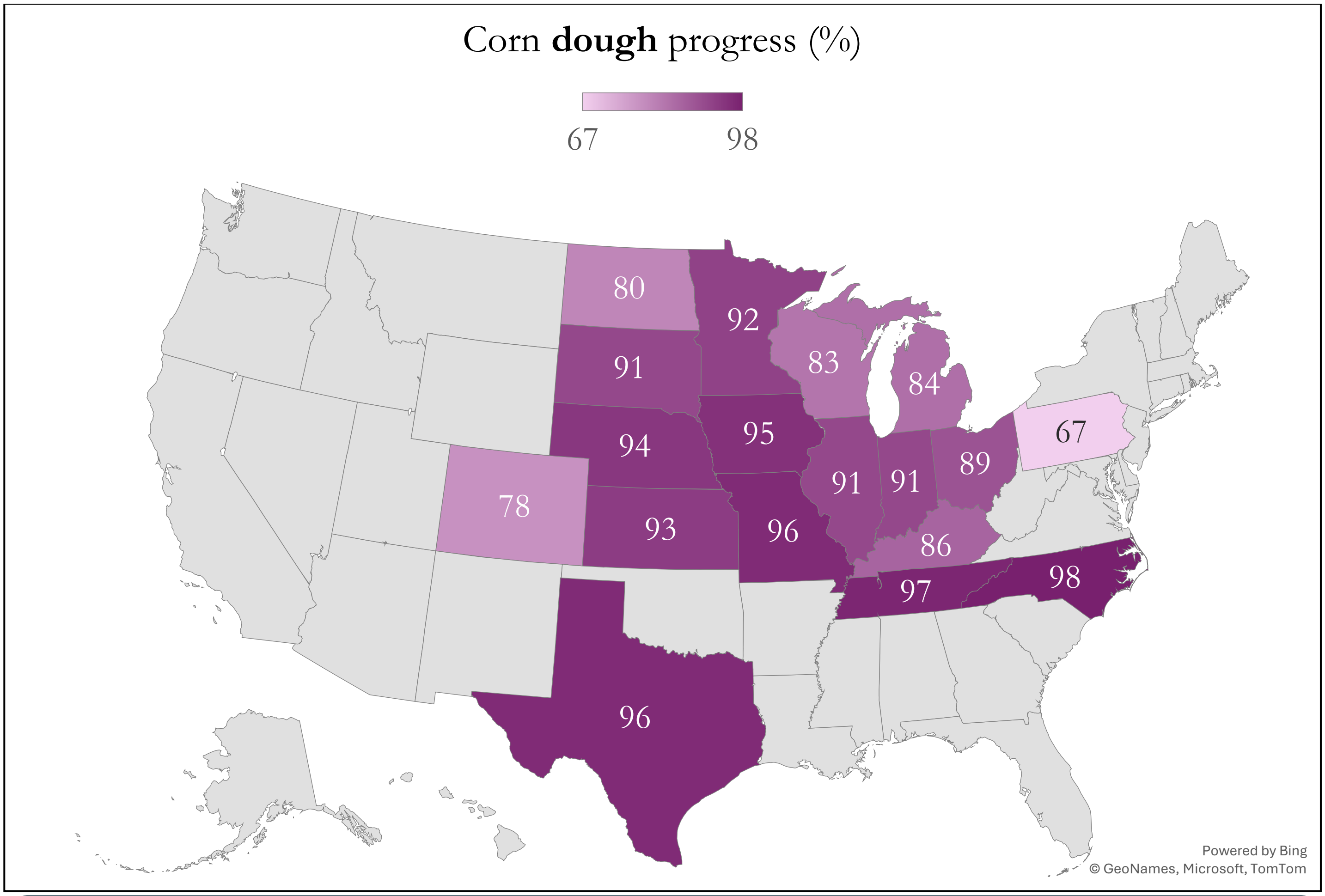

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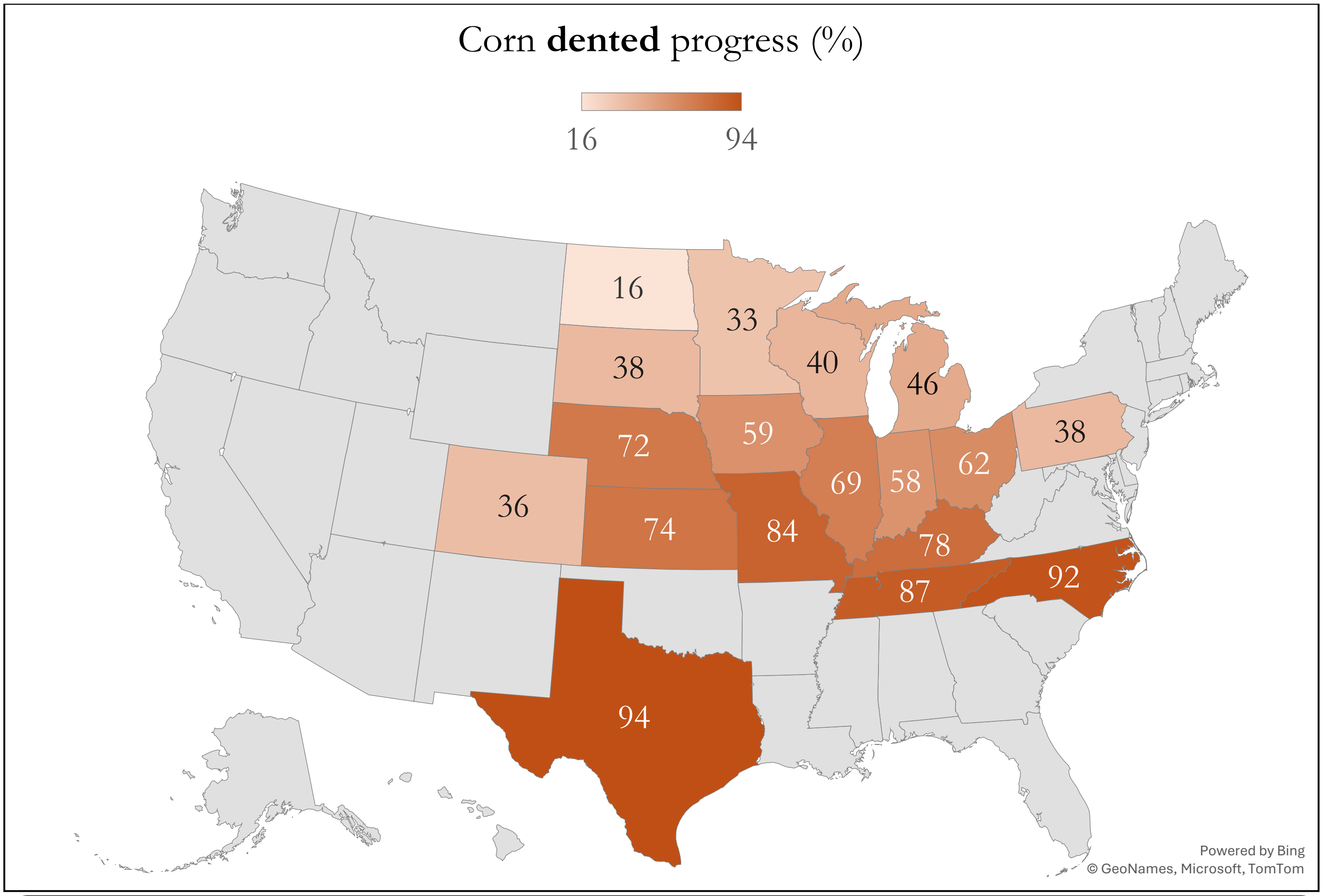

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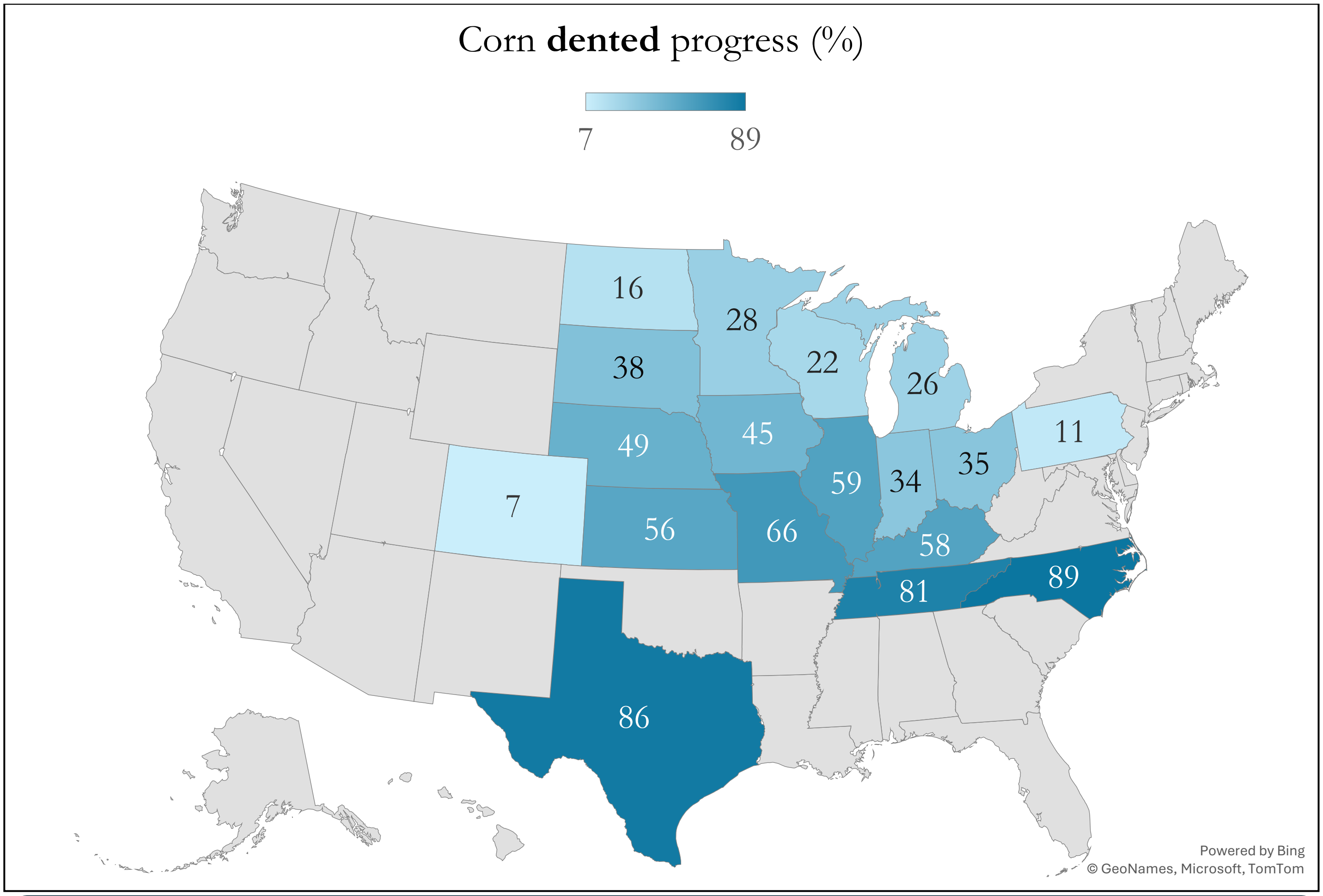

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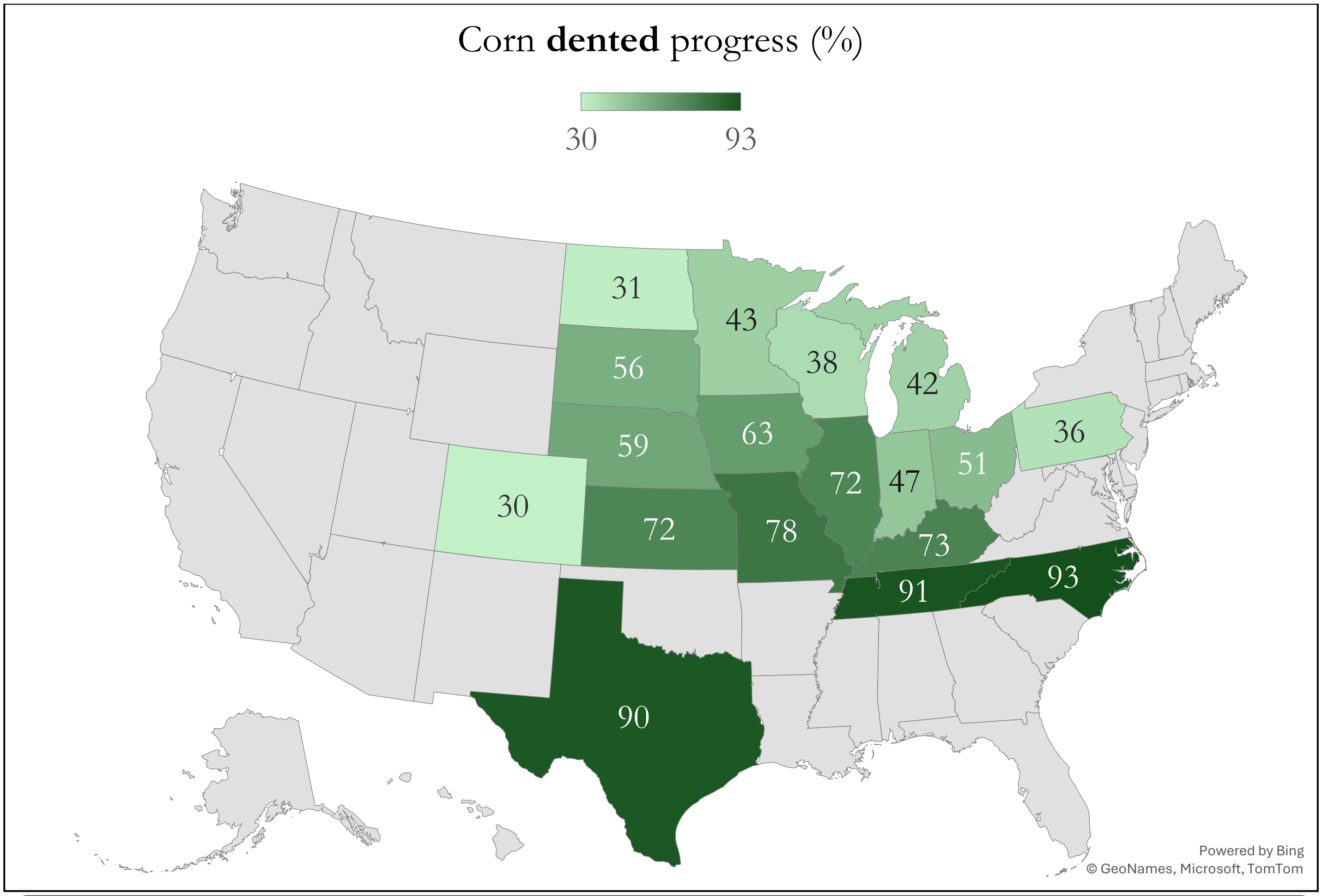

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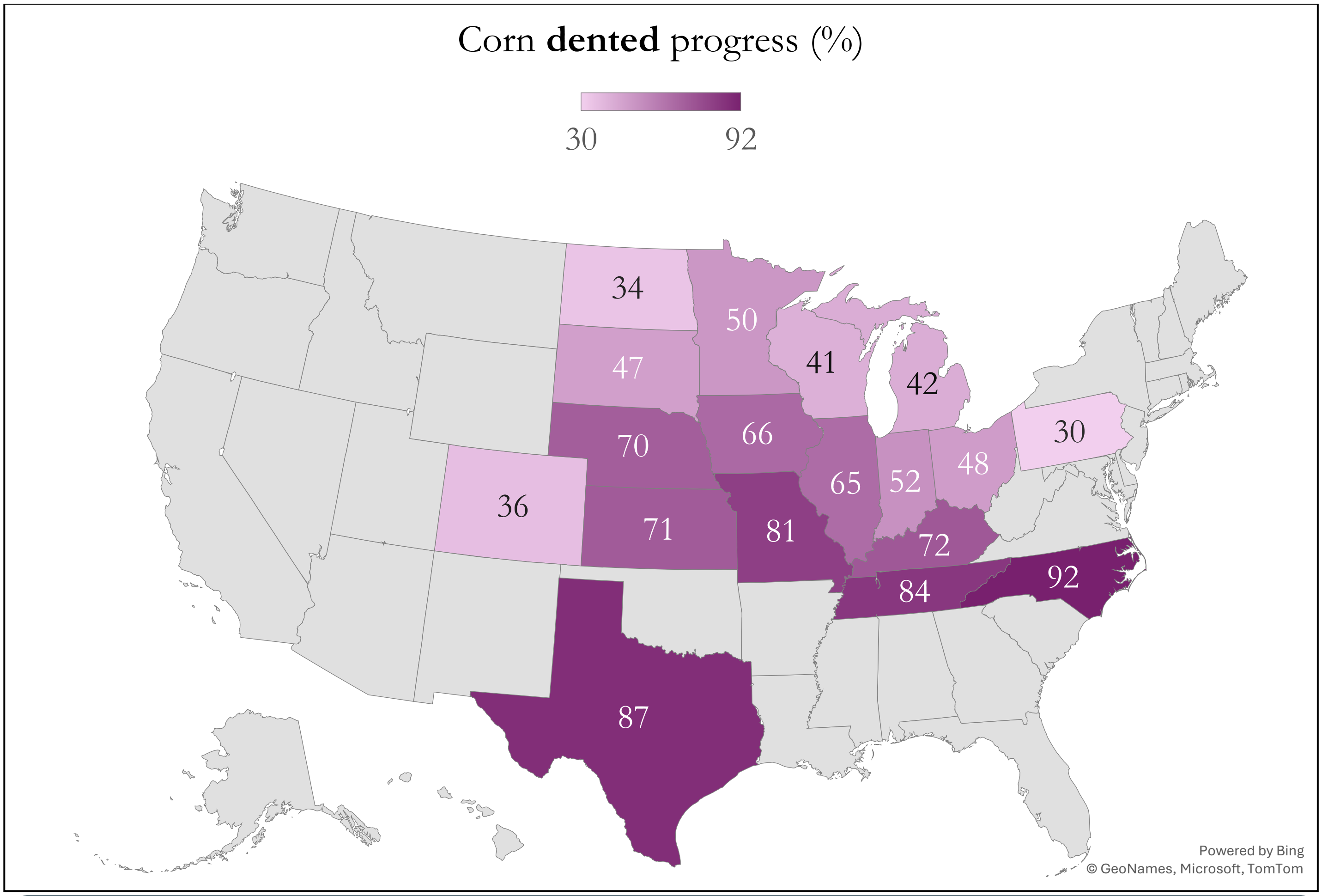

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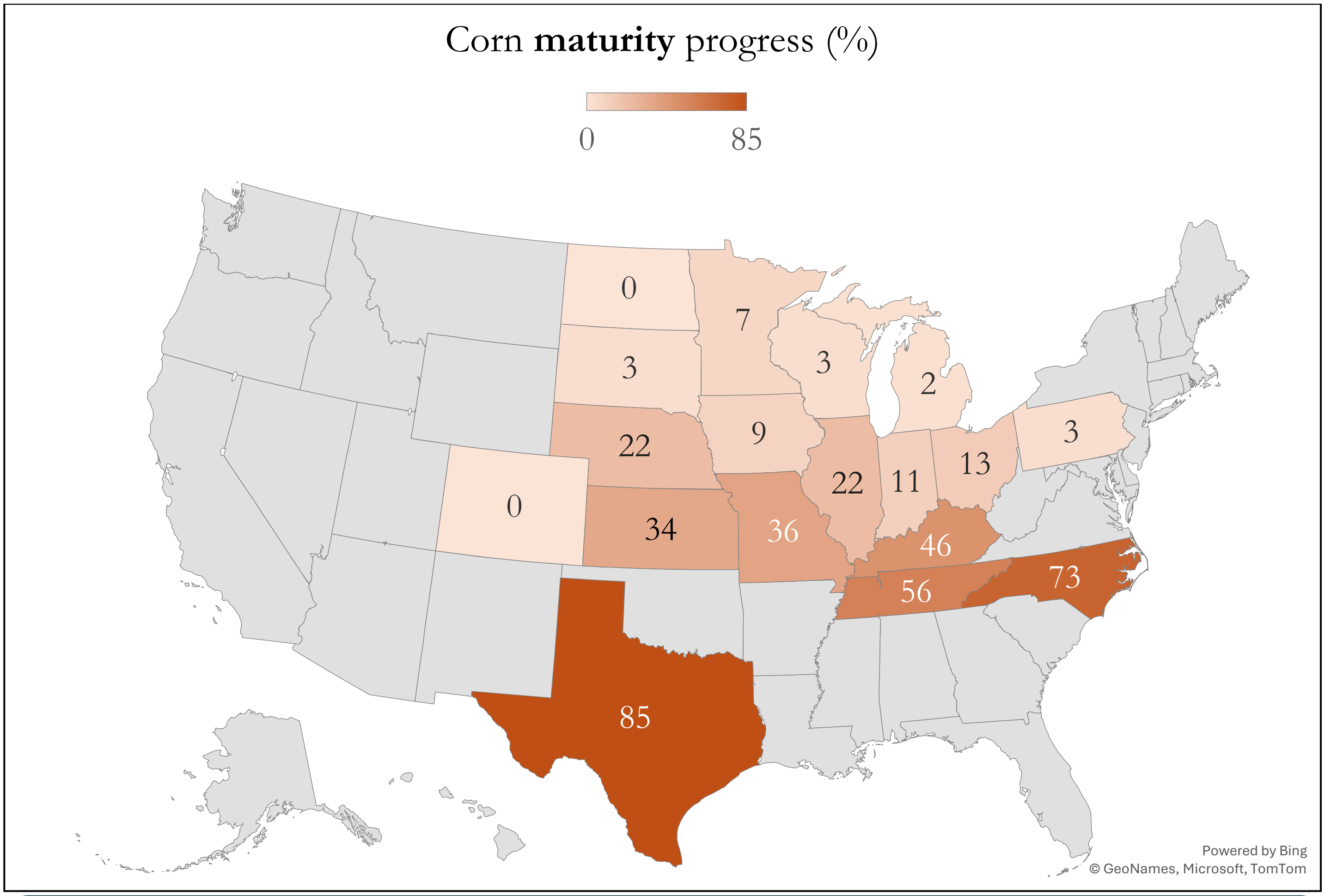

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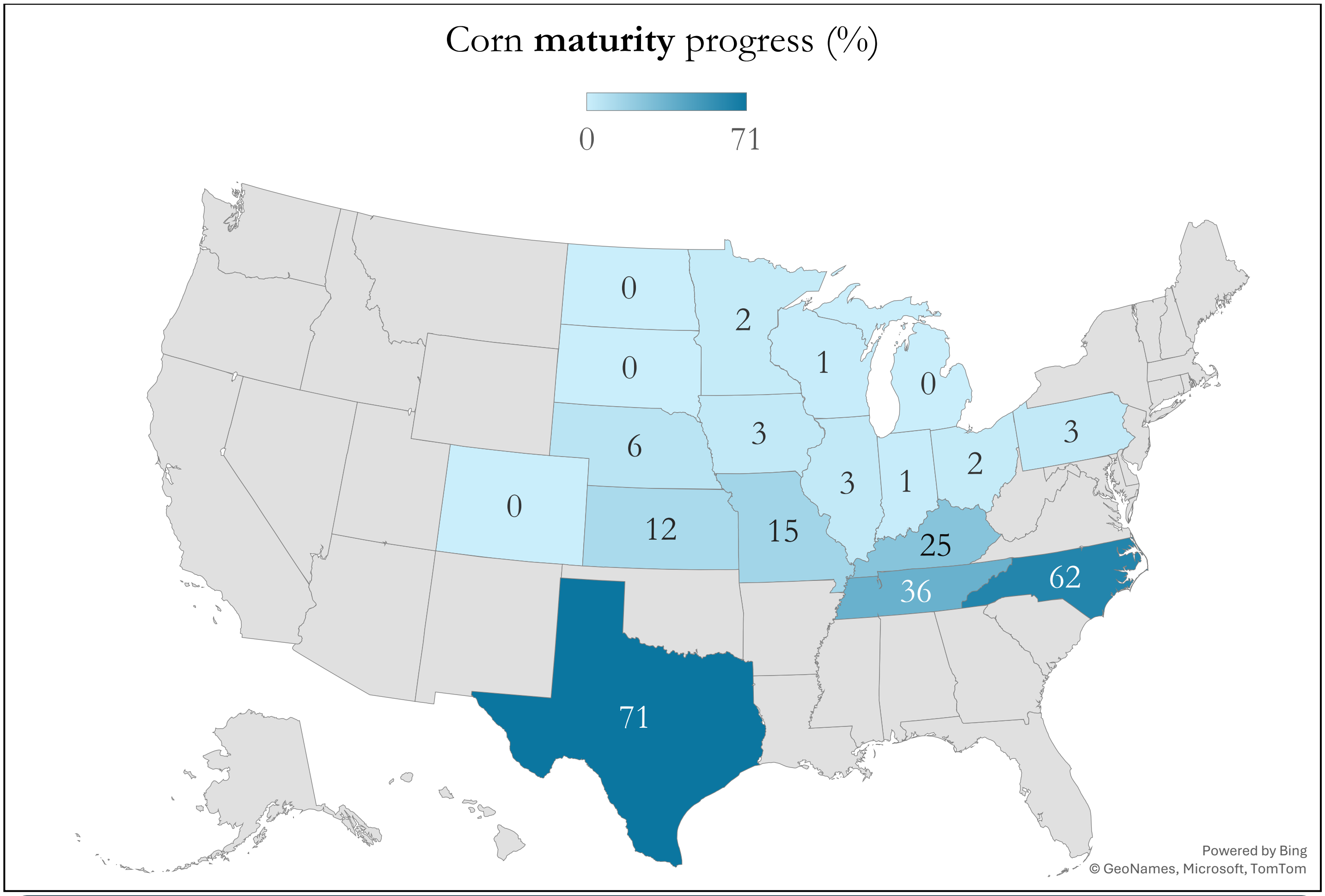

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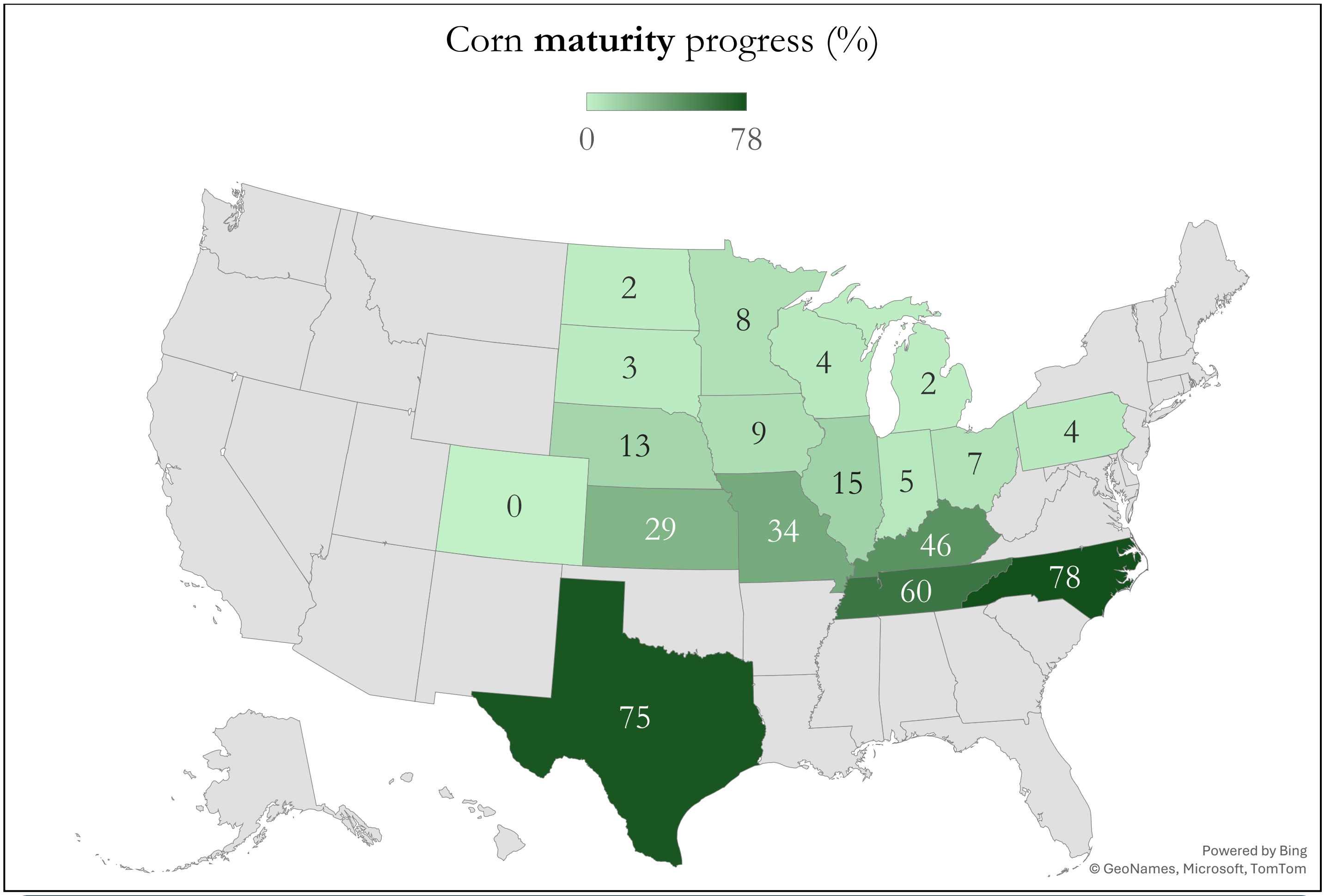

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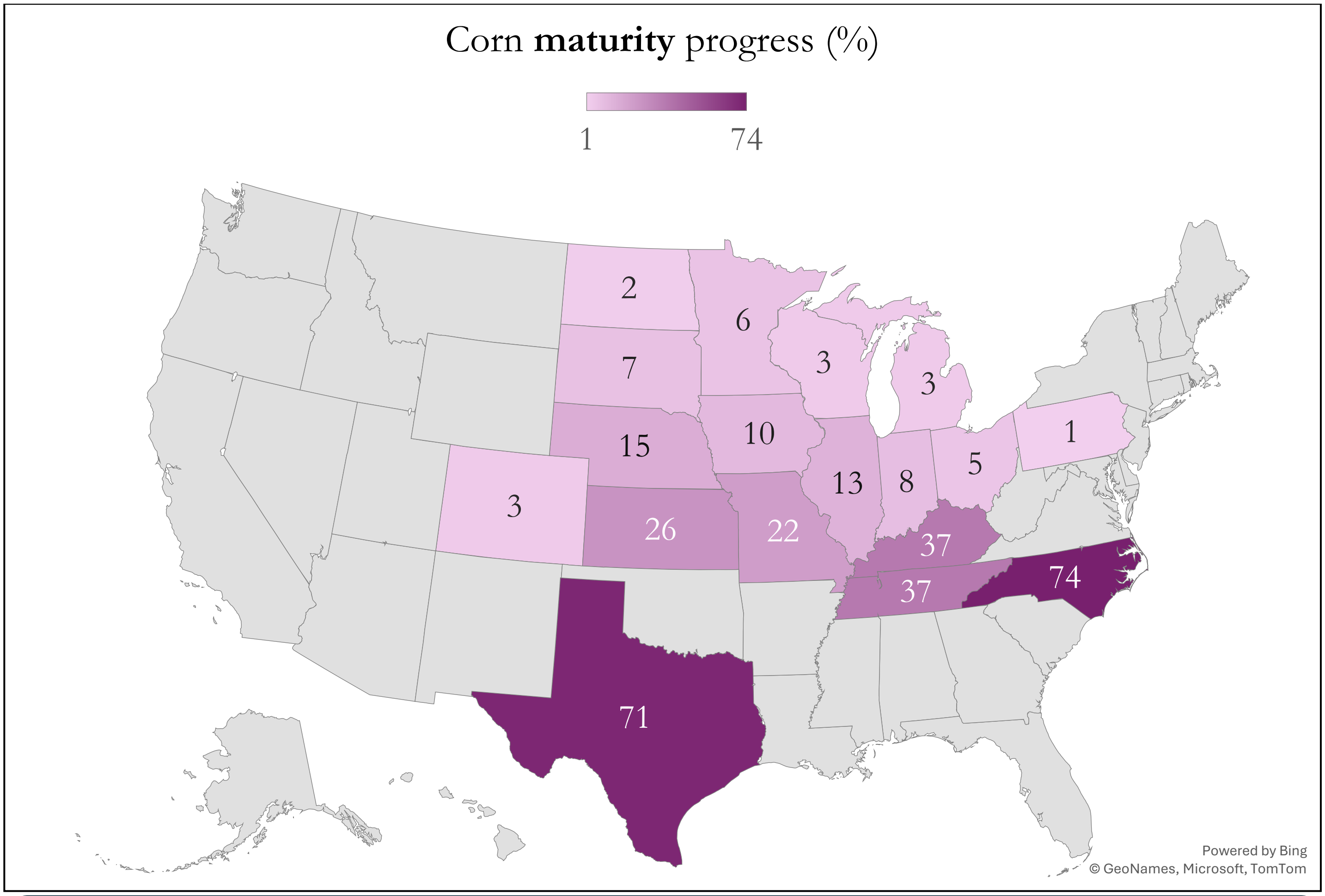

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