

Pest & Crop newsletter

Purdue Cooperative Extension Service and USDA-NIFA Extension IPM Grant

This work is supported in part by Extension Implementation Grant 2017-70006-27140/ IND011460G4-1013877 from the USDA National Institute of Food and Agriculture

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Hemp Production In 2019 Had Its Challenges

(Marguerite Bolt, mbolt@purdue.edu)

Some of these challenges include severely delayed planting of hemp (and most other crops), labor shortages for some growers, "hot" hemp crops (THC > 0.3%), and harvested hemp left in barns and warehouses while some of the larger hemp processing companies filed for bankruptcy. With all these known difficulties plus COVID-19, you may wonder if we will see any hemp planted in 2020. The state chemist office has approved around 200 licenses and 6,000 acres have been registered. I am confident we will see some hemp planted, but growers are wary of the current climate and some have decided to hold off on planting until 2021.

In these uncertain times, we are trying to adapt and keep everyone up to date on changes in the hemp industry. Since we have had to cancel several in-person events, we have moved them to webinars and are hopeful that we will reach a large audience and provide quality content. Most webinars will be archived and publicly available on purduehemp.org. A list of upcoming webinars can be found at <https://purduehemp.org/events/>

We have also created a listserv focused on hemp research updates and upcoming events. If you would like to sign up for this listserv please follow the instructions found [here](#)

<https://lists.purdue.edu/mailman/listinfo/hempnews>

Plant Populations For Corn In Indiana

(Bob Nielsen)

Seed corn represents the single most expensive variable input cost for Indiana corn growers (Langemeier et al., 2019) and so choosing the most economical seeding rate is important for maximizing that dollar return to seed at harvest time. Choosing the most economical seeding rate involves balancing the cost of the seed corn and the price you expect to receive for the harvested grain when you sell it. Just as importantly, the most economical seeding rate depends on the yield response of corn to final PLANT POPULATION.

Jim Camberato (jcambera@purdue.edu) and I conducted nearly 100 field scale trials around Indiana from 2008 through 2019 to document the yield response of corn to PLANT POPULATION. The complete summary of that research is available online (Nielsen et al., 2019).

Figure 1 below comes from that summary and illustrates the average yield response of corn to final PLANT POPULATION for 83 trials that represent a range of growing conditions that we characterize as "normal" for Indiana. In particular, those 83 trials were not subject to severe drought conditions. Mathematically, maximum corn yield occurred at a final PLANT POPULATION of about 32,000 PLANTS per acre.

Note how "shallow" or nearly "flat" the yield response curve is for those 83 trials. That "flatness" reflects how tolerant today's hybrids are to higher populations, much more so than hybrids were 30 years ago. However, also note how tolerant today's hybrids are to lower populations. The tolerance to both low and high populations results in the shallow response curve.

The upshot of such a shallow yield response curve is that "squeezing" one more bushel from a field by increasing seeding rate, when the POPULATION is near the optimum to start with, requires more seed than you can afford. In fact, our data suggest that potential yield at final PLANT POPULATIONS ranging from about 28,000 to 35,000 PLANTS per acre at harvest varies by only +/- 1 bushel per acre!

The dollars and cents upshot of the shallow yield response curve is that the ECONOMIC OPTIMUM PLANT POPULATION for corn throughout most of Indiana is amazingly low. Table 1, also from

our complete online summary, provides estimates of economic PLANT POPULATIONS for a range of seed corn costs and market grain prices.

The astute reader will have noticed my use of the capitalized term “PLANT POPULATION”. The reason for that is corn responds the actual plant population in the field, not directly to the seeding rate because percent stand success is rarely 100%. In our own field trials, we know that average percent stand is 95%. For other folks, that number may be 90% or 98% or 85%.

Assuming you know your typical percent stand from past field scouting, then you can calculate the seeding rate that targets a desired economic optimum plant population by simply dividing the target PLANT POPULATION by the percent stand. For example, if you are aiming for a final stand of 30,000 PLANTS per acre and your average percent stand success is 95%, then the seeding rate to achieve that target would be 30,000 divided by 0.95, which would equal a seeding rate of about 31,600 SEEDS per acre.

The final comment I would make is that optimum PLANT POPULATION for drought prone fields is obviously lower than for fields with adequate soil moisture. Our data suggests that the optimum population for droughty fields is 5 to 10,000 fewer PLANTS.

Reference List

Langemeier, Michael R., Craig L. Dobbins, Bob Nielsen, Tony J. Vyn, Shaun Casteel, and Bill Johnson. November 2019. 2020 Purdue Crop Cost & Return Guide. Purdue Extension Publ. ID-166-W.
https://ag.purdue.edu/commercialag/home/wp-content/uploads/2019/10/id166_2020-november-2019-projections.pdf [URL accessed Mar 2020].

Nielsen, RL (Bob), Jim Camberato, and Jason Lee. 2019. Yield Response of Corn to Plant Population in Indiana. Applied Crop Production Research Update, Purdue Univ. Dept. of Agronomy.
<http://www.kingcorn.org/news/timeless/CornPopulations.pdf> [URL accessed Mar 2020].

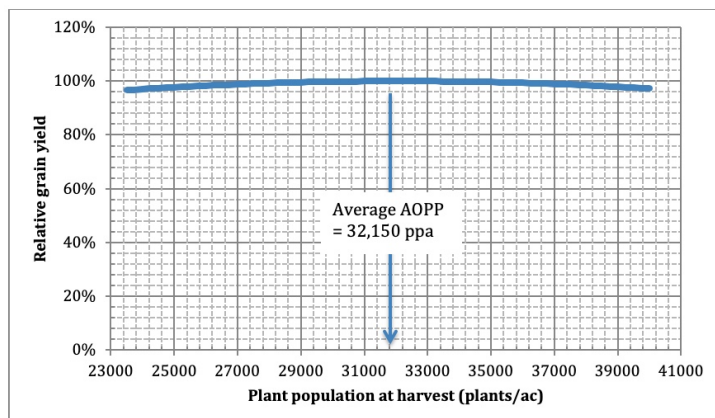


Fig. 1. Average grain yield response of corn (relative yield, 0 to 100%) to plant populations at harvest (plants per acre), based on the aggregated results of 83 field scale trials conducted across Indiana from 2008 to 2018 that represented a normal range of growing conditions (minimal to modest stress). The agronomic optimum population (AOPP) for this group of trials was 32,150 plants per acre at harvest with an average yield of 195 bushels

per acre.

Seed \$ ↓	Grain \$ →							
	\$2.50	\$3.00	\$3.50	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00
\$150	27026	27880	28490	28947	29303	29588	29821	30015
\$175	26172	27168	27880	28414	28829	29161	29433	29659
\$200	25317	26456	27270	27880	28354	28734	29044	29303
\$225	24463	25745	26660	27346	27880	28307	28656	28947
\$250	23609	25033	26050	26812	27405	27880	28268	28591
\$275	22755	24321	25440	26278	26931	27453	27880	28236
\$300	21901	23609	24829	25745	26456	27026	27492	27880
\$325	21047	22898	24219	25211	25982	26599	27103	27524

NOTE: To calculate seeding rates from the values in this table, divide by your expected percent stand. For example, 26000 plants per acre divided by 95% stand = 26000 divided by 0.95 = 27368 seeds per acre.

Table 1. Plant populations that maximize marginal return to seed (i.e., economic optimum plant populations) for combinations of market grain price per bushel and seed cost per 80,000 seed unit, based on average yield response to population in 83 Indiana trials conducted from 2008-2018 that represented a normal range of growing conditions (not severe stress conditions).

OISC Issues Temporary Regulatory Compliance Guidance In Response To Issues Resulting From The Current COVID-19 Pandemic

(Office of Indiana State Chemist)

West Lafayette, IN (March 19, 2020) – Office of Indiana State Chemist (OISC) is releasing new temporary guidance regarding compliance with state pesticide and fertilizer regulatory requirements in Indiana, in consideration of the disruptions to normal operations that are being caused by the COVID-19 pandemic.

The following temporary modifications are being implemented immediately, but may be subject to change, as the COVID-19 issues continue to evolve.

1. All pesticide and fertilizer applicator certification training and examining sessions scheduled at Purdue University through May 17, 2020 have been cancelled.
2. Group training and examining sessions at Purdue, scheduled to occur after May 17, 2020, may also be subject to cancellation. However, for now these sessions are being evaluated on a week-to-week basis, in the event that current guidance regarding COVID-19 changes.
3. Self-study and individual examination at an Ivy Tech Examination Center is still an option to training and examining at Purdue. However, this option may also soon be unavailable, as over half of the testing locations have already shut down operations.
4. Pesticide applicators using or supervising the use of Restricted Use Pesticides (RUPs) during 2020 must be certified and licensed, just as has been required previously. U.S. EPA has not suspended or modified this legal requirement, therefore, OISC will not either.
5. OISC will suspend the Registered Technician requirements for pesticide and fertilizer applicators operating under the supervision of a certified applicator when using only

General Use Pesticides (GUPs). The requirement to pass the Core exam and apply for a Registered Technician credential will be suspended through December 31, 2020, unless another date is determined to be necessary by legal counsel.

6. All supervision requirements for noncertified applicators and registered technicians will remain in place. But new technicians will not be required to obtain a credential, as long as the current situation exists.
7. Nothing in this temporary regulatory guidance shall exempt any applicator from complying with all other existing requirements, such as using a pesticide in a manner consistent with the product label directions.

WATCH THIS SITE FOR FUTURE DEVELOPMENTS. Thank you for your cooperation during these challenging times. [Continue reading article.](#)

First Purdue Crops Podcast Is Live; Up Next They'll Talk COVID-19 And Ag

(Andy Eubank), (Bob Nielsen) & (Shaun Casteel)

Purdue Extension and Hoosier Ag Today have teamed up for a new podcast to provide timely, relevant and credible agronomic insights to listeners. **Purdue Crop Chat** features extension corn and soybean specialists Dr. Bob Nielsen and Dr. Shaun Casteel from Purdue. The first episode is available now, and Casteel explains how the recent past is playing a role in the new, upcoming planting season.



"I have to look in the rearview mirror because I go back to 2019, but I also go back to 2018," he said. "There's a lot of things that we were trying to get accomplished in the harvest of 2018 that didn't and then came over into spring of '19 and it didn't get accomplished. So, a lot of these fields have issues of compactions from two years ago."

Nielsen added tight financial conditions are contributing to the various predicament's farmers face this year.

"We're trying to recover from last year's late planting and all the headaches that brought, but a lot of these folks are also in a

position where cash flow is extremely tight and so yes, we're looking for ways to increase yields cheaply, but we're also in many cases looking for ways to reduce costs," Nielsen says.

The podcast includes discussion about the importance of selecting the right hybrids and varieties, and there is plenty of back and forth between the two.

"You mention P and K and you're exactly right," Nielsen said. "If their P and K soil test levels, assuming they have recent soil tests..."

But Casteel interrupts, "What's recent Bob?"

"I'd say 2, 3, maybe 4 years," Nielsen says. Casteel thinks 4 might be pushing it. Nielsen goes on to say "But, if their P and K soil test levels are well within the adequate levels, we know from experience, we know from data, that applications of P and K at that point do not increase yield, they simply maintain levels."

The first Purdue Crop Chat was recorded at the beginning of this month, before Coronavirus and COVID-19 had truly swept the country and financial, oil and ag markets. This current situation brings a whole new set of concerns right to the farm, including the availability of seed, fertilizer, and pesticides, and also workers, drivers and services and applicators. The age of many farmers is in the at-risk zone for COVID-19, yet another concern.

Episode two is in production now so that both Purdue Extension specialists can offer insights. HAT will have that available at <https://www.hoosieragtoday.com/category/purdue-crop-chat/> this week.

Purdue Crop Chat Podcast Episode 2, COVID-19 Implications

(Andy Eubank)

The second Purdue Crop Chat podcast presented by Purdue Extension and Hoosier Ag Today is here to address implications of COVID-19 on farming. Purdue extension corn and soybean specialists Dr. Bob Nielsen and Dr. Shaun Casteel try to shed some light on where planting prospects are now, related to the effects of the pandemic. Nielsen says seed supplies right now are adequate based on conversations he is having.

[Click here to go to the site for the podcast.](#)

2019 Summary Of U.S. Agricultural Confined Space-Related Injuries And Fatalities

(Bill Field)

Since the 1970's Purdue University's Agricultural and Biological Engineering Department has been documenting and investigating incidents involving grain storage and handling facilities at both commercial and on-farm locations. Beginning in 2013, the effort was expanded, with support from a U.S. Department of Labor Susan Harwood Training Grant, to include incidents involving grain transport vehicles (trucks, wagons, railcars); injuries

occurring inside of confined spaces due to exposure to powered mechanical components, such as augers; falls from or into confined spaces; and other types of agricultural confined spaces including forage storage silos, liquid storage tanks, and manure storage facilities. All documented cases have been reviewed by a team of experts to ensure elimination of duplicates, assign case information to specific coding categories, and to identify potential contributing factors. Data were derived from a wide range of sources including online searches, news clippings from local sources, work product from civil litigation, published personal accounts, and death certificates (during early years). The data were coded using a coding form developed and tested by Riedel and Field (2013). Coded data were entered into the Purdue Agricultural Confined Space Incident Database (PACSID) allowing for summarization.

[Click here to read the full report.](#)

2020 Popcorn Agri-Chemical Handbook

(Genny Bertalmio)

The [2020 Popcorn Agri-Chemical Handbook](#) is available to ensure everyone in the popcorn industry is informed about products registered for use on popcorn or in popcorn storage facilities. The handbook lists agri-chemicals registered and regulatory status or special use restrictions.

The handbook provides appendix information on residue tolerances as found in the [BCGlobal Pesticide MRL Database](#), which includes popcorn (corn, pop) and denotes established levels by the U.S., Codex and over 130 markets.

The handbook notes the Mode or Mechanism of Action (MOA) numerical classification of each listed chemical when used on a product label. The classification schemes are published by the Insecticide Resistance Action Committee, the Herbicide Resistance Action Committee and the Fungicide Resistance Action Committee. The handbook also highlights the Signal Word "Danger" when used on a product label as required by the EPA's Label Review Manual.

The Popcorn Board urges you to provide the above links or print and distribute the updated version of this critical information to growers. Contact Genny Bertalmio, +1.312.673.4883 or gbertalmio@popcorn.org, for further information.

The Popcorn Board accepts voluntary contributions to ensure continued funding of its efforts to provide this important information to the popcorn industry. Checks should be mailed to The Popcorn Board, 8333 Solutions Center, Chicago, IL 60677-8003.

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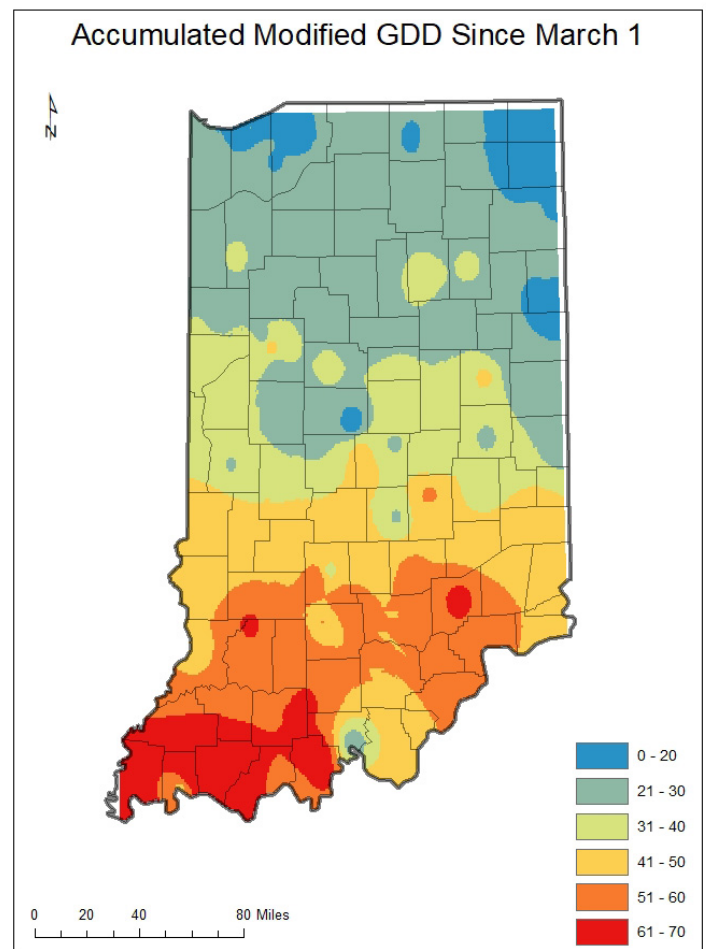


Figure 1. Accumulated modified growing degree days (base 50°F) since 2020 March 1 through 2020 March 24.

Warm And Wet Winter Will Hopefully Transition To A Dry Period In Early April

(Beth Hall)

Over the past 30 days, southern Indiana has received above-average precipitation which has caused some flooding and well-saturated fields. Northern Indiana has received near-normal precipitation, yet there are localized areas of pooled water. Snowfall across the state has been below normal throughout the entire season, mostly due to temperatures staying above freezing.

Growing degree days (base 50°F) have started to accumulate (Figure 1), which means plants are starting to emerge and green up. While this green up suggests warmer temperatures ahead, keep in mind that Indiana is still statistically likely to still experience at least one more hard frost. The average date of the last frost with temperatures 28°F or lower is between April 3-10 across most of the state (Figure 2).

Average Date of Last Spring Frost 28 F or Lower

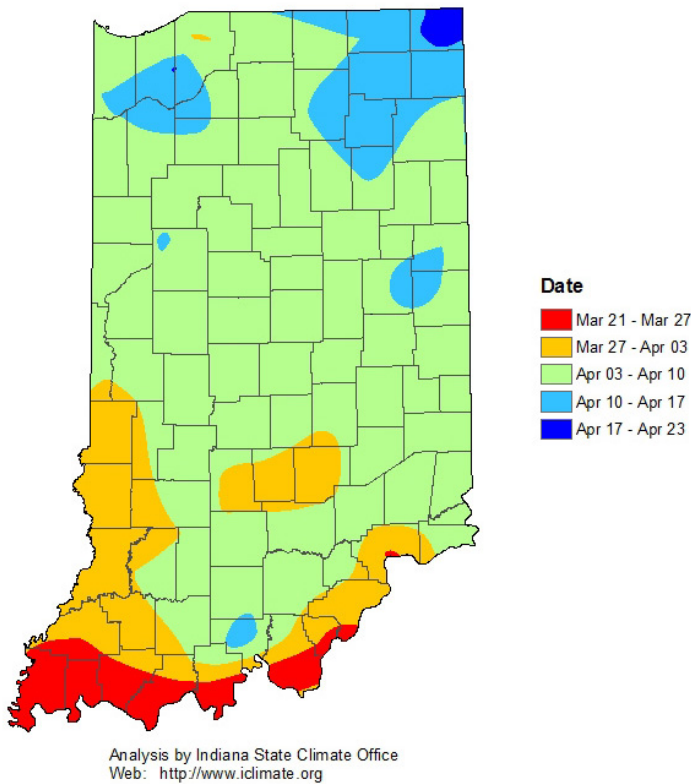


Figure 2. Average date of the last frost with temperatures at or below 28°F.

Speaking of temperature, the December 2019 – February 2020 three-month period ranked as one of the warmest over the past 125 years (1895-present) (*Figure 3*). Not only is this remarkable, but could suggest significant overwintering of many pests across the state!

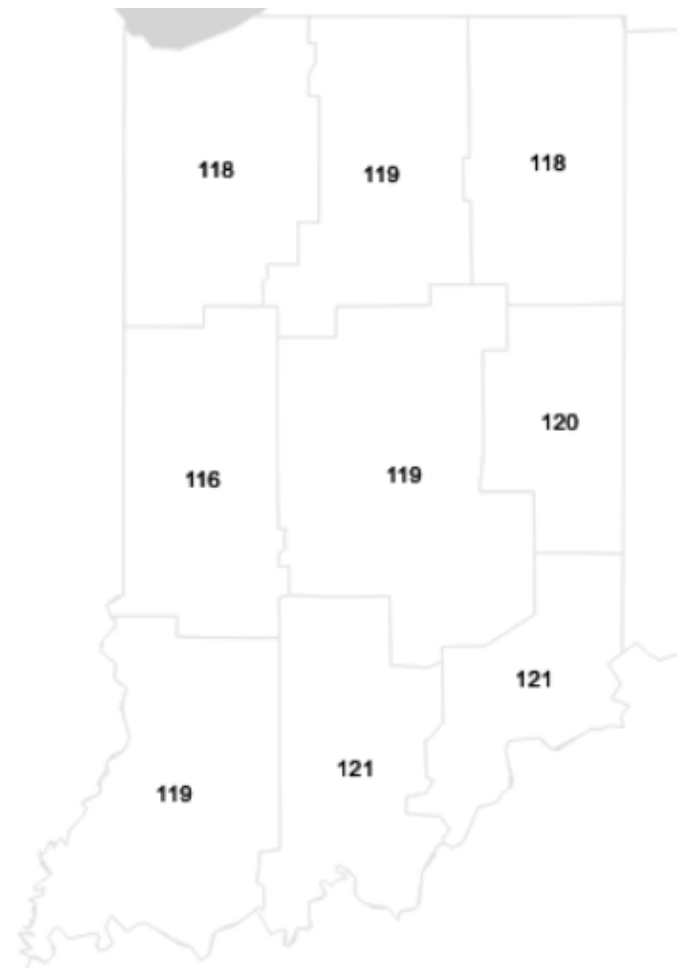


Figure 3. Climate division rankings of the December 2019 through February 2020 mean temperature compared to the 125-year climatology (1895-present). A rank value of 125 would indicate the warmest 3-month period on record. Therefore, these ranks indicate that for Indiana, this past meteorological winter ranked in the top 10 warmest years.

Climate outlooks for April 3rd through 9th are showing increased confidence of below-normal temperatures and precipitation (*Figure 4*). Assuming temperatures are not too below normal, this will hopefully help dry things out enough to be able to start preparing for the upcoming growing season! Unfortunately, the climate outlook for April is suggesting increased confidence of above-normal precipitation for the southern half of Indiana. At this time, however, those amounts do not appear to be as high as they were in 2019.

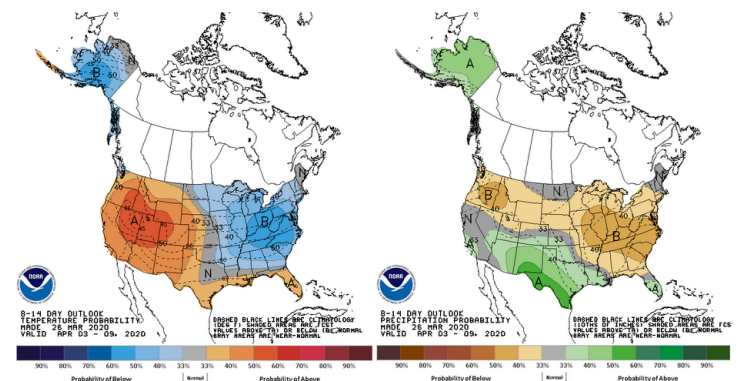


Figure 4. Climate outlooks for the 8- to 14-day period representing April 03-09, 2020. Temperature probabilities are displayed on the left;

precipitation probabilities displayed on the right. The greater the probabilistic value, the greater the confidence that temperatures /

precipitation amounts will be above / below normal – depending on the map and shading, respectively.

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