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Nematode Updates - Corn Parasitic Nematodes – *(Jamal Faghihi and Virginia Ferris)* -

We've had a cool and wet spring, conditions right for the needle nematode to cause damage to corn grown in sandy soils. There is still time to sample, especially those sandy areas of cornfields with erratic growth.

Needle nematodes are the most yield-limiting nematodes in corn. This nematode needs cool and wet conditions to cause problems in corn. Other nematodes, like lance and lesion nematodes, do not require those conditions to be a problem. So, if conditions were right in your area (cool, wet, and sandy soil) needle nematodes could be the culprit for irregular growth this year. If you have had problems on corn before, and weather conditions are in the nematodes' favor, you might consider sampling for nematodes. In this

case, you may wish to send the entire root system with adjacent soil to the Nematology Laboratory, address below, at Purdue University for analysis. Samples must be kept cool and prevented from drying. The best time to sample for needle nematodes is 4-6 weeks after germination. Even though the time is getting short for sampling for needle nematode; there is still a short window for sampling.

Under high nematode pressure, roots do not develop normally. The roots are truncated and resemble herbicide injury. Similar symptoms are present where lance nematodes are causing a problem. Lesion nematodes, however, will not cause the described root symptoms. Symptoms for most plant parasitic nematodes are usually in patches and do not follow a uniform pattern in the field.

Often needle nematodes disappear when soil temperature rises above 85^{o}F, and in most cases corn will recover but the damage has been done. You can sample for other corn parasitic nematodes throughout the growing season.

If you have any questions about corn parasitic nematodes or any other kind of plant parasitic nematodes, you can contact Jamal Faghihi at 765-494-5901 or send an email to jamal@purdue.edu. Soil samples for nematode analysis can be sent to: Nematology laboratory, Purdue University, Department of Entomology, Smith Hall, 901 W. State Street, West Lafayette, IN 47907-2089. The cost for nematode analysis for each sample remains at $10/procedure (if only soil samples are submitted). However, if we have to incubate the roots to extract internal nematodes, an additional $10/sample will be charged. We published an article earlier this year describing the sampling method for various plant parasitic nematodes.

Additional information and a sampling form can be found on our Nematology website: .

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Update on Foliar Diseases of Corn – *(Kiersten Wise)* -

The warm, humid weather has caused concern about foliar diseases of corn, particularly in southern Indiana where corn is at a growth stage where farmers need to be thinking about scouting fields prior to fungicide application. Of particular concern is a report from Kentucky of potential southern rust of corn, caused by (***Puccinia polysora***). The sample in question had common rust (***Puccinia sorghi***), not southern rust. More details on this report and updated management for southern rust, including fungicide timing, are reported in the Kentucky Pest News article that can be found **here**.

We have NOT confirmed southern rust in Indiana to date. The most northern confirmation is currently in Arkansas. The fungus that causes southern rust does not overwinter in Indiana, and the spores blow northward each year. Southern rust typically reaches Indiana at some point in the growing season each year, but usually arrives too late to cause economic damage. However, in 2016, southern rust was severe, and farmers may be nervous about the potential impact in 2017. Just remember that common rust and southern rust are easy diseases to confuse, and any suspected samples should be sent to the Purdue Plant and Pest Diagnostic Laboratory (**PPDL**) for confirmation before deciding on a management tactic, such as fungicide application. The Purdue Extension publication "**Diseases of Corn: Common and Southern Rust**" has more information on distinguishing between common and southern rust.

Other fungal diseases like gray leaf spot (***Cercospora zeae-maydis***) and northern corn leaf blight (***Exserohilum turcicum)*** are more likely to be present at the critical tasseling period in 2017. It is very important to scout fields this year and check hybrid resistance ratings prior to fungicide application. Also consider crop production factors and their impact on disease development. Planting continuous corn or conservation tillage programs increase the risk for diseases such as gray leaf spot and northern corn leaf blight development since the fungi that cause these diseases survive in residue. Additionally, irrigated fields are at higher risk since irrigation creates an environment favorable for disease development. **Purdue research indicates the optimum timing for foliar fungicides (if needed) for gray leaf spot and northern corn leaf blight is at the tasseling/silking (VT-R1) growth stage. Scouting corn just prior to VT-R1 can help determine if a fungicide application is needed.**

1. Consider a fungicide application if:
   The hybrid is rated as susceptible or moderately susceptible to foliar diseases AND 50 percent of the plants in a field have disease lesions present on ear leaf at tasseling.
2. Consider a fungicide application if:
   The hybrid is rated as moderately resistant to foliar diseases AND 50 percent of the plants in a field have disease lesions present on the ear leaf or higher prior to tasseling AND additional factors or conditions that favor disease development are present (residue present, favorable weather conditions)

Scout resistant hybrids for disease problems, but in general, fungicide applications to resistant hybrids are not recommended and will not consistently result in increased yield.

For more information on gray leaf spot and northern corn leaf blight, please read Purdue Extension bulletin BP-056-W: **http://www.extension.purdue.edu/extmedia/bp/BP-56-W.pdf**. Purdue Extension bulletin BP-084-W: **http://www.extension.purdue.edu/extmedia/BP/BP-84-W.pdf**.

Fungicide efficacy of specific fungicide products for corn diseases are described in the updated fungicide efficacy table for management of corn diseases, which is developed by the national Corn Disease Working Group: **http://www.extension.purdue.edu/extmedia/BP/BP-160-W.pdf**.

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WEEDS

Herbicide Injury Samples – *(Joe Ikley and Bill Johnson)* -

With the calendar reading June 22nd, summer has officially arrived in Indiana. With a challenging spring now behind us, we want to provide an update of the herbicide injury complaints we have received throughout the spring. We can break the types of samples we have received into three different categories: injury on stressed crops, sprayer contamination, and drift.

Several of the samples we received after we emerged from our cold wet spell were crop injury samples on plants that sat in cold, wet conditions for several weeks. Many of our postemergence herbicides that are typically safe on crops caused a lot of visual injury symptoms. Many of our group 27 herbicides that are found in corn products like Halex GT, Armezon PRO, and many other caused very visual bleaching on exposed corn leaves at application. We have also received many samples of soybeans with leaves that are puckered and have a drawstring effect. While drift rates of group 4 herbicides can cause similar symptoms, many cases we have seen involved a postemergence application of a group 15 herbicide to stressed soybean plants. Under the right conditions, all of these group 15 herbicides can cause this type of damage to soybean plants.

Group 27 on corn.

Group 15 injury on soybean.

We have also received numerous injury samples that were caused by sprayer contamination. These type of complaints tend to increase in years with wet springs. As soils dry out and sprayers are able to roll across the field again, sometimes sprayer sanitation takes a backseat to the desire to spray as many acres as possible while the ground is fit. We have received many cases of clethodim contamination on corn. This was likely due to many applicators terminating failed corn stands, then moving onto spraying postemergence herbicides on corn fields. We have also seen an uptick in contact herbicide burn on corn and earlier planted soybean fields. These cases are often when a sprayer makes a late burndown application with spray mixes containing paraquat or a product containing Sharpen. If the boom or tank was not properly rinsed, these products create very visual burns and speckling on whatever crop is sprayed next.

Clethodim on corn.

Lastly, we have received a number of drift complaints. As we transitioned into a period of drier weather, the winds seemed to pick up as well. Among these drift samples have been several complaints about group 4 injury on soybean. In our experience, most of this injury has come from products containing dicamba being applied to corn, and NOT Xtend soybean. To date, we have received very few complaints of dicamba moving off target from Xtend soybean fields. This is in great contrast to reports we have heard out of Arkansas and the Mississippi Delta, where over 200 official complaints have been filed. Here is a link from the Arkansas Plant Board that offers daily updates of their

official complaints (http://www.aad.arkansas.gov/arkansas-dicamba-information-updates). We still have a lot of small soybean fields across Indiana, so this is a great time to remind applicators to follow all dicamba laws with any applications yet to be made. Hopefully we can continue to avoid reaching the number of complaints our colleagues have seen down south as we finish up our spray season.

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Postemergence Herbicide Considerations – *(Bill Johnson and Joe Ikley)* -

Rain and storms have kept many Indiana farmers and custom applicators out of the field and likely delayed postemergence herbicide applications. As some fields begin to dry out enough to allow sprayers to reenter fields, farmers and custom applicators need to consider a couple of factors before spraying.

The delay has likely allowed weeds to grow well beyond their recommended postemergence application height of 4 to 6 inches. Applicators may have to consider higher labeled rates to control those larger weeds. In same situations producers may need to consider an alternate or additional herbicides to control the larger weeds.

During this delay not only have many of the weeds advanced past their optimal growth stage, but crops will also be approaching or exceeding growth stages in which herbicide applications may be restricted. As crops approach their reproductive stages the chances of herbicide injury and yield loss is increased. Two tables from the Ohio, Indiana, and Illinois Weed Control Guide are included in this article that outline the corn and soybean growth stage restrictions for many of the commonly used herbicides.

We also need to consider the replant intervals of postemergence herbicides to avoid herbicide residue carryover into the next crop as the month of July approaches. For example the fomesafen containing products that are often used on tough to control amaranths and ragweeds in have a 10-month replant interval for corn. Applications made in July versus June will have a higher probably of causing carryover problems for next years corn crop.

The last thing we will mention is dicamba use in soybeans. As most of you are probably aware of by now, there have been widespread occurrences of offsite movement and damage to sensitive crops in the state of Arkansas (http://www.aad.arkansas.gov/arkansas-dicamba-information-updates) (https://www.dtnpf.com/agriculture/web/ag/news/crops/article/2017/06/21/re-vote-coming-arkansas-dicamba-ban-2). They are considering very drastic measures which include a ban on dicamba applications for the rest of this growing season because of the amount of complaints filed with their state regulatory agency. As of this week (June 19), the situation here in Indiana has been relatively quiet, with just a few instances that I have observed in my trips to extension activities and research sites throughout the state. Most of these issues appear to be due to dicamba use in corn, and are consistent with what we have observed over the last 10-15 years. We are however, about 3-5 weeks behind the southern US both in crop development, and postemergence weed control activities in soybean. So we anticipate that if we are going to run into the same issues as the southern US, that the next couple of weeks will tell us how successful we were in stewarding the dicamba resistant soybean technology. So, we encourage all applicators to remember the label directions about Engenia, Xtendimax, and Fexapan, the only formulations labelled for use in Xtend beans when making spray applications.

While it has already been a difficult season for many farmers, they will need to keep these considerations in mind as they return to the fields to make postemergence applications in order to further protect their current crop yield as well reduce the risk of future crop injury.

Table 8. Rainfast Intervals, Spray Additives, and Crop Size for Postemergence Corn Herbicides This table shows the required time interval between herbicide application and rainfall and summarizes label recommendations for spray additives and maximum crop stage. Check herbicide labels for additive rates. Information in this table applies to field corn only.

Herbicide	Rainfast Interval (hours)	Spray additives/Maximum Crop Size (field corn)
2,4-D Amine	6-8	No additives. Broadcast up to 8-inch corn; directed spray before tassel stage.
2,4-D Ester	2-3	No additives. Broadcast up to 8-inch corn; directed spray before tassel stage.
Accent Q, NIC-IT	4	MSO, COC or SURF (Addition of UAN or AMS is recommended). Broadcast up to 6 collars or 20-inch corn; directed spray up to 10 collars or 36-inch field corn.
Aim	1	SURF. AMS or UAN may be added if required by tank-mix partner. Do not use COC or tank-mix with EC formulations of other crop protection chemicals except as specifically directed by label. Apply up to 8-collar corn.
Armezon PRO	1	MSO or COC plus UAN or AMS. Can use SURF in mixtures. Up to the V8 stage or 30-inch corn, whichever occurs first.
Atrazine	2	MSO or COC. Apply before corn is 12 inches tall.
Basagran	8	COC + UAN or AMS, depending on weed species present.
Beacon	4	COC or SURF (UAN or AMS may be added). Broadcast 4 to 20-inch corn; directed spray before tassel emergence.
Bestow	4	NIS + UAN or AMS. Broadcast up to 12 inches or 5-collar stage.
Bromoxynil	1	No additives. Apply before tassel emergence.
Bromoxynil+atrazine	2	No additives. Apply before corn is 12 inches tall.
Cadet	4	NIS, COC, or MSO. UAN or AMS can be added. Preplant up to 48 inches tall, and before tassel emergence.
Callisto	1	COC + UAN or AMS. Apply up to 30-inch or 8-leaf corn.
Callisto GT	-	NIS + AMS. COC can be used instead of NIS but increases risk of crop injury. Broadcast up to 30-inch or V8 corn.
Callisto Xtra	-	COC or NIS + UAN or AMS. Apply up to 12-inch corn.
Capreno	1	COC + UAN or AMS. Apply broadcast from V1 to V6 corn; directed spray up to V7 corn.
Dicamba	6-8	Add UAN if velvetleaf is present. SURF, COC, or UAN may be added under dry conditions. Do not apply with COC when corn height exceeds 5 inches. Broadcast up to 5th-leaf stage or 8-inch corn; directed spray up to 36-inch corn.
Dicamba/atrazine	6-8	Add UAN if velvetleaf is present. SURF, COC, or UAN may be added under dry conditions. Do not apply with COC when corn height exceeds 5 inches. Apply broadcast up to 5-leaf stage or 8-inch corn.
DiFlexx	6-8	Can add SURF, COC, or MSO + UAN or AMS. Broadcast spray from spike through V10 stage and corn less than 36 inches tall.
DiFlexx DUO	4	COC or MSO is recommended, plus UAN or AMS. HSOC can also be used. Broadcast up to but not including V7 stage, or 36 inches tall; directed spray up to V10 or 36 inches tall, or 15 days prior to tassel, whichever occurs first.
Glufosinate	4	AMS. Broadcast or directed up to 24-inch or V7 corn. Directed spray up to 36-inch corn.
Halex GT	2	SURF + AMS. Broadcast up to 30-inch or 8-leaf corn.
Harrow	4	SURF, COC, or MSO plus UAN or AMS. Broadcast from spike to 2-collar stage, and not more than 6 inches tall.
Hornet	2	SURF, COC, or MSO. UAN or AMS may be added under extremely dry conditions. Broadcast up to 20-inch corn or 6 collars; directed spray up to 36-inch corn.
Impact/Armezon	1	MSO or COC + UAN or AMS. SURF can be used in combinations with other broadleaf herbicides. Apply broadcast or directed up to 45 days before harvest.
Laddok	8	MSO, COC, UAN, AMS, DASH, or combinations of these. Apply before corn is 12 inches tall.

Laudis	1	MSO + UAN or AMS. Broadcast up to V8 corn.
Laudis + atrazine	2	COC + UAN or AMS. Broadcast up to 12-inch corn
Northstar	4	SURF, COC or MSO up to 12-inch corn. Only SURF between 12 and 36-inch corn. UAN or AMS may be added. Broadcast 4 to 20-inch corn; directed spray up to 36-inch corn.
Peak	4	COC unless mixed with glyphosate. Broadcast up to V6 or 20-inch corn; directed spray up to 30 inches.
Permit/Sandea/ Halomax	4	SURF, MSO, or COC. UAN or AMS may be added. Apply through layby stage of corn.
Realm Q	4	SURF or COC + UAN or AMS. Broadcast or directed up to 20 inches and prior to the 7-collar stage.
Revulin Q	4	COC or HSOC + UAN or AMS. Broadcast up to V5 stage or 20 inches tall, whichever occurs first.
Resolve Q	4	NIS + UAN or AMS, unless mixed with a glyphosate product or Ignite. Broadcast up to 20-inch or 6 collar corn.
Resource	1	COC. UAN or AMS may be added to improve control of certain species. Apply up to the 10-leaf stage.
Shotgun	6	No additives. Apply before 12-inch corn.
Solstice	1	COC or NIS + UAN or AMS. COC is preferred adjuvant. Do not use MSO. Up to V8 or 30-inch corn.
Spirit	4	COC, MSO or SURF.UAN or AMS may be added. Broadcast 4 to 20-inch corn; directed spray up to 24-inch corn or after 6 collar corn.
Starane	1	An adjuvant can be used if required by tank-mix partner. Broadcast up to the V5 stage; directed spray after the V5 stage.
Status	4	SURF, COC, or MSO + UAN or AMS. Broadcast from 4 to 36-inch corn (rates up to 5 oz/A)
Steadfast Q	4	COC, MSO, or SURF + UAN or AMS. COC or MSO is preferred over SURF. Broadcast up to and including 6 collars or 20-inch corn
Stinger	6-8	No additives. Up to 24-inch corn.
WideMatch	6	No additives. Broadcast up to the V5 stage; directed spray after the V5 stage.
Yukon	4	SURF or COC. UAN or AMS may be added. Apply broadcast or directed up to 36-inch corn.
Zemax	1	SURF or COC. Apply up to 30-inch or 8-leaf corn.

Table 18. Harvest and Feeding Intervals for Soybean Herbicides

Soybean Herbicides	Days to Harvest - Grain	Days to Harvest - Forage
Aim	Apply up to third trifoliate	Do not feed
Assure II/Targa	80	Do not feed
Basagran	30	30
Basagran + 2,4-DB	60	60
Basagran + thifensulfuron	60	Do not feed
Basagran + Reflex	Apply prior to bloom	Do not feed
Basagran + Cobra	90	Do not feed
Cadet	60	Do not feed
Cheetah Max	70	Do not feed
Classic	Apply 60 days before maturity	Do not feed
Clethodim	60	Do not feed

Cobra	45	Do not feed
Extreme/Tackle/ Thunder Master	Apply prior to bloom and 85 days before harvest	Do not feed
FirstRate	70	25
Fomesafen	45	Do not feed
Fusilade DX	Apply prior to bloom	Do not feed
Fusion	Apply prior to bloom	Do not feed
Liberty/Cheetah	Apply prior to bloom.	Do not feed
Poast/Poast Plus	75	Do not feed[1]
Previx/Vise	90	Do not feed
Pursuit	85	Do not feed
Raptor	85 and apply prior to bloom	Do not feed
Resource	60	Do not feed
Storm	50	Do not feed
Synchrony XP	Apply 60 days before maturity	Do not feed
Thifensulfuron	60	Do not feed
Torment	85	Do not feed
Ultra Blazer	50	Do not feed
Warrant Ultra	45	Do not feed

[1] *Soybean hay may be fed.*

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June Crop Water Needs – *(Lyndon Kelley, Irrigation Educator – MSU Extension/Purdue Extension) -*

Many areas in Indiana and Michigan quickly went from too much rainfall at planting to sparsely little rainfall from emergence on leading to an early start for the irrigation season for some. To avoid getting behind on available water, irrigators are encouraged to apply irrigation water to make up the deficit between crop water use and rainfall for the previous week. Forcing crops to grow root into moisture at soil depth to meet their water needs can deplete the soil moisture reserve, a dangerous position to be in if adequate rains do not return.

Reference Evapotranspiration (rET) (the amount of water used by a well-watered grass) is expected to be about 1.4" for most of northern Indiana and southern Michigan in the third week of June but can vary by as much as 0.5" for a week depending on weather. In Indiana, rET estimates from ET Gages are available from the Purdue Agricultural Center stations and can be found at: (**http://www.iclimate.org/**). Michigan Enviroweather network has links for rET estimates and related tool for each of the 87 sites found at: **http://www.enviroweather.msu.edu/homeMap.php**. This data could be used in the county it originates from, or adjacent counties, as long as actual rainfall information from the field is available. The Michigan Enviroweather network offers a daily rET text service to subscribers at the same website.

The rET needs to be adjusted for the water demand for the specific crop being grown. The crop ET annual crops increases until full canopy is reached. Wheat and forage crops at full growth will have an ET about 20% higher than rET. Earlier season crops like potatoes have water use at or just above rET would have used about 1.3" of water last week. Soybeans at V-3 stage would have used 60% of the rET for a weekly water use of just over 0.75"inches. Some soybean fields are nearing the R-1 stage this week and will have an expected water removal equal to our 1.3" rET for late June.

Corn at V-6 stage would have used 40% of the rET for a weekly water use of just over 0.5". Corn at V-10 stage would have used 75% of the rET for a total water use of just less than an inch for the week. Some corn will be at V-12 stage by the end of this week and will have a water removal equal to our rET of 1.3" for the week.

Early season rooting depth of our crops limits our irrigation application volumes. Applications of 0.75" or less are common this time of year to avoid pushing water below the effective root zone, but avoid making too many small (less than 0.4") applications that are less effective and frequent wetting of the plant may aggravate disease. Corn at V-6 stage has an expected effective rooting depth of 20". At V-10 stage we would expect corn to have a 23" effective rooting depth. By VT-16 (tassel) stage we would expect corn to have full effective rooting depth of 36" or more. Soybeans at V-3 stage have an effective rooting depth of 16"and at R-1 stage have almost all of their effective rooting depth of 24".

For more information on irrigation water use and when to irrigate see fact sheet #3 "Irrigation Scheduling tools" at:

http://msue.anr.msu.edu/uploads/235/67987/FactSheets/3_IrrigationSchedulingTools5.14.pdf .

If you are just getting started with irrigation scheduling an excellent paper system is available at:

http://msue.anr.msu.edu/uploads/235/67987/resources/SoilWaterBalanceSheet.03.05.15.pdf.

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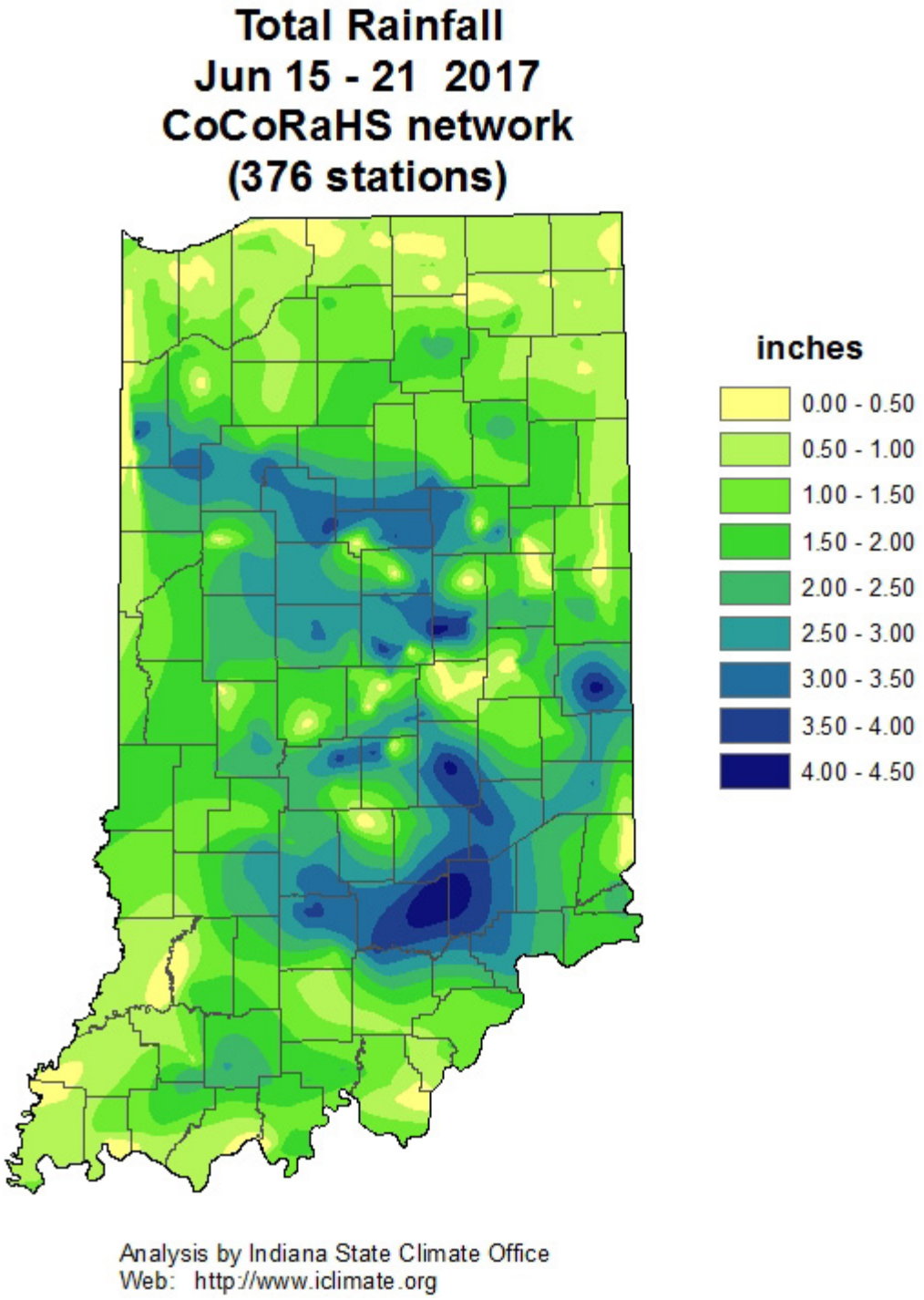
WEATHER UPDATE

Precipitation



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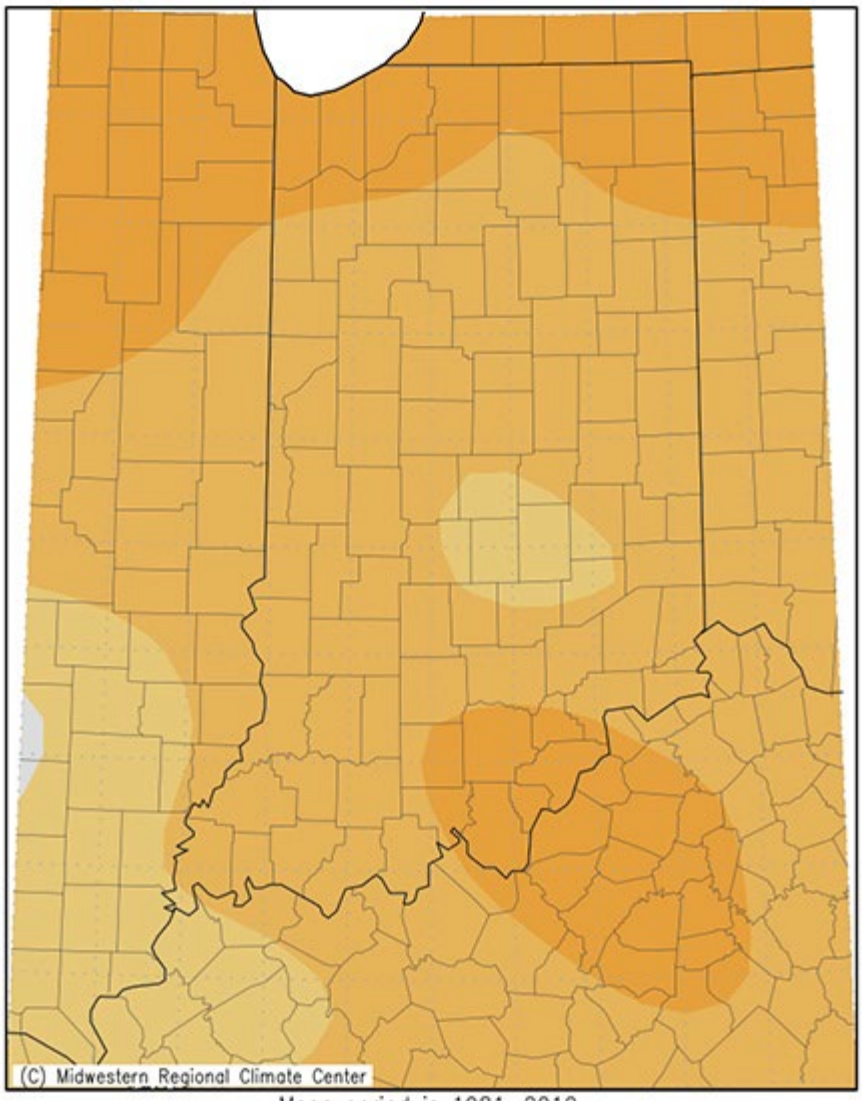
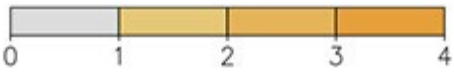
Temperature

Average Temperature (°F): Departure from Mean
June 14, 2017 to June 20, 2017



Mean period is 1981–2010.



Indiana State Climate Office www.iclimate.org
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THANKS FOR READING

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