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Checking the Back Forty

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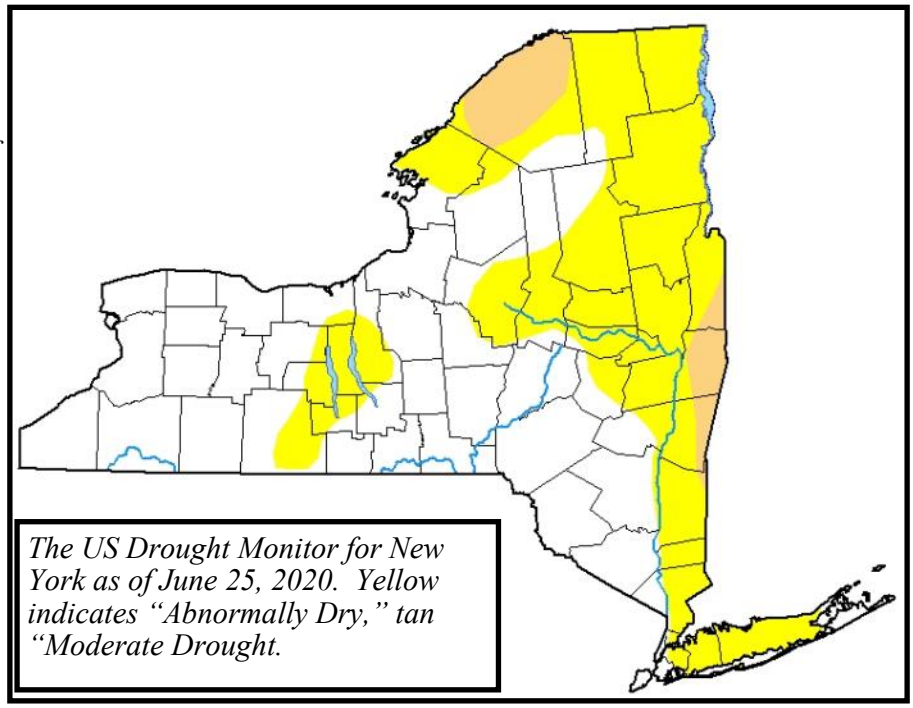
Early Season Drought Stress in Corn

R.L. (Bob) Nielsen, Agronomy Dept., Purdue Univ., West Lafayette, IN 47907-2054
Corny News Network, June 2020
URL: http://www.kingcorn.org/news/timeless/EarlySeasonDroughtStress.html

Kevin's note: Although some eastern locations picked up .5 inch of rain Tuesday night, the western part of our region got a trace to none. For the month of June most locations in our region have had less than an inch of rain which is why the eastern side of our region is now considered abnormally dry in the graphic at right.



The US Drought Monitor for New York as of June 25, 2020. Yellow indicates "Abnormally Dry," tan "Moderate Drought.

Early season dry periods are historically not that common for the Eastern Corn Belt of the U.S. Usually, farmers and agronomists complain about too much rain during stand establishment and early vegetative periods. However, at the moment, conditions throughout Indiana have become stressfully dry over the past several weeks and much of the state was rated as "abnormally dry" by the U.S. Drought Monitor ratings as of mid-June (see our NY conditions in map above) .

What does this mean for young corn when most of the state's crop is not much farther along than about the 8-leaf collar stage of development and in the early stages of the rapid growth period? Good question. The answer is, as you might expect... "It depends".

Possible Consequences of Early Season Dryness

Early season dryness can be beneficial to young, developing corn plants. As I mentioned earlier,

too often in the Eastern Corn Belt the bigger issue in May and June is excessive rainfall that saturates or even ponds the soil, resulting in stunted root development or outright death. Stunted root development includes the restriction of roots to shallow soil depths because deeper depths tend to stay excessively wet longer. Dry, or even unusually dry, soil conditions during the early stages of vegetative development can encourage, or allow, deeper initial rooting of young corn plants. Deeper initial rooting can pay dividends later in the season when conditions more frequently turn hot and dry.

When soil near the surface becomes excessively dry at the time when initial nodal root development of young corn plants (V2 ~ V6) is occurring, the young roots may desiccate and die. One consequence of such early season dryness is the development of "rootless" or "floppy" corn and potential loss of plant population (Nielsen, 2019)

Truly severely dry soils early in the season, coupled with warm sunny days, can limit water uptake by the young plants to the extent that photosynthesis is compromised. An outward symptom that is common around the state these days are young corn plants rolling their leaves in response to the leaf stomates closing as the plants try to slow transpiration of moisture through the plants. While the reduction in transpiration can be initially beneficial to the stressed plant, the closed stomates also result in less carbon dioxide being taken in by the leaves and this contributes to a reduction in photosynthesis (translation: "not good").

The impact of the leaf rolling and the associated reduction in photosynthesis takes its toll on young corn plants by either stunting eventual plant development (shorter plants, smaller leaves) or restricting ear size potential (ovule formation during the rapid growth period). Of course, truly severe drought conditions can kill young corn plants outright, too.

So, potential grain yield reduction due to early season dryness can result from (1) outright loss of plant population due to death, (2) loss of potential kernel numbers before pollination (i.e., ovule formation), and/or (3) & (4) loss of surviving kernels after pollination (i.e., abortion of young kernels) or decreased kernel weight during grain fill due to smaller plants (smaller "factories") and inadequate photosynthetic "output".

Which of these consequences occur depends on the severity and duration of the early season dryness and what happens the remainder of the season. That's why "it depends".

Related References

Nielsen, R.L. (Bob). 2019. "Rootless" or "Floppy" Corn Syndrome. Corny News Network, Purdue Extension. http://www.kingcorn/news/timeless/FloppyCorn.html [URL accessed June 2020].

The National Drought Mitigation Center. 2020. United States Drought Monitor. A partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.

https://droughtmonitor.unl.edu/ [URL accessed June 2020]

https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NY

Potato leafhoppers make their presence known

Trying to think of when I have seen as many new seedings as I have seen this spring; no doubt because weather was dry enough to get them in and because last spring's weather prevented a lot of them from getting planted.


Photo by: Kevin Ganoe

Temperatures through first cutting were cold so alfalfa harvest of established stands was delayed but now we are seeing second cutting coming off as temperatures have gone the other direction.

This spring-summer we have been lucky enough to have a Cornell Ag Science student, Peter Burritt, intern with us and one of his responsibilities is to check fields some alfalfa fields for potato leafhopper (PLH) so we have a handle on what is happening in the field.


Photo by: Peter Burritt

Adults are a narrow wedge shaped light green insect about 1/8 of an inch long. The adults lay eggs in the stem or larger veins of leaves and the yellow/green nymphs or young leafhoppers emerge after 7 to 10 days. They reach the adult stage after about two weeks and the entire cycle takes about 28 days. This cycle goes quicker in warm weather.

Since Peter started in early June we have found PLH in every field, new seeding or established. Established fields have been at or below threshold but that is because as the PLH counts have gone up the alfalfa height has also increased so they have never been above threshold and control will be harvest.

New seedings have been another story with PLH numbers at or above threshold and you check your new seedings. What makes new seedings very susceptible to PLH is the fact that the leafhoppers come in when there is still considerable time to harvest and lay eggs and newly hatched nymphs have time to mature. The young nymphs are very small and do not fly but can crawl rather quickly. Also young alfalfa plants have considerable leaf area left even after harvest so PLH nymphs may remain. Adults will fly on to other food sources if the alfalfa is removed, the nymphs cannot.

Bottom line is you need to check your alfalfa fields.

Here are your options at this point if you <u>have</u> visible yellowing and stunting

Harvesting may be the most effective control if you have enough material to harvest

- ⇒If you don't because the stunting is so severe, clipping may is a good option and needs to be done to promote regrowth
- ⇒You are mowing/clipping to deny the PLH material to feed on

Spray the regrowth if sufficient numbers of PLH are present. You need enough leaf area to catch any insecticide application so spraying fresh cut stubble is not advised.

Here are your options at this point if you <u>do not</u> have visible yellowing and stunting and you have PLH present.

Use a standard 15 inch diameter sweep net to determine if PLH are present to justify control. If you find you have more than threshold numbers of PLH:

Average Stem Length (in.)	Leafhoppers per Sweep (Threshold)
less than 3 in. (new seedings)	0.2
3 to 7 in.	0.5
8-10	1.0
11-14 inches	2.0
15 inches or greater	If PLH numbers exceed 2.0 per sweep, and if regrowth is within 1 week of harvest, no action is needed. If not, use a short-residual insecticide

⇒ Harvesting may be the most effective control if you have enough material to harvest

⇒ Use an insecticide if you don't have sufficient growth. You need enough leaf area to catch any insecticide application so spraying fresh cut stubble is not advised. Follow all harvest restrictions on label.

⇒ For clear seeded alfalfa insecticides labeled are cyfluthrin (*Baythroid XL), chlorpyrifos (*Lorsban 4E), dimethoate, lambda-cyhalothrin (*Warrior II), and permethrin (*Pounce).

⇒ For mixed alfalfa grass stands insecticides labeled are cyfluthrin (*Baythroid XL) and zeta -cypermethrin (*Mustang)

* Restricted-use pesticide

READ THE LABEL

References

2020 Cornell Guide for Integrated Pest Management