AGRONOMIC ALERT
Technology Development by MONSANTO SM

Drought Effects on Corn for Grain and Silage

Prolonged dryness in the area has many growers concerned about drought stress in corn for grain and silage. Drought stress is most severe when it occurs within two weeks prior to and following silking. Carefully assessing yield potential and quality of the grain and silage will aid in harvest decisions this fall.

Effects of Drought Stress

Drought stress prior to pollination may reduce ear length and reduce the number of potential kernels. Heat and moisture stress during pollination and the period immediately following can cause significant reductions in yield potential and possibly complete barrenness. The level of yield reduction is dependent on severity of drought, field environment, and hybrid.

Silks are approximately 95% water; therefore, when there is dry weather in combination with high temperatures of >90° F, delay in silk emergence is common. Corn pollen shed typically lasts 5 to 7 days with silk emergence beginning 1 to 2 days after tassel emergence. In drought, pollen shed is often reduced to 2 to 3 days and silk emergence delayed 4 to 5 days, resulting in a reduction in viable pollen to fertilize the silks. Temperatures above 95° F often reduce pollen viability.

Continuation of dry and hot weather in late July and early August can cause post-pollination kernel and ear abortion. Kernels are most susceptible to abortion in the days immediately following pollination. Kernel abortion begins at the ear tip and works its way down the ear. Shallow root systems, high plant populations, nutrient deficiencies, and hybrid can impact the severity of kernel and ear abortion. Water use in the plant is highest from silking to milk stage of development. This is when the largest reductions in yield can occur.

> "Four consecutive days of visible wilting can reduce potential corn yield by 5-10% during the vegetative growth stage, or by 40-50% during silking and pollination."
>
> *Source: Purdue University*

Corn hybrid performance can vary greatly. Corn hybrids with good drought tolerance have a better ability to handle the lack of water and excessive heat. Drought-tolerant hybrids may still experience yield reductions because they are not drought resistant. Early hybrids may be favored in drought this year due to earlier flowering and grain fill in more favorable moisture conditions. However, if the weather would turn cool and rain is received, then later hybrids may be favored because of the timing of flowering and grain fill better coinciding with rainfall.

Leaf rolling in corn is a way for the plant to respond when it is stressed (Figure 1). Leaf rolling results in a reduction of photosynthesis within the plant. Under normal conditions a plant can take in water during the nighttime hours which provides the plant with moisture for daytime photosynthesis; however, in drought, this may not be possible. Leaf rolling does not always indicate yield performance at harvest but can indicate root development throughout a field. Shallow-rooted, poorly developed root systems, or root injury from corn rootworm larvae often result in leaf rolling due to inability to take in water.

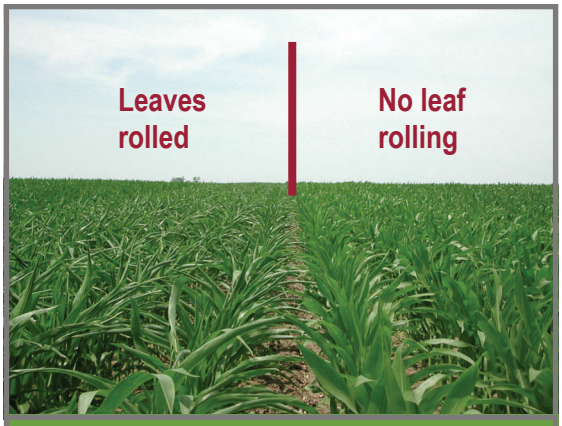

Figure 1. Pictured, a corn field with two corn hybrids. The hybrid on the left is exhibiting a typical sign of drought stress, rolled leaves.

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Management

Assessing Corn for Grain. Corn may have the ability to recover from drought stress. Figure 2 gives an example of how to estimate yield potential. Four consecutive days of visible wilting can reduce potential corn yield by 5-10% during the vegetative growth stage, or by 40-50% during silking and pollination. If corn has reached tassel, has leaves that do not unroll at night, and the tips start to brown, it will probably not recover. If half the leaves are dead or dying, the field may be a candidate for silage.

Harvesting for Silage. If the decision to harvest the crop for silage is made, the next step is deciding when to harvest the silage. As browning of the corn plant continues, forage quality decreases. Therefore, delaying silage harvest will reduce yield and quality and may reduce the chance for planting a second crop. Corn moisture should be checked to determine if it is necessary to delay harvest. If the moisture is greater than 75-80%, harvest should be delayed to avoid seepage and loss of silage quality.

The following are additional points to consider when feeding drought-stressed corn for silage:

- Drought-stressed corn can usually be salvaged as a usable feed although nitrate toxicity can pose a serious problem for animals and should be considered when evaluating a feeding plan.
- Ensiling the plants will usually reduce the amount of nitrate-nitrogen by one-fifth to two-thirds, but caution should still be paid to the potential for nitrate toxicity and a nitrate test should be considered.
- Properly sample and test the plants for nitrate-nitrogen. Adjust the ration to keep nitrate levels below 0.4% of ration dry matter.
- Nutritive value of drought-stressed corn will generally be 65-85% of normal corn. As a result, supplement droughty corn with plant or animal protein sources for improved animal performance.

Figure 2. Estimating Pre-harvest Corn Yield

1. **Estimate the number of kernel rows on a representative ear.**
2. **Count the number of kernels per row, if the kernels near the tip are less than half-size do not count them.**
3. **Determine the number of ears per acre.**
4. **Multiply the kernel rows by the kernels per row and then by the ears per acre.**
5. **Divide this number by 90,000 to get bushels per acre.**
6. **Repeat this process at several areas in the field to get a representative sample of the crop.**

***The final yield will depend on conditions during grain fill. This estimate is for average-sized kernels. If drought stress is continuous throughout grain fill, the resulting estimate may be greater than actual yield.**

Source: Pennsylvania State University

Please consult your local agronomist for more information regarding drought-related decisions in corn.

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