

# *Drought and Forage*

*Bill Curran, Ph.D., CCA  
Agronomist, Pioneer Hi-Bred Int'l*

Severe drought conditions throughout Colorado have raised questions about forage management. Good forage management will be critical to maximize returns in 2002.

Corn is a versatile crop in drought conditions because it may be harvested for silage or grain. Harvesting corn for silage nearly doubles the amount of protein harvested per acre and produces 1.5 times more total digestible nutrients than if only the grain is harvested. On average corn utilizes 24 to 27 inches of water per acre during the growing season. Repeated moisture stress during the silk to tassel stage can result in grain yield losses as high as 50 percent. The four-week period surrounding silking, approximately July 20, is the most important time for irrigation. Depending on hybrid maturity, it takes between 50 and 60 days to reach black layer from 50% silk.

**What is the yield potential of drought stressed corn silage?** Corn silage yields may be 50 to 90% of normal under drought stressed conditions. Timing and duration of drought stress will determine yield loss. Silk emergence is the most critical time to avoid drought stress while early vegetative is the least critical period for drought stress. When irrigation water is limited, refrain from irrigating until the silking to blister stage of development, if possible. Drought stress during the blister to dough stage can cause yield losses between 20 and 40%. Hybrids vary greatly in their ability to handle drought. Side-by-side comparisons are a good way to determine yield differences between hybrids. If little or no grain is present, a general rule is that there will be one ton of 70% yield per foot of plant height.

Less water is required to raise corn silage than to grow a grain crop. Because corn silage is harvested 15 to 20 days before black layer or physiological maturity is reached, less water is needed to mature the crop to harvest. Depending on soil type and available water, harvesting corn for silage can reduce the number of irrigations needed by one to two irrigations.

**What effect does drought have on silage quality?** Drought can cause lower starch contents because there is less grain in the total silage mix. Energy will be partitioned

*Table 1. Influence of moisture stress at various growth stages on corn grain yield.*

<u>Stage of Development</u>	<u>% Yield Reduction</u>
Early Vegetative	5 - 10%
Tassel Emergence	10 - 25%
Silk / Pollen Shed	40 - 50%
Blister Kernel	30 - 40%
Dough	20 - 30

more into fiber instead of grain. Important analytical measurements are: total dry matter, neutral detergent fiber digestibility, sugar, starch and non-fiber carbohydrates. Have corn silage tested. **Do not rely solely on standard NIR** (near infrared) tests when the crop is altered due to unusual environmental conditions. Use a wet chemistry analysis. Studies conducted by Michigan State University indicate that severely stressed corn, which had essentially no ears and was short, still had a feeding value of approximately 70% of normal corn silage. Under these circumstances, the value of corn silage may be based on nutrient density values.

**When should corn silage be harvested?** If the corn has any grain, use the milk line in the kernel to determine the proper time to chop. In general, when the milk line is one-third of the way down the kernel, it is ready for the bunker. When the milk line is two-thirds to three-fourths of the way down to the kernel tip, whole plant moisture is 63 to 68%. Whole plant moisture is 50 to 60% as the black layer begins to appear at the tip of the kernel. Green, barren stalks may contain 75 to 90% moisture. It is important to sample fields and conduct dry matter tests because the tendency is to harvest drought stressed corn too early and ensile too wet. Hybrid maturity, drought tolerance, and late season plant health may influence harvest timing significantly. If conditions remain hot and dry, silage harvest may occur earlier than normal. Harvest assessment will be required on a field-by-field basis. Be prepared to make harvesting adjustments with custom harvesters.

**Will insects affect harvest time?** The principle insect of concern is the spider mite. Spider mite activity is greater under hot and dry conditions and their influence will be greatest on stressed corn. If infestation levels are severe enough, early harvest may be warranted. Pesticides used to treat spider mite infestations have the following harvest intervals: Comite, 30 days after application; Dimethoate, 14 days after application; Capture, 30 days after application.

**Should I be concerned with nitrates?** High nitrate levels are likely in drought stressed forages. To avoid nitrate toxicity, test forages before feeding. Nitrates are in the highest concentration in the lower portion of the stalk. Increasing the cutting height is a simple method to address a high nitrate issue. In addition, ensiling the forage reduces the amount of nitrates by half.

**How will drought affect alfalfa quality?** When cut at similar stages of maturity, drought stressed alfalfa tends to be higher in crude protein and digestible dry matter (especially acid detergent fiber) due to lower fiber levels. Alfalfa goes dormant under severe water stress and requires several inches of moisture to green up.

**Sorghum sudangrass has become a popular hay crop in 2002 because of the drought.** Sudangrass requires certain management strategies to avoid problems with prussic acid. Any stress that retards normal growth may increase prussic acid risk. Young leaves contain the highest levels of prussic acid. Drought stunted plants or frozen leaf tissues present the greatest risk. Consider these management strategies to avoid prussic acid poisoning:

- \*\* Do not graze or greenchop until plants are 20 – 24 inches in height.
- \*\* If stunted by drought or other conditions, do not graze or greenchop until plants are 20 – 24 inches in height.
- \*\* Do not pasture following a closely cut hay or greenchop harvest.
- \*\* Avoid pasturing immediately following frost or freeze that does not completely kill plants; wait until top growth turns completely brown.
- \*\* Do not greenchop for two or more day after a killing freeze.
- \*\*Prussic acid is not eliminated by ensiling .