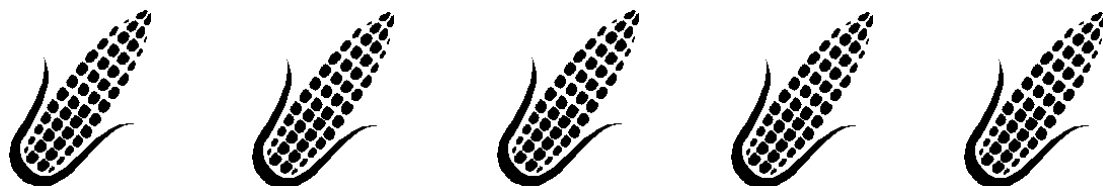




Farm Views



Utilizing Drought-Damaged Corn

Identification of drought-stress and effect on corn growth and yield

Inadequate moisture during any period of growth can result in reduced grain yield. Nutrient availability, uptake, and transport are impaired without sufficient water. Plants weakened by stress are also more susceptible to disease and insects. Severe moisture stress is indicated by leaf wilting and is alleviated only when the plants receive additional water.

Drought stress prior to tassel and silk appearance may result in small ear size. From the 10-leaf to the 12-leaf stage (V10 to V12), potential number of rows of kernels on the cob is determined. From the 12-leaf to the 17-leaf stage (V12 to V17), potential number of kernels per row is determined. Moisture stress during these vegetative periods may reduce ear length and the number of potential kernels on each ear. If ear size is reduced during this period, it cannot be corrected by relieving the moisture stress later in the season.

Drought stress after pollination and fertilization will result in aborted kernels or poor kernel fill, causing low test weight and reduced yield. It may also predispose the plants to development of stalk rots.

Four consecutive days of visible wilting can reduce potential corn yield by five to ten percent during the vegetative growth stage. During silking and pollination, yield reduction after four consecutive days of wilting can be as much as 40 to 50 percent. Moisture stress during this period can result in a lack of synchronization between pollen shed and silking at pollination, because pollen grains may not remain viable and silking may be delayed.

Within one to three days after silk is pollinated and fertilization is successful, the

silk will detach from the developing kernel. Thus, you can carefully remove the husk leaves from an ear shoot, shake the cob, and estimate the degree of successful fertilization by observing how many silks shake loose.

Another method to determine whether drought-stressed corn plants have been pollinated and fertilized is to look for small white blisters on the ear seven to ten days after pollen shed. To identify the blisters, take ears from several areas in the field and break them in half. Using a knife, dig out several kernels on each ear. If you find kernels that resemble blisters on the ears, you can assume kernel fertilization occurred. If you are unsure whether fertilization has occurred, observe the kernels again in five to seven days. If the kernels were fertilized, the blisters will have rapidly increased in size. If fertilization did not occur, the kernels will not have increased in size. It is also possible to tell if fertilization has occurred by slicing the kernels longitudinally through the embryo side and looking for the young embryo. Only fertilized kernels will produce embryos. Most kernels that have been fertilized, will continue to develop and mature if the plants get water.

If a plant has tasseled and shed pollen but no blisters have appeared, it will be barren. A common result of prolonged moisture stress or moderate moisture stress during late pollination is the production of ears with barren tips. This occurs because the tip kernels were not pollinated or were aborted after pollination.

Feeding drought-stressed corn silage

Before making and feeding silage, be sure all pesticides applied to the crop are cleared for silage use. The interval between final application and

allowable harvest may differ for silage and grain. Be sure to check the label of any chemical that was applied.

Before drought-stressed corn is chopped for silage, test moisture percentage. Even though lower leaves may be brown, plants can contain 75 to 90 percent water, which is too wet for acceptable silage fermentation. If drought-stressed corn has pollinated, it is best to delay harvest as long as some green leaf and stalk tissue remains and the black layer has not formed on kernels. Rainfall and subsequent relief of moisture stress can increase grain dry matter and silage quality.

The feed value of silage made from drought-stressed corn is between 90 and 100 percent of silage made from well-eared corn, based on equal dry weights of the two feeds. Crude fiber and protein will be somewhat higher and TDN (total digestible nutrients) lower than with normal silage, because ears from drought-stressed corn may contain 50 percent or more cob compared to 20 percent cob on normal ears. Drought-stressed silage should be tested for moisture percentage and feed value.

Shelled corn from drought-stressed plants contains between 90 and 100 percent of the feed value of normal shelled corn. Test weight will be lower. Market discounts on low test-weight corn are often greater than the reduced feeding value, so this shelled corn is a good buy for a livestock producer.

Selling drought-stressed silage

For moisture-stressed corn, you can expect to harvest about one ton of silage per acre for each five to eight bushels of corn grain per acre that could have been harvested. For example, if you expect a grain yield of 50 bushels per acre, you can expect six to ten tons per

acre of 30 percent dry matter silage. If very little or no grain is expected, a rough preharvest estimate of yield can be made by assuming one ton of 30 percent dry matter silage can be obtained for each one foot of height of plant material, excluding the tassel.

Selling Price

Two methods can be used to determine a fair market value for silage, each make comparisons with substitute feed sources. The first compares to the price of corn and alfalfa hay. For 70 percent moisture (30 percent dry matter) silage, first, add \$0.50 per bushel to the price of corn grain to cover the added costs of harvesting and storing corn silage rather than grain. Next, multiply the result by five. This gives the minimum value of the silage compared to corn. Next, divide the price of good quality alfalfa hay by three. This gives the value of corn silage compared to a substitute forage. The price per ton of corn silage should fall somewhere between the prices calculated by the two methods.

For example: If corn is \$2.20 per bushel and good quality alfalfa hay is \$75 per ton, compare corn: $\$2.20 + \$0.50 = \$2.70 \times 5 = \13.50 per ton. Compare alfalfa hay: $\$75 \div 3 = \25 per ton. The range is \$13.50 to \$25.00 per ton for 70 percent moisture silage.

If the buyer harvests and stores the silage, \$2 to \$2.50 per ton should be subtracted because the seller will pay nothing to harvest the crop.

The silage values based on the prices for the two commodities represent the range of bid prices you can ask for drought-stressed silage. You should receive at least the minimum price determined above, or you might as well harvest and market it as grain.

A second method that can be used to calculate a price for

silage uses the price for corn and soybean meal. Table 1 lists prices for drought-stressed corn silage based on both energy (TDN) and crude protein (CP) content for a range of corn grain and soybean meal prices. These prices were calculated assuming 30 percent dry matter corn silage with 65 percent TDN and 10 percent crude protein. The actual exchange price for drought-stressed corn silage will vary by area, depending on the relative supply and demand.

Ensiling stressed corn is preferred to chopping or grazing because of the potential for nitrate toxicity. The potential for nitrate toxicity is practically eliminated during the fermentation process. **Caution!** Ensiling high-nitrate forage can result in production of various nitrogen oxide gases (known, collectively, as silo gas). These gases are highly toxic to humans and livestock. Do not enter a silo for the first four weeks after filling without first running a blower for 15 to 20 minutes.

If drought-stressed corn is green-chopped and fed without ensiling, it should be fed immediately after it is chopped and not allowed to begin to heat. Feed only the amount that will be cleaned up within two hours. When drought conditions prevent normal plant growth, the corn stalk may contain abnormally high levels of nitrate. If fed in excessive amounts, it can cause animals to go off feed or die. Under most feeding situations, the nitrate level in feed must be over 2000 ppm to cause a problem. Nitrate testing of feed is especially important if high rates of nitrogen fertilizer or manure were applied, or if the soil has a high organic matter content. A return to non-stressed conditions following substantial rainfall should decrease nitrate accumulation, but chopping should be delayed for three to five days. (TD)

Table 1. Value of Drought-Stressed Corn Silage, Based on Corn Grain and Soybean Meal Prices.*

Price of soybean meal (\$/cwt)	Price of corn grain (\$/bu)						
	1.80	2.00	2.20	2.40	2.60	2.80	3.00
	Value of corn silage (\$/ton)						
6.00	16.97	18.54	20.11	21.68	23.24	24.81	26.38
6.50	17.21	18.77	20.34	21.91	23.48	25.05	26.62
7.00	17.44	19.01	20.58	22.15	23.72	25.29	26.86
7.50	17.68	19.25	20.82	22.39	23.96	25.53	27.09
8.00	17.92	19.49	21.06	22.62	24.19	25.76	27.33
8.50	18.16	19.72	21.29	22.86	24.43	26.00	27.57
9.00	18.39	19.96	21.53	23.10	24.67	26.24	27.81
9.50	18.63	20.20	21.77	23.34	24.91	26.47	28.04
10.00	18.87	20.44	22.01	23.57	25.14	26.71	28.28
10.50	19.10	20.68	22.24	23.81	25.38	26.95	28.52
11.00	19.34	20.91	22.48	24.05	25.62	27.19	28.76
11.50	19.58	21.15	22.72	24.29	25.86	27.42	28.99
12.00	19.82	21.38	22.96	24.52	26.09	27.66	29.23
12.50	20.06	21.62	23.19	24.76	26.33	27.90	29.47
13.00	20.29	21.86	23.43	25.00	26.57	28.14	29.71

* Find the current price for corn grain in the row at the top of the table and the current price for soybean meal in the far left-hand column. You will find the value of silage at the intersection of these prices.

