
Sorghum Silage

Management Highlights

- Target pH: **6.0**
- Split N applications to increase N use-efficiency in sorghum silage production. Apply a small amount at planting and the remainder of the N requirement (75-80%) at the 5th leaf stage.

Yield Goals

Silage yield of sorghum is influenced by many factors, including the cultivar selected, planting date, winter weather, soil type and water-holding capacity, nutrient and water availability, weed, insect and disease pressure and crop management practices. *On Delaware soils, 10 - 15 tons/ac is a realistic yield goal for sorghum silage production in a good to average year.* When field history supports the use of a different yield goal, growers should use that information to adjust management decisions and fertility programs accordingly.

Soil pH and Liming

The target pH for sorghum on most Delaware soils is **6.0**. Soils that are higher in organic matter ("black" soils) have a lower target pH (5.6) because organic matter moderates some of the effects of excessive soil acidity (e.g., aluminum toxicity). The lime recommendation for a specific field is calculated from the soil pH and buffer pH measurements using the steps outlined in *Calculating the Lime Requirement -- Chapter 3, Section 3.4*. Avoid overliming in order to prevent deficiency of micro-nutrients such as manganese.

In most cases, the lime requirement can be met by either calcitic or dolomitic limestone.

Dolomitic limestone is recommended if:

- soil test Mg is less than 50 FIVs, or
- soil test Mg is between 50 and 100 FIVs *and less than soil test Ca.*

Calcitic limestone is recommended if:

- soil test Mg is greater than 100 FIVs, or
- soil test Mg is between 50 and 100 FIVs *and greater than soil test Ca.*

Nitrogen Management

The University of Delaware recommends a nitrogen (N) rate of **160-180 lbs N/ac** for sorghum silage production on Delaware soils. Nitrogen use will be most efficient when applied in a split application. A small amount of the N (approximately 25%) should be applied at or just prior to planting. The remainder of the N requirement should be applied at the **5th** leaf stage. When a single application is planned, N should be applied as close to planting as possible to reduce the potential loss of N prior to crop uptake.

Application rates for N should be reduced when planting into legume cover or when manure has been applied. To determine the N adjustment, see *Nitrogen Rate Adjustments -- Chapter 3, Section 3.5.1.2*.

CAUTION: To avoid *nitrate toxicity* in the crop which could be dangerous when used as feed for livestock, be cautious when harvesting silage after a drought or if a recent application of N was followed by cool, wet weather. Both situations can result in nitrate-N accumulation in the plant.

Forage Crops

Phosphorus Management

Yield-limiting phosphorus (P) deficiency is rarely a concern on Delaware soils. Long-term applications of fertilizers and manures have resulted in P accumulations in many soils that are capable of supplying crop needs for several years with no further additions.

To determine whether P fertilization is necessary for a specific field, conduct a routine soil test. University of Delaware P recommendations for sorghum silage are dependent upon the soil test P value. A summary of those P recommendations are given in Table 1 below.

Table 1. Broadcast application rates for P for sorghum silage production.

P Index Value						
0	10	20	30	40	60	80
----- lbs P ₂ O ₅ / ac -----						
140	120	100	90	80	40	0

Note: These rates are for a broadcast application. If P is to be applied in a fertilizer band, rates should be cut by half.

Potassium Management

The need for potassium (K) fertilization of sorghum silage is best determined by the use of a routine soil test. Potassium recommendations are based on the the soil test K value and the K needs of the crop. A summary of University of Delaware K recommendations for sorghum silage is given in Table 2. Potassium can be broadcast prior to planting or applied in the fertilizer band. *To avoid salt injury to seedlings, do not band more than 75 lbs K₂O/ ac.*

Table 2. Potassium fertilizer recommendations for sorghum silage.

K Index Value						
0	10	20	30	50	70	90
----- lbs K ₂ O / ac -----						
200	183	167	150	117	84	50

Calcium and Magnesium Management

Calcium (Ca) and magnesium (Mg) needs of sorghum silage are usually met through routine liming. ***Magnesium application is recommended if the soil test Mg value is less than 38 FIVs.*** If liming has been recommended, use dolomitic limestone to raise soil pH and increase soil Mg. If, however, liming is not necessary but Mg is still indicated, apply Mg as Mg sulfate or Mg chloride to increase soil Mg. Appropriate application rates are given below in Table 3.

Table 3. Application rates for soluble Mg as a function of Mg fertility index value.

Mg Index Value								
0	5	10	15	20	25	30	35	40
----- lbs soluble Mg / ac -----								
80	70	60	50	40	30	20	10	0

Manganese Management

Manganese (Mn) deficiency may occur in silage sorghum grown on Delaware soils, most often as a result of overliming soils that are naturally low in Mn. The University of Delaware Soil Testing Program uses an availability index based on the soil test Mn value and soil pH to predict the likelihood of Mn deficiency. That availability index is calculated using the equation:

$$MNAI = 101.7 - (15.2 \times pH) + (2.11 \times ST-Mn)$$

where:

MNAI = Mn availability index
 pH = water pH of the soil
 ST-Mn = soil test Mn in lbs/ac.

Table 3-14 in *Chapter 3, Section 3.5.5.2 (Manganese Management)* gives a summary of MNAI values for various soil pH-soil test Mn combinations. Interpretations of the Mn availability index for sorghum silage are given below in Table 4.

Table 4. Interpretation of the Mn availability index for silage sorghum.

MnAI Value	Interpretation
Less than 17	Mn deficiency is likely at this soil pH and Mn concentration.
17 to 25	Mn deficiency is possible at this soil pH and soil Mn concentration. Monitor crop for deficiency symptoms.
Greater than 25	Mn deficiency is unlikely.

Suspected Mn deficiency can be confirmed by tissue analysis. Confirmed deficiency situations can be corrected in season by foliar applications of Mn of 1-2 lbs/ac of actual Mn as Mn sulfate, Mn oxide or Mn chelate. If deficiency is predicted by the availability index or was observed during the previous growing season, it can be prevented by an application of 8-10 lbs/ac of actual Mn in the fertilizer band. Band applications of acid-forming fertilizer, which lower soil pH in the area of plant roots, may correct Mn deficiency without the addition of Mn fertilizer.

Other Nutrients

No other nutrients are known to be limiting to sorghum silage production in Delaware.

Additional Information

See Soil Test Notes 1, 2, 4 and 5 (Appendix 7) for additional information concerning nutrient management of sorghum silage.