

21 Popcorn

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Since the mid to late 1970s, Nebraska has become one of the leading popcorn producing states in the nation, often bringing in the highest popcorn yields. Increased popcorn production in Nebraska is due primarily to irrigation resulting in more consistent yields, which is critical when producing popcorn under contract.

In 1997 Nebraska producers raised 269 million pounds of popcorn on approximately 73,000 acres for an average yield of about 3,700 pounds per acre. Nebraska ranked first in total production and second in acres harvested for popcorn in 1997.

Fertility requirements for popcorn are similar to field corn. Popcorn, however, has a less extensive root system compared to field corn, and is less efficient at utilizing nutrients in soil. Consequently, though yield levels for popcorn are less than field corn (on average 85% of field corn yield), fertility requirements are similar. Popcorn also typically has poorer standing ability than field corn, and consequently is susceptible to lodging at high nitrogen (N) rates, particularly if potassium (K) levels are low. Popcorn seedlings are less vigorous than field corn, so the producer should probably use a starter fertilizer on popcorn.



Nitrogen and phosphorus (P) are the two most essential nutrients in both popcorn and field corn production. Soil potassium levels low enough to expect yield increases from potassium fertilization are relatively rare in Nebraska. Other nutrients that may be limiting in the soil and require fertilization for popcorn are sulfur (S), zinc (Zn), and occasionally iron (Fe).

Nitrogen

Like field corn, the amount of nitrogen necessary for popcorn is based on expected yield, soil organic matter, residual nitrate in the soil, previous crop in the field, the amount of manure and other organic wastes applied, and irrigation water nitrogen. The producer should credit all nitrogen sources and adjust his fertilizer rate accordingly. That rate should be about 15% lower than the recommended rate for field corn on the same field with the same expected yield. As previously expressed, excessively high nitrogen rates can cause lodging, especially when potassium levels are low.

■ *Nitrogen fertilizer recommendations*

Table 21-1 shows nitrogen fertilizer rate recommendations for various yield levels based on soil nitrate and organic matter levels. These rates apply for preplant or sidedress applications. The popcorn producer should not employ a fall nitrogen fertilization program.

Phosphorus

The grower should base phosphorus fertilizer needs for popcorn on Bray-1 P or Olsen P test levels. Table 21-2 gives phosphorus application rates based on soil phosphorus level and phosphorus fertilizer application method.

TABLE 21-2

Phosphorus fertilizer recommendations for popcorn.

| Phosphorus Soil Test | | Relative Level | P ₂ O ₅ to Apply | |
|----------------------|----------|----------------|--|--------|
| Bray-1 P* | Olsen-P* | | Broadcast | Band** |
| <i>ppm</i> | | | <i>pounds per acre</i> | |
| 0 - 5 | 0 - 3 | Very low | 80 | 40 |
| 6 - 15 | 4 - 10 | Low | 40 | 20 |
| 16 - 24 | 11 - 16 | Medium | 0 | † |
| 25 - 30 | 17 - 20 | High | 0 | † |
| > 30 | > 20 | Very high | 0 | 0 |

*Phosphorus tests: Bray-1 P for acid and neutral soils; Olsen-P for calcareous soils (pH 7.2 or greater).
 ** Applied in a band preplant or beside the row at planting.
 † Applying 10 to 20 pounds per acre P₂O₅ with 5 to 10 pounds per acre N in a band at planting may increase early growth on these soils. See NebGuide G77-631, Using Starter Fertilizers for Corn, Grain Sorghum and Soybeans.

Potassium

Most soils in Nebraska contain adequate amounts of potassium for maximum popcorn yields. For soils low in potassium, the producer should apply potassium fertilizers according to the guidelines in Table 21-3.

TABLE 21-3

Potassium fertilizer recommendations for popcorn.

| Potassium Soil Test* | Relative Level | K ₂ O to Apply | |
|----------------------|----------------|---------------------------|--------|
| | | Broadcast | Band** |
| | | <i>pounds per acre</i> | |
| 0 - 40 | Very low | 120 | + 20 |
| 41 - 74 | Low | 80 | + 10 |
| 75 - 124 | Medium | 40 | or 10 |
| 125 - 150 | High | 0 | 0 |
| > 150 | Very high | 0 | 0 |

* Potassium test: exchangeable K.
 ** Banded beside the seed row, but not with the seed.

Sulfur

Sulfur deficiency in Nebraska generally only occurs on sandy, low organic matter soils; however, in popcorn it also may occur on medium to coarse textured soils. This is because popcorn seed germinates and seedlings grow more slowly than field corn. Also, the popcorn root system is less extensive than the field corn root system so high clay soils and poorly draining soils weaken roots, reduce yields and increase lodging. Popcorn producers should test soil and irrigation water for sulfur content if there is a concern about sulfur availability to the crop.

Guidelines for sulfur fertilization are listed in Table 21-4. Most irrigation water, except in the very sandy area of north central Nebraska, contains enough sulfur to supply popcorn's requirements. Where sulfur may be low, as indicated by soil testing, applying fertilizer containing sulfur in a band at planting on sandy soil may be effective.

TABLE 21-4

Sulfur fertilizer recommendations for popcorn.

| Sulfur Soil Test, SO ₄ -S [‡] | Annual Sulfur Application Rate | |
|--|--------------------------------|-----------------------------------|
| | <i>pounds per acre</i> | |
| <i>ppm</i> | <i>Soil Organic Matter ≤1%</i> | <i>Soil Organic Matter >1%</i> |
| Irrigation water with < 6 ppm SO₄-S | | |
| < 6 | 10 row* or 20 broadcast | 5 row* |
| 6 - 8 | 5 row* or 10 broadcast | 0 |
| Irrigation water with > 6 ppm SO₄-S | | |
| < 6 | 5 row* or 10 broadcast | 0 |
| 6 - 8 | 5 row* or 10 broadcast | 0 |
| > 8 | 0 | 0 |

[‡]Sulfur test is Ca(H₂PO₄)₂ extraction.
*Applied in a band next to row, but not with seed.

Zinc

Zinc is most likely to be limiting for popcorn production in low organic matter soils, and areas of fields that have been leveled for irrigation. Soil testing provides the best method for measuring zinc requirements in popcorn. Table 21-5 gives recommended rates of zinc to apply according to soil testing and excess lime content of the soil. Recommended broadcast rates are for raising soil zinc content to a level that is adequate for several years. Row treatment rates are for annual application.

TABLE 11-5

Zinc fertilizer recommendations for popcorn.

| DTPA-Zn <i>ppm</i> | Relative Level | Zn to Apply | |
|-----------------------|-------------------|-----------------------------|---------------------------------|
| | | <i>Calcareous Soils</i> | <i>Non-calcareous Soils</i> |
| 0 - 0.40 | Low | 2 row or 10 broadcast | 2 row or 5 broadcast |
| 0.41 - 0.80 | Medium | 1 row or 5 broadcast | 1 row or 3 broadcast |
| > 0.80 | High | 0 | 0 |

Resources

1. D'Croz-Mason, N., and R. Waldren. 1990. Popcorn Production. NebGuide G78-426. University of Nebraska, Cooperative Extension, Lincoln, NE.

