



Spring 2005, No. 6

NUTRITION AFFECTS COTTON YIELD AND QUALITY

A major factor in profitable cotton production is the availability of adequate and balanced nutrition.

Good nutrient management results in higher yields, improved fiber quality, greater water and nutrient use efficiency, and reduced potential for environmental impairment.

Cotton takes up about 60 pounds of nitrogen for each 480-pound bale produced. Nitrogen is essential for the development of all plant organs including shoots, buds, leaves, roots, and bolls. Uptake of nitrogen by cotton peaks at about 2 to 3 pounds per acre per day during fruiting. Uptake is limited prior to squaring, and the majority of total nitrogen is taken up after first bloom. Therefore, split applications of nitrogen (e.g., preplant and at or before first bloom) improve the chances of meeting the crop needs during peak demand periods. Texas Tech University researchers have shown that on the Texas South Plains about 5 pounds of nitrogen are required per inch of water consumed. Since cotton is an indeterminate perennial, too much nitrogen late in the season may cause excessive vegetative growth and should be avoided. Soil and petiole tests can be helpful in determining preplant and midseason nitrogen management.

Approximately 25 to 30 pounds of P_2O_5 is taken up per bale of cotton produced. Phosphorus is important in early root development, photosynthesis, cell division, energy transfer, early boll development, and hastening of maturity. Banded application of phosphorus may be beneficial, especially where soil test levels are low or in reduced tillage or no-till systems. Insufficient phosphorus results in dwarfed plants, delayed fruiting and maturity, and reduced yield. Use soil tests to determine optimum phosphorus application rate.

Cotton utilizes about 60 pounds of K_2O per bale. Potassium is an especially important nutrient in cotton production. It reduces the incidence and severity of wilt diseases, increases water use efficiency, and affects fiber properties like micronaire, length, and strength. It is important in maintaining sufficient water pressure within the boll for fiber elongation. Thus, the need for potassium increases dramatically during early boll set. About 70 percent of uptake occurs after first bloom, and uptake peaks at about 2 to 3 pounds per acre per day. Potassium deficiency may be expressed as a full season deficiency, or it may not appear until late season since this is the period of greatest demand. A shortage of potassium reduces fiber quality and results in plants that are more susceptible to drought stress and diseases. Preplant applications of potassium fertilizer, and in some cases mid-season foliar applications, are effective in correcting potassium deficiencies. Soil testing is the first step in predicting potassium needs.

Secondary elements and micronutrients are also critical to profitable cotton production. A high yielding cotton crop can take up as much as 30 pounds each of sulfur and magnesium. Cotton responds to trace elements like boron, zinc, and manganese where these elements are deficient. Soil tests, plant analyses, field history, and experience should be considered when establishing the need for these elements.

Complete and balanced nutrition is critical to achieving optimum cotton yields and maximum profit. And balancing nutrition with other critical management inputs like water, variety, tillage, and rotation helps assure maximum production efficiency and profit.

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