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PHOSPHORUS NUTRITION OF COTTON

Phosphorus is an important nutrient in cotton production for several reasons. The nutrient is essential for vigorous root and shoot growth; it promotes early boll development and hastens maturity; it helps overcome the effects of compaction; it increases water use efficiency; and it is necessary for energy storage and transfer within the plant.

Approximately 30 pounds of P_2O_5 is taken up per bale of cotton produced. Of the total uptake, slightly less than 50% (14 pounds of P_2O_5) is removed per harvested bale. Phosphorus uptake by cotton follows closely the pattern of dry matter accumulation. By first flower the crop has accumulated about 20% of the total seasonal uptake. After this time, the rate of uptake increases dramatically. By peak bloom, about half of the crop's phosphorus has been taken up, and by first open boll the crop has taken up over 70% of its needs. Peak daily uptake of phosphorus occurs 60 to 100 days after planting and can exceed one pound of P_2O_5 per acre. Failure to meet the uptake demand during the peak period will result in plant stress, yield loss, and a decline in lint quality. Phosphorus uptake is completed by the time the crop reaches the 50% open boll stage.

To ensure proper seed and lint development, adequate soil phosphorus levels must be built and maintained. A rule of thumb for raising soil test phosphorus is that it takes 6 to 14 lb P_2O_5 above crop removal to build soil test phosphorus by one pound per acre on sandy loam to silt loam soils. There are other important reasons to build soil test phosphorus levels into the high or medium to high range:

- Increase root growth for efficient uptake of other nutrients;
- Capitalize on "good weather" years and minimize risk associated with "bad weather" years;
- Raise soil productivity and increase yield potential of all crops in the rotation;
- Improve grower profit potential.

Placement of phosphorus fertilizer can be an important consideration in some circumstances. Banded application of phosphorus may be beneficial, especially where soil test levels are low or in reduced tillage systems. The amount of fertilizer that can safely be placed in-furrow with the seed is limited due to possible seedling damage and toxicity. Research has shown that rates of 11-37-0 fertilizer greater than 2.5 to 2.8 gallons per acre can reduce cotton stands and yield, and rates greater than 1.5 gallons per acre are not recommended.

Adequate phosphorus nutrition is critical in optimizing yield, quality, and profit potential in cotton production. Insufficient phosphorus results in dwarfed plants, delayed fruiting and maturity, and reduced yield. While placement of phosphorus fertilizer is not as important as in the production of many other crops, banding phosphorus can increase yields in some situations (e.g., reduced or no-till, compacted soil conditions). Use soil tests to help determine optimum phosphorus application rate. **Soil test levels should be maintained in the medium to high range to assure consistent production, and that phosphorus does not limit cotton yield and quality.**

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