



POTASSIUM FERTILIZATION



● Potassium (K)

Although potassium is retained by soils more strongly than N, it can be lost through leaching, and may need replacing. Prompt replacement is important, especially early in the season. Approximately 25 to 30 pounds per acre of potash should correct most leaching losses.

The symptoms of potassium deficiency can be very pronounced. Deficiency symptoms first appear on the older leaves as a yellowish-white mottling. The mottling changes to a light yellowish green, and yellow spots appear between veins. The centers of these spots die, and numerous brown specks appear at the leaf top, around the margin, and between the veins. The tip and the margin of the leaf breakdown first and curl downward. As this physiological breakdown progresses, the whole leaf becomes reddish brown, dies, and is shed prematurely. The premature shedding of leaves contributes to dwarfed and immature bolls.

In recent years, some regions have reported K deficiency symptoms appearing in the upper part of the plant. In some cases, soil K levels appear to be high, but the plants are unable to obtain adequate K. In these cases, foliar K fertilization has improved yield and quality. At the present time, these symptoms have been associated with three factors: 1) the use of very high yielding, determinate-type cultivars that set a heavy fruit load over a very short period; 2) soils that "fix" K in non-available forms, and 3) an unidentified disease. Symptoms are most common in parts of California and the Mid-South. Symptoms are becoming more common in the Limestone Valley. Researchers have found a site on a Lucedale (dark red, high in iron, sandy loam texture) soil in the upper coastal plain of Alabama that responded to foliar K applications even though the soil test K was high.

Source: *Cotton Fertilization*, Steven C. Hodges, Soil Science Extension Specialist, North Carolina Cooperative Extension Service, 1995.

● Potassium Deficiency in Cotton Linked to Leafspot Disease

Late-season K deficiency and associated leafspot are not new to Georgia cotton. ([See photos below](#)) However, over the past few years, this problem has occurred more frequently, more severely and much earlier in the growing season. In some worst cases, cotton was totally defoliated soon after the fourth week of bloom.

The first indication of this problem was actually the discovery of a new leafspot for Georgia -- *Stemphylium*. It is estimated that 2,000 acres of Georgia cotton were infected with this new disease in 1995 and up to 20,000 acres in 1996. The symptoms of leafspot are small brown lesions caused by the fungal organisms *Cercospora* and *Alternaria* in addition to *Stemphylium*. Upon further investigation, it was discovered that the leafspot was actually secondary to the primary problem -- K deficiency. It is well known that K adds strength to plant leaf cells and the lack of K in leaf cells makes them weak and susceptible to secondary fungal infection.

In almost every case where leafspot was investigated, low soil K, low plant tissue K and/or low petiole K was discovered. Low petiole K appeared to be the best indicator. In some cases the problem was traced back to inadequate K fertilization. Some cases were under dryland conditions where low soil moisture was suspected of reducing uptake of K. Some cases occurred on short-season varieties where intense demand for K in a short period of time was suspected as the main problem. A few cases occurred with high soil magnesium (Mg) levels which were thought to have caused competition for K uptake and subsequent K deficiency. The majority of cases, however, were discovered on full season varieties under irrigation around the fourth week of bloom with heavy fruit set. This timing and situation correspond with a heavy demand for K. The roots of the cotton plant also start to decline at this time due to competition for carbohydrates by developing bolls. This adds to the challenge of taking up soil K at this time. Even with irrigation, adequate water may not have been provided during a critical dry period, or with adequate water, may have contributed to higher yield conditions and K demand.

Once K deficiency sets in and leafspot appears, fungicide sprays do not alleviate the condition since the primary problem is K deficiency. If K deficiency is detected around the fourth week of bloom and is not severe, foliar K sprays may lessen yield effects. Petiole testing could also help avoid this problem, since it is designed to predict nutrient deficiencies up to two weeks in advance, especially as the crop moves toward peak bloom. Unfortunately, if severe K deficiency occurs late (sixth week of bloom) foliar K sprays will likely not correct the problem. Also, K deficiency and leafspot are fairly common once cotton "cuts-out". No corrective treatment is recommended at this time.

● Best Management Practices to Avoid Potassium Deficiency

- **Soil Testing** - The first and best line of defense for avoiding K-deficient cotton is soil testing. Maintaining soil test K levels in the medium to high range for cotton is recommended. Also keeping a good balance of other nutrients such as calcium (Ca) and Mg will help.
- **Split K Applications** - Since K is relatively mobile in sandy soils, split applications are recommended on soils with no clay subsoil in the top 16 inches. Apply half the K at planting and remainder at side-dressing, sometime around the first square. This helps supply K at a time when demand increases rapidly and may even be helpful on "stiffer" soils.
- **Foliar Fertilization and Petiole Testing** - In most cases where soil K levels are maintained at medium to high levels, preplant soil applications of K fertilizer should provide enough K so that foliar applications will not be necessary. There are a number of cases, however, where a yield response to foliar applications may occur: deep sands, low-soil K at planting, high yield irrigated conditions, and during periods of limited soil moisture. The best way to determine the need for foliar K is by petiole testing. A complete petiole testing program is designed to predict nutrient deficiencies up to two weeks in advance, before any yield reductions due to deficiencies occur.

Excessive fertilizer rates should not be used as a strategy to avoid K deficiency. Other problems can result from nutrient imbalance. Getting back to the basics of soil testing, proper fertilization, and petiole testing should help eliminate K deficiency as a cause of yield reduction for cotton in the future.

● **Leafspot Examples** (click on photo to view or print enlargement)



Source: Dr. Glen Harris, Extension Agronomist, Environmental Soils and Fertilizers Specialist,
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[Return to Cotton Fertility: Week 2](#)







COTTON FERTILITY

Internet Inservice Training



WEEK 2:

Potassium Fertilization and Conservation Tillage



At the end of this week, you should know:

- 1. Symptoms of potassium deficiency in cotton.**
- 2. Conditions causing potassium deficiency and leafspot disease.**
- 3. Recommended practices for avoiding potassium deficiency.**
- 4. Traffic pan problems and how to manage them.**
- 5. Lime and fertilizer management with no-till cotton.**
- 6. Comparisons between conventional and no-till planted cotton.**
- 7. Use of starter fertilizers with no-till.**
- 8. Best rotations with no-till cotton.**
- 9. Weed control with no-till cotton.**
- 10. Required no-till equipment.**



Potassium Fertilization

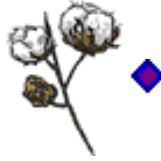


Conservation Tillage



Return to Cotton Fertility Training Schedule

Attendance: **936399243**



The attendance display is flanked by two identical illustrations of cotton plants with white bolls and green leaves, each preceded and followed by a small blue diamond symbol.
