

NUTRITIONAL GUIDELINES FOR POTASSIUM IN COTTON

**B. Weir, R. Miller, D. Munk,
B. Rains, B. Roberts, R. Travis,
R. Vargas, S. Wright, and M. Keeley**
University of California

Abstract

A three bale cotton crop accumulates approximately 180 pounds of elemental potassium (216 pounds of K₂O). Since the entire plant is not harvested, much of the potassium is returned to the soil, and an estimated 42 pounds of potassium (50 pounds of K₂O) are removed in seeds and lint. During mid-season growth, potassium accumulation may approach 7 pounds per acre per day. To maintain soil potassium at sufficient levels, it is usually necessary to supplement cotton with additional sources of potassium.

Nutritional guidelines for potassium on cotton were established in the late 1960's using different varieties with lower lint yield potential, and different cultural practices.

Field scale potassium trials were conducted on 16 sites throughout the six cotton growing counties in the San Joaquin Valley. Three years of a four year study have been completed. Potassium fertilizer (muriate of potash) was applied at rates of 0 and 400 pounds of K₂O per acre at each site using a replicated experimental design. The material was banded in the shoulders of fallow beds at a depth of 7 inches after emergence. Tests were conducted in exact locations each year in order to evaluate the effects of high rates of potassium fertilizer applied in successive years.

Critical values for petiole K content, and extractable soil K, relative to cotton yields have been established. Some conclusions which will be explored and expanded during subsequent research are:

(1) Petiole K determined on samples collected at peak bloom (two weeks after first bloom) should have at least 2.70% potassium. Petioles levels lower than this indicate that potassium should be applied for subsequent cotton crops.

(2) A pre-plant soil sample from a depth of 5-15 inches should have least 105 ppm extractable potassium (extracted by either ammonium acetate or mehlich

3). Lower levels indicate the need for potassium fertilizer to assure adequate growth.

(3) A pre-plant soil sample from a depth of 5-15 inches should have at least 95 ppm extractable potassium (extracted by the AB-DTPA method).

(4) A soil sample with less than 105 ppm (Ammonium Acetate or Mehlich 3), or 95 ppm (AB-DTPA), should be evaluated for K-Fixation.

(5) Lint yields on soils with K fixations greater than 62% were highly responsive to K applications.

(6) Statistical analyses currently establish a critical soil K level of 105 ppm when extracted by Ammonium Acetate or Mehlich 3, and 95 ppm when extracted by AB-DTPA method.

(7) Potassium fertility for cotton is most accurately evaluated based upon (I) Ammonium Acetate, Mehlich 3, AB-DTPA extractable potassium; (II) A sampling depth of 5-15 inches; (III) potassium fixation potential, and (IV) petioles concentrations from tissues collected two weeks after first bloom.