

**EFFECT OF WATER DEFICIT STRESS
ON K PARTITIONING IN COTTON**
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Abstract

Water deficit is the principal cause of reduced crop yields throughout the world. Widespread potassium (K) deficiencies across the U.S. Cotton Belt limit cotton (*Gossypium hirsutum* L.) yields and reduce fiber quality. Cotton growth and K partitioning under limited K and water were studied in greenhouse and field environments. Treatments consisted of (1) high soil K (HK) well watered (WW), (2) HK water deficit (WD), (3) low soil K (LK) WW, and (4) LK, WD. Stomatal resistance and plant available water were monitored upon initiation of a water deficit stress cycle in the greenhouse. Plants were harvested for dry matter and tissue nutrient determination at the end of a stress cycle. Leaf water potential was monitored to determine irrigation timing in the field. Plant samples were collected from the field at pinhead square (PS), first flower (FF), and first flower + 5 weeks (FF+5) or peak flower. A greater reduction in dry matter and plant tissue K at low soil K levels occurred with increasing stress cycles or plant age. Under WW greenhouse conditions, root K concentration compared to other organs was most sensitive to available soil K. Water deficit conditions coupled with low soil K under field conditions enhanced the K deficiency in above-ground plant tissues. The margin of decrease in final lint weight from high to low soil K supply was greater under WD of field-grown cotton.