

**APHIDS SUCK!
(PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES OF COTTON FOLLOWING APHID FEEDING)**

S.K. Gomez and D.M. Oosterhuis

Department of Crop, Soil and Environmental Sciences

University of Arkansas

Fayetteville, AR

D.R. Johnson

Cooperative Extension Services

University of Arkansas

Fayetteville, AR

D.C. Steinkraus

Department of Entomology

University of Arkansas

Fayetteville, AR

D.L. Hendrix

USDA-ARS

Phoenix, AZ

Abstract

The cotton aphid (*Aphis gossypii* G.) has become a key pest across the U.S. Cotton Belt due to widespread resistance to different classes of insecticides. Outbreaks in cotton (*Gossypium hirsutum* L.) have generally been associated with insecticide use for other pests. In 1991, the cotton aphid was the most serious pest of cotton in the U.S., reducing production by 360,209 bales. Aphids may damage the crop directly through feeding on the phloem sap and indirectly through the production of honeydew. Sooty molds may develop on the honeydew and lead to reduced photosynthesis, reduced fiber quality of open bolls and hindered fabric production at the mill due to "stickiness". On tender terminals and young leaves, feeding may result in distorted growth, and excessive feeding may cause wilting, chlorotic leaves, and premature leaf loss. Large aphid populations have been shown to negatively affect cotton, however, scarce information exists relating aphid numbers and their physiological impact on the cotton plant

The physiological and biochemical responses of cotton following aphid feeding were studied in a controlled environment. Nine days of aphid infestation significantly reduced stem, leaf and plant dry weights. There was a trend for an aphid infestation of between 300 to 400 aphids per leaf to alter leaf photosynthetic and respiration rates, but this was not significant. The amount of individual carbohydrates found in the aphid honeydew varied significantly with time. The total amount of sugars produced per aphid per 24-h period was 2.5 μg . The number of honeydew droplets excreted per aphid also varied significantly with time. Moreover, the pattern of honeydew excretion did not appear to be consistent. Aphids did not significantly alter non-structural carbohydrates on a leaf area basis over the 24-h period. Stress was documented in aphid-infested leaves by a significantly higher glutathione reductase activity after six days of exposure to aphids. In this study, cotton plants seemed to compensate for carbohydrates losses caused by aphids.