

COTTON RESPONSE TO BORON AND NITROGEN FERTILIZATION

A. O. Abaye

Virginia Polytechnic Institute and State University

Abstract

Field experiments were conducted at the Tidewater Agricultural Research and Extension Center, Virginia. The Objectives of the experiment were to investigate if nitrogen-fertilized cotton produced additional yield increases with added B, if plant B content was maintained throughout the growing season by use of foliar B sprays and if the rate of N fertilization affected plant B response. Four levels of nitrogen (N) 0, 60, 90 and 120 lbs/acre and four levels of boron (B) (0, 0.5, 1.0, and 2.0 lbs/acre) were used on DPL-50 in a split-plot design with B subplot treatments randomly assigned within N whole plot treatments. The experiment was replicated four times. Nitrogen as ammonium nitrate was side-dressed and boron as solubor foliar applied. Yield parameters were measured for each treatment. There was no significant N X B interaction thus, data were averaged over N and B rates, respectively. Visual observation of plots not fertilized with N or B showed severe nutrient stress resulting in premature cutout. In 1997, the highest yield was obtained with the combination of 90 lb/acre N and 0.5 lb/acre B which was 214 lb lint/acre over the untreated control. The addition of B beyond 0.05 lb/acre did not increase lint yield further. In 1998, the highest yield was obtained with the combination of 120 lb/acre N and 1 lb/acre B, followed by 90 lb/acre N and 0.5 lb/acre B. This yield advantage over the untreated control was 320 and 312 lb/acre lint yield, respectively. The application of B higher than 1 lb/acre did not increase lint yield further. For both 1997 and 1998, leaf B level increased with the application of increase B rates. Petiole B level declined over time indicating B use by the cotton plant. Both leaf and petiole analysis indicated adequate B level 5 weeks after first flower. Petiole NO_3 however, declined rapidly, more so in 1997 than 1998. Generally N fertilization increased lint yield, although the N rate at which the highest yield was obtained varied. N fertilization produced larger plants and high leaf N levels, but also increased yield. Excessive vegetative growth at the expense of flower production was not observed in this study. Our findings support the current recommendation for B which is 0.50 to 1.0 lb/acre for high yielding cotton. Possible relationship between cotton yield and B:N in tissue at various sampling dates will be examined.