

CHARACTERIZATION OF THE COTTON FRUITING CURVE

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Abstract

A four-year experiment was conducted during the 1998-2001 growing seasons at the Tidewater Agricultural Experiment station, Suffolk, Virginia to characterize the cotton fruiting curve as affected by nitrogen fertilization using two cultivars. Early and mid-season cultivars, SG 747 and STV 474, respectively were planted at the earliest possible dates. Both cultivars were grown with 70 lb. N/acre, the standard recommended rate in Virginia, and 90 lb. N/acre, a value found to provide higher yields in recent tests. The higher rate was applied as a split application of 35 and 45 lb. N/acre at pinhead square and at first flower for the 70 lb N/acre and the 90 lb N/acre rates, respectively. The growth regulator Mepequat Chloride was applied as needed. The physiological progress of the crop was monitored using the COTMAN cotton mapping system and compared to the Target Development Curve (TDC). COTMAN crop monitoring records included: basic measurements of SQUAREMAN such as plant height, main-stem nodes, first fruiting branch, squaring nodes and percent square retention. Records of major phenological stages: PHS, FF and NAWF=5 were recorded. In 2000, the growth and development of the early maturing cultivar SG747 was affected by N fertilization. Seventy days after planting, the N treatments tracked the target development curve (TDC) much more closely than the untreated control. The untreated control treatment showed slow nodal development, lower apogee and premature cutout. In 2001, the effect of N fertilization on the growth and development of the early maturing cultivar SG 747 was not evident. Generally, the growth curve in 2001 showed a slow nodal development followed by a much lower apogee compared with the 2000 growing season.

A similar response to N treatment was observed for STV 474. The untreated control for STV 474 showed a much lower apogee and an earlier premature cutout than SG 747. Similar to SG 747, the growth curves from the N treatments tracked the TDC. With the exception of a slight delay in crop maturity, the effect of N fertilization on the growth curve observed for STV 474 in 2001 was similar to 2000. The untreated control treatment and the lower N rate (70 lb/acre) showed a much lower apogee and an earlier premature cutout than the higher N rate (90 lb/acre). Overall the growth curves for STV 474 much closely tracked the TDC compared with the early maturing variety SG 747.

Cotton lint yield of SG 747 was significantly affected by N fertilization in 2000. Nitrogen fertilization of 70 lb/acre yielded 650 lb of cotton over the untreated control. No yield advantage was found when N application was increased over the recommended 70 lb N/acre rate. Although similar trend was observed in 2001, no significant yield increase was observed with N fertilization.

Cotton lint yield of SG 747 was significantly affected by N fertilization in 2000; N fertilization of 70 lb/acre yielded 650 lb of cotton over the untreated control, but no yield advantage was found when N application was increased over the recommended 70 lb N/acre rate. Although a similar trend was observed in 2001, no significant yield increase was observed with N fertilization. Generally, the data generated by the COTMAN program showed the importance of using a standard growth curve to describe the effects of fertilization. The N rate at which the highest yield was achieved varied for the different cultivars, probably due to the variation in the fruiting growth pattern that resulted in different response times for management inputs such as fertilizer.