

SUMMARY OF NITROGEN MANAGEMENT EXPERIMENTS IN IRRIGATED COTTON IN ARIZONA

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Abstract

Fertilizer N management in an irrigated cotton (*Gossypium spp.*) production system is important agronomically, economically, and environmentally. The objective of this project was to summarize the results from a series of experiments conducted from 1988 to 2000 that compared two N management strategies (scheduled vs. feedback) and a broad range of fertilizer N rates in a furrow irrigated cotton. Field experiments were conducted using Upland cotton (*G. hirsutum* L.) at the University of Arizona Maricopa (Casa Grande sandy loam), Marana (Pima clay loam), and Safford (Grabe clay loam) Agricultural Centers. The experiments each utilized N management tools such as pre-season soil tests for NO_3^- -N, in-season plant tissue testing (petioles) for N fertility status, and crop monitoring to ascertain crop fruiting patterns and crop N needs. At each location, treatments varied from a conservative to a more aggressive approach of N management. Results at each location revealed a strong relationship between the crop fruit retention levels and N needs for the crop. Four treatments were utilized at each location that consisted of 1) check (no fertilizer N), 2) scheduled N application program, 3) feedback N management, and 4) 2X rate of treatment three. The experimental structure was a randomized complete block design with four replications. Plots were eight, 40 inch rows wide and extended the full length of the irrigation run (600 ft.). All pest control and irrigation management practices were carried out on optimum, an as-needed basis at each location. Surface soil samples were collected pre-season at each location, to which routine soil analyses were performed. Basic plant measurements were carried out within each plot on a regular 14 day interval for the entire season. These measurements included plant heights, number of mainstem nodes per plant, flower numbers per 167 ft.² area, and the number of nodes above the top white flower to the terminal (NAWF). Petioles were also sampled on a routine basis throughout the season and analyzed for NO_3^- -N. Plant mapping was performed on each distinct treatment at 14 day intervals during the course of the season. Results from the plant mapping provide information concerning the percent total fruit retention (sum of positions one and two on each fruiting branch) for each treatment, a record of the general vegetative/reproductive balance maintained by the various treatments over time, and maturity progress. Lint yields were obtained for each treatment by harvesting the entire center four rows of each plot with a two row mechanical picker. Results for each site-year were analyzed by appropriate analysis of variance procedures. However, the pooled data set consisting of all site-years contained a high degree of variability due to seasonal differences. Stability analyses were used to compare treatment means from the accumulated results of all site-years included in this project. Stability analysis involves the linear regression of individual treatment means against all of the environmental means (for all site-years). These results revealed the greatest stability and best collective response from the feedback approach to management which was treatment 3 in this experimental construct.