

## **COTTON RESPONSE TO RATE AND TIMING OF UREA AND ENVIRONMENTALLY SMART NITROGEN AT TWO LOCATIONS**

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### **Abstract**

Improving N use efficiency (NUE) by reducing fertilizer-N losses to the environment will increase profit margins and reduce potential environmental risks associated with excessive N fertilization. Currently the University of Arkansas (U of A) recommends split application of a total of 110 to 120 lb N/acre for irrigated cotton production to improve NUE. However, split application requires additional planning, labor, and farm equipment. In recent years, a polymer-coated urea (44% N, Agrium Wholesales, Denver, CO) enhanced efficiency N fertilizer has become available to Arkansas producers and is marketed under the trade name of Environmentally Smart Nitrogen or ESN. According to the manufacturer, the N in ESN is slowly released (by temperature and moisture) over the course of the season, thus its use (as an alternative to urea) may eliminate the need for split application of urea. The objective of this research was to evaluate cotton response to split application of urea and single application of ESN each applied at several rates. Two field experiments were conducted at the U of A Northeast Research and Extension Center in Keiser and Manila Research site in Manila, Arkansas. Nitrogen treatments consisted of: a no N (0 N) control, a two way split application of 110 lb/acre urea-N (standard practice), a single application of 60 lb/acre of urea-N, a two way split application of 90 lb/acre urea-N, a single application of 60 or 90 or 100 lb/acre of ESN-N.

At Keiser, N-treatment significantly influenced the plant height at 79 days after planting (DAP). Cotton fertilized with split application of 110 lb/acre urea-N was significantly taller than all the other N fertilized (31.7 as compared to 26.5 to 29.5 inches). Cotton that received a single application of 60 or 90 lb/acre of ESN-N was not significantly shorter than cotton that received a single application of 60 or a split application of 90 lb urea-N/acre. At Manila N-treatments significantly influenced the plant height at 73 DAP. Plants that did not receive any N were significantly shorter than plants fertilized with any N. Cotton fertilized with a single application of 90 lb/acre ESN-N was not significantly shorter than plants fertilized with a single application of 60 lb/acre of urea-N or split application of 90 or 100 lb/acre of urea-N. Nitrogen fertilizer application significantly affected seedcotton yield at both sites. Seedcotton yield of the control (0 N) treatments were 1870 and 1800 lb/acre at Keiser and Manila respectively. Seedcotton yield of the cotton that received any N ranged from 2210 to 2970 lb/acre at Keiser and 2650 to 3260 lb/acre at Manila. At both sites cotton fertilized with 90 lb N produced significantly higher seedcotton than the cotton fertilized with 60 lb of N/acre regardless of the N source. At Keiser seedcotton yield of cotton fertilized with a split application of 110 lb/acre of urea-N was not significantly different than that of the cotton fertilized with 100 lb ESN-N. However, numerically application of 100 lb ESN-N produced 220 lb more seedcotton. The results suggest that a single application of ESN maybe a viable application to urea for optimum seedcotton yield production. Additional research at multiple site and years are needed to test the applicability and reproducibility of these results.