

COTTON NITROGEN NEEDS AND USE TRENDS

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After water, nitrogen (N) is frequently the most limiting nutrient for crop yields. As measured by crop content, approximately 50-55 lbs. of N are required to produce one bale (480 lbs.) of cotton lint. Over the last 12 years of available data (1985-1996) (USDA-NASS), fertilizer N per planted acre of U.S. cotton has increased from about 77 to 102 lbs. N/acre; but cotton lint yields have not increased. This apparent lack of response to additional N inputs indicates that factor(s) other than N are limiting yields, and that the in-field efficiency of N is declining in lbs. lint/lbs. N applied. Such a decrease is cause for concern, as N is frequently the most costly plant nutrient applied to cotton. Use of a supra-optimal rate of N may generate additional costs by increasing inputs needed for plant growth regulation, for aphid (*Aphis gossypii*) and plant bug/lygus (*Lygus lineolaris* and *L. hesperus*) management, and for defoliation. In addition, N applied in excess of plant uptake is reactive and mobile, and may contribute to air and water pollution. Chronic additions of N in excess of plant uptake favor degradation of soil organic matter by the soil biota, as excess free N in the soil permits increased oxidation of soil carbon, contributing to a long-term decline in soil quality. Neither the causes of cotton yield stagnation nor the apparent decline in the efficiency of N use in cotton have been definitively determined. Cotton yield stagnation has been attributed to changes in cotton breeding objectives and adverse environments in recent growing seasons. Whereas much attention has been directed to the environmental effects of excess N in air and water, less attention has been directed to the possible decline in the efficiency of N use in agriculture. Increased understanding of N utilization by cotton should positively influence the economics of cotton production and the effect of production agriculture on the environment.