FOLIAR FERTILIZATION OF COTTON Derrick M. Oosterhuis Department of Crop, Soil, and Environmental Sciences University of Arkansas Fayetteville, AR

Abstract

Foliar fertilization is a widely used method used to supplement soil applications to improve the yield and quality of cotton. There is a wealth of literature about foliar fertilization that was first used as long ago as 1844 to correct plant chlorosis with foliar sprays of iron. Foliar fertilization has only caught on in cotton production in the last two decades, although there is still some speculation about the benefits and correct implementation of this practice. Optimal crop productivity in cotton requires that nutrient deficiencies be avoided. However, deficiencies often occur for a variety of reasons, most of which can be rectified by timely application of the deficient nutrient. In crop production, this usually entails a soil application, or foliar applications may be appropriate after canopy closure or when a specific nutrient is urgently required. Foliar application of specific nutrients is a method used to improve the efficiency of fertilizer use and increase yields. The increased use of foliar fertilizers in cotton production in the last decade is due in part to changes in production philosophy. The change to cotton cultivars which fruit in a shorter period of time and mature earlier has placed greater emphasis on understanding plant uptake and utilization of nutrients. Current crop monitoring techniques also focus attention on plant development and make it easier to combine concomitant nutrient monitoring allowing remedial action on a timelier basis. Furthermore, cotton lends itself to foliar fertilization because of the large number of aerial applications that are already made for pest control. While there are many reports on research involving soil-applied fertilizer, there are relatively few definitive studies on the usefulness of foliar-fertilization in cotton.

The practice of foliar fertilization has the advantages of low cost and a quick plant response, and it is particularly important when soil problems occur and root growth is inadequate. On the other hand, foliar feeding has disadvantages of possible foliar burn, solubility problems, and only a small amount of the nutrient can be applied at any one time. Variable yield responses to foliar fertilization have been reported. These are probably associated with incorrect timing of applications, the use of inappropriate fertilizer materials, and insufficient attention to soil available nutrients, the size of the boll load, and environmental conditions. A reliable soil analysis constitutes the basis of a successful fertilizer program, and tissue analysis plays an integral part of this program for fine-tuning mid-season tissue nutrient concentrations and remedying any possible deficiencies. The efficiency of foliar fertilization can be influenced by the type of fertilizer, concentration and pH of the solution, the use of adjuvants, and compatibility with other agrochemicals. Attention also needs to be given to the rate and timing, and incorporation of foliar feeding into existing production practices.

Over the past decade there have been numerous studies devoted to understanding the mechanism of absorption of foliar fertilizers, nitrogen and potassium in particular, and the factors that effect the efficiency of uptake and utilization. There have also been comprehensive studies on the nature and characteristics of the cotton leaf cuticle and the interaction with environmental stress. Much of this has been summarized in a review of foliar fertilization in cotton by Oosterhuis and Weir (2002) in the new Handbook of Cotton Physiology published by Kluwer. Foliar fertilization of cotton is a viable means of applying certain fertilizers that can supplement traditional soil methods. Foliar fertilization can result in yield and fiber quality increases.