NITROGEN FERTILIZER RESPONSE OF COTTON IN ROTATION WITH SUMMER LEGUMES

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Abstract

The potential of using summer legumes as N sources in corn and vegetable rotations has recently been documented. The objective of this study was to evaluate the potential of using summer legumes [*Crotolaria juncea* and cowpeas (*Vigna unguiculata*)] as an N source for cotton (*Gossypium hirsutum* L.) production. The study was conducted from late July (when summer legumes were planted) through cotton harvest in 2004-2005, 2005-2006, and 2006-2007. Because of poor legume stands due to dry weather, data from 2005-2006 were not included in the analysis. Treatments in the study were summer legume (none, *C. juncea*, and cowpeas) and four N rates (0, 40, 80, and 120 lb N per acre). Summer legume biomass and N content, soil total combustible N (TCN) content, cotton leaf N, and cotton yield were measured. Biomass of *C. juncea* at the first killing frost was 4.8 tons per acre in 2004 and 3.2 tons per acre in 2006, with N contents of 182 lb/ac in 2004 and 87 lb/ac in 2006. Cowpea biomass was 1.4 tons per acre in 2004 and 2.6 tons per acre in 2006, with N contents of 51 lb/ac in 2004 and 78 lb/ac in 2006. Even though substantial amounts of N were fixed by the legumes, there was no difference in soil TCN between the legume and the control plots. Nitrogen content of uppermost fully expanded leaves of cotton following the legumes was slightly higher than cotton grown without a previous summer legume at the lower fertilizer N rates in 2005, but not in 2007. The summer legumes had no effect on seedcotton yield in either year. The data suggest that these two legumes can produce ample N in a relatively short time during the summer, but the N is not available to a succeeding cotton crop.