

NITROGEN MANAGEMENT TO INCREASE COTTON PRODUCTION IN CONSERVATION CROPPING SYSTEMS

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ABSTRACT

The use of conservation management practices, like cover crops and no-tillage, is common in semi-arid cropping systems to reduce wind erosion. However, the use of these practices can also reduce cotton lint yield. The purpose of this study was to determine the impact of nitrogen (N) management in conservation cropping systems to increase cotton lint yield. Two experiments were conducted at the Agricultural Complex for Advanced Research and Extension Systems in Lamesa, TX, USA. The first experiment utilized litterbags in 2020 and 2021 to determine cover crop decomposition rates following termination. In 2020, approximately 75% of the cover crop biomass remained 128-d following termination while approximately 25% of the biomass remained 128-d after termination in 2021. The differences in decomposition rate between 2020 and 2021 are likely the result of significant differences in biomass production between the two years. Cover crop herbage mass production in 2020 resulted in significantly greater N immobilization compared to 2021. The second experiment utilized four N fertilization timings to determine the impact of supplemental N fertilization on cotton yields following cover crop termination to minimize potential N immobilization. Three supplemental N fertilization timings were compared to a traditional farm practice of 138 kg N/ha fertigated at 30% preplant and 70% applied at pinhead square following cover crops, the current Texas A&M AgriLife Extension recommendation. The three applications consisted of applying a supplemental 34 kg N/ha at (1) pre-plant, (2) post-emergence + three weeks, and (3) pinhead square + two weeks. An early-season application of N either pre-plant or post-emergence resulted in significantly greater cotton lint yields following cover crops in 2018 and 2019, but not 2020. Supplemental N did not increase cotton lint yield in the traditionally grown cotton or a cotton-wheat-fallow rotation. Nitrogen use efficiency was significantly greater in pre-plant and post-emergence systems following a cover crop but not in the conventional system. Averaged across years and cropping systems, pre-plant and post-emergence N applications resulted in a 22 and 24% increase in economic return compared to the conventional system, respectively. These results demonstrate that N management practices that account for potential N immobilization following cover crops can significantly increase cotton lint yield and decrease the potential yield loss associated with conservation management practices in semi-arid regions.