COTTON NITROGEN UNTILIZATION FOLLOWING APPLICATION OF FRESH AND PELLETIZED BROILER LITTER

Ardeshir Adeli
ARS-USDA
Mississippi State, MS
Morteza Mozaffari
University of Arkansas Department of Soil, Crops, and Environmental Sciences, Soil Testing Laboratory
Marianna, AR

Abstract

The use of broiler litter as a nutrient source in row crop production has been encouraged. Many studies suggest that broiler litter has appreciable value as fertilizer source for row crop production. In Mississippi, the areas of intensive poultry and cotton production are geographically separated in the south central to northwest part of the state, respectively. The cost of hauling the litter is the main factor to consider in using broiler litter as a row crop fertilizer in the Delta. Currently, broiler litter is being pelletized to increase the economic feasibility of transporting broiler litter from nutrient-rich production areas to areas of high demand for nutrients such as the cotton producing area in northwestern Mississippi. However, cotton responses to pelletized broiler litter have not been reported. A study was conducted on a sandy loam soil located at the Plant Science Center Mississippi Agricultural and Forestry Experimental Station (MAFES) to evaluate whether broiler litter form, fresh or pelletized, has a significant influence on the N-fertilizer value of broiler litter. Also to determine the N fertilizer value of pre-plant incorporated broiler litter forms compared with standard practice of applying inorganic N fertilizer. The experimental design was a randomized block with six treatments replicated four times. Individual plot size was 4 by 9 m with a 3 m buffering zone. Treatments included fresh and pelletized litter at the rate to provide 250 kg TN ha^{-1}, inorganic fertilizer N at the rate of 67, 134 and 201 kg ha^{-1} and the control (no organic or inorganic fertilization). Cotton growth, lint yield and N uptake for both fresh and pelletized litter were significantly increased relative to the control treatment but lint yield for both litter forms was not significantly different from that of inorganic fertilizer N. At the same rate, pelletized litter resulted in 130 kg more lint that fresh litter but the difference was not significant. Nitrogen availability from pelletized litter was greater (54%) than fresh litter (43%) during cotton growing season. Application of fertilizer N at the rate greater than 134 kg ha^{-1} was not advantages as evidenced by lower yield and greater residual soil NO3-N.

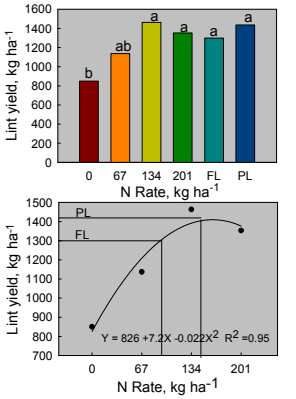

Fig.1. Effects of fresh and pelletized broiler litter relative to inorganic fertilizer N on cotton lint yield.

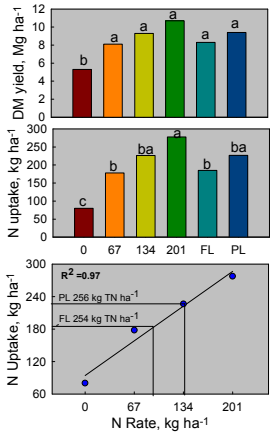

Fig. 2. Effects of fresh and pelletized litter relative to inorganic N on cotton growth and N uptake.

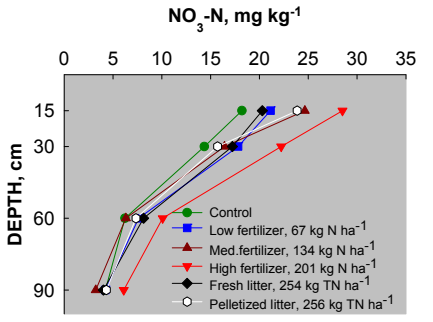

Fig. 3. Effects of fresh and pelletized litter relative to inorganic N on residual soil NO_3-N.