

USING  $^{15}\text{N}$  TO DETERMINE NITROGEN FERTILIZER  
EFFICIENCY IN COTTON FOLLOWING CORN

Chism Craig and C. W. Kennedy  
Department of Agronomy, Louisiana State University  
Agricultural Center  
Baton Rouge, LA

**Abstract**

Across much of the Midsouth, much of the land previously planted to cotton is now being planted in corn. Because large amounts of fertilizer nitrogen may remain in the soil after corn harvest, it is often difficult to manage cotton nitrogen fertility in the year following corn. Although cotton requires moderate amounts of nitrogen for optimum growth and profitability, overfertilization can cause major problems such as rank (vegetative) growth, delayed maturity, increased insect problems and harvesting difficulties. Knowledge of how efficiently cotton utilizes both residual and applied forms of nitrogen is needed. Double-labeled 5 ATM%  $^{15}\text{N}$   $\text{NH}_4\text{NO}_3$  was used in a rotation study to determine how residual N affects applied N efficiency. After three cropping seasons, plots that received 150 and 250 pounds of nitrogen fertilizer per acre in the previous year's corn crop showed an increase in yield of 119 and 258 lb ac<sup>-1</sup> respectively over the plots receiving no fertilizer in either crop. Preliminary results from one year of data showed a trend in decreasing recovery of labeled fertilizer as rates of nitrogen fertilizer increased in the previous year's corn crop.  $^{15}\text{N}$  recovery in above ground biomass peaked at 53% and 50% in plots receiving 50 and 100 pounds of N per acre respectively where no nitrogen was applied to the previous corn crop. Plots receiving 250 lb N ac<sup>-1</sup> followed by 50 and 100 lb N ac<sup>-1</sup> had recoveries of 47 and 39 % respectively. Yield partitioning of seedcotton showed a temporal effect of increasing fertilizer rates. Increased fertilizer from both crops tended to shift seedcotton yield into the upper third of the plant. Percent of total N represented by  $^{15}\text{N}$  was significantly lower than all other fertilizer combinations following the 250 lb ac<sup>-1</sup> N rate for all plant parts except for branches and leaves in the 50 lb ac<sup>-1</sup> cotton N rate.  $^{15}\text{N}$  % of total N declined significantly for all plant tissue except leaves when 100 lb ac<sup>-1</sup> N followed 250 lb ac<sup>-1</sup> N from the previous year. Although total N increases temporally within the plant, it appears as if fertilizer  $^{15}\text{N}$  is diluted equally as previous N rates increase. Based on one year of data, residual N appears to be utilized throughout the season.