CORRELATION OF NO-TILL COTTON YIELDS WITH EXTRACTABLE K BASED ON SOIL SAMPLING POSITION

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Abstract

Variable rate technology has increased our awareness of soil sampling and the protocol utilized in the collection process. Considerable time and effort has been expended in sampling conventional tilled soils. It has been assumed that the same sampling protocol can be used for sampling no-tillage soils. However, research indicates that orienting cotton (***Gossypium hirsutum*** L.) rows within a few inches of the previous year's row allows extractable K accumulation within the row (I-R) position relative the to between row (B-R)position. Apparently, this accumulation results from nutrient recycling from decaying root bio-mass. In some instances, differences in extractable K between the two sample positions could result in different recommended fertilization rates. The objective of this study was to correlate extractable K by sample position with relative yields to evaluate protocol for soil sampling long-term no-till cotton soils. Soil samples were collected from three long term no-till research soils after harvest in 1996 and from two soils following harvest in 1997. These soils were a Memphis silt loam, Lexington silt loam and a Loring silt loam. Cores were collected from ten (five/row) I-R and B-R positions for Mehlich I extractable K evaluations. Extractable K values from these two positions were averaged to simulate random (R) sampling. These sample positions were correlated with the 1997 and 1998 yield data. Correlations were conducted utilizing GLM of SAS. The R^2 value for each sample position by yield correlation was used to evaluate the sampling protocol. In addition, extractable K by position was correlated with broadcast fertilization rates. Relative yields were correlated by sample position for each site-year (5), across years by soil (2), and across the five site-years for a total of 8 evaluations. Generally, the R^2 values were slightly higher when relative yields were correlated with R sampling relative to either the I-R or B-R positions. For the 8 correlations, the R^2 value for R sampling was equal to or higher than R^2 values of the other positions for 6 regressions. The R^2 for the I-R position was equal to or higher for 3 of the 8 regressions. The R^2 values for correlating broadcast K_2O rates with extractable K by position were higher for R sampling relative to the I-R or B-R sampling positions. For the 5 correlations, R^2 value for the R position was equal to or higher than the R^2 value of the other positions for 4 regressions. The R^2 for the I-R sample position was equal to or higher than the other positions for 2 of the 5 regressions. These data indicate that a random (R position) protocol correlated better with relative yields and broadcast K fertilization rates for sampling long term no-till cotton fields. Between row sampling, the easiest sample position, provided the poorest correlations for the three sampling positions.

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