MEHLICH 3 SOIL P FOR COTTON ON COMMERCE SILT LOAM IN NORTHEAST LOUISIANA

Ernest L. Clawson
H.J. Mascagni
LSU AgCenter
St. Joseph, LA
J.J. Wang
Brenda Tubaña
Louisiana State University
Baton Rouge, LA
Joshua S. Price
LSU AgCenter
St. Joseph, LA

Abstract

After a number of years of using the Bray 2 test, Louisiana adopted the Mehlich 3 test for soil P. Conversion of Mehlich 3 soil test values to equivalent Bray 2 values, using a relationship derived from the performance of both soil tests on samples of a range of soils, has since proved to be problematic for at least some soils in the Commerce series. A direct calibration of Mehlich 3 soil test P to crop responses to P fertilizer is needed. Randomized complete block designs were used in two studies on soils in the Commerce series at the LSU AgCenter Northeast Research Station, Saint Joseph, LA. Each included 10 treatments. Treatments 1-5 were comprised of rates of triple superphosphate equivalent to 0, 30, 60, 90, and 120 lb P_2O_5/A, respectively, applied only in 2007. Treatments 6-10 were identical rates applied only in 2008. All P treatments were broadcast in the spring, prior to planting, and incorporated. Study 1 was planted to cotton in 2007 and to corn in 2008. Study 2 was planted to corn in 2007 and to cotton in 2008. In general, the soil in both studies was coarse textured, with the exception of one replication in Study 2, where hand-judged textures were mostly silty clay loam. Average pH values were 5.6 and 5.8, respectively in Study 1 (June 2007, check plots) and Study 2 (April 2008, all plots). In Study 1, June 2007 check plot 0-6" Mehlich III soil P values ranged from 11.9 to 22.8 ppm. Lint yield did not differ among treatments, and on an individual-plot basis for those plots soil sampled (all treated plots plus two untreated per replication), showed little evidence of relationship to postharvest 0-6" Mehlich III P. Lint yield was also unrelated to postharvest 6-12" Mehlich III P in a reduced subset of treatments. In Study 2, April 2008 (prior to fertilizer treatment application and planting) 0-6" Mehlich III soil P values, from all plots, ranged from 19.8 to 27.4, with no significant differences among treatments. Lint yield, which was depressed and variable because of severe weather events, did not differ significantly among treatments. In individual plot data, lint yield showed little evidence of relationship to preplant or postharvest Mehlich III soil test P values from either 0-6" or 6-12" depths. In summary, lint yield had little relationship to preseason or postseason Mehlich 3 soil test P at either sample depth, although adverse weather conditions in 2008 affected yields. The preliminary results suggest that on the soils in these studies, P may not be yield limiting for cotton. Mehlich 3 soil test P critical levels for cotton on this soil may be lower than the soil test values obtained to date.