SOIL TEST PHOSPHORUS EXTRACT COMPARISONS
FOR COTTON USING GRID SOIL DATA

K.F. Bronson, J.D. Booker, R.C. Ward, T.T. Chua, J.W. Keeling,
R.K. Boman and T.L. Provin
Texas A&M University
Texas Agric. Exp. Stn.
Lubbock, TX
Texas Coop. Extn.
College Station, TX
Wards Laboratories, Inc.
Kearny, NE

Abstract

Soil test calibration is an on-going process. Traditionally, this process has been done with fertilizer rate experiments for multiple sites and years. Questions, however, have arisen if results from small plots can be extrapolated to large, farmers' fields. We hypothesized that grid soil data from two, 27-acre irrigated cotton sites (Ropesville, and Lamesa, TX) in the Southern High Plains can provide useful P soil test calibration information. Four extracts, Mehlich 2, Mehlich 3, Olsen, and acidified NH_4OAc-EDTA, were compared. Relative P uptake at early squaring and relative lint yield was plotted against each soil test P extract value for each of three site-years. Unlike in better controlled, small field plot studies, wide "clouds" were observed in the landscape-scale grid soil data. In these cases, boundary line analysis can be employed, which assumes that data points below the upper boundary line were subject to yield-limiting stresses. Examples of these include areas of the fields that have shallow or sandy soils, and therefore low water-holding capacity. We extracted the top 10 % highest yielding data from 16 soil test P intervals for each extract. Quadratic-plateau models were fitted to the upper boundary data. At one site, Ropesville, there were no relationships to be fitted. The Lamesa site showed correlation for each extract. Mehlich 3 extract showed the highest R^2 (0.55) for relative yield and the Olsen test had the highest R^2 (0.52) for P uptake. Without using boundary line analysis these R^2s for Mehlich 3 and Olsen were 0.15 and 0.14, respectively. We initially conclude that the grid soil test data/boundary line calibration approach has merit, and should be pursued further.