Profitable Fertilizer Programs

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To develop an economical soil fertility program begin by collecting soil samples to determine what the current nutrient levels are in fields. If soil test results indicate several nutrient disorders in the same field but input money is available to only correct one problem at a time, start by correcting low soil pH. Liming acid soils will make P and K more available to crops and help prevent low crop yields from manganese and aluminum toxicity. Other factors that affect decisions on building up P and K levels are yield potential of soils, how long you plan to farm the field, price of crops and fertilizer, and nutrient requirements of rotational crops. When P and K levels become depleted from crop removal below critical levels, several years of increased fertilizer applications will be required to rebuild P or K. Approximately, 5 to 7 lb K2O or P2 Variable Rate Technology in Cotton. From 1996 to 2004, we conducted cotton field experiments at the Delta Center and on growers' fields evaluating variable rate lime and fertilizer. Results showed trends towards higher yields with variable rate technology (VRT) compared to uniform applications, but often the differences were not dramatic or statistically significant. The most important information that we learned was that less fertilizer was applied with VRT in most fields. Fertilizer dealers usually charge farmers $10 to $15 per acre for grid soil sampling and $1 to $3 per acre for variable rate applications. Soil test results are good for 3 to 4 years, but the variable rate charge is an annual expense. In the past, with relatively cheap fertilizer prices, many farmers were not willing to pay the extra costs for variable rate applications. In the current situation, that may change if farmers can save on fertilizer costs. O fertilizer are needed to increase soil test K or P levels one pound.

The objective of this project is to evaluate cotton fields on Missouri farms that have been had VRT applications in the past. In 2009, we collected 1099 soil samples from 275 acres (0.25 acre grid) in five cotton fields in Southeast Missouri cotton fields. One half of the land area had previously received applications of variable rate P and K fertilizer. As controls, we will also sampled neighboring fields which constant rate applications.

More fields need to be sampled in the next two years of this project before making conclusions on the effectiveness of variable rate P and K. In 2010, we are sampling more fields. Preliminary results is 2009 did not show that P and K fertility levels were any better in fields that had received variable rate that fields with uniform fertilizer applications.

The general trend that we found was that P and K variability in fields may be man-made rather than soil type variability. Our research concurred with previous published studies showing nutrient variability was highest across rows and lowest within rows. Fertility tended to be highest in rows closest to the field entrance and decline in rows farther away (Figure 1). This suggests that spreader trucks in the past may have adjusted the gates down or the chain drives delivered less as they had less fertilizer in the trucks at the far side of the fields. Another pattern that we found was "streaks" of high P or K in rows surrounded by lower P and K in rows to the right and left (Figure 2). This pattern may have 1 been caused by improper swath width spacing and not enough overlap in the spreaders. Since P and K is residual in the soil, application uniformity mistakes may have occurred many years in the past with obsolete spreader

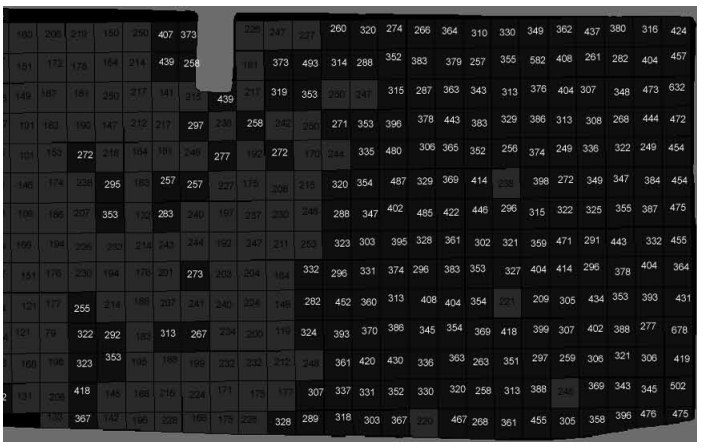

Figure 1. Extractable soil test K (lb/acre) in cotton field near Malden, MO showing high K (dark cells) in rows on east side compared to low K in rows on west side (light cells).

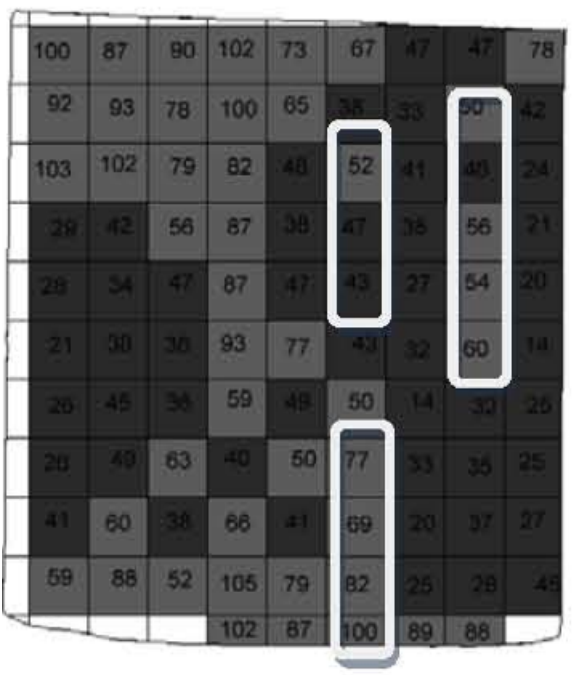

Figure 2. Extractable soil test P (lb/acre) in cotton field near Malden, MO showing streaks of high P (dark cells) with low P rows on right and left (light cells).

technology but are being observed in the cotton fields today.

Possible natural causes of low K levels in cotton fields despite high fertilizer applications may be low cation exchange capacity in sand areas resulting in leaching of potassium cations in the soil profile or crystallized illite clay which adsorb or fix K in the mineral layers. We will investigate to determine how common these occurrences are in Delta cotton fields in Southeast Missouri. Δ

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