AGRI-BRIEFS
AGRONOMIC NEWS ITEMS

From Agronomists of the
Potash & Phosphate Institute (PPI)
655 Engineering Drive, Suite 110
Norcross, Georgia 30092-2843 USA
Phone (770) 447-0335

Winter 2000-2001, No. 2

SOIL VARIABILITY AND INTERPRETING SOIL TEST PHOSPHORUS AND POTASSIUM LEVELS

Every winter we hear from a number of farmers who are confused by the year to year variability in soil test phosphorus and potassium levels. While we all agree that soil testing is an important guide to our fertility management planning, it is not an exact science given the dynamic nature of farm fields, management practices, and environmental conditions. However, seeing results and recommendations differ from year-to-year can make interpretation difficult.

Both phosphorus and potassium are considered to be immobile nutrients in the soil. That is, these nutrients move in the soil principally by diffusion. Diffusion is a slow, short distance process and depends on factors such as soil moisture and soil temperature. Phosphorus and potassium availability to plants is a function of the amount of each nutrient adsorbed to the soil complex and the chemical and biological reactions controlling its release. As a result, if we could collect soil samples from the exact location in a field each year, it is likely we would not see large changes in phosphorus and potassium levels.

Soil nutrient levels are not uniformly distributed throughout fields, with landscape, erosion, and past management influencing their variability. Mobile nutrients such as nitrate, sulfate and chloride move with water and as a result often accumulate in lower slope positions. As immobile nutrients, phosphorus and potassium are tightly bound to soil and movement in the landscape is a result of soil movement through erosion and tillage. This variability can make the selection of soil sampling sites within a field difficult.

Grid soil sampling, used in some precision farming projects, has shown that phosphorus and potassium are more variable than previously thought. This variability can result in recommendations that are insufficient to meet crop yield goals. An example of this is a study in Alberta where sampling a 40 acre field on a one acre grid revealed soil potassium levels ranging from 118 to 620 pounds per acre, with an average of 270 pounds per acre. While this average value would result in no potassium fertilizer recommendation for the field, the grid sampling showed that 30 percent of the field was deficient, and another 33 percent would be considered marginal in potassium. Similarly, the phosphorus levels in the field ranged from 8 to 112 pounds per acre, with an average of 26 pounds per acre.

Field variability and nutrient mobility can make interpretation of average soil tests for phosphorus and potassium difficult. Where a single sample is going to be collected for a field every attempt must be made to select areas that best represent the average productivity. In fields with distinctly differing regions of productivity, taking more than a single sample can greatly improve the interpretation of soil nutrient status.

Understanding soil nutrient variability will help in our interpretation of soil tests. Keep this in mind while establishing starter phosphorus and potassium rates on individual fields for spring seeding.

—AMJ—

For more information, contact Dr. Adrian M. Johnston, Western Canada Director, PPI, Suite 704, CN Tower, Midtown Plaza, Saskatoon, Saskatchewan, Canada S7K 1J5. Phone: (306) 652-3535. E-mail: ajohnston@ppi-ppic.org

Note: *Agri-Briefs* are available online at the PPI web site: **ppi-far.org/agri-briefs**