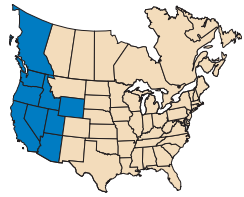
WEST REGION



A Check-Up on Nutrients in the West

By Rob Mikkelsen

Many soils in the West Region continue to test medium or low in phosphorus (P) and potassium (K). A notable exception is the jump in P concentrations in the Pacific Northwest, likely due to the greater analysis of waste-application fields. Balance between K imports and exports remains negative for all the western states. Monitoring soil nutrient concentrations is essential for making the most of applied fertilizers and manures.

Maintaining soil fertility depends on managing complex biological, chemical, and physical properties of the soil. Some of these properties are difficult to alter or change, but maintaining adequate plant nutrition is somewhat easier. The value of adding essential plant nutrients has been known for thousands of years, but the science of soil fertility and modern fertilizer has been developed mostly during the last century. A primary mission of PPI continues to be providing the best information available to get the most value from plant nutrients.

With ready access to modern soil testing, constantly improving crop nutrient recommendations, and the ability to carefully blend the required fertilizers, there is no longer any reason for having crop nutrition limit yields or harvest quality. But the results of the most recent summary of soil test information from the West indicate that there is still room for improvement and there are a significant number of growers who continue to underfertilize their crops. Although these latest results provide only an average look at soil test conditions, there are a number of emerging trends that are noteworthy.

Potassium Status of Western Soils

It is frequently assumed that there is less need for K fertilization in western soils due to their mineralogy and younger geologic age, compared with soils in other parts of North America. However, recent estimates of the balance between K fertilization and crop K removal show that many areas are drawing down the K reserve in the soil. Decades of harvesting high yields continue to deplete native soil fertility unless the nutrient supply is eventually replenished. While this nutrient drawdown may be acceptable for a time in soils that have a high nutrient status, such negative nutrient budgets are not sustainable over the long term.

One surprising result of this survey is the relatively high number of California soils that are now low in K. Almost half of the soils tested medium or lower in 2005. This finding requires a closer look at current fertilization trends and supports the conclusions drawn from state-wide nutrient balances. For example, it was recently reported that California crops remove over twice as much K as added back to the soil in fertilizer and animal wastes. All other western states also have a similarly negative K budget, where more is removed in crops than is replenished in the soil… clearly not a trend that can be maintained over the long-term.

Soil K concentrations generally remained steady or declined between 1997

and 2001. The 2005 survey shows similar trends in overall soil K status in the West. Special attention should be given to particular regional differences, such as the high-K fixing soils and their need for careful management to meet the unusual K requirement in these areas. **Figure 1** shows percentage of samples testing <120 parts per million (ppm) ammonium acetate extractable K or >160 ppm in the western states and in North America.

The primary potash source used in the West Region is potassium chloride (KCl), but a number of other excellent materials are also available and commonly used. Generally, KCl is the least expensive K source and also supplies Cl, which is regularly shown to boost yield and quality of several important crops in the region. Other excellent K sources include potassium magnesium sulfate ($K_2SO_4 \bullet 2MgSO_4$) potassium sulfate (K_2SO_4), and a variety of other materials well suited to more specialized applications. Potassium contained in organic wastes and crop residues is rapidly released and returned to the soil, but the harvested portion of the crop accounts for nutrients exported from the farm. For example, alfalfa removes over 60 lb K_2O/A in each ton of hay. Declining soil test K values are frequently observed after multiple years of hay production without replacing the harvested nutrients.

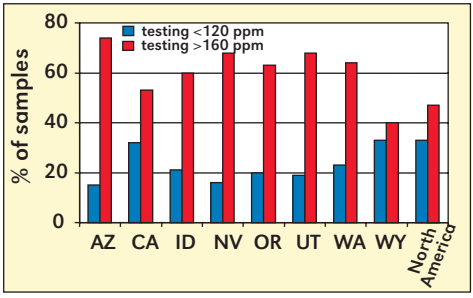


Figure 1. The percentage of soil samples testing <120 ppm ammonium acetate extractable K or >160 ppm K in the West region and the percentage in North America.

Phosphorus Status of Western Soils

The soil P concentrations for most of the West Region remained relatively unchanged… with the exception of the Pacific Northwest states…where apparent P concentrations are higher than in previous surveys. This survey, similar to those conducted previously, indicates that there are many soils that need additional P for crops to meet their growth potential.

The number of samples in the very high category…>50 ppm P…increased in every state compared with the 2001 survey. This increase likely represents a greater number of samples taken from fields receiving regular applications of organic wastes. Much of this sampling is legally required for waste management plans and these soil samples cannot be separated in the survey from the more traditional samples receiving fertilizer. Since there is seldom an agronomic justification for increasing P concentrations to these high levels, it is very unlikely that a farmer would squander resources to apply unnecessary fertilizer where no crop response is expected. A regular program of soil testing is needed to track the depletion or accumulation of nutrients in a cropping system to avoid such high soil P concentrations. **Figure 2** shows percentage of samples testing <30 ppm Bray P equivalent or >50 ppm in the western states and in North America.

Where organic materials are applied to meet the nitrogen (N) requirement of a growing crop, it is common that 3 to 10 times more P is simultaneously added than the crop will take up and remove in the harvested portion. This nutrient imbalance between N and P in organic wastes requires careful management to prevent excessive concentrations of nutrients and potentially undesirable consequences. Manures should be applied only to fields that can benefit from the additional nutrients, and not to fields that are already very high in nutrients or with a high loss potential.

Although high P soils may get more attention because of potential environmental concerns, a large number of fields remain low in P. In several western states, from 40% to over 60% of all fields sampled

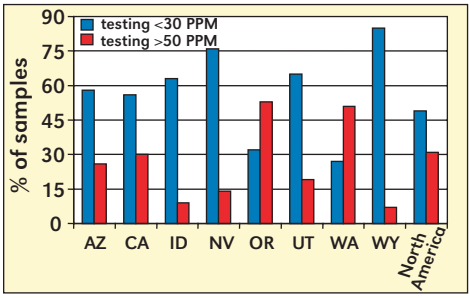


Figure 2. The percentage of soil samples testing <30 ppm Bray P equivalent or >50 ppm Bray P equivalent in the West region and the percentage in North America.

continue to remain low or medium in soil P concentrations. Crops grown in these soils will generally respond to fertilization with higher yields and plant health compared with crops growing in fields with nutrient-deficient conditions. Given the high yield potential and profitability of most crops grown in the West, it surprising that so many growers continue to allow a lack of adequate plant nutrition to drag down profitability.

Overall, the results from this most recent soil testing survey correspond well with a study released from the University of California showing that soil quality has generally improved over the past 50 to 60 years of intensive management and cropping. Does that mean that the status quo is fine? No, continued efforts must be made to continue to protect and improve our soils that are vital for food and fiber production for the world's population.

We know that soils cannot be continually cropped and nutrients removed without depleting their native fertility and quality. Efforts to maintain high yields and soil quality are essential for long-term sustainability. Careful management and utilization of modern technology accomplish this. The technology available in 2005 is beyond the wildest dreams of the farmers not too many years ago. Let's continue the progress that has been made to improve the soil nutrient status of soil through regular testing and monitoring. Replacement of essential nutrients when needed is a key factor in profitable and sustainable farming. A healthy and fertile soil is in everyone's best interest. BC

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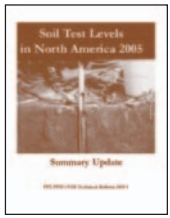
Soil Test Levels in North America, 2005



A new publication from PPI/PPIC summarizes soil test levels for phosphorus (P), potassium (K), and pH…plus magnesium (Mg) and sulfur (S)…in North America. The summary was prepared with the cooperation of numerous public and private soil testing laboratories.

The 45-page publication—titled *Soil Test Levels in North America, 2005*—offers a snapshot view of soil test levels in the U.S. and Canada in 2005, but also provides a comparison to the previous summary which was completed in 2001.

The 8 l/2 x 11-in. coil-bound booklet is available for purchase at US$25.00 each. An optional CD-ROM is available for US$10.00 each. It contains a PDF file showing the pages of the report, a PowerPoint file of all figures (graphs) in the report, and an Excel workbook of the major tables to facilitate construction of custom graphs for regions of interest. The combination package of the printed publication plus the CD-ROM is available for US$30.00. Shipping cost is additional.

An order form is available as a PDF file at the website: **>www.ppi-ppic.org<**. Or contact Circulation Department, PPI, 655 Engineering Drive, Suite 110, Norcross, GA 30092-2837. Phone: 770-825-8082. Fax: 770-448-0439.