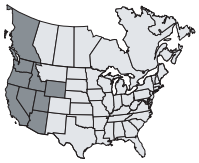
IPNI INSIGHTS
INTERNATIONAL PLANT NUTRITION INSTITUTE



July 2009

Western Region Research Update

Aiming for Productivity and Efficiency

The productivity of agriculture in Western North America is among the highest in the world. Farmers in the region are eager to embrace new techniques and technology in the search for greater efficiency. Environmental pressures and chronic water shortages add extra incentive to continue the search for better ways of farming. The link between research and agricultural innovation remains strong, even as public funding for research decreases. IPNI is pleased to be able to partner with leading researchers to discover better ways of using valuable plant nutrients in the most appropriate way.

The reports provided here reflect only a small fraction of the research projects that IPNI supports worldwide. Supporting important agronomic research is central to our mission of responsible management of plant nutrients for the benefit of the human family.

This issue of *INSIGHTS* features a brief summary of research projects supported by IPNI in the Western North America Region. Additional information on each project can be found at the research database on our website: **>www.ipni.net/research<**.

California

Evaluation of Improved Methods for Tissue Testing of Alfalfa in California

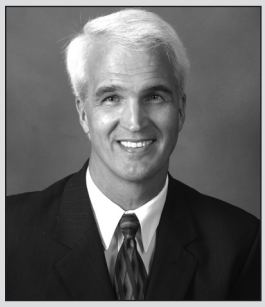
Project Leader: Steve Orloff, University of California, Cooperative Extension, 1655 S Main St, Yreka, CA 96097. Telephone: 530-842-2711. E-mail: sborloff@ucdavis.edu

Project Cooperator: Dan Putnam

Despite the reliability of plant tissue tests, most alfalfa growers do not conduct regular tissue testing to assess fertilization needs. The current recommendations for alfalfa sampling are cumbersome for routine analysis and can be expensive. However, many growers routinely take cored samples of haystacks to measure forage quality for animal nutrition. This project is evaluating the feasibility of using cored-hay samples taken from the bales for analysis of both nutrient concentration and forage quality.

Hay samples were collected from over 20 cooperating farmers during the past 2 years to compare soil nutrient concentrations, whole plant and mid-stem nutrient concentrations, and baled-hay samples. Results found an excellent correlation between whole plant P and whole plant K and their respective concentrations in baled hay ($r^2 = 0.94$). The same relationship for S contained within fresh and baled samples was not as strong ($r^2 = 0.73$). These results indicate that the cored bale sampling technique could be used in place of the currently recommended analysis of fractionated stem samples.

Current tissue standards are based on alfalfa measured at the "one-tenth" bloom growth stage. To produce highly digestible alfalfa for the dairy industry, growers routinely harvest alfalfa in the bud stage and fields never reach the one-tenth bloom stage. These data document a rapidly declining P concentration in alfalfa with advancing maturity. Thus, the stage of growth is important to consider when interpreting plant tissue tests. For example, a sample collected at one-tenth bloom may appear to have adequate P, but that same concentration would be considered deficient at early bud stage. A further evaluation of critical plant tissue concentrations during the growing season is underway. *CA-26F*



Dr. Robert Mikkelsen
Western North America Director
International Plant Nutrition Institute (IPNI)
4125 Sattui Court
Merced, CA 95348
Phone: 209-725-0382
Fax: 209-725-0382
E-mail: rmikkelsen@ipni.net
Website: www.ipni.net

Improving Yield and Quality of Sweet Potato in California with Proper Fertilization

Project Leader: Scott Stoddard, University of California, Cooperative Extension, 2145 Wardrobe Ave., Merced, CA 95341. Telephone: 209-385-7403. E-mail: csstoddard@ucdavis.edu

California sweet potatoes are well known for their excellent quality and high yields. However after being stored for many months, their quality begins to deteriorate. Sugar accumulation during storage is problematic for processing because it creates darker colors and changes

in texture. A project was conducted in 2008 to observe the effect of in-season N and K management on crop response, yield, and storage quality in orange-flesh sweet potatoes.

The test area for this trial was located in a sandy-textured commercial field that had been cropped to sweet potatoes the previous year. Beauregard sweet potatoes were transplanted in early June in drip-irrigated plots. In the first experiment, N fertilizer was applied in two forms and two application methods. Potassium was applied as potassium chloride (KCl) or potassium sulfate (K_2SO_4). In a second experiment, K was applied as K_2SO_4 or as potassium nitrate (KNO_3) directly to soil or with irrigation water. Plants were analyzed for nutrient content, yield, and storage properties.

In the first experiment, differences were measured in N tissue concentrations, but there was no consistent response in root yield due to the treatments, unlike the previous year. No significant yield differences between K sources were observed, though there was a small improvement in yield with the K_2SO_4 source. Initially low concentrations of soil K indicate that a response to fertilizer K would be expected. *CA-27F*

Idaho

Response of Potato to Ammonium Sulfate Nitrate in Idaho

Project Leader: Dr. Bryan Hopkins, Brigham Young University, 251 WIDB, 685 E University Pkwy, Provo, UT 84602. Telephone: 801-422-2185. Fax: 801-422-0008. E-mail: hopkins@byu.edu

Potatoes are sensitive in their requirement of an adequate and steady supply of N. In the past, ammonium nitrate (AN) was commonly used since it is not susceptible to ammonia volatilization under hot, humid, and windy conditions. Ammonium nitrate is no longer readily available in the region and although its substitution with ammonium sulfate (AS) provides one option, AS is more expensive per unit N and it may supply more S than is required. A new fertilizer product (Sulf-N 26), a fused combination of AN and AS, offers one more possible alternative source of potato nutrition. Two controlled-release fertilizers based on AS (SRAS15 and SRAS20) are also of interest. A field experiment was conducted near Paul, Idaho, on irrigated potatoes to compare these experimental N fertilizers with conventional farmer practices that primarily rely on the use of urea ammonium nitrate (UAN).

Petiole nitrate concentrations were monitored weekly, but no differences were noted between the N sources. The potato harvest occurred on September 10 when the middle 20 ft. of the two center plot rows were sampled, weighed, and graded for size and quality. Later analysis included potato defects, specific gravity, and storage quality. As observed in the 2007 growing season, no significant differences in yield or properties were found among the soluble N fertilizers. Tuber size was greatly increased with fertilization, compared with the unfertilized control. However, N fertilization also caused a drop in specific gravity. The controlled-release N fertilizers performed very well. Both SRAS15 and SRAS20, applied at only two-thirds the rate used for conventional products, had larger yields than those obtained with UAN or Sulf-N 26. The first year of data on these new fertilizer products appears very promising, similar to results obtained previously with other controlled-release fertilizers. *ID-09F*

Washington

Spatial Variability in Soil Phosphorus in Eastern Washington

Project Leader: Dr. Richard Koenig, Washington State University, Department of Crop and Soil Sciences, PO Box 646420. Pullman, WA 99164-6420. Telephone: 509-335-2726. E-mail: richk@wsu.edu

Considerable spatial variability exists in soil P concentrations across the variable topography and climatic zones of eastern Washington. Reasons for this variability are numerous and must be understood in order to implement appropriate P management practices in this unique environment. The objectives of this study are to: 1) characterize the mineral forms of P in soil samples representing different positions on a typical Palouse landscape; 2) evaluate the effectiveness of conventional soil test extractants in providing an index of plant-available P; and 3) evaluate the response of wheat to P fertilizer.

Geo-referenced soil samples (n = 25) from an 80-acre field located near Pullman, Washington, and samples collected in a 100 mile east-west transect in eastern Washington, were analyzed for total, organic, and soil test-extractable P (Morgan and Olsen methods). Phosphorus concentrations varied widely in these samples. Total, mineral, and organic P fractions were correlated with Olsen P, but not with Morgan P. Olsen and Morgan P were also not well correlated. Fractionation analysis (Ca, Al, and Fe forms) indicate the majority of P is still present as Ca minerals even in samples with pH as low as 5.2. A working hypothesis is that P minerals are currently in various states of transition from Ca to Fe/Al forms; however, equilibrium chemistry suggests that Ca-P minerals are not controlling solution concentrations of P. *WA-13F* ■

International Plant Nutrition Institute
3500 Parkway Lane Suite 550
Norcross, GA 30092-2806
Phone: 770-447-0335
Website: www.ipni.net