

# NEWS & VIEWS

A regional newsletter published by the  
Potash & Phosphate Institute (PPI) and the  
Potash & Phosphate Institute of Canada (PPIC)



Dr. Robert L. Mikkelsen,  
West Region Director  
August 2004

## Searching for Answers in 2003 and Beyond

IT'S NOT OFTEN that you see or hear good news about agriculture in a media story...especially if major newspapers and TV are your primary sources of information. However, there are many unheralded, positive developments related to improving nutrient use to grow higher yields of healthy food, and in an environmentally-friendly way. While fertilizers are just one part of modern production systems, we are continually looking for ways to use this resource more effectively.

For many years, the Potash & Phosphate Institute (PPI) has been dedicated to discovering the most appropriate way to use plant nutrients. Partnering with the Foundation for Agronomic Research (FAR), these two institutions help support agronomic research and educational programs across North America. These efforts are all designed to answer current questions about how to help farmers be as efficient, productive, and sustainable as possible.

Both PPI and FAR have a long history of supporting research projects throughout the West Region. Following is a brief summary of the current projects supported by PPI and FAR. It must be remembered that many of these projects are still underway and final conclusions cannot be made from preliminary data. If a particular project is of interest to you, feel free to contact the individual university researcher to get the latest information.

The summaries that follow provide a brief overview of each project. For more details, please consider contacting the research project leader or Dr. Rob Mikkelsen. You can also view the full annual reports of each project (current and past), when available, at the website:



>[www.ppi-far.org/research](http://www.ppi-far.org/research)<



Agronomic market development information provided by:  
**Dr. Robert L. Mikkelsen, West Region Director**  
Potash & Phosphate Institute (PPI)  
617 Oeste Drive, Davis, CA 95616  
Phone: (530) 758-4237  
E-mail: [rmikkelsen@ppi-far.org](mailto:rmikkelsen@ppi-far.org)  
Website: [www.ppi-ppic.org/west](http://www.ppi-ppic.org/west)

### British Columbia



#### Effect of Pulsed Applications of Phosphorus on Fruit Development of Five New Apple Cultivars

*Project Leader: Dr. Denise Neilsen, Agriculture and Agri-Food Canada, Pacific Agriculture Research Centre, 4200 Hwy 97, Summerland, BC V0H 1Z0, Telephone: 250-494-7711, E-mail: [neilsend@agr.gc.ca](mailto:neilsend@agr.gc.ca)*

*Project Cooperator: Gerry Neilsen*

Interest in planting new apple cultivars as replacements for standard varieties such as Red Delicious, Golden Delicious, and McIntosh has been growing in British Columbia and the Pacific Northwest. Recent work has shown that applications of nutrients through fertigation, including less mobile nutrients such as phosphorus (P) and potassium (K), allow nutrients to be targeted to the root zone of young apple trees. The objective of this project is to determine the effects of P fertigation and nitrogen (N) rate on growth, production, and fruit quality of Gala, Fuji, Cameo, Ambrosia, and Silken apple on M.9 rootstock.

While a damaging spring frost and summer drought decreased apple yields in 2003, the P treatment continued its superior cumulative yield performance in the 5th fruiting year (1999-2003). The pulsed-P treatment continued to be effective at increasing leaf and fruit P concentration in this study. The high P fruit also showed an improved resistance to browning when cut slices of the fruit were stored for a week in modified atmosphere packages. A leakage analysis found that the P-treated fruit also had the lowest leakage, indicating improved fruit membrane strength. While water core was found to be significantly reduced by P treatment in past years, the 2003 results indicate only a positive trend. These study results confirm that positive yield and fruit quality parameters can be obtained from P fertigation in high density apple orchards. *BC-14*

---

## California



### Potassium Foliar Fertilization of Pistachio

*Project Leader: Dr. Patrick Brown, University of California, Department of Pomology, Davis, CA 95616, Telephone: 530-752-0929, Fax: 530-752-8502, E-mail: phbrown@ucdavis.edu*

*Project Cooperators: Nacer Bellalloui, Hening Hu*

The purpose of this study is to determine the benefits of foliar K application alone or in combination with K applied in irrigation water for increasing pistachio nut yield and quality. It was initiated in 2001. Application of a variety of K sources, application techniques, and application rates over a 3-year period in pistachio resulted in no significant differences in yield among treatments. The stated hypothesis of this research was that foliar K might possibly replace or effectively supplement soil K applications. Due to the high degree of yield variability in this experiment, and the failure to detect a statistically significant decline in yield in the unfertilized control, we cannot interpret these results as demonstration that foliar applications are adequate replacements for soil applications. This possibility, however, cannot be excluded.

Recent work with precision harvesting in pistachio demonstrates that yield variability in this species is far greater than previously anticipated. Indeed, an orchard of 12,400 trees in a high-yielding region exhibited a normally distributed variation in yield with 95% of the trees falling within  $\pm 4$  standard deviations of the mean. Under these circumstances, approximately 150 trees would be required in each treatment replicate to detect a 10% yield differential. No experimental trial in pistachio has ever utilized this many trees. This calls into question the validity of many published research reports, and emphasizes the need to develop the means for large scale single tree harvest capability to enable research in this species.

Acreage of nut crops is rapidly increasing in California, with 530,000 acres currently under production. The farm value of just the pistachio crop varies from \$100 million to \$300 million in California. CA-22F



### Mapping Soil Potassium Fixation in the San Joaquin Valley and Development of a Practical Soil Test for Potassium Fixation

*Project Leader: Dr. Stuart Pettygrove, University of California, LAWR, One Shields Ave, Davis, CA 95616-8627, Telephone: 530-752-2532, Fax: 530-752-1552, E-mail: gspettygrove@ucdavis.edu*

*Project Cooperator: Randall Southard*

We developed a map showing the location of potentially K-fixing soils in cotton-producing areas of Fresno, Tulare, Kings, and Kern counties in the southern San Joaquin Valley, California. The map was produced from seven digitized soil surveys (NRCS SSURGO database) and a California Department of Food & Agriculture cotton database. The criteria for soil map unit selection included: (1) age of soil as indicated by degree of horizonation, with younger soils presumed to have more potential for K fixation; (2) formation of the soil on Sierra Nevada parent material, which is more likely to contain vermiculite (the K-fixing mineral) formed from biotite mica; and (3) coarse to medium texture, as indicated by soil taxonomy family level texture. Laboratory measurement of K fixation by a modified Cassman incubation method and conventional x-ray diffraction supports this model, but further studies, including measurement of K fixation in a larger number of fine-textured soils with Sierra Nevada genesis and measurements across a chronosequence must be completed in order to confirm it. CA-23F

---

## Idaho



### Phosphorus Fertilization of Southern Idaho Sugarbeets

*Project Leader: Dr. Jason Ellsworth, University of Idaho, PO Box 1827, Twin Falls, ID, 83301, Telephone: (208) 736-3611, E-mail: jwellsw@uidaho.edu*

*Project Cooperator: Bryan Hopkins*

Phosphorus is an essential element for sugarbeet nutrition. Soils in the Western U.S. tend to be calcareous and alkaline, resulting in low P solubility. Sugarbeets have difficulty exploiting soluble P in surface soil due to their tap root system. Research in the Northcentral U.S. supports P applied in a band in contact with the seed or below the seed for best results. However, grower concerns about germination problems and seedling vigor have prevented adaptation of these techniques in Idaho. The objective of this project is to determine optimal P starter fertilizer placement for

sugarbeets grown in calcareous soil. The initial study (2002) evaluated the effectiveness of two fertilizers [ammonium polyphosphate (APP) and phosphoric acid (PA)] with four placement techniques (broadcast and 0, 2, and 6 in. band below soil surface) and three rates (0, 20, and 220 lb P<sub>2</sub>O<sub>5</sub>/A). The results of this study showed increases in sugar production when APP was band applied, regardless of rate or depth. The other treatments did not result in yield increases. The treatments were revised in 2003 to better evaluate the effectiveness of P bands. Two starter fertilizers... APP and urea ammonium nitrate (UAN)...were applied at two locations with similar techniques as in the initial study. Similar to the first study, the banded application of APP at the 6 in. depth resulted in increased sugar production at one location. Contrary to the findings of the initial study, sugar yield was significantly reduced for the surface-applied APP. The other treatments did not result in yield effects. No treatment effects were observed at the second location. Although the results are slightly different at each site, it is noteworthy that the deep-banded APP resulted in the highest sugar yield at two of the three locations. *ID-06F*

---

## Oregon



### Response of Barley and Wheat to Chloride Fertilization in Eastern Oregon

*Project Leader: Dr. Steven Petrie, Oregon State University, Columbia Basin Ag Research Center, PO Box 370, Pendleton, OR 97801, Telephone: 541-278-4186, Fax: 541-278-4188, E-mail: steven.petrie@orst.edu*

*Project Cooperator: Richard Smiley*

Research on chloride (Cl) fertilization in the Willamette Valley of western Oregon and a number of other western states has shown that wheat yield is often increased by Cl applications. The areas where Cl responses have been reported are either much wetter than eastern Oregon or the precipitation occurs primarily in the summer. There has been very little field research on the effect of Cl application to winter wheat and winter barley in the dryland region of eastern Oregon where the majority of the precipitation occurs in the winter. We established field trials at Moro and Pendleton in the 2002-03 growing season to evaluate the response of winter wheat and winter barley to Cl applications on sites with relatively low soil test Cl values. Chloride was broadcast-applied as KCl at 0, 50, or 150 lb/A at both Moro and Pendleton. We seeded eight winter wheat varieties (six common and two club varieties) and three winter barley varieties (two feed and one malting variety) in mid-October, 2002. All nutrients except Cl were applied based on soil test results. Chloride fertilization increased wheat leaf Cl concentration and reduced physiologic leaf spot (PLS) at Moro and Pendleton and increased wheat

grain yield, test weight, and kernel weight at Pendleton. Chloride fertilization increased leaf Cl concentration in feed and malting barley varieties and increased grain yield of one feed type and one malting type winter barley at Moro. Test weight of winter barley tended to be increased by Cl fertilization, as did plump kernels. *OR-13F*

---

## Washington



### Effects of Chloride Fertilization on Yield, Protein, and Flour Quality of Four Spring Wheat Cultivars

*Project Leader: Dr. Bill Pan, Washington State University, Department of Crop and Soil Sciences, PO Box 646420, Pullman, WA 99164-6420, Telephone: 509-335-3385, Fax: 509-335-8674, E-mail: wlpan@wsu.edu*

*Project Cooperators: John Burns, K. Campbell, Kimberlee Kidwell, and Rich Koenig*

Soils in eastern Washington have been found to be extremely low in Cl availability throughout the wheat root zone, due to the historical sufficiency of native soil K supply and lack of necessity for KCl fertilization in the region. Fertilization with at least 10 lb Cl/A has been found to raise wheat shoot Cl levels above critical tissue levels. Varietal differences in physiological leaf spot and yield responsiveness to Cl fertilization have been observed, although these differences seem to vary by year and environment. Routine additions of Cl appear to be beneficial for wheat production in this region. *WA-12F* ■

RN 04079



**Potash & Phosphate Institute (PPI)**  
655 Engineering Drive, Suite 110  
Norcross, GA 30092-2837

PRESORTED STANDARD  
U.S. POSTAGE  
**PAID**  
Atlanta, GA 30329  
Permit No. 1355

---

**NEWS**  
**& VIEWS**

**West Region**  
**August 2004**