

NEWS & VIEWS

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Dr. A.E. (Al) Ludwick,
Western Director
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Searching for Answers in 2000 and Beyond

EACH YEAR the Potash & Phosphate Institute (PPI) and the Foundation for Agronomic Research (FAR) help support research projects across North America. These projects involve crop production in the field...research to develop efficient high yielding systems. They are designed to answer current production questions and related environmental concerns.

PPI will be assisting with nine FAR-supported research projects in the western U.S. in 2000. All are continuing from last year. Two projects were completed at the end of 1999. Following is a brief summary of each project. Please understand that for projects still in progress the release of detailed results is strictly up to the researcher. If any project is of special interest, you might want to contact the researcher to get a first-hand update.

Arizona



Alfalfa Response to Forms of Phosphorus in the Irrigated Southwest

Project Leader: Dr. Michael J. Ottman, Plant Sciences Department, University of Arizona, Tucson, AZ 85721. Phone: (520) 621-1583, fax: (520) 621-7186, e-mail: mottman@ag.arizona.edu

This project evaluates the relative benefits of different phosphorus (P) sources (liquid and dry) and best management practices for alfalfa production in the irrigated desert climate of Arizona. It was initiated in the fall of 1996 and concluded at the end of the 1999 growing season.

Results of the first two years show that both 10-34-0 and 11-52-0 can be effectively topdressed to produce high

yield alfalfa. The topdressed 11-52-0 produced somewhat higher yields in the initial season and seemed to move deeper into the soil than did the water-run 10-34-0. There were no yield differences between fertilizer sources in 1998 or 1999. Adequately fertilized treatments with either source produced over 11 tons/A in 1997 and 1999 and over 12 tons/A in 1998.



Effects of Fluid Phosphorus Fertilization on Growth and Yield of Microsprinkler Irrigated Citrus in the Desert Southwest

Project Leader: Dr. Thomas L. Thompson, Department of Soil, Water, and Environmental Science, University of Arizona, Tucson, AZ 85721. Phone: (520) 621-3670, fax: (520) 621-1647, e-mail: thompson@ag.arizona.edu

Project Cooperator: Mr. Dean Bacon.

The objectives of this project are to evaluate P fertilization through microsprinklers for yield and quality of grapefruit and to update P tissue test guidelines for use in desert climates such as in central Arizona. This three-year project was initiated in the spring of 1998.

The experiment, being conducted at the University of Arizona Citrus Agricultural Center, consists of phosphoric acid (0, 41, 82, 124 lb P₂O₅/A) split in monthly injections into the microsprinkler irrigation system. There were no significant effects of P fertilization on fruit yield or quality in the first harvest (January 1999) although available soil P (Olsen bicarbonate) levels increased 30 to 60 percent. In the second harvest there were no yield differences, but definite trends toward lower acidity and higher ratios of total soluble solids to total acidity (TSS/TA) with P fertilization, resulting in sweeter fruit.



Agronomic market development information provided by:
Dr. A.E. (Al) Ludwick, Western Director
Potash & Phosphate Institute (PPI)
P.O. Box 970, Bodega Bay, CA 94923-0970
Phone: (707) 875-2163
E-mail: aludwick@ppi-far.org



Evaluation of Balanced Cotton Nutrition Management

Project Leader: Dr. Jeffrey C. Silvertooth, Dept. of Plant Sciences and Dept. of Soil, Water, and Environmental Science, University of Arizona, Tucson, AZ 85721. Phone: (520) 621-7616, fax: (520) 621-7186, e-mail: silver@ag.arizona.edu

The purpose of this project is to evaluate various commercial cotton fertilization regimes involving nitrogen (N), P, potassium (K), and micronutrients in relation to the University of Arizona fertilizer guidelines. It was initiated in 1999 with support from PPI, although it actually began in 1998.

Five fields evaluated P nutrition in 1999. Individual plots, replicated three or four times, extended the length of the irrigation run and were large enough to be harvested into separate modules. A summary of over 20 site-years for upland and pima cotton involving banded P studies including the 1999 sites indicates that the current University of Arizona guidelines are appropriate. The guidelines indicate there is a high probability of response to P if the soil test (Olsen bicarbonate) is less than 5 parts per million (ppm), medium probability between 5 and 10 ppm, and low probability above 10 ppm.



Response of Lisbon Lemon to Potassium Fertilizer on a Sandy Soil

Project Leader: Dr. Charles A. Sanchez, Department of Soil, Water, and Environmental Science, Yuma Agricultural Research Center, University of Arizona, Yuma, AZ 85364. Phone: (520) 782-3836, fax: (520) 782-1940, e-mail: sanchez@ag.arizona.edu

Project Cooperators: Drs. Abraham Galadima and Glen C. Wright.

This project evaluates the effectiveness of different rates and sources of K fertilizer...potassium chloride (KCl) and potassium sulfate (K_2SO_4)...applied directly to the soil (Superstition sand), to the foliage, or in combination for lemons grown in western Arizona. It was initiated in 1999.

The trees were 1.5 years old at the beginning of the project and are not yet producing. Although all trees increased in size the first year of the experiment, there were no significant differences in trunk diameter due to treatments.

California



Reassessment of Leaf Potassium Critical Values in Almond

Project Leaders: Dr. Patrick Brown, Department of Pomology, University of California, Davis, CA 95616. Phone: (530) 752-0929, fax: (530) 752-8502, e-mail: phbrown@ucdavis.edu; and Dr. Steven Weinbaum, Department of Pomology, University of California, Davis. Project Cooperators: Roger Duncan and Edwin Reidel.

Almond yields have increased substantially since the University of California (UC) guidelines for leaf K were first published in the early 1960s. Increasing numbers of growers and analytical laboratories are concerned that the current UC guidelines for leaf K are inadequate. This project was initiated in 1998 to evaluate and update these guidelines.

A vigorous almond orchard with low leaf K levels was chosen as the study site. Baseline yields for individual trees were determined in the initial year, and K_2SO_4 was applied at 0, 120, 240, and 360 lb K_2O/A to begin establishing a broad range of tree K nutrition. Low K treatments resulted in reduced viability of current spurs and growth of new fruiting wood in 1999, which is expected to translate into reduced yields next year. Whole tree excavations were conducted in 1998 at a separate location (Delta College Regional Almond Variety Trial).

The data obtained indicate that K accumulation by almond is substantial and continuous during fruit development, beginning immediately following fruit set. Potassium removal for a 2,000 meat lb/A "Nonpareil" crop is estimated to be about 170 lb K_2O/A equivalent.



Predicting Potassium Availability in Rice Fields under Alternative Rice Straw Management Practices

Project Leader: Dr. Chris van Kessel, Department of Agronomy and Range Science, University of California, Davis, CA 95616. Phone: (530) 752-4377, fax: (530) 752-4361, e-mail: cvankessel@ucdavis.edu; and Dr. William R. Horwath, Department of Land, Air and Water Resources, University of California, Davis.

Project Cooperators: John Williams and Dr. Marlin Brandon

The purpose of this project is to re-evaluate the accuracy of soil K tests for predicting K fertilizer needs for rice production. The K supplying power of flooded rice

soils will also be studied as affected by alternative (to burning) rice straw management practices. The project was initiated in 1999.

No significant increase in grain yield was observed following K fertilization where straw had been removed or incorporated, even though the soil tested low in available K. However, higher uptake of K was related to treatments. Various K soil tests are being evaluated to determine if a more reliable soil test for plant available K can be developed.

Idaho



Chloride's Role in Maximizing Wheat Performance (Multi-Regional Project)

Project Leader: Dr. Brad Brown, University of Idaho SW Idaho Research and Extension Center, 29603 U of I Lane, Parma, ID 83660. Phone: (208) 722-6701, fax: (208) 722-6708, e-mail: bradb@uidaho.edu

This project was initiated as part of a multi-regional program begun in the fall of 1997. It will terminate in 2000.

An irrigated winter wheat trial involving 16 varieties (mostly soft white, some hard red) was planted in the fall of 1997 and 10 varieties were planted in the fall of 1998. There was only minor physiologic leaf spotting among the varieties studied despite low soil and plant chloride (Cl) levels. Chloride fertilization did not increase yields that averaged 96 bu/A in 1998 and 97 bu/A in 1999. It was observed that yields may have been limited both years by moisture stress during stem extension. Kernel weights of 200 seeds and test weights were increased both years with Cl when averaged across varieties. The experiment has been moved to a field testing low in Cl on the Parma Research and Extension Center for the 1999/2000 season.



Precision Fertilization of Irrigated Potatoes in Southern Idaho

Project Leader: Dr. Jeff Stark, Univ. of Idaho Aberdeen Research and Extension Center, P.O. Box AA, Aberdeen, ID 83210. Phone: (208) 397-4181, fax: (208) 397-4311, e-mail: jstark@uidaho.edu

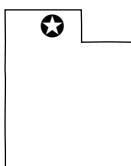
Project Cooperators: Richard Johnson, Ralph Oborn, John Ojala, Paul Stukenholtz, and Paul Patterson.

The purpose of this project is to evaluate P and K fertilization of commercial potato fields based on different soil management systems. It began in 1998, although PPI

began support in 1999.

Three fields were studied in 1999 with 10 to 15 acre replicated strips representing the different fertilizer programs: (1) soil sampling of 1.5 acre grids (precision management), (2) utilizing soil maps plus aerial photos (zone management), and (3) composite field sampling (conventional management). Yields of US#1 tubers over 7 oz. were 25 and 50 cwt/A higher with zone fertilization at two of the sites, netting an additional \$69 and \$164/A, respectively. There were no significant effects at the third site.

Utah



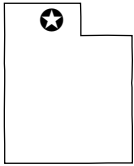
Phosphorus and Potassium Soil Test Relationships and Nutrition for Irrigated Alfalfa Production in Utah

Project Leader: Dr. Richard T. Koenig, Department of Plants, Soils and Biometeorology, Utah State University, Logan, UT 84322-4822. Phone: (435) 797-2278, fax: (435) 797-3376, e-mail: richk@ext.usu.edu

Project Cooperators: James Barnhill, Boyd Kitchen, Chad Reid, Brent Bunderson, Clyde Hurst, and Dr. Jan Kotuby-Amacher.

This project evaluates P and K fertilizer recommendations for irrigated alfalfa production on calcareous soils and re-calibrates the sodium bicarbonate (NaHCO₃) soil test for both P and K. It was initiated in 1996 and is tentatively planned to continue through 2001...focusing on K in 2000 and 2001.

Results from four years of field research have demonstrated excellent responses to P fertilization. This information was used to update Utah State University (USU) recommendations included in a new alfalfa fertility guide published in 1999. This guide can be obtained in electronic (.pdf) format from the USU Extension Web page (<http://www.ext.usu.edu>) under the title "Fertilizer Management for Alfalfa, AG-FG-01." Research in 1999 focused on K since previous trials showed an inconsistent relationship between K response and soil test values (0.5 M NaHCO₃). Responses to K ranged from 0 to 2.6 tons/A across three locations. Preliminary results indicate that (1) K rates as high 600 lb/A of K₂O increase soil test K to approximately 130 ppm, (2) productive, low K-testing alfalfa sites respond to relatively high rates of K fertilization, and (3) high rates of K may be required to bring low K testing soils up to adequate levels.



Fertilizer Requirements of Long-Term Sustainability of High Yielding Crops

Project Leaders: Dr. Richard T. Koenig, Department of Plants, Soils and Biometeorology, Utah State University, Logan, UT 84322-4822. Phone: (435) 797-2278, fax: (435) 797-3376, e-mail: richk@ext.usu.edu; and Dr. Von D. Jolley, Department of Agronomy & Horticulture, Brigham Young University, Provo, UT.

The purpose of the "Utah Centennial Plots" is to evaluate the long-term sustainability of yield and the effects on soil properties of organic (manure), inorganic (fertilizer), and combined organic and inorganic fertilizer programs on two crop rotations: alfalfa-wheat and alfalfa-corn-wheat. The study was initiated in the fall of 1996 with alfalfa and wheat as the first crops in the rotation and will continue indefinitely.

The 1999 wheat yield averaged 25 bu/A for the control (unfertilized), 51 bu/A for the inorganic treatment, 48 bu/A for the organic treatment, and 58 bu/A for the inorganic/organic combination. Alfalfa yield averaged 12.8 tons/A for the control, 15.2 tons/A for the inorganic treatment, 14.2 for the organic treatment, and 14.2 for the combination. Steady depletion of soil nutrients over the years is increasing yield differences between the control and fertilizer treatments. Variations in manure content and availability make it difficult to calculate accurate manure application rates. To date, manure treatments have resulted in lower soil test P and higher soil test K values than comparable inorganic fertilizer treatments.

Washington



Evaluating Potassium Sources and Time of Application for Potato Production in the Columbia Basin

Project Leader: Dr. Joan R. Davenport, Washington State University Irrigated Agriculture Research and Extension Center, 24106 N. Bunn Rd., Prosser, WA 99350-9687. Phone: (509) 786-9384, fax: 509-786-9370, e-mail: jdavenp@beta.tricity.wsu.edu

Project Cooperators: Dr. Bob Stevens, S. Schneider, L. Dever, and E. Bentley.

This program evaluates the benefits of different K sources, forms (liquid vs. dry), and time of application on yield and quality of potato production under center pivot irrigation. The study was initiated in 1997 and terminated at the end of 1999.

Yields were significantly increased by K fertilization in 1999, but not the two previous seasons. Differences among sources and forms were relatively minor. Applying 75 percent of the the K in-season, however, actually reduced yields and percent US#1s below the control. The effects of K fertilization on specific gravity were relatively small regardless of source or form of fertilizer material and did not have nearly the impact caused by adverse weather (extreme heat in 1998). In 1997, early blight and black leg diseases were reduced by K fertilization, the granular form appearing more effective than liquid. In 1999 a low level of black dot disease was observed in only the K_2SO_4 plots.

Summary

We at PPI/FAR are pleased to be part of research and education programs that advance the cause of efficient production agriculture. ■

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