

# NEWS & VIEWS

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

Dr. Terry L. Roberts,  
Western Canada Director  
May 1998

## Western Canada Research Report

**THE MISSION** of the Potash & Phosphate Institute (PPI) and Potash & Phosphate Institute of Canada (PPIC) is to “*scientifically promote the worldwide development of phosphorus (P) and potassium (K) use in crop production systems based on agronomically sound, economically advantageous and environmentally responsible information*”. We accomplish this with the help of the Foundation for Agronomic Research (FAR). The Foundation was created under the leadership of PPI to generate funding for agronomic research and education. Since 1980, FAR has invested more than \$6 million in the future of production agriculture in the U.S. and Canada.

Last year, PPI/PPIC and FAR helped support 18 projects in western Canada. They are listed below. These studies are in various stages of completion. If you'd like more information about this research, feel free to contact the project leader, or us.

### British Columbia



#### Potassium Fertilization of High Density Apple Orchards

Project Leader: *Dr. Denise Nielson, Agriculture and Agri-Food Canada, Pacific Agriculture Research Centre, Summerland, BC V0H 1Z0. (250-494-7711).*

This project has been investigating K deficiency in high density apple orchards in the Okanagan Valley for the last three years. Drip irrigation in these coarse textured soils aggravates the K deficiency problem, but fertigation has

been shown to correct it. Regular application of K with the irrigation water maintained adequate K in the soil solution beneath the drip emitters and kept K at adequate levels in the apple leaves throughout the growing season. Potassium increased fruit size, but did not affect fruit quality at harvest or during storage. Growers have been reluctant to fertilize apples with K, because of reports that it affects calcium (Ca) nutrition of the fruit and may cause a loss of quality during storage. However, in this study K did not affect fruit Ca content or storage disorders associated with low Ca levels. This study has successfully shown K fertigation will help Okanagan growers produce higher yielding, better quality apples.



#### Effectiveness of Applied Phosphorus for Field Corn in Relation to Cropping Practices and VAM Colonization

Project Leader: *Dr. Shabtai Bittman, Agriculture and Agri-Food Canada, Pacific Agriculture Research Centre, Agassiz, BC V0M 1A0. (604-796-2221).*

This project is attempting to determine how crop rotation and tillage affect the rate of infection by mycorrhizae and early P nutrition in corn. Mycorrhizal fungi improve P uptake, and intensive tillage appears to cause poor mycorrhizal infection in corn roots. Results to date indicate that previous crop impacts mycorrhizal infection. For example, corn following canola had similar symptoms of P deficiency to corn after fallow. British Columbia corn growers report that P deficiency symptoms often occur in flooded or compacted soils. This study is showing that side-banded starter P corrects this problem and is a good management option for corn growers.



Agronomic market development information provided by:

**Dr. Terry L. Roberts, Western Canada Director**  
**Potash & Phosphate Institute (PPI)/Potash & Phosphate Institute of Canada (PPIC)**  
**Suite 704, CN Tower, Midtown Plaza, Saskatoon, Saskatchewan, Canada S7K 1J5**  
**Phone: (306) 652-3535 E-mail: troberts@ppi-far.com**





### **Influence of Mineral Nutrition, Aluminum, Carbohydrate Metabolism and Plant Hormones on Cranberry Flower Induction and Alternate Bearing**

Project Leader: *Dr. David McArthur, Department of Plant Science, Suite 248 - 2357 Main Mall, University of British Columbia, Vancouver, BC V6T 1Z4. (604-822-4384).*

Although cranberry production occupies only about 3,000 acres in British Columbia, it is a highly lucrative crop and one that may respond to high rates of P and K. However, good fertility information is lacking. Current production guides recommend about 40 lb/A of P<sub>2</sub>O<sub>5</sub> and 20 lb/A K<sub>2</sub>O, but some growers...those that report the highest yields...apply as much as 575 lb/A P<sub>2</sub>O<sub>5</sub> and 360 lb/A K<sub>2</sub>O annually. Flower number is the key to high fruit production, and at present, flower production is highly variable between bogs and from year to year. Because cranberry bogs are acidic and usually have high aluminum (Al) levels, P availability is greatly reduced. This new project is investigating how P nutrition affects flower induction.

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## **Alberta**



### **Feeding the Plants that Feed the World**

Project Leader: *Betty Gabert, Agriculture in the Classroom Program, Alberta Agriculture, Food and Rural Development, 2<sup>nd</sup> Floor, J.G. O'Donoghue Building, Edmonton, AB T6H 5T6. (403-427-4225).*

This pilot project is developing educational resource materials for use in grades 4 and 8 classrooms in elementary schools. The resource is a science kit that includes hands-on experiments that show upper elementary and junior high school students how plants grow and their nutritional needs. The kits include representative soil samples, fertilizers, seeds, and a facilitator's guide for various experiments and activities. This Ag in the Classroom project is part of a Canadian Fertilizer Institute initiative to increase urban school student knowledge and awareness of the vital role that fertilizer plays in food production. Once introduced in Alberta, the kits will be made available to the Ag in the Classroom programs in other provinces.



### **Seed-Placed Boron for Canola and Cereals**

Project Leader: *Elston Solberg, Alberta Agriculture, Food and Rural Development, Agronomy Research Unit, 6909-116 Street, Edmonton, AB T6H 4P2. (403-427-7098).*

Many producers are interested in boron (B) and its potential to increase cereal and oilseed yields in western Canada. And, because of the interest in direct seeding and low application rates required, most farmers would prefer to place B in the seed row at planting. However, past experiences placing B in close contact with the seed have many producers worried about possible injury to seedlings. This study evaluated seed-placed and broadcast B. When seed-placed B was spread over 25 percent of the seedbed, higher application rates (i.e. 2 to 3 lb/A) had a minimal effect on barley and canola germination, unless the seedbed was dry. However, when only 5 percent of the seedbed was utilized, seed-placed B reduced emergence of barley and canola. In fact, any seed-placed B severely reduced canola emergence. Broadcast application was shown to be the most effective way to apply B to canola.



### **Nutrient Requirements of Mixed Forages**

Project Leader: *Jerome Lickacz, Alberta Agriculture, Food and Rural Development, 2<sup>nd</sup> Floor, Agronomy Centre, 6903-116 Street, Edmonton, AB T6H 4P2. (403-427-7098).*

This project is demonstrating the importance of balanced nitrogen (N) and P fertility in mixed forage stands. Results show that N consistently increases first cut forage yields and that applying P further increases yields, although additional yield increases were small. For example, at one site, a 6 percent increase in response to P was observed compared to N alone. Forages fertilized with N and P also appear to maintain more uniform and vigorous alfalfa in the stand compared to surrounding areas. These results are proving the importance of P fertilizer in mixed forage stands.



### **Site-Specific Management of Potatoes**

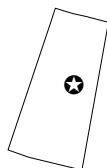
Project Leader: *Dr. Colin McKenzie, Alberta Agriculture, Food and Rural Development, Crop Diversification Centre, SS # 4, Brooks, AB T1R 1E6. (403-362-1300).*

This project is evaluating site-specific nutrient management of irrigated potatoes. Two fields have been yield

monitored since 1996 and grid sampled for soil and plant tissue nutrients. Results are showing irrigated potato production can be highly variable, making it a good candidate for more precise nutrient management. Variable rate N application increased yields by 17 percent in one field. Tissue sampling demonstrated that one field with low soil test P, but fertilized with recommended amounts of P, was able to maintain tissue P at adequate levels for only the early part of the growing season. Tissue K was just as variable, but at adequate levels across the fields and throughout the growing season. The variability seen in tissue nutrient concentration, especially for P, is showing farmers the need to do a better job of fertilization and that some areas of the field are not receiving enough fertilizer.

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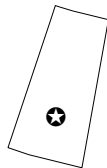
## Saskatchewan



### **Maximizing Canola Yield with Balanced Nutrition in the Saskatchewan Parkland**

Project Leader: *Dr. S.S. Malhi, Agriculture and Agri-Food Canada, Box 1240, Melfort, SK S0E 1A0. (306-752-2776).*

The Prairie Provinces seeded about 12 million acres of canola last year. Canola is a high user of plant nutrients. Sulfur (S) is especially critical for canola production, and there is a potential need for B in some soils. Both S and B deficiencies are associated with poor seed set and flower bud development in canola. This new project is looking at the effect of S and B on canola yield and quality at two locations with two different canola varieties. Initial results have shown good response to S at both locations and by both varieties. Response to B was not as consistent. However, B did cause a 23 percent yield increase in one variety. Canola growers are well aware of the need for S and usually do a good job with S fertilization, but they have lots of questions about the need for B fertility.



### **Effect of Potassium Chloride on Physiological Leaf Spot, Grain Yield and Quality of Winter Wheat in Saskatchewan**

Project Leader: *Dr. Brian Fowler, Department of Crop Science, 51 Campus Drive, University of Saskatchewan, Saskatoon, SK S7N 5A8. (306-966-4944).*

High-yielding, semi-dwarf winter wheat often shows physiological leaf spotting under favorable growing conditions, indicating chloride (Cl) deficient soils. This study is examining how KCl helps suppress these symptoms and increases wheat yields and grain quality. Results to date show Cl fertilization eliminated physiological leaf spotting where it was observed and increased grain yield in 1996 by 2 to 14 percent. There was no yield response

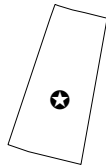
recorded in 1997. However, soil Cl levels were twice as high in 1997 compared to 1996. Interestingly, root rot symptoms were also much higher in 1996, when soil Cl was lower. Understanding how winter wheat responds to Cl is important in the Canadian prairies because acreage is increasing, and many first time growers are wanting fertility information.



### **Spring Wheat Response to Chloride Addition in a Rolling Landscape**

Project Leader: *Dr. Jeff Schoenau, Department of Soil Science, 51 Campus Drive, University of Saskatchewan, Saskatoon, SK S7N 5A8. (306-966-6844).*

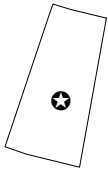
Topography affects and complicates response to Cl fertilization. Because Cl is soluble in water and behaves much like N in the soil, differences in soil Cl levels with slope position may be expected. A landscape-based Cl response trial was conducted to evaluate spring wheat response to seed-placed KCl in central Saskatchewan. Results in 1996 showed a large (19 bu/A) response to Cl in the footslopes (depressions), where soil Cl was low. However, slope position had a minor effect on Cl response in 1997, but soil Cl levels in the depressions were much higher, and the hot dry summer was not conducive to disease pressure. This study is showing that we need to pay close attention to topography when fertilizing for Cl.



### **Availability of Phosphorus Contained in Pulse Crop Residues to a Subsequent Crop**

Project Leader: *Dr. Jeff Schoenau, Department of Soil Science, 51 Campus Drive, University of Saskatchewan, Saskatoon, SK S7N 5A8. (306-966-6844).*

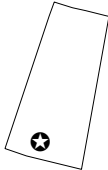
This study is evaluating the role of above-ground pulse crop residue in supplying plant available P to a following crop. Pulses fix N and are known to improve subsequent crops, but the N they supply does not completely explain their beneficial effects. Results last year showed P also appears to play a minor role, but conditions were dry at the test sites. In 1998, the researchers will use radioactive tracers to follow the release of P from pulse residues to continue their efforts to unravel this puzzle. Pulses are high users of P and K and are becoming increasingly important in prairie agriculture.



## **Agronomic and Economic Assessment of Variable Rate Fertilization**

Project Leader: *Dr. Dan Pennock, Department of Soil Science, 51 Campus Drive, University of Saskatchewan, Saskatoon, SK S7N 5A8. (306-966-6852).*

The potential for variable rate fertilizer application in the rolling landscapes of prairie soils is great. Topography, because of its effect on moisture re-distribution, has a major impact on crop productivity. After two years, this study has demonstrated that landscape can be readily separated into management units based on slope position and that slope positions respond differently to N and P. But the response is complicated. Canola has consistently responded to increasing N in the lower slope soils, but wheat has not. Similarly, different response to applied P has also been observed. Lower slope soils require twice the recommended P rate for wheat and half the recommended rate for canola. The potential for variable rate application is great, but the challenge in predicting crop response in a given year is also great.



## **Increasing Flax Yields: A Closer Look at Fertilizer Utilization and Weed Management**

Project Leader: *Dr. Guy Lafond, Agriculture and Agri-Food Canada, Indian Head Experimental Farm, Indian Head, SK S0G 2K0. (306-695-5220).*

Proper fertilizer placement is important in all zero-till cropping systems, but is especially critical in flax, which has a low tolerance for seed-placed P. This study, with locations in Saskatchewan and Manitoba, is looking at different placement options for N and P in zero-till flax. Results last year indicate that side banding, pre-plant banding and sweep openers were all effective in increasing flax yields and suggest that a one-pass seeding and fertilizing system is viable for zero-till flax production.

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## **Manitoba**



## **The Influence of Fertilizer Placement on Crop and Weed Ecology in Direct-Seeding Systems**

Project Leader: *Dr. Doug Derkson, Agriculture and Agri-Food Canada, Box 1000A, R.R. # 3, Brandon, MB R7A 5Y3. (204-726-7650).*

This is the second year of a study evaluating the impact of N timing and placement on weeds in canola and wheat. Fall and spring fertilizer placements at different row spacing and herbicide rates are being compared at sites in

Manitoba, Saskatchewan and Alberta. Results are showing little difference in yield when herbicide rates are reduced by a third of the recommended rate. The Manitoba portion of the study is also looking at the impact of P and K on wild oat competition in wheat and flax. With the first year now complete, applied P and K produced a positive yield response in both crops and greatly reduced wild oat competition. Seed-placement of P and K has always been discouraged because of seedling damage, but these results showed higher rates of P and K did not harm the flax when they were side-banded.



## **Chloride's Role in Maximizing Wheat Variety Performance**

Project Leader: *Dr. Cindy Grant, Agriculture and Agri-Food Canada, Box 1000A, R.R. # 3, Brandon, MB R7A 5Y3. (204-726-7650).*

Response of wheat to Cl fertilization has been well documented, but not all varieties, or cultivars, respond equally and not all responsive varieties are known. This project is part of a large regional study that is evaluating how different varieties of spring and winter wheat react to applied Cl. Chloride was applied to 15 cultivars of spring wheat on two different textured soils. After two years of evaluation, Cl fertilization has increased yields and dry matter of several cultivars, but the response pattern for cultivars has not been consistent from year to year, or location to location. Because of this inconsistency, predicting responsive varieties will be difficult.



## **Fertility Management of Winter Wheat Grown after Alfalfa**

Project Leader: *Dr. Martin Entz, Department of Plant Science, University of Manitoba, Winnipeg, MB R3T 2N2. (204-474-8563).*

Land broken out of alfalfa is often deficient in N, P and K because of the high nutrient demand of alfalfa. This project is investigating the fertility requirements of winter wheat seeded on alfalfa breaking. Initial results show that a combination of alfalfa in rotation with N fertilizer provides higher protein than either alfalfa or N alone. The effect of Cl on yield and suppression of leaf spotting is also being evaluated, but Cl did not have any effect in 1997.

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## **Summary**

The research supported by PPI/PPIC and FAR demonstrates our commitment to helping develop factual information that improves nutrient management and crop production. We work closely with the research community and other industry partners in western Canada and look forward to continued associations with them. ■