Organic Agriculture Centre of Canada

2004 Annual Report

"Respect for soil, plants, animals, air and water contributes to respect for people and the planet."

Introduction

The staff of the Organic Agriculture Centre of Canada (OACC) invites you to review our activities in 2004. Our vision is to strengthen the science and practice of organic agriculture in Canada and our mission is to conduct, coordinate and disseminate producer-oriented research and education, contributing to sustainable communities.

OACC conducts research and engages in education at the university level to support farmers, students and consumers with credible information about organic agriculture and food. We work with many organic organizations and individuals across Canada, identified throughout this report, and we appreciate their generous cooperation. Sponsors of OACC, featured on our back cover and on page 5 are crucial to our work and we very much appreciate their support.

The OACC website, www.organicagcentre.ca has become the dynamic archive for information related to organic research and education in Canada and you are encouraged to explore it.

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Lynda Weatherby
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Graduate Students

The OACC actively supports graduate student training as part of its research activities. Listed below are graduate students supervised by OACC staff and or whose programs were funded in whole or in part by OACC during 2004.

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OACC Advisory Board Members

Volunteer members serve on the OACC Advisory Board, for three year terms, to deliberate and make recommendations about policy, strategic directions and sustaining OACC. The Board considers feedback from Advisory Forums held at organic conferences across Canada each year. Groups represented from the organic sector, include organic farmers, transition farmers, food distributors and retailers, university researchers, Agriculture and Agri-Food Canada and organic organizations.

- Jeanne Cruikshank, Canadian Council of Grocery Distributors
- Robert Guilford, Organic Farmer, MB and Canadian Organic Growers
- Mike Leclair, Agriculture and Agri-Food Canada
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- Natural Sciences and Engineering Research Council - *Strategic grant to faculty at the Nova Scotia Agricultural College and the University of Manitoba*
- New Brunswick Department of Agriculture Fisheries and Aquaculture
- Nova Scotia Agricultural College
- Nova Scotia Department of Agriculture and Fisheries
- Manitoba Agriculture, Food and Rural Initiatives
- Ontario Ministry of Agriculture and Food
- OntarBio Organic Farmers' Cooperative
- Organic Crop Improvement Association
- Organic Producers Association of Manitoba
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Research Summaries

The Integration of Forages, Livestock, and Soil Amendments in Organic Systems

Many people believe that organic farms need livestock and perennial forages on their farm to be sustainable. Livestock add diversity, utilize waste feed, and produce manure which can be used as a nutrient source. Perennial forages build soil and break disease and pest cycles associated with annual cropping. The purpose of this research is to find what the optimum farming system is from the perspective of economics and sustainability. In 2002, we established 4-year crop rotations that include 0, 1 or 2 years of perennial forages. These rotations are being managed as if there were no livestock on the farm, chickens on the farm, or cattle/sheep on the farm. Alfalfa meal and allowable organic inputs are being applied to the stockless plots, while composts are being used as the main source of nutrients on the plots managed with livestock. We are measuring the crop productivity, weed competition, soil fertility, soil ecology and the economics of these systems. The research is being done in both Manitoba and Nova Scotia. So far our research has focused on crop yield and soil fertility.

The 2004 is the third field season of the 4-year rotation; 2005 will be a very important year in which we will grow potatoes to measure the additive effect of all the management practices on crop yield and weed populations. So far in NS, we are seeing that the rotations with no forages have higher available nitrogen, which isn't a surprise since we have not been adding as much compost to the plots with forages, we want the red clover to fix nitrogen from the air. But by year 3, we have also seen higher available nitrogen in the plots receiving beef/sheep compost. This will be an interesting trend to watch into 2005. Many of the plots have different crops each year because of the different number of years of forages in the rotation. This makes it difficult to compare productivity, and is the reason why we have potatoes planned for all plots in 2005 and wheat in 2006. Now that we have 3 years of data and management completed, we are also beginning detailed economic analysis on the farming systems, looking at not only the productivity but the costs of inputs, time, etc. also.

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Nutrient Supply from Organic Soil Amendments

Many cash crops require extra nutrients to reach their full yield potential. On organic farms these nutrients are supplied in soil amendments such as livestock manure and compost, animal and fish processing byproducts (e.g. feather meal, crab meal), and harvested plant materials (e.g. alfalfa meal, seaweed). Unlike chemical fertilizers, the quantity and timing of the nutrient supply from these amendments is hard to predict. In a growth room experiment, comparisons were made in regards to the amount and timing of release for several nutrients in alfalfa meal, feather meal, vermicastings (i.e. earthworm castings), and poultry manure compost. Additional testing was applied to yield response in lettuce and orchard grass planted one week after amendment application. Amendments are applied at rates to deliver equal amounts of total, rather than plant available, nitrogen.

Results show that the feather meal and poultry manure compost initially either stunted the plants or killed them, especially when applied to lettuce at higher rates. Allowing more time between amendment application and planting will likely prevent this problem. Although the lettuce plants never fully recovered, the orchard grass was more tolerant and also had more time to recover. The vermicastings gave the lettuce and orchard grass a good boost at the start of the experiment and also gave the highest lettuce yields. In the longer running orchard grass experiment, however, the early stimulation was not sustained, and the poultry manure and feather meal produced higher yields.

Results obtained with the Plant Root Simulator probe (PRS™; www.westernag.ca) showed that the kinds and amount of nitrogen initially available to the crop varies with the amendments. The amendments also supplied varying quantities of other nutrients such as phosphorus, potassium, and sulphur. It is therefore likely that blending different amendments will be the best approach to managing crop nutrition.

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Technology Development Program of the NS Department of Agriculture and Fisheries, and the Natural Sciences and Engineering Research Council (NSERC)

Integrated Nutrient Management for Organic Dairying in Ontario

The production characteristics and economic performance of organic dairy farms in Ontario has been documented, the efficiency of nutrient use on these farms is less well understood. Recent European research suggests organic dairying systems may be prone to phosphorus (P) deficiencies in the long term, and there is a need to evaluate whether such trends might be important on Canadian farms. The project commenced in 2003 on fifteen long term (>10y) organic dairy farms in Ontario. Project objectives include;

1. To model whole farm nutrient (NPK) mass balances (imports-exports) on Ontario organic dairy farms and compare with conventional production systems.
2. To examine current status and historic trends in soil fertility on Ontario organic dairy farms and its relationship to farm nutrient balance and livestock nutrient management.
3. To characterize the distribution, form and dynamics of P in soil as affected by production system.
4. To evaluate local sources of phosphate rock, as alternative sources of soil P inputs.

Data from soil sampling of all farm fields, indicated soil test (0.5M $NaHCO_3$) P levels were low to very low (<10ppm) on over 60% of all 225 farm fields tested. Annual farm nutrient (N, P, K) balances are being determined for each of 3 years. In year 1, average farm P surpluses (2.8 kg ha yr^{-1}) were low. Plot research trials were established at three farm sites to assess the ability of two Ontario (Carbonatite, Volcanaphos) and three imported phosphate rock (PR) sources (Calphos, Tennessee PR, and Pebbled PR) to supply P to a green manure (buckwheat) and following crop, when applied at 100, 400 and 800 kg P ha^{-1}. PR materials contained from 1.4 to 16.8% total P, and little (<0.1%) extractable P. Over 7 weeks buckwheat growth in 2004, increased yields and P uptake was most evident for Calphos treated plots. Additional research will examine mechanisms to improve solubility of un-acidulated PR materials in these alkaline soils.

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New Directions in Agri-Food and Rural Research Program of the Ontario Ministry of Agriculture and Food.

Vermicomposting Development for Organic Farms

Vermicomposting, or composting with worms, is becoming recognized as an effective means of recycling organic wastes. The worms initially break down organic matter through their digestion process and make it easier for microbes to finish the job of composting the material. Vermicomposting has also been shown to produce a variety of plant growth promoting substances that are not produced in the normal composting process. These positive characteristics suggest that the vermicomposting warrants further investigation and testing as an option for organic farms. Therefore, the OACC has initiated a vermicomposting research program that includes growth room, laboratory, and field trials. We are using farm manure from two different sources, each of which will be split into the following treatments: (a) regularly composted manure; (b) vermicomposted manure; (c) a blend of regular and vermicomposted manure; and (d) a mixture of vermicomposted manure and shredded cardboard.

The nutrient supplying potential and the growth of lettuce in response to vermicompost and compost of the same substrate was tested in a greenhouse experiment. Vermicompost and compost were prepared from the same manure source, using either a beef manure or a dairy manure. For the beef manure, an additional treatment of a 75:25 (vol.) ratio of shredded cardboard fibre: manure was vermicomposted. Treatments were applied at rates of 1.25% and 2.5% on a dry weight basis to both an impoverished sandy soil and fertile loamy soil. Lettuce yield and nutrient uptake (for the 2.5% rate only) were measured. Handled in the same manner, soil nutrient supply rates were measured over a 75 day period using ion exchange membranes in a separate set of pots. Vermicompost generally produced higher lettuce yields and supplied more nitrogen, phosphorus, potassium, sulphur and magnesium than compost. Compared with composting and considering the total amount of nitrogen in the amendments, vermicomposting did not increase soil nitrogen availability when applied at a 2.5% rate. There was no added benefit from mixing composted manure with vermicomposted manure. Vermicompost produced from the cardboard: manure mix did not improve lettuce productivity, and would reduce productivity if applied to a nutrient deficient soil.

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Funding for this research was provided by the National Research Council's Industrial Research Assistance Program (IRAP), the Nova Scotia Green Municipal Enabling Fund, and EcoAction Canada.

Crop Rotation and Soil Erosion Risk in Organic and Conventional Systems

A criticism of organic farming systems is that they increase soil erosion through greater use of tillage. Crop rotations can ameliorate many agronomic problems in farming systems, and organic systems generally have different crop rotations than conventional systems. The objectives of this study were to compare crop rotations and how they affect erosion risk on organic and conventional systems within the Canadian provinces of AB, SK, MB, ON, PEI & NS.

A mail-out survey was used in 2003 to collect data on soil conservation, crop rotation and tillage practices from farmers in the study provinces. As well, soil was sampled from three long-term rotation studies (Lethbridge, Scott and Glenlea) and farm pairs to compare wet and dry aggregate stability, as well as organic C content on organic and conventional systems.

225 surveys were returned (23% response) from farmers with conventional, organic, or both organic and conventional production. 60% of all respondents said they practiced reduced tillage; however, significantly more conventional farmers used no tillage. A significantly larger proportion of organic farmers had forages in rotation.

Soil samples were collected from the three long-term studies in the fall of 2003 and spring of 2004. The Lethbridge trial yielded no significant results. At Glenlea, with a moist climate and clay soils, the organic systems were found to have lower organic C than the conventional systems. Despite lower organic carbon levels, the organic systems showed greater resistance to water erosion. At Scott, where the climate is drier than Glenlea and the soil has a loam texture, the perennial-containing rotation resulted in higher organic C levels than the annual-only or biennial-containing rotations. The rotations containing biennials lent greater structural stability to the soil at both Glenlea & Scott.

Soil samples were also collected from paired organic and conventional farms in the spring of 2004. The results from these soil analyses will be available by May 2005. Thank you to all the farmer participants and researchers who allowed me to collect soil samples and production information. Their time, effort and interest in this project is greatly appreciated.

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Funding:
Natural Sciences and Engineering Research Council
Organic Agriculture Centre of Canada
Canadian Organic Growers
University of Manitoba

Fertility and Weed Management in Organic Highbush Blueberry Production

The Nova Scotia highbush blueberry industry, because of the late season harvest, commands a significant niche on the N. American fresh market, with additional export markets for fresh and frozen product in Europe. Organic highbush blueberry production is recognized as a significant market opportunity for the industry both in Nova Scotia and in the US and Europe, with buyers in these markets regularly requesting certified organic product. A significant hurdle to cost effective organic highbush blueberry management, however, is the labour costs associated with in-row weed control. Thick mulches in-row can provide weed suppression, improved soil tilth and water holding capacity, reduced temperature fluctuations, improved root distribution, and if well formulated, slow-release N. Commonly used mulches include weathered sawdust, wood chips, chipped brush or acidic peat moss. Difficulties in estimating N availability under mulched systems using composts, has led to over fertilization in some organically managed highbush blueberry systems, however, with deleterious impacts on crop yield and quality. Few studies have examined in an integrated manner weed pressure, and efficiency of crop N use, when diverse organic amendments are applied as heavy mulch, under irrigated highbush blueberry production. The project, which will commence in 2005, has as its objectives:

(1) To assess the use of PRS™ (anion/cation) membrane probes as an index of plant available N in highbush blueberry production, and as a decision support tool for determining split N applications

(2) To evaluate the benefits with respect to efficiency of crop N use, reduced leached N losses, and weed management, of a range of in row organic amendments/mulches (including commercial and on-farm composts, pelletized poultry manure, and sawdust, alone or combined in mixtures) when compared with standard inorganic N fertilizer (ammonium sulphate) application.

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Natural Sciences and Engineering Research Council (NSERC), Industrial Postgraduate Scholarship (IPS) Program.

Evaluating Flax performance in the Maritimes

Canada is the world leader in flax production with over 750,000 tonnes produced in the prairie region (approximately 40% of global production). The agronomy of flax production is well understood as a result of extensive flax research and development conducted in Saskatchewan and Manitoba. Despite the limited presence of flax in the Maritime Provinces, research has shown that the crop can be grown here with comparable results to that in Western Canada. Our objective with this project was to demonstrate the potential of organic flax production for the Maritimes.

We selected two varieties of flax, CDC Mons and Hanley, to investigate the potential for organic flax production in Nova Scotia. Both varieties were sourced from Manitoba and were chosen for their above average lodging resistance, high oil quality and disease resistance. Yield and weed competition in the two varieties was measured in response to planting date an early or late planting date, and intercropping with wheat (AC Helena) or no intercropping. The early seeding date was May 13th; this included a disking operation on May 7th and an s-tining on May 12th. The late seeding date was June 1st ; in addition to the disking on May 7th and s-tining on May 12th this treatment was also disked and s-tined on the day of seeding.

Initial data indicated a higher flax and wheat density at the later planting date. The Hanley variety had a higher density than CDC Mons, and was maturing at a slightly faster rate. The annual weed population was higher at the early seeding date.

Flax yield of the individual plots without wheat intercrop ranged from 0.44 t/ha to 1.75 t/ha depending on treatment. Very low yields were observed in plots with high couch grass competition. Overall, the wheat intercrop reduced flax yields by approximately 40%, however total yield of flax and wheat was comparable to total flax yield in plots not intercropped. Late seeding of flax produced comparable yields to early seeded flax which is possibly due to benefits of additional weed control. There were negligible differences in yield between the flax varieties overall. Flax quality has not yet been determined.

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New Flax and Lupin Trials in Nova Scotia

Flax and lupin may present new market and feed opportunities for organic growers in the Maritimes. Farmers need to get excited about the potential for grain production. In a sense, neither flax nor lupins are new to Nova Scotia. The Acadians grew flax 400 years ago, primarily for fibre. Since that time the market for flax has grown considerably due to research conducted on the human and livestock health benefits of flax in diets. Organic farmers have an interest in flax not only for its potential market but for its low nitrogen requirements. In the early 90's Dr. Gary Atlin at the NSAC found that flax could be grown successfully in the Maritimes, with yields reaching as high as 3 Tonnes/ha; roughly 3 times the average prairie yield with comparable quality. Weed control was identified as the primary determinant of flax yield. Late flowering, and the resulting potentially lower seed weight, was an additional challenge.

One of the biggest constraints to growth of an organic dairy industry in Nova Scotia is finding an allowable high protein feed. At the same time, there is a growing market for an organic protein source for hog production in Europe. Lupins offer great potential for both of these markets. The advantages of lupin include their excellent feed (protein) potential, frost tolerance, high nitrogen fixing potential, soil improvement and increased available phosphorus. Disadvantages included long growing season requirements and susceptibility to hot conditions during flowering, weed competition, and to pathogens and insects. There are three lupins of agronomic potential, sweet white lupin (*Lupinus albus)* narrow-leafed (or blue) lupin (*L. angustifolius*) and yellow lupin (*L. luteus*). Sweet white lupin has primarily been grown and studied in Canada and the northeastern U.S.A. Lupins were grown in the Maritimes in the late 1980s and early 1990s with yields in order of 3 T/ha, but were dropped because of late maturity and inconsistent yields. However, production in Australia and much of Europe consists primarily of narrow-leafed lupin. New varieties with better disease resistance and shorter growing seasons have been developed.

We will be establishing variety trials for flax and lupin at Brookside and on two farms over the next two years, to re-evaluate their potential in Nova Scotia.

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Howard Selig, Valley Flax Flour, NS
Todd Grant, Speerville Mill, NB
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Beth McMahon, ACORN, Atlantic Canada

Funding:
Nova Scotia Department of Agriculture and Fisheries, Technology Development Program

Field Pea and Cereal Mixtures for Organic Feed Production

Meeting the farm's requirement for high protein feeds continues to be one of the biggest challenges for organic livestock production. Peas can be used as a protein source on organic farms, and when grown for livestock feed can be grown alone or in combination with cereal crops. Growing field peas in mixtures may have certain agronomic advantages such as improved pest and weed control, improved use of nutrients, light, and water, and reduced lodging in comparison to peas grown in monocrop. However, in Atlantic Canada there are currently no recommended pea varieties, since peas have largely been replaced by soybeans, which remain difficult to produce organically. In 2003 and 2004, oats (Nova), barley (Westech), two pea varieties (Carrera, Miami) and a line (746-3) selected at NSAC, were grown on small plot trials in monocrop or in two- or three-way intercrop mixtures at the OACC/NSAC site in Brookside, NS and the AAFC site in Harrington, PEI. In mixed crop treatments, peas represented an average of 12%, 22% and 42% of the seeds present at seeding. A subset of the mixtures and two additional pea varieties (Mozart, Lenca) were evaluated on six Maritime farms in both years.

At Brookside and Harrington, barley and oat monocrops yielded between 2 to 3 t ha^{-1}, whereas the yields of peas alone or in mixtures ranged from 3-4 t ha^{-1}. Weeds were effectively managed through pre- or post emergent finger weeding. Among pea monocrops, there was a trend for greater protein content (~25%) and lower lodging for line 746-3 compared to Miami and Carrera. While oats or barley moncrops contained less than 12% protein, mixed crops protein content ranged from 15% (3-way mixture, 12% as peas at seeding) to over 20% (2-way mixture; 22-40% as peas at seeding). However, lodging was consistently severe when peas in the seed mix were present at 22% or greater during seeding. In on-farm trials, protein benefits (>15% protein) from pea mixtures were obtained when target pea content of the stand (15%) was achieved. Failure, on some farms, to consistently achieve this crop protein target was linked to challenges related to seedbed preparation and seeding.

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Funding:
Funding for this project was provided by the NB Department of Agriculture, Fisheries and Aquaculture, the PEI Department of Agriculture and Forestry, and the NS Department of Agriculture and Fisheries.

The Competitive Ability of Spring Wheat under Organic and Conventional Management in North Central Alberta

Height and tillering capacity are commonly cited traits of cereal crops that are competitive against weeds. In addition, farmers and researchers have theorized that older or 'historical' wheat varieties selected before the advent of chemical pesticides and fertilizers are possibly better suited to organic production and more competitive against weeds. Two trials were carried out in order to test these hypotheses.

The 'competition' trial was conducted at one organic and one conventional site in Edmonton and at a certified organic farm in New Norway, AB in 2003 and 2004. Nine spring wheat varieties differing in height and tillering capacity were evaluated for their performance with and without weed pressure under organic and conventional management systems. In this same trial, the effect of seeding rate on the reduction of in-crop weeds was also studied.

In the 'historical' trial, we looked at the performance of 32 historical wheat varieties on organic and conventional land. We tested 32 different Canadian spring wheat varieties released between 1885 and 1999 at both organic and conventional sites in Edmonton, Lacombe and New Norway, AB in 2002, 2003 and 2004.

Results from the 2003 'competition' trial indicate that doubling the seeding rate of wheat was effective in increasing yield and suppressing weed biomass. Tillering capacity was found to be correlated with grain yield and tame oat biomass at all locations, thus tillering capacity may be an indicator of competitive ability in wheat. The variety CDC Go out-yielded all other varieties at all locations. All other data from this experiment and from the 'historical' trial are currently being analyzed. Thesis and final report will be out in 2005.

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Collaborators:
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Funding:
Funding for this research was provided by a Canadian Wheat Board scholarship and a Natural Sciences and Engineering Research Council (NSERC) Discovery grant. Funding for summer students was provided by the OACC throughout the duration of the project.

Management and Competition Effects on Crop and Cultivar Mixtures with Wheat

The utilization of crop mixtures is a strategy used most often in marginal areas, usually to ensure some yield is obtained where a monoculture crop may fail. Various crops take advantage of different spatial and temporal niches so that competition may be decreased, making companion cropping particularly appropriate for organic practices. Few studies have occurred on crop mixtures in organic systems in Canada, but with society's increasing awareness of where its food comes from, these cropping alternatives are on the rise.

We developed two experiments to examine the use of wheat in crop and species mixtures:

1. Growing two cultivars of spring wheat (var. McKenzie and Park) in mixtures with one variety each of barley (var. BT562), oats (var. Grizzly) and triticale (var. AC Alta). The species were mixed in 1:1, 1:3 and 3:1 ratios and grown in three locations: conventional and organic land on the Edmonton Research Station and on a certified organic farm located ~100km southeast of Edmonton.

2. Growing one tall (var. 5600HR), one average (var. AC Intrepid) and one semi-dwarf (var. Superb) spring wheat variety in two- and three-component mixtures. This experiment was grown on the same three locations as the cereal species experiment. Monoculture plots of all varieties were included in the experiments as checks.

Both experiments had an introduced weed, oriental mustard (*Brassica juncea*), seeded over one half of each replication to ensure a base level of competition in half of the plots. Under conventional management, the mustard ended up being the only significant weed present, but under both organic regimes heavy weed pressure was present in addition to the imposed competition. We have taken all agronomic data, including yield, height, weed pressure, yield components, etc. but most data have not been analyzed yet.

Preliminary results from the wheat cultivar experiment show that imposed weed competition significantly decreased crop yield regardless of management regime. Under drought stress, organically managed plots yielded more than conventional plots, perhaps due to higher soil organic matter content and moisture availability. The semi-dwarf variety Superb had the highest yield under both management regimes, but on average, a 1:1:1 mixture of all three wheat cultivars yielded the similar to Superb under all conditions.

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Funding:
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Yield and Weed Response to Seeding Rate on Organic Farms

Organic producers have been known to increase the seeding rates above the conventional rates. At a higher seeding rate, the grain is expected to make more efficient use of resources and become a stronger competitor with weeds. The objective of this research was to determine if higher seeding rates for spring wheat can reduce weed competition in without affecting crop yield and quality.

We tested 5 treatments on small plots in Brookside NS: a control with no seed; a normal conventional rate; and then 1.25x, 1.5x and 2x the conventional. After two field seasons, we can say with some certainty that increased seeding rates did indeed reduce weed competition. In 2003, we had intense weed competition, especially in our fertilized plots. 2004 brought a higher yielding stand with fewer weeds overall, although still enough to be a good test of seeding rate. In both years, wheat yield increased slightly at higher seeding rates and weed biomass was reduced. Grain protein content was unaffected by seeding rate, but was higher in the fertilized plots. Also, the fertilized wheat plots had higher weed pressure, especially notable at the low seed rates. Grain from the fertilized plots was lighter and had a lower test weight, indicating that grain filling may have been affected by weed competition or higher disease pressure.

On-farm trials were also conducted across Canada in 2003 and 2004. The effects of different seeding rates on crop density and biomass production, yield and grain quality and weed competition were measured. Although 13 farmers on the prairies and 3 farmers in Ontario participated in 2004, the weather did not cooperate for many producers on the prairies. Crops were slow to mature due to high precipitation and low temperatures, making them susceptible to damage from early frost. Farmers were unable to get into the fields in the spring and early summer to conduct their normal mechanical weed control. Detailed results should be available in the spring of 2005. A big thanks goes out to all the producers who participated in the trials, they are the key to successful research.

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Funding: Natural Sciences and Engineering Research Council (NSERC)

Seeding Rates for Green Manure Crops

Legume green manure crops that are grown to feed the soil are a valuable summerfallow replacement. They can increase soil nitrogen, reduce erosion, increase organic matter, and reduce weed pressure. However, they can be costly to produce and may also use valuable soil moisture.

We compared Indianhead black lentil, AC Green Fix chickling vetch, and Trapper pea as green manure crops at different seeding rates, with or without weeds. Weeds reduced the biomass for all green manure species. At higher seeding rates, green manures competed better with weeds, producing more green manure biomass and less weed biomass. Pea was most competitive, and lentil least.

Water use did not differ among green manure species, even though pea produced more biomass than lentil or chickling vetch.

Greater biomass nitrogen accumulated where there was greater biomass. Nitrogen concentration was similar for the various green manures, and for green manures and weeds.

Optimal seeding rates for the conditions of this experiment were calculated using marginal cost analysis. This was based on the amount of nitrogen that a green manure would contribute to the subsequent crop, the value of that nitrogen in terms of crop yield, organic crop prices, and the cost of the green manure seed. Optimal field pea densities were calculated as 45-60 plants per m2 (without weeds) or 50-80 plants per m2 (under weedy conditions). Similarly, black lentil optimal densities were 180-220 (without weeds) or 220-300 (weedy conditions). Chickling vetch, because of its large and expensive seed was only profitable assuming greater nitrogen contributions. Optimal rates were 20-30 plants per m2.

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Funding:
Agriculture Development Fund, Saskatchewan Agriculture, Food and Rural Revitalization

Improving Phosphorus Availability through Green Manures

Phosphorus deficiency has been noted repeatedly on organic farms. It has the potential to severely limit organic production across the prairies. Viable alternatives for phosphorus management provide the key to long term sustainability of the organic farming option. Conventional producers wishing to reduce their fertilizer inputs can benefit from realistic options for nutrient replacement. Our studies will provide information for all producers to make effective decisions on nutrient management. The objective of this study was to determine ways to increase phosphorus availability through the use of green manure crops, composted manure, and rock phosphate.

Green manure crops of buckwheat, berseem clover, mustard, oat, and a pea/faba bean mixture were established in plots on two organic farms and on the Glenlea organic research plots. Despite a difficult year, green manures established well, though one site also had a substantial population of wild oats. Soil, weed and green manure samples were taken at all sites. Soil and green manure were assessed for nutrient content; weed and green manure biomasses were measured. Data are still being analyzed.

Green manures were incorporated in 2004. In 2005 we plan to seed a common test crop across all treatments at a site (potato at the Kroeger farm, and flax at the other sites). Some plots will receive phosphorus sources such as composted manure or rock phosphate and *Penicillium bilaiae*. We will measure soil nutrient status and tissue phosphorus and the yield of the test crop. This will allow us to see if the various green manure options improved the phosphorus status of the soil or the subsequent crop.

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Funding:
Agri-Food Research and Development Initiative, MB

Improving Phosphorus Availability through Mycorrhizal Amendments

Soils on organic farms typically indicate that plant available phosphorous is at "deficient" levels for available phosphorus. Phosphorus that is not plant "available" in a soil test may be made "available" through the microbial community, particularly the mycorrhizal fungi that extend the ability of the plant to search the soil for phosphorus as it is released from the organic matter or soil matrix.

Mycorrhizal communities may be enhanced through reductions in tillage, through increases in soil organic matter, and through the use of crops and green manures that sustain them. Mycorrhizal innoculants are also available.

The objective of this study was to determine the efficacy of a mycorrhizal input to increase mycorrhizal colonization and phosphorous uptake. Plots were established at two organic grain farms near Brandon, MB. Treatments included Myke, a mycorrhizal product; rock phosphate; Myke plus rock phosphate; and Myke plus *Penicillium bilaiae.* Plant samples were taken 6 weeks after seeding for analysis of phosphorus and mycorrhizal colonization. Samples are currently being prepared.

Extreme conditions in Brandon this year, excess moisture and reduced heat, resulted in delays in seeding and in crop maturity. Although the crop was not harvested in 2004, it is our hope to plant a common test crop across treatments in 2005, to again measure tissue phosphorus and mycorrhizal colonization a year after treatment.

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Evaluating Cover Crop Mixtures in Alberta

Cover crops are used to reduce erosion, improve soil quality, and manage weeds, insects and diseases. Currently there are few recommended cover crop options for producers. Our goal was to screen a variety of cover crops for their ability to perform well under Alberta conditions. This was done at Lethbridge and Edmonton.

Important features of a good cover crop include the ability to build high quality soil, compete well with weeds, and provide diversity that deters the buildup of diseases and insects. Some producers will also consider the grazing potential for cover crops, either in spring or fall.

In 2003 we seeded 15 mixtures that included a legume for nitrogen fixation (pea, hairy vetch, sun hemp, cowpea, lentil, phacelia, faba bean, crimson clover, Persian clover, subterranean clover, woolypod vetch, chickling vetch, white lupin), a cereal for rapid biomass accumulation (oat, sorghum-sudan grass), or another species we felt had properties that might add to the mix (buckwheat, oilseed radish, chicory).

Cover crop growth and quality were measured in 2003. At harvest, the mixtures were cut and left on the soil surface. This year we seeded the plot area to spring wheat. Soil and plant communities were assessed on 5 of the mixtures.

The results to date demonstrate the differing growth potential of the legumes, in particular, between precipitation zones. The legumes that established and performed well at both locations were: woolypod vetch, chickling vetch, subterranean clover and black lentil. Few differences were noticed between wheat yields on plots that followed different cover crops. Presently work is being completed on mycorrhizal colonization, microbial community and N and C mineralization for the first year wheat rotation following the cover crops.

In a related study, 19 potential cover crops were evaluated under dry land and irrigated conditions at Lethbridge. Species that produced good cover under both conditions included black lentil, buckwheat, chickling vetch, cowpea, sorghum, winter peas and woolypod vetch. Additional species that performed well under irrigation included chicory, crotalaria, hairy vetch, medic, phacelia, and subterranean clover.

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Funding:
Organic Agriculture Centre of Canada (OACC)
Alberta Food and Rural Development.

Rotary Hoeing for Weed Control in Pulse Crops

This study was conducted at the Scott Research station in Saskatchewan to determine the optimum timing for using a rotary hoe, and the number of passes that would maximize weed control and minimize crop injury.

A minimum till rotary hoe was used on three crops: chickpea, lentil and field pea. Hoeing was done using 0 to 6 passes, at 5 different growth stages: pre-emergence, ground-crack, 5-node, 8-node, and 11-node. The hoeing was done under weedy and weed-free conditions.

All crops were direct seeded into standing stubble. Even after 6 passes with the rotary hoe, surface crop residue was maintained. Field peas were hoed throughout all the growth stages and showed no change in yield. The lentil and chickpea treatments had higher yields when hoed at later stages than when hoed at early stages. In the absence of weeds, two passes of the hoe reduced crop yields.

Lentil plant densities declined as the number of passes with the hoe increased, while field pea and chickpea densities remained relatively stable.

Weed control with a rotary was variable. Wild mustard control was best when hoeing occurred early. Two passes with the hoe prior to the crop being in the 5 node stage gave best wild mustard control. Hoeing had little impact on wild oat density or biomass at any crop stage.

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Funding:
Pesticide Risk and Reduction Program

Adventures in Finger-weeding

Weed control is a big challenge facing organic farmers. Along with using clean seed, most organic farmers have adopted good tillage and rotation practices to get ahead of their weeds. I've been told that "timing is everything" when finger-weeding. But what is the right time? Do you base it on your crop stage, weed stage, or soil conditions? A loose moist seedbed with sunny and dry conditions works best for killing weeds. We have found that a pre-emergent finger-weeding can be very effective. We finger-weeded the soybean crop when the shoot was a good inch below the soil surface and the weeds were at the cotyledon emergence stage. At this stage the weeds are extremely susceptible, but barely visible (you can't see them from your tractor seat). We had 83% weed control with one pass of the Lely finger-weeder and 91% control with two passes.

After much debate we decided to finger weed potatoes. We finger weeded our potatoes twice, once when they were just sprouting (weeds at cotyledon stage) and again when 2 or 3 leaves had emerged (weeds at 1-2 leaf stage). With a single pre-emergent pass we had 83% weed control (in-row), with pre and post-emergent passes there was 87% control. With more control of weeds and no damage to the potato with the pre-emergent pass, it is recommended to repeat it at least once or twice.

We finger-weeded our peas just after they emerged; the weeds were at the cotyledon stage. We had 92% weed control with a one pass of the Lely weeder, with only 3% damage to the pea crop.

Flax is known to be a difficult crop to finger weed and so the weeder was set to be less aggressive. We found that if finger-weeding was done too early the flax plants (2.5 – 3 cm tall) were buried and couldn't recover (34% losses, 57% weed control). Too late (flax 10 cm tall) and the weeds (at the 3 leaf pair stage) are too big to get effective control (7% flax loss, 34% weed control). We had the best luck finger-weeding when the flax was 5 cm tall (9% flax loss, 54% control).

In summary, finger weeding strategies vary by crop and soil conditions, however, whatever you can do to get the crop growing ahead of the weeds will not only make finger weeding more effective but will give your crop an advantage. To get the upper hand here is what we are trying:

- till just prior to planting
- use a seeder with an in row packer as opposed to pulling a general packer behind the seeder; only packing the rows results in firm soil around plant, loose soil around weeds
- do pre-emergent passes if possible (the longer you wait the firmer the soil will be and the more aggressive your weeder will need to be)
- don't let the weeds get beyond the 4-leaf stage
- on potato hills, do at least 2 pre-emergent passes; the tines spread out on the hill and therefore are less effective with one pass.

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Post – Emergence Harrowing: On- Farm Trial

During most growing seasons post emergence harrowing can be an effective way to reduce weed populations in some crops. This year was very difficult as it rained so much throughout the months of May, June and July that most farmers were barely able to get their crop in the ground. This meant there was very little opportunity to harrow prior to or post emergence.

In 2003 OACC had nine producers participate in the harrowing trials; this summer (2004) we had only 3 producers. Participation was low due to weather conditions and would have been much higher had the weather allowed for more field work. Although the trial was conducted this year the results are difficult to see as it rained so much throughout the season, both the crop and the weeds did well whether they were harrowed or not.

In total 5 fields of cereals and flax was monitored. The format for the trial remained the same as in 2003 with producers agreeing to leave a strip that was not harrowed. During the months of July ad August weed samples were collected from all the fields in both the harrowed and not harrowed sections. Actual crop plants were also counted in both sections. Prior to harvest we completed the trial by collecting crop samples from the harrowed and not harrowed areas of the field. These samples were then thrashed to find yield differences. Based on the limited number of fields studied for this trial and the high precipitation we feel the results may not be very accurate and therefore will add them to last years data. By running the trial another couple of years it is expected that more concrete results will occur.

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Post Emergent Harrowing of Field Peas

This study focused on post emergence harrowing of field peas at the Scott research station. The purpose of the test was to identify optimum timing, the number of passes and level of soil disturbance to maximize weed control and minimize crop damage

The field peas were harrowed at 3 different stages: 5 nodes, 8 nodes and 11 nodes. The harrow was set at 3 different soil disturbance levels: low, moderate and high and the number of passes with an Einbock flex-tine harrow varied from 0 to 6. The treatments were applied to field peas in both weedy and weed free conditions.

The field peas showed great tolerance to harrowing at all crop stages as reflected by maintenance of plant stands and crop yields. The disturbance setting had a much higher influence on both plant densities and crop yield. Plant densities were maintained at the low disturbance setting, but declined even after one pass at the moderate to high level of soil disturbance. It was found that field pea yields tended to decline after 2 passes and was most evident at the high soil disturbance setting.

Harrowing as a weed control depended on the stage of growth and type of weed present. Wild oat biomass was lowest when harrowing was done early (5 node stage) and the field pea yields tended to be highest when harrowing was performed during this time. Harrowing had a minimal effect on wild mustard due to low densities. The highest soil disturbance setting reduced wild mustard density, wild oat density and biomass, but had no effect on wild mustard biomass.

Wild mustard and wild oat biomass were significantly lower after 2 to 3 passes of the harrow. It was found that two passes with the harrow resulted in significantly higher yields than the untreated check. Additional passes were found to have no benefit. When the peas were in later stages of growth the highest yields were achieved through high aggressive harrowing. During the early stages of plant growth the highest yields were achieved through moderate levels of soil disturbance.

Based on the first year results, it was determined that field peas should be harrowed at an early stage (5 total nodes or 3 above-ground nodes) using 2 to 3 passes with a setting that results in a moderate level of soil disturbance (about 65 to 70% crop burial).

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Funding:
Pesticide Risk and Reduction Program

Assessing CPB control options and N fertility in Organic Potato Production

Organic potato producers have access to a limited number of options to control the populations of Colorado potato beetles in their crop. The bacterial insecticide Novador has been a key product over recent years but was being eliminated from approved organic input lists when this project was undertaken. It was necessary to assess the efficacy of a replacement insecticide, Entrust. In potato production in general but especially in organic production, it is also important to understand potential interactions between N fertility, plant development, insect population dynamics with their potential consequences for the use of insect control products. The project, undertaken in 2004 on a transitional organic site at AAFC Fredericton, had three objectives:

1. Compare the efficacy of a potential organic insecticide (Entrust) to a bacterial insecticide (Novador) and to no insecticide,

2. Test the hypothesis that healthy, vigorous (well fertilized) plants have a better tolerance of insect pests such as the CPB

3. Compare the effect of three levels (0, 150, 300 kg total N ha^{-1}) of organic fertilization (Nutriwave 4-1-2, Envirem Technologies, Fredericton, NB) on potato yield and plant biomass.

The high rate of organic fertilizer was required to produce significant marketable yields. The efficacy of the insecticide Entrust at controlling a low density population of Colorado potato beetle in an organic production setting was shown to be similar to or better than Novador. It was possible to produce three levels of potato crop/plant health (measured as plant height and plant canopy) by manipulating fertilization levels. The hypothesis that healthy, vigorous plants have a greater tolerance to insect pests such as the Colorado potato beetle was not fully assessed because of the unusually late colonization and very low beetle density. Insect control treatment (Entrust applied at 1.5 oz/acre and Novador at 6 L/ha) were not required until July 20th. However, data from weekly counts (taken from June 29th –August 21st) of abundance of CPB adults, egg masses, and larvae suggested that plant health affects the timing of the different potato beetle life stages and therefore the timing for the application of the insect control measures. It is hoped to repeat this study in 2005, under conditions of greater beetle abundance.

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Funding:
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Nitrogen Dynamics in Organic Processing Potato Production

The increased demand for organically produced potatoes suitable for the processing market, and availability of approved soil amendments, may change the intensity of nutrient use in organic potato production. Potato yield benefits from compost application have also been linked to improved soil moisture retention. A study conducted in 2003 and 2004 at Brookside, NS and Kentdale Farms, PEI, examined crop response and nitrogen dynamics under organic potato production as affected by contrasting organic amendments. A commercial compost and a pelletized dehydrated poultry manure product were applied at 300 and 600 kg total N ha^{-1} to potato variety Shepody and selection A90586-11 (from McCain Produce Inc). Soil N dynamics were monitored using standard soil and petiole sampling techniques, recovery of whole plant samples at top kill, and N absorbed on anion/cation exchange Plant Root Simulator (PRS™) probes (www.westernag.ca) placed *in situ* in root exclusion cores until hilling. Soil mineral N (ammonium and nitrate) was also measured at harvest.

Crop yields and crop N recovery was not affected by potato variety. In un-amended plots, relatively high tuber yields (26.5 ± 5.3 t ha^{-1}) and crop N recovery (120.3 ± 28.2 kg N ha^{-1}) was reflective of the long rotations (4-yr +) characteristic of organic potato production. Poultry manure, at the lower rate only, consistently increased yields (+ 4.9 t ha^{-1} avg.) in both years. These yield gains were matched by the high rate of compost applied in 2004. Poultry manure increased tuber N concentration and decreased tuber specific gravity. Crop recovery of N applied in compost and manure ranged from –1.3% to 1.2% (compost) and 18.2 to 25.4% (manure). Nitrate remaining in soil after harvest was below regional averages (~60 kg N ha^{-1}) for residual soil nitrate following potatoes, except for manure applied at 600 kg total N ha^{-1}. At all sites, mineral N sorbed on PRS™ probes reflected N released by organic amendments, and was strongly related to seasonal crop N uptake, whether buried for 3 or 30 days after planting (R^2 = 0.96 and 0.99, respectively). Given current premiums for certified organic potatoes, enhancing yields through application of organic amendments appears warranted. PRS™ probes may be an effective tool to address the uncertainty associated with N availability from soil and amendments, and avoid the risks to crop quality and the environment associated with excessive N supply.

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Funding:
Funding for this project was provided by the PEI Department of Agriculture and Forestry and the NB Department of Agriculture, Fisheries and Aquaculture.

Alfalfa Mulch for Fertility and Weed Management

Alfalfa is well known for its ability to fix nitrogen and in established swards, to choke out weeds. Strip farming is an option for adding alfalfa hay directly to grain crops, to receive the benefits of alfalfa in other crops on the farm.

Strip farming involves growing alfalfa and annual crops in alternating strips in a field. The mulch harvested from the alfalfa strips in applied to the grain crops. In time, alfalfa and grain strips are rotated. The goal of this study was to determine if alfalfa could be used for nitrogen fertilizer and weed control in spring wheat.

Alfalfa was harvested with a flail mower, and applied to wheat either before emergence or at the 3-leaf stage, at field trials at Winnipeg, Carman, Clearwater and Kenton, MB. The amount of alfalfa applied to a wheat plot was the amount of alfalfa that would grow in a plot half that area, the same area or twice that area.

Compared to control plots without alfalfa, the wheat with alfalfa mulch were darker green, indicating higher nitrogen content. When wheat received alfalfa at 2x the alfalfa, it yielded almost twice the amount of wheat in control plots.

Weeds were present in higher numbers in plots where low mulch rates were applied. It seems that low levels of mulch improved the conditions for weed establishment. Compared to controls, high mulch rates suppressed weeds.

Soil moisture in the top 10 cm was highest under the highest rate of mulch. The mulch appeared to reduce evaporative loss of soil moisture.

This study demonstrated that application of alfalfa mulch to spring wheat is a successful way to extract value from alfalfa hay. Both timings of application were successful. As alfalfa rate increased, wheat yield increased, mainly as a result of mulch-supplied nitrogen.

If practical methods of field scale application can be developed, alfalfa mulch could be an opportunity for organic grain farmers to capture the soil building benefits of alfalfa.

Researchers:
Matthew Wiens (Graduate student), Dept. of Plant and Animal Sciences U of M, MB
Martin Entz, Dept. of Plant Sciences U of M, MB
Andy Hammermeister, OACC, Dept. of Plant and Animal Sciences, NSAC, NS
Ralph Martin OACC, Dept. of Plant and Animal Sciences, NSAC, NS

Funding:
Provided by the Natural Sciences and Engineering Research Council

Organic Amendments for Strawberries and Half-High Blueberries

There is a growing interest among consumers in organically produced fruits and berries. To help producers meet this growing demand, there is a need for more scientific research on specific aspects of small fruit production. This three-year study will help provide information on the feasibility of using organic amendments in place of chemical fertilizers in strawberry and blueberry production. The field experiments were initiated in May 2002, at Boutilier's Point near Halifax, NS, on a Gibraltar brown sandy loam soil. The four organic amendments (alfalfa meal + rock phosphate + wood ash; Lunenburg municipal solid waste (MSW) compost; yard waste, manure, and food waste compost (YMFC); and ruminant compost) will be compared with chemical NPK fertilizers. The amendments will be applied to give equivalent amounts of total N, with N availability from the organic amendments assumed to be 25%. The effects of the treatments on crop nutrition, soil fertility, and crop yields in three strawberry and two half-high blueberry cultivars will be evaluated.

The Ruminant compost had a strong (K) and mild effect (P and Mg) on extractable soil nutrients and leaf nutrients in strawberry cultivars. The Ruminant compost also had a strong effect on soil extractable and leaf K levels in half-high blueberry cultivars. The fruit yield was not affected by the treatments in strawberry or half-high blueberry. Therefore, the Ruminant compost treatment provided equivalent amount of plant essential nutrient compared to chemical fertilizer treatments in strawberry and half-high blueberry. The MSW compost application produced the highest level of extractable Na in all cultivars, and the chemical fertilizer treatment gave higher levels of extractable soil sulphur in both strawberries and blueberries. Results for 2003 show that there was no significant difference between the treatments, in respect to the yield of strawberries. However, the half-high blueberries did not produce a consistent yield and there was non-uniform ripening of fruits.

Researchers:
Shankar Ganapathi Shanmugam (Graduate student), OACC, Department of Plant and Animal Sciences, NSAC, NS
Phil Warman, Department of Environmental Sciences, NSAC, NS

Collaborators:
Jeff Hoyle, Department of Environmental Sciences, NSAC, NS
David Percival, Department of Environmental Sciences, NSAC, NS

Funding:
Provided by the Agrifocus program of the Nova Scotia Department of Agriculture and Fisheries and a Natural Sciences and Engineering Research Council (NSERC) Discovery grant.

Education

OACC web-based courses are available to farmers, students, and others involved in organic agriculture. Participants can register for the courses regardless of their location and participate in the course material during the hours most suitable to them. Many students have found the interactive approach to be enjoyable and educational. It can be a valuable experience to interact with the instructor and with classmates with similar interests and questions while sitting comfortably at home.

The web-based courses available in 2004 were:

- Composting Skills
- Key Indicators of Sustainable Agriculture
- Organic Crop Production on the Prairies
- Organic Field Crop Management
- Organic Livestock Production
- Organic Marketing
- Principles of Organic Horticulture
- Transition to Organic Farming

The Nova Scotia Agricultural College (NSAC) offering a "**Certificate of Specialization in Organic Agriculture.**" Any student who has successfully completed four of the eligible organic agriculture credit courses (including at least two courses from NSAC), and who has an overall average of at least 60% in these courses can apply to receive a Certificate of Specialization in Organic Agriculture.

For more information or to register for a course please visit the OACC website:
http://www.organicagcentre.ca/courses_web.html

Extension Articles

The following list provides the titles of articles written in 2004 on organic agriculture and posted to the OACC website. For further reading click on News Articles at www.organicagcentre.ca

- *Taking a New Look at Green Manure Crops*. B. Frick and Y. Lawley November 2004
- *What the heck is Bt*? T. Moreau, October 2004
- *Can the Competitive Ability of Spring Wheat Be Increased?* B. Frick and H. A. Mason, October 2004
- *OACC Launches the Organic Policy Tool Shed* L. Stahlbrand, September 2004
- *Concerns about Phosphorus Deficiency* B. Frick, September 2004
- *Community Supported Agriculture in Quebec: Le Vallon des Sources* M. Hope – Simpson, August 2004
- *Capturing the Potential of Alfalfa* M. Wiens and B. Frick, August 2004
- *The Challenge of Biodynamics* B. Frick, August 2004
- *Marvels and Mysteries of Mycorrhizae* B. Frick, July 2004
- *Specializing in Organic Agriculture* B. Frick, June 2004
- *Organic Research Update* B. Frick, May 2004
- *Technical Innovation and Know – How in Organic Vegetable Production: Selwood Green* M. Hope – Simpson, May 2004
- *Finding Our Way Home* B. Frick, May 2004
- *Heater Hens and Hothouses* R. Jannasch, April 2004
- *A Rose by Any Other Name?* B. Frick, April 2004
- *Growing and Marketing Organic Potatoes in PEI: Kentdale Farms* M. Hope – Simpson, March 2004
- *Long-Term Research Yields Results* B. Frick, February 2004
- *Lessons Learned in Organic Apple Production: Log Cabin Orchard* M. Hope – Simpson, February 2004
- *Are Higher Seeding Rates Warranted?* B. Frick, January 2004
- *Mad Cows and Organic Beef* R. Jannasch, January 2004

2004 Events

Field Days

Throughout the year a variety of organic field days are held across Canada. The following list indicates field days attended, presented or organized by OACC staff.

- Agri Fest: Canning, NS
- Alberta Organic Field Day: Camrose, AB
- OACC Organic Research Field Day: Brookside, NS
- OCIA Chapter 1 Organic Field Day: Bienfait, SK
- OCIA Chapter 5 Organic Field Day: Kelvington, SK
- OCIA Chapter 8 Organic Field Day: Ernfold, SK
- Scott Experimental Farm Field Day: Scott, SK
- SOCA Organic Field Day: Sturgis, SK

Farm Visits & Tours

The following list identifies farms that were visited by OACC staff during the 2004 growing season:

- Bill Pipke – Davidson, SK
- Elmer Laird – Davidson, SK
- Eric and Sharon Ter Beek *Golden Bay Dairy* – Southhampton, PEI
- Falls Brook Center – Knowlesville NB
- Fred Dollar *Kentdale Farms* Winslow, PEI
- Gary Clausheide *Sweet Clover Farm* – Valleyfield, PEI
- John and Shauna MacLauchlan – Mount Stewart, PEI
- John Duynisfeld *Holdanca Farm* – Wallace, NS
- Kirby McCuaig N*ature's Acres Organic Farm* Eastend, SK
- Loehr Organic Project *St. Peter's Abbey* Muenster, SK
- Raymond Loo *Springwillow Farms* Kensington, PEI
- Reg Phelan *Sea Spray Farms* – Morrel, PEI
- Wind Horse Farm – Bridgewater, NS

SEMINARS, WORKSHOPS & CONFERENCES

The following, outlines the events that were attended, presented and/or organized by different members of OACC staff.

- ACORN Organic Conference *Cornwall, PEI*
- Agrapoint Organic Dairying in Atlantic Canada Workshop, *Truro, NS*
- Alternative Agriculture for the Future *Saskatoon, SK*
- Annual Meeting of the American Society of Agronomy, Soil Science Society of America, Crop Science Society of America and Canadian Society of Soil Science, *Seattle, WA*
- Atlantic Agriculture Science and Technology Workshop NSAC, *Truro, N.S.*
- Aurora Organics, *Kerrobert, SK*
- Canadian Forage and Turf Seed Conference, *Saskatoon, SK*
- Canadian Society of Agronomy Annual Meeting, *Edmonton, AB*
- Canadian Society of Agronomy Atlantic Agronomy Workshop, *Charlottetown, PEI*
- The Canadian Agri-Food Research Council (CARC) Annual Meeting, *Ottawa, ON*
- Cuban Delegation Seminar, *Saskatoon, SK*
- Dairy session of Grey-Bruce Farmers week, *Elmwood, ON*
- Eco Farm Day Conference, *Cornwall, ON*
- First Canadian Organic Research Workshop, *Guelph, ON*
- Grey-Bruce Farmers conference, *Elmwood, ON*
- Global Television – Body + Health interview, *Truro, NS*
- Guelph Organic Conference, *Guelph, ON*
- Keynote Speaker Soils and Crops Conference, *Saskatoon, SK*
- NE Potato Technology Forum, *Charlottetown, PEI*
- Nova Scotia Environmental Network Meeting, *Tatamagouche, NS*
- OACC Orientation Workshop. Teleconference, *Truro, NS, Saskatoon, SK, Edmonton, Lethbridge, AB, Winnipeg, MB*
- Organic Connections Conference, *Saskatoon, SK*
- Organic Crop Improvement Association Chapter 8, *Kerrobert, SK*
- Organic Crop Improvement Association Chapter 8, *Pontex, SK*
- Organic Producers Association of Manitoba Annual General Meeting, *Brandon, MB*
- Organic Research Workshop 2004, *Guelph, ON*
- PEI ADAPT Council, Annual General Meeting & Conference, *Charlottetown, PEI*
- Potato Symposium, *Cornwall, PEI*
- Presentation to Grade 8 College Park School, *Saskatoon, SK*
- Saskatchewan Organic Certification Association, *Preeceville, SK.*
- Scotia Horticultural Congress, *Wolfville, NS*
- University of Saskatchewan, Plant Sciences Graduate Seminar, *Saskatoon, SK*
- Western Grains Research Foundation Wheat Advisory Board Annual Meeting, *Saskatoon,* SK

Financial Statement ($)

April 2003 – March 2004

Expenses	
Salaries of Researchers and Core Staff	356,153
Research and Costs and Analysis	103,961
Market Research and Dissemination	49,140
Web Course Development	64,609
Information Dissemination	98,167
Translation	160,000
Travel	21,503
Financial Management	38,766
Total Expenses	**892,299**
Revenue	
Alberta Agriculture, Food and Rural Development	60,658
Alberta Agriculture and Food Council	17,500
Canadian Adaptation and Rural Development of AAFC (National)	572,227
Canadian Wheat Board	15,000
CARDS Comm of the SK Council for Community Development	17,500
Manitoba Rural Adaptation Council	17,500
NB Department of Agriculture Fisheries and Aquaculture	50,000
NS Department of Agriculture and Fisheries	50,000
PEI Department of Agriculture and Forestry	50,000
Saskatchewan Agriculture, Food and Rural Revitalization	5,000
University of Saskatchewan	20,000
Total Revenue	**875,385**

Notes

i) Excess expenditures were covered by revenue ($16,914) from 2002 - 2003 and from specific research contracts.

ii) Specific research contracts held in whole or in part by OACC staff, are not included in this statement.

iii) In-kind contributions (not shown here) are significant, especially those of the Nova Scotia Agricultural College.

iv) Any assets of OACC are assigned to NSAC or the University of Saskatchewan.

Agriculture and Agri-Food Canada is pleased to participate in the production of this OACC Annual Report for 2004. AAFC is committed to working with our industry partners to increase public awareness of the importance of the agriculture and agri-food industry to Canada. Opinions expressed in this document are those of OACC and not necessarily of AAFC.

GOLD PARTNERS

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www.organicagcentre.ca