ONTARIO FIELD CROPS
RESEARCH AND SERVICES COMMITTEE

2005 ANNUAL REPORT

TO

ONTARIO AGRICULTURAL SERVICES
COORDINATING COMMITTEE

February 1, 2006

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Executive Summary

The Ontario Field Crops Research and Services Committee (OFCRSC) reports directly to the Agricultural Research Institute of Ontario (ARIO). The role of the Ontario Field Crops Research and Services Committee and its eight constituent subcommittees is to recommend strategic research and service directions. These include research and service initiatives to improve the efficiency of crop production; reduce the environmental "foot print" of these production practices and improve the competitiveness of, and opportunities for, Ontario agriculture in world markets. The role of this committee is to identify and prioritize research and service initiatives to insure the effective use of publicly funded research. Our members include industry partners and growers representing the Ontario Field crop sector as well as, university and government research, policy and extension personnel.

Field crops grown in Ontario had an estimated value of $2.5 billion and produced farm cash receipts totaling $1.5 billion in 2004. This represented approximately 42% of the total cash receipts for crops grown in Ontario in 2004, which was calculated to be $3.6 billion. The acreage of field crops grown in Ontario continues to be dominated by soybeans, corn, cereals, and forages (Figure 1). Based on available data for Ontario from 2004, soybeans and corn were grown on 27.9% and 24.0% of the land available for field crops and produced 28.9% and 29.2% of the total farm gate value, respectively. Cereal crops were grown on approximately 17% of the land seeded and produced 11.7% of the total farm gate value. Hay was grown on 28.1% of the seeded acreage and produced 19.7 % of farm gate value (Figures 1 and 2). The estimated farm value (value per hectare) from the field crop sector in Ontario for 2004 was approximately $2.5 billion (Table 1). This is in comparison to farm cash receipts of $1.5 billion from dairy, $2.8 billion from other livestock, and farm values of $0.27 billion from commercial fruit crops, and $0.79 billion from commercial vegetables (including green house crops and mushrooms).

In addition, Ontario field crops are a major source of exports. In 2004, $2.4 billion in grains and oilseeds products and animal feeds were exported and $2.5 billion imported. Ontario produces approximately 80% of the Canadian soybean crop. Quantities of soybeans equivalent to 23% and 32% of the annual production are imported and exported, respectively. Although 2.8% of the corn crop is exported, Ontario is a net importer of corn. Of total corn usage in Ontario, 19% was imported and 26% was industrial use. In order to maintain the viability of agriculture in Ontario the efficiency of production and the quality, safety and marketability of all field crops need to continually improve both to enhance domestic markets and to compete globally. These are the primary goals of our agricultural research programs.

Highlights and issues related to the Ontario field crop industry in 2005:

- Winter wheat produced a near record provincial average yield of 71.5 bu/ac but spring wheat produced only 42 bu/ac.
- Soft red winter wheat continues to dominate with 2/3rd of the crop in harvested 2005.
- An estimated record acreage of 1.2 million acres of winter wheat seeded in the fall of 2005.
- Corn acreage remained stable and produced record provincial yields.

- Soybean acreage increased and provincial yield records were set.
- Soybean aphids were found in soybeans fields across the province and a significant number of acres sprayed.
- Discovery of Asian soybean rust in the southern United States may have significant consequences for Ontario soybean and pulse crop production
- Spring Canola yield and quality was severely reduced by early season dry warm weather.
- Winter Canola yields were reduced compared to previous years but quality was acceptable.
- White bean and Coloured bean acreage increased from 2004 and record yields were established. The strong Canadian dollar and good yields in the USA pushed prices down for Ontario producers.
- Alfalfa winterkill was severe in the eastern part of the province. Dry and warm early season conditions reduced first-cut forage yield and quality.
- Declining tobacco production and sustainability of the industry are of significant concern to Ontario tobacco growers. Imperial Tobacco Canada announced the closure of its Canadian manufacturing operations in Guelph by 2006.
- Organic crop production continues to increase and have an estimated farmgate value of in excess of $30 million.
- new research efforts need to be directed towards the development of bio-based industrial products from Ontario field crops
- research needs for northern Ontario agriculture continues to be an issue

The Ontario Field Crop and Service committee has identified three research priorities and one service priority. These research and services priorities encompass four main themes, which are building economic strength by adding value, providing solutions to societal changes, strong leadership/ industry renewal and safe, nutritious food. All priorities whether specific to commodities or disciplines address one or more of these themes. Specific research priorities and service priorities are grouped under the following headings:

Research Priorities

1. **Agronomic Systems and Environmental Stewardship.**
   Research leading to production systems, which enhance competitiveness, food quality and safety and environmental sustainability.

2. **Innovative and enhanced germplasm development and utilization.**
   This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.

3. **Market Responsiveness**
   Research and economic analysis to address existing and potential market opportunities, new product development, food safety and related issues.

Service Priorities

1. **Efficient and effective technology transfer.**
   Development and implementation of strategies to ensure the verification and uptake of appropriate technological advancements by the field crop sector.

   These core areas are detailed in the section on Strategic Directions in which specific research/service recommendations are identified. These recommendations represent the areas of research and technology transfer that FCRSC considers essential to the strengthening of the field crop industry in Ontario. Within each core area are commodity and pest management specific priorities (see Table 2 Research Priorities by Commodity and Discipline).

Fig. 1 Field Crop Trends 1985 - 2005

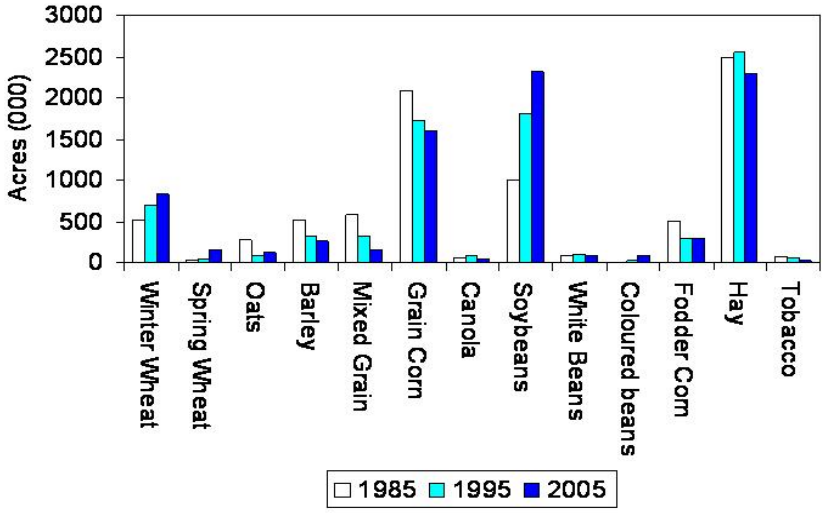
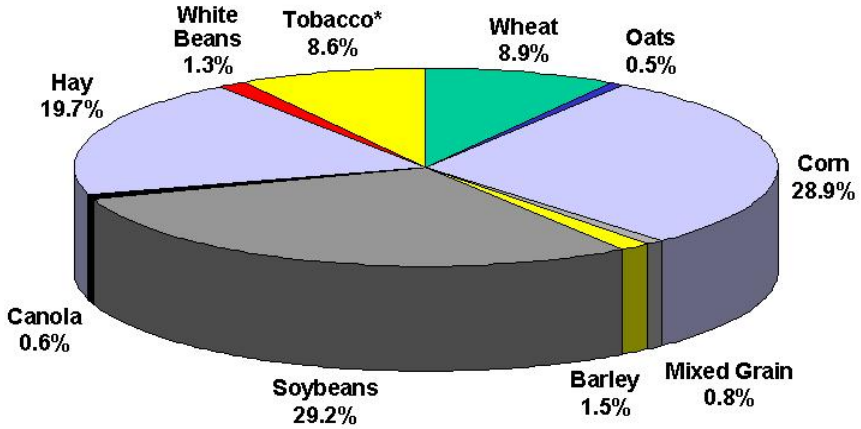


Fig. 2 Major Field Crops
Relative Farm Gate Value - 2004



* 2003 value

Table 1. Estimated Area, Production and Farm Value of Specified Field Crops Grown in Ontario, 2003, 2004 and 2005.

Crop	Year	Units	Area		Production		Farm Value	
			Seeded	Harvested	Yield	Total	Per Unit	Total
			(acres)	(acres)	(units/acre)	('000 units)	($)	($'000)
Winter	2003	bu	990,000	990,000	76.3	75,500	4.04	304,800
Wheat[a]	2004	bu	750,000	750,000	72.5	54,400	3.54	192,800
	2005	bu	830,000	830,000	70.0	58,100	…	…
Spring	2003	bu	115,000	115,000	52.2	6,000	5.10	30,600
Wheat	2004	bu	120,000	120,000	50.8	6,100	4.62	28,200
	2005	bu	155,000	155,000	43.2	6,700	…	…
Fall Rye[a]	2003	bu	65,000	60,000	40.0	2,400	3.64	8,700
	2004	bu	65,000	65,000	36.9	2,400	…	…
	2005	bu	60,000	60,000	36.7	2,200	…	…
Oats	2003	bu	120,000	110,000	72.7	8,000	2.25	18,000
	2004	bu	105,000	90,000	70.0	6,300	2.16	13,600
	2005	bu	125,000	115,000	58.7	6,750	…	…
Barley	2003	bu	265,000	255,000	63.5	16,200	2.76	44,800
	2004	bu	255,000	235,000	63.8	15,000	2.47	37,100
	2005	bu	26,5000	250,000	53.6	13,400	…	…
Mixed Grain	2003	bu	190,000	175,000	66.9	11,700	2.17	25,400
	2004	bu	155,000	140,000	67.5	9,450	1.99	18,800
	2005	bu	160,000	145,000	59.3	8,600	…	…
Grain Corn	2003	bu	1,800,000	1,725,000	127.0	219,000	3.62	793,700
	2004	bu	1,700,000	1,600,000	131.3	210,000	2.94	618,300
	2005	bu	1,600,000	1,565,000	145.0	227,000	…	…
Canola	2003	bu	50,000	50,000	36.0	1,800	7.93	17,300
	2004	bu	55,000	55,000	37.3	2,050	7.73	15,800
	2005	bu	50,000	44,000	25.0	1,100	…	…
Soybeans	2003	bu	2,000,000	1,990,000	31.9	63,500	9.87	627,000
	2004	bu	2,325,000	2,300,000	39.6	91,000	7.99	726,800
	2005	bu	2,325,000	2,315,000	41.0	95000	…	…
Dry White	2003	cwt	55,000	55,000	20.0	1,100	30.10	33,100
Beans	2004	cwt	60,000	60,000	19.0	1,140	28.78	32,800
	2005	cwt	90,000	90,000	20.6	1,850	…	…
Coloured	2003	cwt	50,000	50,000	21.0	1,050	…	…
Beans	2004	cwt	65,000	65,000	20.5	1,330	…	…
	2005	cwt	100,000	100,000	21.0	2,100	…	…
Fodder Corn	2003	tons	325,000	320,000	14.4	4,600	23.60	108,600
	2004	tons	300,000	290,000	15.9	4,600	21.80	100,300
	2005	tons	290,000	285,000	16.7	4,765	…	…
Hay (b)	2003	tons	2,360,000	2,320,000	2.4	5,650	85.63	483,800
	2004	tons	2,340,000	2,275,000	2.4	5,400	90.72	489,900
	2005	tons	2,300,000	2,235,000	2.3	5,030		
Tobacco	2003	lbs	35,700	35,700	2,625	93,955	2.28	214,000
Flue Cured	2004	lbs	36,600	36,600	2,400	87,852	2.25	198,000
	2005	lbs	…	…	…	…	…	…

[a] Area seeded represents area remaining as of June 1
Source: OMAFRA Statistics

Table 2. Research Priorities by Commodity and Discipline

Priority	**Cereals**	**Corn**	**Oilseeds**	**Forages**	**Pulse crops**	**Tobacco**
1	Breeding for disease resistance	Breeding for improved cold tolerance	Genetic improvement and cultivar development	Reducing climate related risk	Genetic improvement and cultivar development	Breeding for cultivar quality
2	Cultivar performance evaluation	Breeding for pest and disease resistance	Pest and disease control	Genetic improvements for feeding value	Breeding for special quality and use traits	Breeding for pest and disease resistance
3	Nitrogen management	Genetic improvement of corn	Breeding for special quality and use traits	Cultivar performance evaluation	Integrated pest management for insects and diseases	Pest and disease control
4	Breeding for yield and quality traits	Enhanced energy and environmental efficiencies	Cultivar performance evaluation	Breeding for yield	Weed management	Weed management
5	Reducing climate related risk	Develop value added markets	Weed management	Forage preservation and storage	Agronomic and market development	Nitrogen management
6	Market development and grading systems	*Cultivar performance evaluation**	Cropping systems research	Forages and the environment		Water use efficiency
7	Production and crop rotation systems	*Weed management*	Soil fertility, quality and management	Corn silage		Harvesting systems
8	Micronutrient management	*Pest and disease control**		Market grading system		
9	*Pest and disease control**			Weed management		
	*Weed management**			*Pest and disease control**		

** Discipline priorities not addressed within commodity*

Mandate of Field Crops Research and Services Committee:

The Ontario Field Crops Research and Services Committee and its constituent subcommittees are empowered to review and direct research and services leading to the improvement in crop production efficiencies and competitiveness of Ontario agriculture in world markets. Specifically the mandate of the committee is:

(a) To review reports submitted by Commodity and Pest Management-based subcommittees.

(b) To assess requirements for Field Crop Research and Services

(c) To establish priorities for Field Crop Research and Service programs

(d) To assess progress in Field Crop Research

(e) To develop and present reports and recommendations to the Ontario Agricultural Services Coordinating Committee describing the needs for Field Crop Research and Services including as appropriate information in relation to:

(i) cost-benefit
(ii) research facilities and personnel required
(iii) location best suited for the investigation
(iv) how funds might be obtained or freed to conduct new research or services
(v) operation of crop committees

(f) To consider and approve Chairs and membership of each Crop Committee

(g) To appoint representatives to other OASCC Research and Services Committees when requested and to liaise with the Ontario Pest Management Research and Services Committee.

(h) To provide an inventory of the research effort in field crops

(i) To take a lead role in the documentation of Research Accomplishments and Proposed New Research Directions for ARIO program reviews on a 4-year basis.

Industry/Sector Scan

Ontario Field Crop Research Coalition

Innovative Farmers of Ontario
Oat & Barley Council of Ontario
Ontario Canola Growers' Association150 Research Lane, Suite 205
Ontario Coloured Bean Growers' AssociationGuelph, Ontario N1G 4T2
Ontario Corn Producers' Association
Ontario Forage Council
Ontario Soil & Crop Improvement Association
Ontario Soybean GrowersPhone: (519) 767-1919
Ontario Wheat Producers' Marketing BoardFAX: (519) 767-2466
Ontario White Bean Producers
Seed Corn Growers of Ontario

In 2005 the reps of our 12 member organizations, most of whom are farmers, have been preoccupied with the current farm income situation. This situation has forced farmers into a survival mentality. Basic “do’s” such as crop rotation, certified seed usage and adoption of new technologies and production practices are being set aside. Our members are stewards of some 8 million acres of Ontario farmland and this trend away from the basics is disturbing to say the least.

In spite of this the OFCRC still maintains a wide area of research focus. Many projects ranging from applied agronomic research, disease research such as the battle with FHB and mycotoxins in wheat to bioproducts research all aimed at improving the competitiveness of Ontario farmers.

OFCRC was recently invited to participate in the AAFC science consultation regional meeting in London and the symposium wrap up of this consultation process in Gatineau QC. OFCRC members are concerned over new directions in research which place less importance on applied research, the benefits of which accrue directly to farmers in favour of very lofty research goals which to our relief were viewed rather sceptically by those in attendance. A notable comment to this was “How do you expect to get the glory if you don’t do the grunt work?” Skepticism was further bolstered by non-committal ministerial comments such as “would like to see funding increased”. The AAFC budget has been virtually static for 10 years.

The OMAF/UofG contract and the new research funding landscape being created in its wake is something our group is still trying to get a handle on. Recent correspondence between OFCRC and the UofG has provided some clarity, however our members remain unconvinced that the effectiveness of research spending is not being diminished. We have adopted a wait and see attitude toward all this and hope that recent project submissions will show us exactly how research funds are being allocated.

OFCRC is pleased to still have many avenues available for research funding as well as the topnotch researchers, scientists and agronomists who work on behalf of Ontario’s farmers. It is our hope that we can count on these things as we move toward the future.

OFCRC members were pleased with the announcement of the 4th round of the Canada-Ontario Research and Development Program (CORD IV). This program will provide $4.47 million for field crop research in Ontario from April 2005 until December 2007. OFCRC members are pleased to play a key role in initiating, reviewing, and approving research projects funded by the CORD IV program. This is seen as a very effective way to ensure that agricultural research is directed toward projects that maximize benefits to the sector. As of December 1, 2005 just over 50% of the field crop CORD IV funds were allocated into 44 research projects.

Cereals

State of the Industry/ Significant Research/Service Accomplishments

INCREDIBLE!! The 2005 winter wheat crop hung tough, finishing with a provincial average yield of 71.5 bu/ac! Despite record heat, and absolutely no rainfall throughout the entire grain fill process, the crop was able to come within 1.5 bu/ac of trend line yields. We were but one rain away from a new yield record! Quality of the crop was excellent, with high protein levels, high test weights, and phenomenal falling number!

DISMAL!! Spring cereal yields are down dramatically, with high temperatures and lack of moisture being too much for the crop. Spring wheat yielded a disappointing 40 bu/ac, off 17% from trend line predictions of 48. Spring grains are even more disappointing, only 2100 pounds/acre, a full 24% off trend line predictions of 2750. Quality was marginal, with test weights just barely making grade, and small, shriveled kernels ruling the day.

Record acreage of winter wheat has been planted this fall. While final numbers are not yet in, estimates run well above 1 million acres of wheat planted. At least 80% of this crop was planted on time, into perfect soil conditions. Yield potential should be excellent!

Winter cereals: An estimated 780,000 acres of winter wheat were planted in the fall of 2004, with at least ¾ of the crop being planted on time. In the southwest, the crop came through the winter in **stellar** condition, with less than 1% winterkill! Even November planted wheat had excellent winter survival. The same could not be said of central and eastern Ontario, where winter survival was marginal at best. Winter injury from ice cover and wet, soggy soils in the spring combined to reduce stands and cause replanting of some acres in this area.

The disparity between southwest and east central continued. Nitrogen applications were timely (mid April), with excellent, dry soil conditions for field travel in the southwest. It was so dry in this region that there were concerns over nitrogen loss, due to volatilization. However, if any loss did occur, it was not significant enough to reduce yield. In the east and central regions, wet soils challenged growers to avoid rutting fields, yet apply nitrogen before the crop hit the rapid growth stage.

Heavy snowfall in much of the province in late April, coupled with a cool, dry May, slowed crop development significantly. Heading was delayed by 3-5 days, with the first heading dates around May 30th. The cool soil conditions gave rise to more apparent **Manganese deficiency** symptoms than

normal. However, in many cases these symptoms were not Mn deficiency, but a response to weather stress in general (physiological). This exercise drove home the importance of the "squirt and see" approach, where growers treat a small section of row by hand, to see if the crop responds, before spending money on treating the whole field.

New this year was the **Weed Emergence Survey**, done by Mike Cowbrough, OMAFRA Weed Lead. A number of fields were scouted on a bi-weekly basis throughout the wheat growing area, to determine weed species, weed density, and time of emergence. From this survey, only ½ of wheat fields have sufficient weed pressure to warrant weed control measures. The second target of this survey is to help growers apply herbicides at the right time. Despite this, there were still a number of cases of late herbicide application (flag leaf stage), which significantly reduced yield in these fields. This survey will be continued and refined for next year, along with a continued extension thrust in this respect.

Disease pressure remained low in virtually all of the crop with the dry conditions throughout the crop's development. Day after day of high UV index levels caused a great deal of **physiological fleck** (sunburn), which was often confused with disease. **Stripe rust** was present in a few fields at very high levels, but did not spread to the crop in general. **Stagonospora** (septoria glume blotch) was evident in some fields as well. With low disease levels, response to foliar fungicides was minimal. Some interesting results were obtained with the new fungicide **Headline**, which warrants further tests next year. In some fields (but not all), saw significant yield increase from this fungicide in the absence of disease. However, thus far, this response is not predictable.

Insect pressure was low in most of the wheat crop. Although there where some high aphid numbers, and isolated reports of cereal leaf beetle, there was no need to control insects in the crop.

Dry, cool conditions turned to hot and dry as May turned to June. With July like conditions, the wheat headed and pollinated much more rapidly than normal, taking only 3 days for a process that normally takes 6 days. As the weather stayed hot and dry, **Fusarium** risk dropped to the lowest level in recent memory. As more growers are intent upon protecting a good crop, more acres were sprayed with **Folicur** than in previous years. As expected, with the continuation of dry, hot weather throughout grainfill, there was less response to Folicur applications. Fusarium was essentially a non-issue in this year's crop (whew!).

Hot, dry conditions became a huge scare in the wheat crop. In many fields, bottom leaves began to fire, and in some varieties "onion leafing", just like corn under drought stress, was seen on wheat flag leaves. These symptoms were exaggerated wherever any other stress existed. Short rotations, compaction, and drought prone sands all showed dramatic stress symptoms, which ended in very poor yields. Grainfill shortened from the hoped for 21 days down to 14 days in many fields. Harvest was advanced accordingly.

With all the hot, dry weather, straw was extremely short, and lodging was virtually non-existent. Harvest began with tough, green straw and shriveled kernels creating great challenges for combine operators. However, the grain just kept pouring into the bin! While yields were down from the last several years levels, there was 10 bushels per acre more wheat than most growers ever expected!

Straw yields did not match grain yields, with straw yields 20% below normal. Grain quality was excellent. Rain that saved the corn crop came on July 16th. Amazingly, soft white winter wheat that was hardly mature immediately had **sprouts**. Even some soft red had sprouts, and **mildew** in grain samples became an issue. Despite these sprouts, in many cases falling numbers remained high, due to the tremendously high initial falling numbers. As harvest wrapped up, the vast majority of the crop was excellent, but the need to harvest on time in the wheat crop was driven home yet again.

Protein in the crop is ¾ to 1 full point above last year's levels. While this is good news for the hard red crop, the soft wheat crop was almost too high in protein to meet milling and baking needs. The high number of small kernels in this year's crop has reduced milling yield slightly, and made mill adjustment critical. However, when all is said and done, a much better crop than anyone anticipated!

Spring Cereals: **Acreage** of spring cereals **increased** by nearly 15% this year, primarily due to the poor economics of growing corn. Unfortunately, spring cereals did not enjoy the same favourable outcome that winter cereals did.

Planting was timely in the southwest, with much of the crop planted in mid-April. However, much of the crop in the east-central and northern areas was planted later than ideal, due to the wet soil conditions. Even in the southwest, a considerable portion of the crop was not planted prior to the April snow, and seeding was delayed into May. For the first year in 4 years, there was essentially no window of opportunity to frost seed cereals, as conditions went from snow-covered to dry without any cold nights.

Emergence was good in much of the crop, however a considerable acreage did have variable emergence due to dry soil conditions. Once the crop was planted, the weather turned extremely dry, so that any seed not planted into moisture was well delayed in emergence. **Herbicide** and nitrogen applications were on time, with dry soil conditions.

Disease levels remained extremely low in the crop, with no rainfall. **Insect** levels were another matter, with extreme cases of armyworm outbreaks. Some fields were completely stripped by armyworm, and many producers were not scouting closely enough to catch armyworm outbreaks before the damage was severe. Cereal leaf beetle was another insect issue in some fields, but did not cause the level of damage that armyworm did.

Continued hot (above 30 C) and extremely dry conditions throughout the growth and development of the crop took a great toll. Some crops headed out at only 40 cm (16 inches) tall. Straw yields were almost nonexistent in these fields, and in many fields straw yields were below 50% of normal. Yields were down dramatically (20%), and quality suffered as well. Mildew downgraded the spring wheat crop, and many milling oat fields struggled to make test weight. Malt barley fields fought to make grade, with kernels being too small, and protein too high.

While spring cereals were not the bust that spring canola was, the result for most growers was extremely disappointing.

Fall 2005 Plantings: A record acreage of wheat was planted this fall (estimated at 1.2 million acres). Soft red continues to command a larger percentage of the crop, moving up from 2/3rd of the crop last

year to ¾ of the crop in 2005. Some of this crop was planted well before the optimum planting date, and there are significant concerns of Barley Yellow Dwarf Virus and Hessian fly damage in this portion of the crop. As well, where some growers chose to use farmer saved seed, there was no seed treatment applied. This raises alarm bells for the potential of bunt in next years crop.

Fall weather continued with well above normal temperatures, and October was the driest October on record in many locations. While most fields had excellent stand establishment, fields where growers chose to plant shallow rather than into moisture had extremely variable emergence.

Considerable consternation exists over the yellow appearance of many of the early planted wheat fields. These symptoms have been attributed to many factors, from nitrogen or manganese deficiency to rust and lack of moisture. Whatever the cause, these symptoms should have minimal impact on yield potential of the crop next year. Timely planted wheat, with good growth, tillering and crown development in the fall, gives good yield potential prospects if next year will only co-operate.

Emerging Needs and Issues

Hard White Spring Wheat
Hard White Spring (HWS) wheat acres have expanded in Western Canada to a point where over 1 million MT were produced last year. As more Flour Mills in Ontario start to grind this wheat the opportunity for the use of Ontario Grown HWS in blends increases. The HWS varieties available for the planting are currently Western types and not well suited for Ontario. Investment in breeding, screening and testing in Ontario should be considered.

Oat Fusarium
Quaker Oats has continued to increase their sourcing efforts in Eastern Canada over the last four years and has plans to increase capacity at their Peterbourgh plant. As the largest purchaser of over 70,000 MT of oats annually in Ontario they have expressed issues of Fusarium in Oats. There are concerns that there are other strains of Fusarium other than Greminarium that could potentially be impacting oat quality. This is a priority that needs to be investigated to protect an expanding market and consumer health.

Oat Breeding
The retirement of Dr. Art McElroy from Agriculture and Agri-Food Canada has left the only oat breeding program in Ontario without a cereal breeder to continue the program.
Given current policy, there is a chance that no one will be hired to fill this position. With the re-investment by QTG in the Quaker Oat plant at Peterborough, and a growing horse market sector for oat, it is essential that this position be filled.

Spring Wheat Fusarium

The need for improved fusarium tolerance in spring wheat varieties has become critical. Ontario grinds 1.3 million tonnes of hard red spring quality wheat every year. Current Ontario production supplies approximately 0.1 million tonnes. Low yields and immature crops are forcing farmers in shorter season heat unit areas (below 2650 CHU) to search for alternative crops. Spring wheat should be the obvious choice.

Unfortunately, after back to back years (2003, 2004) of high fusarium levels in spring wheat, growers are not willing to increase spring wheat acres. Fungicides to control fusarium (folicur) do not appear as effective in increasing yield in spring crops, reducing use of this technology by growers. While significant progress has been made with winter wheat and improved fusarium tolerance, the best spring wheat varieties would still be considered susceptible to very susceptible.

The need to fill this void, and provide growers in this heat unit zone with an economically viable crop, is critical. Without better options soon, many growers may find it nearly impossible to continue in agriculture.

Wheat Falling Number
Temperature stress (low temperature) has been found to cause alpha amylase activity in specific genetic breeding lines. Increased alpha amylase results in lower falling number in the harvested grain, even in the absence of rain during harvest. Varieties that contain this genetic trait need to be identified, and growers made aware of this concern.

Black Hole Concept
Agricorp sets planting deadlines by region for coverage under the crop insurance program. This often drives producers to plant wheat in poor conditions in late October, to beat the deadline, with disappointing results.

There is sound physiological science that suggests this may be incorrect. November or December planted wheat may be a better option, and yield higher, than late October wheat. This hypothesis needs to be evaluated, and if correct, crop insurance deadlines should be adjusted accordingly.

DONCAST (Fusarium Forecasting Model)
After another year of frustrating results with the DONCAST model, growers are becoming unwilling to utilize this technology. Despite further improvements and improved prediction data utilized in the updated version, growers have developed such a lack of confidence that uptake will remain low. A tremendous effort needs to be co-ordinated in order to restore grower confidence, and increase utilization, of this valuable management tool.

Segregation of Classes:
Ontario grows more classes (types) of wheat than any other jurisdiction in North America. Maintaining the purity of these different quality wheat classes is paramount to maintaining the functionality of our wheat flour. In early 2004, one major end user of Ontario wheat flour began experiencing difficulty in the manufacturing process. These difficulties caused entire lines to shut down, with significant impacts on the end user and their clients.

It has been determined that due to the unique nature of the process used by this particular firm, contamination of wheat flour at 1% or less is sufficient to cause significant difficulties. This fact has caused the industry to join forces in a campaign to target co-mingling of wheat types. Education of growers, elevators and millers is underway, to raise the awareness of the need for proper segregation. It is hoped this education will solve the problem.

Research Priorities for 2006

Rating System

A: High Priority, major concern	1: Increase existing or establish new funding
B: Moderate Priority	2: Maintain funding
C: Low Priority	3: Reduce funding

A1:Fusarium resistance in spring wheat and barley: Breeding

A2: Fusarium: resistance breeding, fungicide control, management options, improvement or prediction models (all cereal crops)

A2: Performance Testing: adaptation, agronomic traits, competitive agriculture, quality attributes, market potential.

A2: Nitrogen Management and Environmental Impact: agronomic rate determination, nitrogen timing, nitrogen fate, split nitrogen impacts on quality and environment, manure utilization on cereals crops, green seeker technology

A2: Cereal Breeding: yield, quality traits, protein fractionation, phytase in feed grains, dormancy/vernalization requirements, milling yield

B1: Reducing Risk Factors: winterkill, winter hardiness traits, sprouting tolerance (especially in white wheat and malt barley), falling number impacts, stripe rust management and leaf rust in spring wheat

B1: Market Development: milling oat, malting barley, hull less grain

B2: Grading Systems: DON (deoxynivalemol or vomitoxin) quick test, computer scanning technology for fusarium damaged kernels, mildew grading and impacts

B2: Rotation Impacts: long term benefits of cereal included in the rotation, consequence of straw removal, carbon sequestration, soil quality parameters

B2: Production Management: planting dates, frost seeding, plant depth and uniformity, tillage impacts, Barley Yellow Dwarf and aphid management, herbicide impacts, European chafer, cereal leaf beetle, dwarf bunt management

C1: Cereal Crop Micronutrient Nutrition: manganese, magnesium, cropper, sulphur, chloride

C1: Underseeding Establishment: double cut and single cut red clover, sweet clover, cereal row widths, seeding rates, nitrogen management

Corn

State of the Industry

Production

Grain corn yields in Ontario were at an all time high in many parts of the province in 2005. Table 1 contains a provincial estimate of 138 bu/ac, but by the time all data is included the provincial average may top 140 bu/ac. These record breaking yields can be attributed to ideal corn planting conditions, timely rainfall, increased photosynthetic rates, and above average CHU accumulation.

Table 1. Grain corn acreage, production and value statistics for Ontario 1991-2005

Year	Area Harvested ('000,000 acres)	Yield (bu/acre)	Production ('000, 000 bu)	Estimated Value ('000,000 $)
2005/06*	1.6	138	221	597
2004/05	1.6	131	210	572
2003/04	1.7	127	216	782
2002/03	1.9	113	215	841
2001/02	1.9	102	194	684
2000/01	1.7	105	179	576
1999/00	1.8	128	230	654
1998/99	1.9	129	245	702
1997/98	1.8	115	207	800
1996/97	1.8	108	194	838
1995/96	1.7	117	199	929
1994/95	1.6	121	194	619
1993/94	1.7	108	184	602
1992/93	1.4	97	136	371
1991/92	1.9	111	211	558

*Estimated Yield

Most of the corn this year was planted prior to May 15, 2005 in ideal soil conditions. This allowed for early canopy closure, and gave the majority of the corn an excellent start to the 2005 growing season. With dry soils during May and June, good root growth, and good soil structure corn plants were able to support high yield even in the face of abnormally low rainfall. Timely rainfall in the July 15-17 period ensured that corn water requirements around the time of pollination were met, giving way to above average kernel set in most parts of the province.

Most pollination occurred in mid-July allowing grain filling to occur under much warmer conditions and during a time when sunlight intensity and day length kept the photosynthetic engine running harder. Adding to ideal growing conditions was the absence of September frost generating crop heat units that allowed even full season hybrids to mature easily.

Common smut plagued many fields in 2005. Common smut in corn is promoted by high temperatures and is often associated with manure applications and/or excessive N application. Some hybrids showed up as being particularly prone to common smut infection. However, impact on yield appeared to be marginal. Leaf disease and stalk rots were of minor importance in 2005. For the most part, stalk quality and standability were good and did not factor into harvest losses.

2005 was a year for poor husk cover and more than average ear tip damage due to insects, birds and ear moulds. Some isolated areas did see Vomitoxin levels that were elevated in grain corn samples but the problem was minor on a provincial scale.

Grain Corn Supply and Demand

Since 1999 the most dramatic increases in grain corn use has been on the industrial side (Table 2). This demand has levelled off recently but the industry is anticipating increased demand with the provincial government November announcement of the Renewable Fuels Standard. The new fuel standard will require an average of 5% ethanol in all gasoline by January 1, 2007. In assuring that the 5% goal is reached the Ontario government has established the Ontario Ethanol Growth Fund (OEGF) to promote increased production of ethanol fuel. The establishment of the OEGF provides capital assistance, operating grants, support for independent blenders, and a research and development fund. Producers are still questioning what impact expanded ethanol production will have on depressed corn prices.

Table 2. Grain corn production, imports and usage in Ontario

	'000, 000 Bushels			
	Ontario Production	**Ontario Imports**	**Feed Use**	**Industrial Use**
2005/06*	221	65	182	83
2004/05	210	59	180	83
2003/04	216	53	171	85
2002/03	215	58	175	84
2001/02	194	57	164	83
1995-1999				

Hybrids with Genetically Modified Traits

Hybrids with genetically modified traits made up a significant portion of the Ontario market in 2004 (Table 3.). The most significant portion of the market consists of Bt Hybrids, consisting of 46% of Ontario's corn acreage in 2004

Table 3. Genetically modified hybrids as a percentage of the Ontario Market (Values are estimates only; last updated March 1, 2005)

Trait	1996	1997	1998	1999	2000	2001	2002	2003	2004
Bt (ECB)	<1	6	19	28	30	32	37	44	46
Liberty Link	-	-	-	4	8	9	12	9	8
Roundup Ready	-	-	-	1	3	5	8	10	12
Bt (CRW)	-	-	-	-	-	-	-	-	<1

Note 1: Liberty Link acreage is not distinct from Bt (ECB) acreage as the majority of these hybrids were both Bt and Liberty Link on the same genetic event. The Liberty Link estimate in this table refers to those acres actually treated with Liberty herbicide

Note 2: Bt percentage represents total Bt acres planted. This includes all Bt events. This will also include all Bt hybrids that contain other stacked traits

Note 3: Roundup Ready percentage represents the total RR acres planted, including stacked traits. Current information suggests that at least 50% of the RR varieties grown are stacked

Note 4: Generally, it is believed that 100% of the RR varieties are sprayed with glyphosate products. When discussing Liberty Link, the best estimate is . that approximately 60 % of hybrids with the trait are actually sprayed with Liberty herbicide

Significant Research/Service Accomplishments

Corn Hybrid Development and Evaluation

Private sector development and evaluation of corn hybrids for Ontario continues to be very active. Seed company support for and participation within the OCC hybrid performance was strong in 2005, 11 companies are featured in the 2005 performance trial report. All 21 trials produced good data and were included in this years report. Funding from OCPA allowed for the creation of a web-based data set of the OCC data. This data set includes all hybrid yield data from 1987 to 2005. The database can be searched for multi-year/multi-hybrid comparisons.

Trade

OCPA filed grievances with the Canadian International Trade Tribunal (CITT). The CITT decided that the preliminary injury inquiry was pursuant to the notification, on September 16, 2005, and initiated the Canadian Border Services Agency (CBSA) to investigate alleged injurious dumping and subsidizing of

grain corn into the Canadian markets by the US. Currently the OCPA is awaiting the CBSA's determination of preliminary duties against imports of US grain corn scheduled for December 15, 2005.

New Nitrogen Recommendations

At the June 14-15, 2005 meeting of the Ontario Soil Management Research and Services Committee (OSMRSC) new provincial nitrogen fertilizer recommendations for corn were approved. These new recommendations will come into effect in the spring of 2006.

The gathering of data and the development of N recommendations was a direct result of a collaborative project between the Ontario Corn Producers Association, Ontario Ministry of Agriculture and Food, and the University of Guelph. Funding for the original gathering of the data was also provided by the CanAdapt program. Data from the past four decades was gathered from Ontario researchers to build the database and the associated nitrogen rate calculator. The calculator allows growers to input factors such as soil type, previous crop and application timing in order to estimate the most appropriate amount of fertilizer N to apply to their corn crop.

Corn and Energy

Record low corn commodity prices and high energy costs are making profitable corn production very difficult. Several of the OCC research priorities deal with promoting research in the areas of energy efficiencies (i.e. hybrids better adapted to cold environments, lower drying costs, increase N use efficiency.) This energy dilemma will most likely result in the 2006 corn acreage being the lowest in recent history.

Emerging Needs and Issues

OCC Research Priorities (2002-2007)

The OCC did not review its research priorities in 2005. There continues to be increasing emphasis on bio-economy and on post-production research. OCC will spend time in 2006 discussing what type of research results in improved returns to rural Ontario and primary producers. The current OCC research priorities are:

1. Improved Cold Tolerance in Corn

2. Breeding For Pest Resistance, Fusarium Ear Rot, and Leaf Diseases

3. Genetic Improvement of Early Corn

4. Enhanced Energy and Environmental Efficiencies

5. Develop Premium Markets for Corn

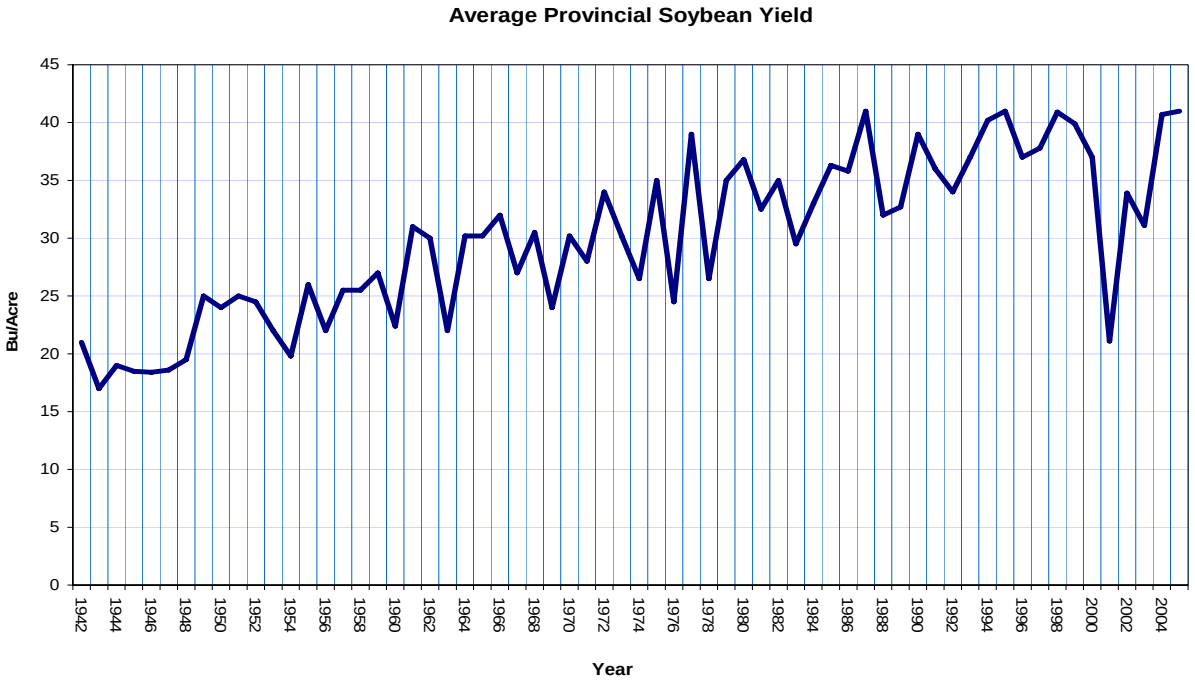
Oilseeds

State of the Industry – Soybeans

- Soybean growers faced numerous production challenges in 2005 including soybean aphids, spider mites, bean leaf beetles, soybean cyst nematode and adverse weather. Geography played a large part in how much this impacted individual producers.

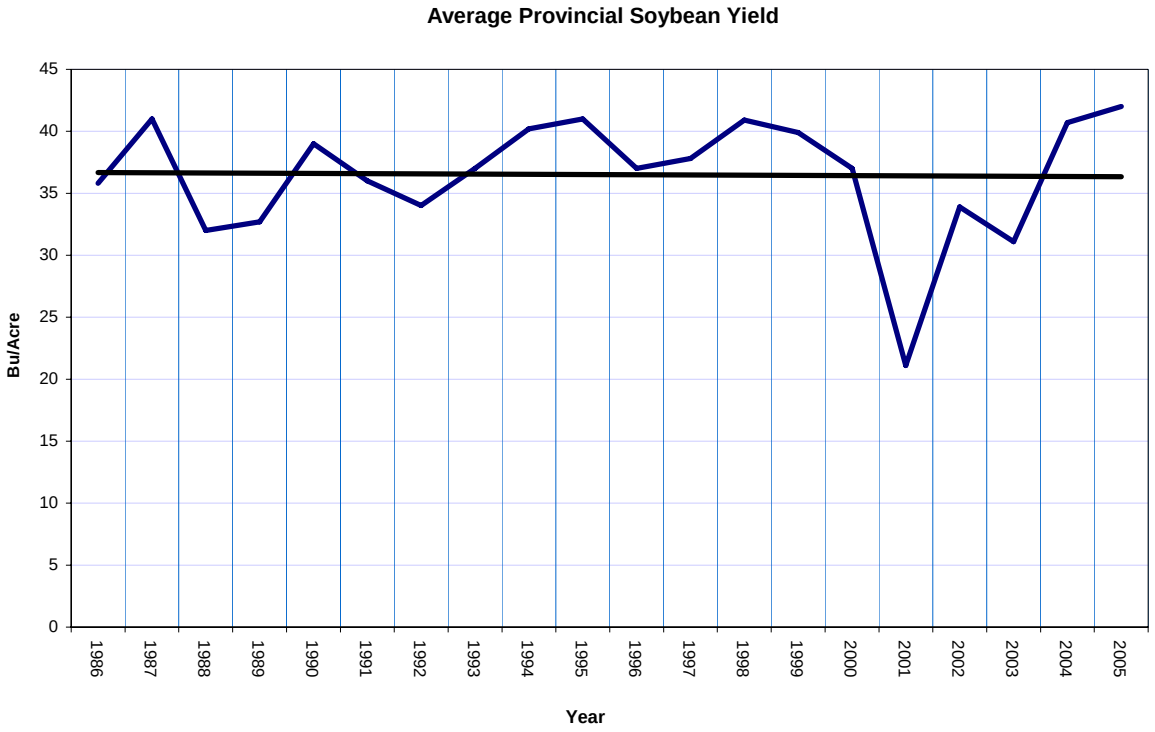
- A lack of moisture was a problem for many areas while some parts of eastern Ontario suffered from excess rainfall. Despite these difficulties, yields were generally at or above average. The range reported was from a low of 25 to a high of 75 bu/ac. Both Perth and Oxford counties had many fields that yielded in excess of 50 bu/ac. Much of the rest of the province achieved yields between 35-45 bu/ac. The provincial average is expected to be approximately 41 bu/ac.

- Over 2.35 million acres of soybeans were planted in 2005, making soybeans the largest row crop in Ontario. A dry spring across much of the province allowed most soybeans to be planted under good conditions and during the ideal planting window. Many producers were able to complete soybean seeding by May 25th. In some parts of Huron and Elgin counties, fields were so dry that soybean emergence was poor resulting in some replanting being required.



- Over the past 20 years the average provincial soybean yield has not improved significantly even though variety genetics have improved. This lack of yield improvement is largely due to

increased insect and disease pressure along with poor crop rotations. The following graph shows the last 20 years of soybean yields in Ontario and the trend line for that time.



- A dry spring across most of the southwest resulted in excellent root establishment during the vegetative growth stage of the plant. This strong root development early in the season was important for the crop when moisture became limited later in the season.

- Initial dry conditions made weed control challenging in 2005. Preemergence herbicides were not activated resulting in re-spays and poor control. Access to product was also a challenge this spring. A late flush of weeds was triggered when rains finally came which resulted in very poor weed control. Herbicides could not be activated at this delayed time and emergence of weeds was not uniform which made timing post emergent weed control difficult. Timing of post applied herbicides was often late due to weather, weed staging, or too many acres to be sprayed within optimum timings.

- Soybean plant injury from post-emergent tank mixes was also prevalent this year. The "bounce back" normally seen from these applications took longer this year due to hot dry conditions. Intense sunshine, high UV ratings and smog alerts resulted in environmental injury symptoms that were often confused with herbicide and disease symptoms.

- Pod set was excellent this year in those areas that received timely showers during the flowering period in early July. The remainder of the season was dry across much of the province. As a

result these extra pods did not necessarily result in higher yields since seed size was smaller than usual. Soybean aphids and/or spider mites also had an effect in those areas impacted.

- The dry, hot conditions experienced this summer were ideal for soybean cyst nematode and as a result nematode injury was very apparent in many fields in southwestern Ontario. Under these conditions, the SCN soil population level needed for above ground plant damage is lower than would be observed in a "normal" or less stressed year. In other words it does not take as much SCN in the soil to cause damage. Yield losses due to SCN were related to the SCN soil population level, environmental conditions, crop rotation and variety. Yield losses ranged from minimal to significant (50%+).

- Soybean Cyst Nematode (SCN) continues to be a major yield reducing pest in southwestern Ontario. SCN has now been found in counties as far east as Brant and Peel and as far north as Bruce. Growers in these areas will need to adjust their management practices to minimize the impact and spread of this pest. Growing susceptible varieties back to back can greatly increase SCN populations in the soil.

- The dry, warm weather resulted in significant spider mite infestations, which were much larger and more widespread this year than is usual in Ontario. Infestations often started as hot spots along field edges, and rapidly moved into the whole field as the weather stayed dry. Significant acreage was sprayed this year to control spider mites.

- Small populations of soybean aphids were observed in early June in southwestern Ontario, and by the end of June soybean aphids could be found in almost every field right across the province. A significant number of acres were sprayed this year for aphid control. Yield response to spraying ranged from 0 - 10 bu/ac, depending on the health of the crop and the number of aphids present. On average, side-by-side comparisons showed a 3-5 bu/ac advantage to the application of control measures.

- Soybean aphids were also a challenge to control in 2005. Every effort to attain good spray coverage within the canopy will be necessary in the future to achieve acceptable control of aphid populations. Scouting will remain an essential tool in determining the infestations of soybean insect pests and the optimal time for application of control products to achieve economic benefit from these activities. Data from 55 strip trials was collected from 2005. An average yield increase of 4.9 bu/ac was observed.

- With the tremendous heat and sunshine of 2005, soybeans matured rapidly in the fall in many areas of the province. Harvest began during the first half of September and many producers were finished by October 1st. Some beans came off at moistures as low as 8%, but the majority of the crop was harvested at 12-15%. Some fields did not mature evenly and the large percentage of green stalks slowed combines and made harvest difficult.

- Various seed quality issues became apparent as harvest got into full swing. A lack of moisture during seed development resulted in mature green seed problems for some producers. Late season feeding of bean leaf beetles and grasshoppers resulted in damaged seed in the southwest. Phomopsis seed decay caused significant damage to some seed lots.

- Soybean acreage is expected to increase again in 2006. Planning a good crop rotation will become more challenging as more soybeans are grown. A good crop rotation is essential to minimize disease and insect damage and maintain good soil structure. The soybean plant does not do much for soil structure and returns very little organic matter to the soil.

- No soybean rust was found in Ontario in 2005. To date, South Carolina is the farthest north and east that the disease has been able to spread. Nevertheless, the industry in Ontario will need to be vigilant in 2006 to monitor the spread of rust, and be prepared to apply control measures if necessary. Emergency use and full registration for soybean fungicides will be pursued this winter by OMAFRA, OSG, and fungicide companies in cooperation with the PMRA.

- Identity Preserved (IP) soybeans have been a key component of Ontario's soybean industry. Ontario has had a strong reputation for top quality soybeans. This, along with Ontario's ability to segregate these beans efficiently, has produced a strong provincial IP industry. There has been renewed interest in IP soybeans due to low soybean prices

- The adoption of Glyphosate Resistant (GR) soybeans across the province has been rapid. In 2001 approximately 30-35% of the crop was GR. In 2003 about 55% of the crop was GR and in 2004, 55- 60%. In 2005 GR beans accounted for about 60% of the crop. Weed control problems with conventional varieties, improved GR varieties, quality, yield, and premium issues with the IP sector have driven this increase. The convenient fit of GR soybeans into a reduced tillage system is another reason for this rapid expansion in RR acres.

- Organic soybean production grew to about 20 000 acres per year in Ontario in 2005. At present there are more markets than supply of Ontario product. Ontario is importing US beans to meet our market requirements (some for export). The main production problem is weeds but with good management they can be kept in check. Prices have been about $12-16 per bushel for feed quality and $18-21 for food quality over the past several years. Chicago price has no effect. Some sold for $25 per bushel last winter. Yields ran 30-40 bu/ac on most well managed farms in 2005.

- The OOPSCC website www.oopscc.org has become a valuable tool for producers and plant breeders. Sponsors enter required data on the web, which significantly improves efficiency over the paper system. The data is also available on the web site for producers. It is now possible for producers to use this interactive tool to create head to head comparisons of specific varieties that are of interest to them.

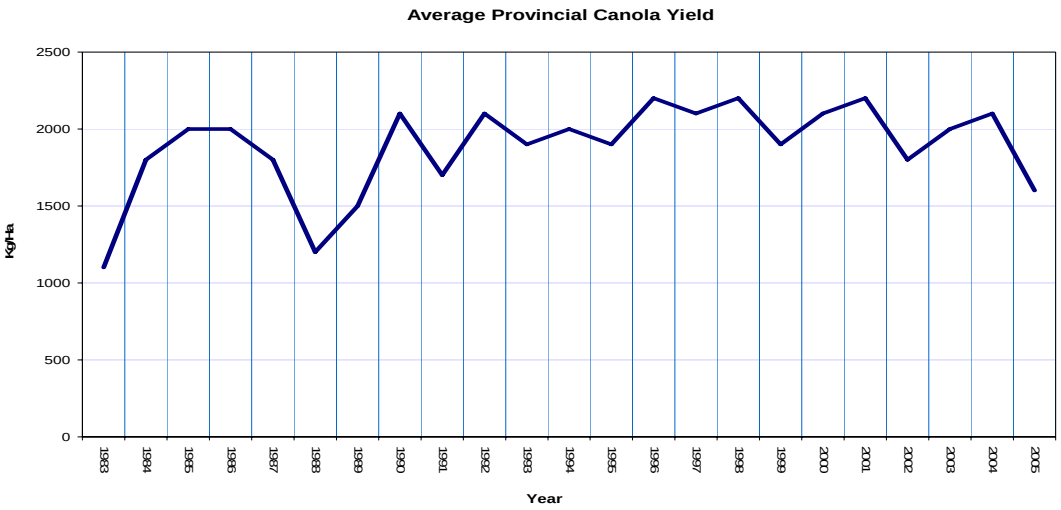
- A strong performance testing system is critical to the continued success of the soybean industry in Ontario. With the development of new traits through biotechnology, this performance data is critical in evaluating the potential of new varieties.

State of the Industry – Canola

- 2005 was a very disappointing canola year for both yield and quality. Early season dry warm weather allowed a good portion of the spring canola crop to be planted in mid April.

Conditions abruptly changed on April 21st, when rain and significant snow covered much of the province, halting further planting progress for 3 weeks. Temperatures remained below average into May, resulting in slow emergence and growth from the early planted crop.

- Foliar flea beetle control was required for much of the early planted crop due to its slow development and high flea beetle pressure. May planted canola emerged more rapidly, often within a week, with excellent populations although some unevenness due to dry soil conditions was reported, with emergence sometimes taking up to 1 month.



- Hot and dry weather in June persisted through till August with more than 24 days during June - July recording temperatures of 30°C or above. In general, the canola canopy volume was reduced due to a lack of rain (in some areas up to 7 weeks) with canola plants often not filling the rows. Early planted canola was impacted the greatest, with some fields in full flower never reaching above knee-high. The flowering period was shortened considerably (up to 1 week), with flower abortion and plant wilting evident during midday.

- Cabbage seedpod weevil was less of a problem in early canola than in previous years. The hot dry conditions favoured high populations of tarnished/lygus plant bugs. Some spraying occurred to control these pests during flowering. Weather related low disease pressure in most fields, meant very little spraying occurred for sclerotinia (white) mold.

- Yields varied greatly ranging from 0.5 t/ac – 1.2 t/ac, and typically averaged .66 -.75 t/ac of long term farm averages.

- Early shipments of spring canola to ADM Windsor identified that there was a major quality problem with the crop due to brown seed content. ADM suspended receiving canola for a short period, backing up movement of canola through the elevator system. Quality was very disappointing with much of the crop not meeting Grades 1 or 2 as required by ADM from most of

the growing regions. Quality analysis from samples analyzed by the Canadian Food Inspection Agency confirmed the poor quality of the oil, making it very difficult to process for human consumption. Higher brown seed levels are the result of canola subjected to severe moisture and heat stress during the filling period. When crushed, brown seed contains higher free fatty acids which increase rancidity and reduces oil quality. To achieve grade 2 and avoid down grading the sample must have less then 5 brown seeds per 1000. On August 30th, ADM announced a revision to their discount schedule, which indicated only grades 1 and 2 canola would be accepted.

- Canola is a valuable rotational crop in northern growing areas. Quality challenges with brown seed in this year's crop last occurred in 1988. Quality analysis of varieties in Ontario Performance Trials may provide information on varietal differences in brown seed count potential. Other market opportunities need to be explored.

- Ontario has had a good reputation for producing No. 1 and 2 canola for the past 24 years. Today's varieties have excellent tolerance to "brown seed", but not complete resistance. ADM is positive about the future of Ontario canola and baring a similarly poor climatic season to 2005, the expectation is for Ontario returning to a high grade crop in 2006.

State of the Industry- Winter Canola

- Survival of winter canola ranged from poor in the southwest to good in more traditional growing areas. Much of the stand reduction experienced is thought to have been caused by the February thaw when temperatures soared to above 20°C. This left fields with little snow cover and often water-logged. This period was followed by a rapid drop in temperatures (up to 40°C) resulting in freeze damage to the crown and roots.

- Cool temperatures through most of May favoured development of a thick canopy and resulted in early pollination. High temperatures and dry conditions occurred from late flowering through to pod fill which resulted in plant wilting, flower abortion and advancement in maturity.

- Populations of cabbage seedpod weevil were lower than previous years. Sclerotinia pressure was generally low in most stands. Yields of winter canola generally ranged from .75 - 1.25 t/ac, and graded mostly Grades 1 and 2.

- Dry conditions through August and September allowed timely planting of winter canola in the fall but resulted in emergence being delayed and uneven. Acreage is estimated to be similar to previous years (4 – 5,000 ac).

- Yield of winter canola was lower than previous years, although quality was acceptable. More on farm field trials and research is required to develop a 'winning' winter canola production recipe.

- There is a need for more research into production parameters, especially for winter canola. Seeding rates, row width, and N requirements needed to reach optimal yields need to be researched.

Emerging Needs and Issues

1. Continued strong support of genetic enhancement for production stability and risk management is essential. Continued support of public soybean breeding programs is required to ensure new varieties suited for Ontario's unique climate are bred. With the emergence of new pests such as soybean aphids and now the possibility of soybean rust resistance varieties to these pests will be an important tool to both reduce their impact and to reduce the amount of pesticides that will be used. Resistant varieties to these two new pests would significantly reduce the amount of pesticides required in Ontario.

2. Reliable third party performance data is vital information to Ontario farmers. All levels should support performance Testing of Soybeans and Canola.

3. Current support of agricultural plant genomics is low in Ontario and needs improvement. The science of Genomics is the study of the activity of many genes in time and space. The information generated from genomics will be available to scientists studying individual genes or processes. Genomics funding needs to be broad based and come from both the provincial and federal levels.

4. Best Management Practices concerning new and emerging pests such as soybean aphids and soybean rust must be established as quickly as possible. Lower production over the last few years in soybeans has been largely due to pests.

Forages

State of the Industry

Extensive Alfalfa Winterkill In Eastern Ontario

- Alfalfa was severely winterkilled in eastern Ontario, from Brockville to the Quebec border and up into some of Renfrew County (340,000 acres of alfalfa mixtures). Up to 70-80% of the alfalfa was reported as heavily damaged in this area, including many fields in the Ottawa Valley that were totally destroyed. Orchardgrass was also winterkilled. There was also a much higher than normal level of alfalfa winterkill in the east-central Ontario area (Toronto to Kingston).

- Poor winter hardening was the result of warm fall temperatures and a late frost, followed by wet weather and saturated soils in December 2004. Extremely cold weather with little snow cover in early January likely resulted in extensive freezing damage. Other contributing factors include extensive harvesting during the 2004 Critical Fall Harvest Period (the forage was needed and the weather was good), some ice sheeting, alfalfa root disease complexes and crown heaving on heavier soils. Diseased older stands on flat, clay soil types were more susceptible to damage. New seedings that had experienced high levels of potato leafhopper damage during 2004 also seemed more likely to be affected.

- In the areas where alfalfa winterkill occurred, there was extensive new alfalfa seedings (more than one-half the acreage in the east), some "patching", as well as the seeding of emergency annual forages such as cereals, cereal-pea mixtures, corn silage or sorghums.

New Seedings

- Winter survival of 2004 summer seeding was poor where extended dry conditions in August and September reduced or delayed emergence going into the fall.
- With good seeding conditions in April and early-May, most new forage seedings were in the ground in good time. There was a great deal of variation in rainfall across the province. Some areas were very dry in June and July, while other areas received adequate moisture. In areas affected by lack of rainfall, the success of new forage seedings was compromised. With hot dry weather and uneven emergence, many new alfalfa seedings were not sprayed for broadleafweed control for fear of suppressing alfalfa growth. This contributed to some severe weed infestations. Annual grass weeds were also a result in many new seedings. Many new seedings which were underseeded to cereal nurse crops were affected by lack of moisture, with a negative impact on stand establishment.

- There were considerable acres of summer seeding, but in the areas that remained dry into August, many farmers cancelled their plans for summer forage seeding. Where summer seeding were done, but drier weather continued into September, delayed emergence and reduced establishment resulted.

First-Cut Yields & Quality

- A combination of cool spring temperatures followed by extremely dry weather in June reduced forage yields in some parts of the province. The relative growth of alfalfa and grass was very regional. With the many cool days, cold nights and reduced Growing Degree Days (ODD) in April and May, the growth and development of alfalfa was significantly behind normal in much of the province at the end of May. In some of the lower CHU areas, the alfalfa growing points may have been damaged by heavy frosts received in early May and the subsequent auxiliary bud development may have resulted in delayed growth. The cool weather slowed the growth and development of the legumes much more than the grasses, which were closer to normal. The opposite appeared to be true on some of the lighter soils in the southwest, where the alfalfa got a head start as a result of warm early April temperatures.

- This resulted in many mixed stands with a high proportion of grasses, as well the grasses being more mature relative to the legumes. Alfalfa fibre levels were higher than normal based on stage of development.

- Optimum harvest dates of first-cut "dairy quality" straight alfalfa were typically a week or 10 days later than normal. Yields of early-cut alfalfa haylage were generally reduced, but forage quality was excellent. With the extreme heat beginning the first of June, the crop matured very rapidly, yields increased, but forage quality dropped quickly and dramatically. Later-cut forage yields were extremely variable across the province, depending on localized rainfall.

- Laboratory analysis of early harvested first-cut alfalfa (May) were high quality with high CP and low fibre (NDF), but later cut alfalfa was much poorer, as quality dropped
- quickly in June. Many samples of mixed stands of alfalfa and grass had higher than normal NDF and lower CP levels.

- The dry June weather did provide excellent conditions for making dry hay. Inventories of "horse quality" hay (no rain damage or dust) are much greater than last year. With the good conditions for making dry hay, the need for propionic acid application or making baleage was reduced. The exception was in some parts of eastern Ontario which received excess rainfall in June.

Second- & Third-Cuts

- Second and third cut yields were also extremely variable across the province, depending on rainfall in localized areas. In dry areas, fields where first cut was harvested late had very little regrowth. Some areas reported first cut yields of only half the normal levels, with almost no second cut. Many pastures entered the "summer slump" period early and required supplementation with hay that was in short supply.

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Hay Inventories Tight In Some Areas

- Hay inventories are reduced in much of the cow-calf areas, including northern Bruce- Grey, Simcoe, Durham, Victoria, Peterborough, Quinte, Renfrew, Manitoulin and Algoma. Below normal rainfall resulted in reduced yields of first cut as well as regrowth and subsequent cuts. Tight hay supplies in these areas have resulted in higher hay prices.

- Many of the affected cow-calf producers either sold some cattle in early fall (with improved prices), or used alternate forages such as corn silage (in areas where that was an option). Below average May and June rainfall and first-cut forage yield was also reported in much of south-western Ontario.

Insects

- Some alfalfa weevil was reported at threshold levels in the south-west, but very little spraying was required. Unlike 2004, potato leaf hopper levels were unexpectedly very low across the province.

Pastures

- Similar to hay and haylage, the "spring flush" of pasture production was also reduced due to the cool spring and dry June. When cattle were turned out according to the calendar rather than the development of the pasture, some damage was done. Many pastures entered the "summer slump" period early and required supplementation with stored feed. Good pasture management and rotational grazing reduced the need for feeding stored forage during the summer. Pastures recovered more quickly in the fall where cattle had been removed to a sacrifice pasture during the

dry weather. Many pastures have been severely injured by continuous over-grazing in situations where livestock inventories have exceeded forage supplies, compounded by dry weather.

Critical Fall Harvest Period

- With the dry September weather and a lack of first and second cut forage, considerable forage acreage was harvested during the Critical Fall Harvest Period. This may increase the risk of alfalfa winterkill. Some producers that needed feed waited for killing frost before taking the final cut.

Variety Committee Concerns

- Variety Subcommittee issues were again dominated by the budgeting and funding challenges of the Elora Research Station variety testing program in the wake of the 25 per cent increase in Elora testing fees with a 15 per cent increase at the colleges.

- The Central Committee has proposed to reorganize the committees by eliminating both the Central and Variety committees and establishing in their place a solitary committee namely the Ontario Forage Crops Committee. This new committee would have membership of both variety and production oriented representatives.

- The OFCC has steadfastly supported the position of farmers in the province to maintain performance testing in the province and also supports performance testing for the registration of forages.

- Aphanomyces has been identified as a problem in many alfalfa growing areas of North America. It was suggested that aphanomyces resistant varieties be reported if survey data documented that aphanomyces was a problem in Ontario. It was also suggested that variety quality data (NDF, NDFD, milk/ton, milk/acre) could be reintroduced when Ontario data could support NIR calibration equations.

OFCC Successes

- During 2005 there was a 90 % increase in the number of forage entries put into testing. This included 27 alfalfas, 3 timothy and 8 perennial ryegrass entries. Tests were seeded at Elora, Pakenham and New Liskeard. Reports indicated that the new seeding went into the fall in generally good shape. At the November meeting there were no entries supported while 3 alfalfa entries were supported on the Fast Track basis. The variety committee has put into place a system of guarantees whereby tests which fail for whatever reason to provide first production year data will offer companies the opportunity to reseed once with no additional charges.

- Performance trials are well publicised by the committee with 44,200 brochures printed. The brochures were inserted in dairy, beef and sheep producer's publications as well as circulation by seed companies. In addition one newspaper printed 13,000 copies at no cost to the committee.

- The OFCC fee schedule continues to be well accepted by the seed industry. For seed companies simply wishing to have their results in the brochure a membership is now required. The membership fee is $1,750.00 per year and the benefit is inclusion in 44,200 copies of the brochure that is well circulated as well as being posted on the internet. Companies are encouraged to pay early by June 30 for a reduction to $1,500.00. Seventeen companies paid the membership for the 2005 brochure. Companies not wishing to be in the brochure may have their varieties tested without the need to be a member.

Cuts and Losses

- The forage position at Kemptville was vacated January 30 2004 and has not been refilled. The earlier vacated forage position at New Liskeard has likewise not been refilled.

- Thunder Bay now remains open as an independent station run by the Thunder Bay Agricultural Research Association, a not for profit corporation, with funding from the Ministry of Northern Development and Mines through NOHFC plus in kind support from OMAF and the U.of Guelph. There were no entries at Thunder Bay in 2005.

- Kapuskasing has now been closed; there have been no entries at Kapuskasing for a number of years.

Field Crop Protection

State of the Industry and Significant Research/Service Accomplishments

- ***Corn*** –Cruiser seed treatment is now registered on corn, with a similar pest spectrum as Poncho, with the exception of black cutworm and a high rate option for corn rootworm. Researchers and extension continue to be concerned about the use of these new seed treatments as insurance without knowledge of the existence of problem pests. Also, plant health benefits in the absence of pests are being promoting by some companies which disregards sound IPM practices. G. Stewart is working on determining the potential yield increase occasionally experienced with these new seed treatments under various stresses in the absence of pests. Work is indicating that planting date plays a significant role in such benefits. Survey work done by A. Schaafsma in 15 first year corn fields, looking for the rotation variant of corn rootworm has indicated there is still no significant/economic levels of the variant here in Ontario. G. Quesnel has found similar results in Eastern Ontario. B. Broadbent continues to monitor ECB populations for resistance to Bt hybrids with no suspect populations existing at this time. Surveys by A. Tenuta are showing an increase in incidences of leaf diseases in corn. In particular there was a rise in gray leaf spot, northern leaf blight and Anthracnose possibly due to less tolerance in available hybrids.

- ***Soybeans*** - June Beetle larvae (3 yr cycle) is an emerging issue in soybeans, particularly in the Highgate area. Cruiser seed treatment has been registered on soybeans for seedcorn maggot, wireworms and European Chafer grubs (but not June Beetle grubs). Work will need to be done to prove it's effectiveness at controlling June beetle larvae too. Will also need to educate growers on when to use Cruiser. Matador received full registration this year for aphid control. Data from 56 grower strip trials across the province was collected by T. Baute, G. Quesnel and H. Bohner. Only an approx. 4-5 bushel increase in yield was experienced this year. Greater heat forced aphids down into canopy and soybean canopies were tall and dense making it harder to reach the aphids with spray equipment. Also, the crop was less stressed than other years. The SBA consensus group is staying with threshold of 250/plant with increasing pops. Increased education on the variables that are at play when deciding whether to spray will be done this winter. Dimethoate worked better than Matador in some fields though yield was not sign. greater than Matador strips. Syngenta is now looking at getting the higher rate (equivalent to the US rate of Warrior) registered for soybean aphids next year. Spidermites were also a significant pest this year causing increased confusion as to which product to use when both aphids and mites are in the same field. In this situation, dimethoate is the product of choice. Soybean aphid parasites and predators were active in many locations. The impact of parasitoids was measurable in local areas. Grad work through A. Schaafsma is looking into the impacts of seed treatments on parasitoids. B. Broadbent looked at 4 predators in a caged soybean trial. *Harmonia* was the most effective in reducing the pops of aphids. *Beauvaria & Verticillium* parasitic pathogen of aphids are being investigated. Surveys done by A. Tenuta, T. Baute and R. Michelluti found a higher incidence of soybean mosaic and alfalfa mosaic from previous years. Seed source may be the reason for greater incidence, with aphids helping to move the virus around. Bean leaf beetle may also provide greater spread of bean pod mottle virus. SCN has not been found in eastern Ont yet. Soybean rust has been reported in Texas and possibly Mexico so the likelihood of spores arriving in Ontario is greater than before – probably a higher risk to southern Ont than the SE states.

- ***Wheat*** – Grad work though A. Schaafsma has shown that barley yellow dwarf may not be entirely attributed to aphids. There is a virus complex and a bridge to weed populations and volunteer wheat in area may allow carry over to new planted fields. Fungicide work for control of dwarf bunt has found Dividend to be very effective. The future of DonCast depends on Folicur receiving full registration.

- ***Forages*** - No emerging pest issues were reported this year.

- ***Edible Beans*** - an increase in tarnished plant bug in edible beans.

- ***Canola*** - M. Sears, T. Baute, R. Hallett, H. Earl and D. Hume working on cabbage seedpod weevil (CSW) and swede midge research in canola. Foliar work on CSW has shown that two applications may be necessary. Timing of applications is critical. Work will continue to refine management recommendations. Sticky traps are proving to work well for indicating when populations move into the crop. An application to New Directions on trap cropping and

monitoring with traps has been put forward. CSW and other insects may have contributed to the brown seed damage experienced by the canola industry this year. New foliar products for both CSW and SM are being investigated.

Emerging Needs and Issues

- **Integrated Pest Management Research in the new OMAF–U of G Research Program Structure.** The FCPSC was very disappointed with the response from the recommendations brought forward by the OPMRSC to OMAFRA and the U of G. Our committee continues to be very concerned about the pest management portion of OASCC system not being represented properly in the new program. If something does not change in the structure, the future of pest management research in Ontario will be in jeopardy. Overhead fees and other differences in funding structure vary greatly from other universities and jurisdictions. Research contracts with industry are being lost to the US and other cheaper research sites. Technical positions can not be secured, causing researchers to focus on the physical field work rather than the research particulars. In response, the FCPSC has created an ad hoc committee that will create a report documenting the discrepancies and structural problems in the new OMAFRA/U of G Research Program, comparing it to other existing universities research programs. It will also include suggestions on how to improve the program structure so that it does better represent Pest Management research. We will also elicit CropLife's support with documentation of their concerns with the new structure and losing pest management research in Ontario. This document will be presented to the OPMRSC, for it to be carried forward. All other technical working groups are encouraged to participate on this ad hoc committee, giving examples of problems in the horticultural pest management research sector. Unified support from all of the Commodity Groups impacted would also ensure a more effective response from U of G and OMAFRA.

- **Alien Invasive species** continue on the rise in field crops. Monitoring, forecasting and management strategies have to be in place to ensure readiness when problems arrives.

- **Seeing a shift in pesticide applications.** "Lower risk" pesticides are being registered and marketing strategies are tending towards the concept of insurance instead of controlling the pest when it is present at economic levels. Need to determine how to respond to such shifts and bring an optimizing prescription to the situation. Thresholds and monitoring strategies, prediction models and economic evaluation of treatments are necessary.

- **Non pest control benefits in the absence of the targeted pest (plant health)** - seeing marketing/promotion of pest control products and their plant health properties (growth promotion) i.e. yield enhancement in the absence of the pest. This requires research and clarification to ensure growers are using these products wisely.

- **Pesticide Stewardship –** Risk of resistance with use of similar seed treatments and foliar chemistries across commodities. Need to go back to promoting IPM and finding solutions to make IPM practical for the grower.

A) Revisions to the Terms of Reference for the FCPSC

Based on the "General Guidelines for Technical Working Groups" recently created by the OPMRSC, the FCPSC discussed making some changes to their Terms of Reference. It was agreed upon that the FCPSC will continue to request data from Ontario trials, with the understanding that if none exists, trials from other jurisdictions as well as expert opinions from members of the committee may also suffice when considering product submissions in our publications. The FCPSC will also keep efficacy as the priority when ranking products in the book, but will include safety to the applicant and environment including biological options, reduced risk, IPM compatibility and safety to beneficials as additional considerations. Products will now be listed by chemistry group to promote resistance management strategies and products with same active ingredient will be listed first by least hazardous and then alphabetically. A short section explaining how to interpret our tables and ranking system will also be included in the publication.

Pest Management – Weeds

State of the Industry

In general, weed control with herbicides was inconsistent in 2005. Soil applied herbicides worked well in those areas that received timely rains, but early season moisture was not adequate in all areas of the province. In particular, the southwestern portion of Ontario faced a dry spring. The efficacy of post-emergent herbicide programs was also inconsistent, as weed growth was slowed during application in some areas due to hardening off of weeds caused by temperature and moisture stress.

Weed Control Results and Overall Crop Report

Overall weed control was fair, as there was poor moisture during the spring months, and extremely dry conditions through mid-summer, which caused stress to plants, reducing herbicide efficacy. Those who were able to get the crop and PRE herbicides in with timely rains did find the weed control to be acceptable.

Delayed crop establishment combined with poor PRE herbicide performance allowed weeds to escape, which put greater stress of POST herbicides. The hot, dry weather reduced the activity of POST herbicides, as the weeds were not hardened off.

About 15% of the corn acres and 60% of the soybean acres in Ontario were planted with glyphosate-tolerant seed. Glyphosate drift onto non-target crops was a significant concern this past season as well, and extension was conducted (i.e. articles and presentations) across the province on methods and technology useful for drift mitigation.

Problem Weeds

The University of Guelph (Guelph and Ridgetown campuses) continues to do a number of herbicide trials on problem weeds including:

- Tufted vetch

- Perennial sowthistle
- Downy brome
- Wild garlic
- Wire-stem muhly
- Dandelion
- Wild carrot
- Large crabgrass
- Yellow whitlow grass
- Prostrate knotweed

Waterhemp (*Amaranthus tuberculatus* var. *rudis*), the scourge of Midwest growers, appears to be spreading further in Ontario. After three sites were initially found in 2002 and 2003 in Essex, Lambton and Kent Cty, a survey conducted by Susan Weaver (AAFC Harrow) has revealed 16 additional sites in Essex Cty. This confirms this weeds ability to spread rapidly. A team including Susan Weaver, Peter Sikkema and François Tardif has begun work to better understand the biology molecular genetics and control of water hemp. Native populations also exist and may cross-pollinate with resistant types. A Problem Weed CD is now available online in English, and the French is in preparation. The following is the link for the English version:
http://www.omafra.gov.on.ca/english/crops/field/weeds/problem_weed.htm

A number of weeds attracted attention this summer in the form of requests to the OMAF Weeds Lead. Many of those are the subjects of research as outlined above: wild carrot, prostrate knotweed, annual and spiny annual sow-thistle, tufted vetch, common chickweed and field violet. Spotted knapweed, downy brome and cleavers were also identified as potential future problem weeds. Giant hogweed and dog strangling vine are two invasive species that are triggering more inquiries, especially following the presentation by Dave Bilyea on poisonous or shelterbelt weeds given at the Southwest Diagnostic Days early in July. Palmer amaranth was found in Hamilton on a rail bed.

Herbicide Resistance
Dr. François Tardif reported that samples provided through OMAFRA Call Centre continue to show Gr. 2 resistant pigweed, with some nightshade as well. Six samples of Green foxtail showed resistance to Gr. 2 herbicides. No ragweed samples were submitted, but Gr. 2 resistance is likely widespread in this weed.
Peter Sikkema reported on a Glyphosate Resistance Update he attended last month. Glyphosate-resistant waterhemp and ragweed are common in Missouri; glyphosate-resistant ragweed and lamb's-quarters are suspected to be widespread in Ohio. It is recommended to use a PRE residual herbicide in all RR crops, as well as planning herbicide rotations between crops. The Herbicide Resistance Working Group met at the CWSS conference in Niagara Falls on Nov. 29th to discuss research needs and priorities, as well as update everyone on the status of resistant weeds across the country.

Minor Use Program for Herbicides
Jim Chaput is the OMAF Minor Use Coordinator, located in Guelph, who maintains a website with updated information on Minor Use Proposals at
http://www.gov.on.ca/OMAFRA/english/crops/minoruse/index.html .

Pulse Crops

State of the Industry-White Bean

The Ontario White Bean Producers' Marketing Board (OWBPMB) completed a Strategic Plan, with the 3 main areas of focus being Research & Extension, Grower Communication, and Promotions. Net Revenue for the Board in 2004 was $111,000 vs. a projected shortfall of $95,000 a result of a 30% larger crop than projected. The percentage of beans marketed through the pool continues to shrink, with now over 97% of beans contracted in one form or other. The board continues to pursue a co-ordinated federal-provincial bean breeding program based at U of Guelph. Global Utilization of white pea beans has been static and is estimated at between 6 to 7 million bags. It is the board's view that white pea beans are a niche crop with a market that is being managed by 3 principal world processors. The OWBPMB established that Ontario requires about 85,000 acres of white beans for the industry to be sustainable. The board's funding of research is approximately 25% of revenues.

Crop Year in Review

Ontario acreage increased by over 60% in 2005 from the previous year to 100,000 acres of white beans and 60,000 acres of coloured beans. Average yield for white beans is expected to be a record 22 cwt/ac(1 t/ac) with total production of 95,000 t. Coloured bean average yield is also expected to reach a record 21 cwt/ac (0.95 t/ac). Acreage was driven by reduced world supply, and higher potential returns vs. other field crops. Spring planting conditions were dry but much cooler than normal, with soil temperatures of 10 – 15° C. By the end of the second week of June, about ¾ of intended acreage of many bean types had been planted. Emergence was uneven in many fields due to continued dry conditions. Leafhopper populations were very low for most of the season, a result of few storm fronts from the USA. Bean plants were smaller than normal, and did not fill in rows until late July. Crop saving rainfall on July 15 – 19th through most dry bean growing areas resulted in a flush of new growth, flowering and pod development. Heavy rains in Western Ontario saturated soils and resulted in portions of fields developing a 'gray cast'. Diagnosis of plants from affected fields confirmed fusarium root rot as the cause. Root rot pressure was low up to this time. In prior surveys, Fusarium root rot has been identified as the principle root rot affecting dry beans in Ontario. Cooler temperatures and improved soil moisture conditions in August allowed for good pod set and development. High populations of tarnished plant bugs in many areas and spider mite to a lesser extent resulted in some spraying for control. Some fields developed heavy infections of bacterial blight. Anthracnose infection was very low in white beans, with only isolated plants in a few fields.

Yields in most areas were mostly average to exceptional, ranging from 12 cwt – 60 cwt, with excellent quality. Low seed moisture at harvest was an issue, resulting in some harvest delays while growers waited for moisture to rebound in an effort to reduce mechanical damage.

Tarnished plant bug caused some increase in pick.

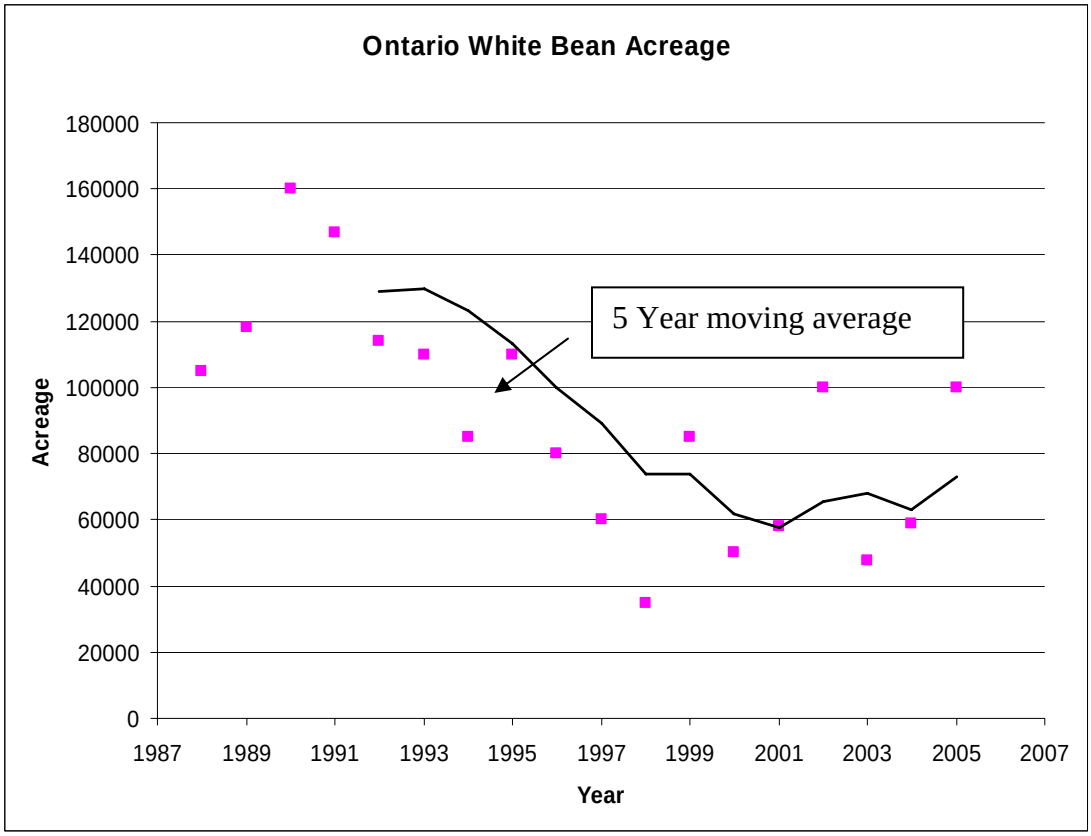


Table 1. White Pea Bean Acreage Trends '000's Acres*

Year	Ont.	Michigan	Min/Dak.	Manitoba	Total
1988	105000	205000	206000	15500	531500
1990	160000	235000	257000	35000	687000
1992	114000	235000	160000	24000	533000
1994	85000	250000	160000	19000	514000
1996	80000	200000	190000	31000	501000
1998	35000	90000	180000	48000	353000
1999	85000	150000	239000	109000	574000
2000	50000	120000	170000	140000	550000
2001	58000	65,000	143,000	125,000	346000
2002	100000	85,000	247,000	142,000	565,000
2003	47,500	40,000	111,000	95,000	293,500
2004	59000	55,000	121,000	90,000	325,000
2005	100,000	75,000	140,000		

* Figures supplied by Ontario Bean Producers Marketing Board

(Table 2) Average White Pea Bean Yields

	Manitoba	Ontario
1988	5.80	12.20
1989	5.81	13.15
1990	11.00	13.47
1991	11.57	16.73
1992	8.60	8.07
1993	4.61	14.14
1994	15.32	15.83
1995	14.04	17.38
1996	14.68	11.06
1997	14.00	14.77
1998	16.90	14.42
1999	16.57	16.41
2000	11.99	11.99
2001	10.27	10.27
2002	15.71	15.21
2003	15.5	20.2
2004	3.75	19.75
2005		22.29

State of the Industry - Coloured Bean

- Ontario coloured bean acres continue to expand (Table 2). Part of the expansion is due in part to the interest in production contracts. Several niche market classes (Otebo, Adzuki, and Kintoki) have expanded production in Ontario. These markets are ‘niche’ markets with limited acreage

that can quickly become saturated. This is evidenced by the increase in acreage of Otebo beans across North America in 2005 combined with good yields, leading to very significant oversupply, that is estimated may take 2 years to be used. U.S. per capita consumption of Pinto, black beans and to a smaller extent cranberry, has increased over the past 10 years. , Attributed in part to the growing Hispanic population. One significant trend is the average price for beans on the world market is dropping. This indicates greater economics of production are required as new production regions emerge. In Ontario, the 2005 yield, size and quality of the crop was excellent.

- The world dry bean market is also becoming a more managed market with only a few principal end users. Research projects that OCBGA fund include breeding programs for Dr. Peter Pauls, Dr. Soon Park, Dr. Kangfu Yu, national bacterial blight project, seed treatment trials, Performance and Variety Trials and Weed Control. Joint consumer promotions with the Ontario White Bean Producers' Marketing Board are undertaken throughout the year. The association also has become more 'market focused' investigating other potential markets in co-operation with Pulse Canada. For further information, contact Bernadine Wolfe, Secretary, OCBGA.

Table 2. Coloured Bean Acreage (Major classes)*

Year	Acres Insured	Average Yield (cwt)
1991	15,182	18.4
1992	13,547	7.9
1993	19,108	15.9
1994	20,837	16.9
1995	25,781	17.1
1996	22,315	12.5
1997	23,527	17.1
1998	24,885	17.3
1999	43,666	16.2
2000	44,244	10.2
2001	53,377	-
2002	56,000	16
2003	60,000	20
2004	55,000	20
2005 (preliminary)	60,000	21.2

- Figures supplied by Agricorp

Significant Research/Service Accomplishments

a) Weed control

Accomplishments. Several effective control strategies were found for the following problem weeds in white and kidney beans; lamb's quarters, red root pigweed, common ragweed, proso millet, green

foxtail, green smartweed and wormseed mustard. Each of these weeds is a major concern in at least part of the dry bean production region in Ontario.

Field studies evaluated the response of 6 market classes (Black, Pinto, Berna, Cranberry, Kidney and Yellow Eye) to four potential new herbicide options. Of the 24 possible combinations of herbicide and market class, 10 combinations were found to provide an adequate level of crop safety, and an URMULE submission will be made to the PMRA.

URMULE Registrations received in 2005:

- Pursuit(ppi) – weeds in adzuki beans;
- Basagran Forte (post) – Cranberry, Black beans;
- Frontier, Poast Ultra, Reflex, Dual II Magnum – Otebo beans;

Why was the work undertaken?
- Control of problem weeds;
- Weed control in Niche market classes;

Who Did the Work?
Peter Sikkema, RCAT, U of Guelph;

b) IPM of Seedcorn Maggot, Wireworm, Potato Leafhoppers.

This project has identified three new seed treatment control strategies, and four new foliar control strategies. These strategies are effective, economical and provide a positive environmental impact, compared to current control strategies. Pest threshold research has measured the impact that PLH has at various stages of crop development, and measured the impact that various control strategies have on the pest and the crop. For instance, the new seed treatment control strategies provide an effective control of PLH for 4-6 weeks. This is considered season long control in some years, but not in others. The development of pest thresholds in combination with this seed treatment technology will allow growers to select the most appropriate foliar control measure, and apply them only when they are needed to adequately control the pest. A final area of research has developed a better understanding of the interaction between PLH and dry beans. It has shown that PLH are attracted to dry beans based on leaf colour. There is some potential to use this information, along with new control strategies, to develop a trap cropping system that will reduce damage from the pest, and reduce the need for repeated application of foliar insecticides by dry bean growers.

Why was the work undertaken?
- Find an alternative seed treatment to Lindane;
- Develop an IPM strategy for leafhoppers that included seed treatments, alternative foliar controls, control strategies to reduce pesticide usage;

Who Did the Work?
- Chris Gillard, RCAT, U of Guelph;

c) Biological Control of Seeding Root Rot in Dry Edible Beans

A number of biological compounds have been evaluated for their ability to control early season root rot in dry beans. Most of the products contained *Bacillus subtilis*, as the active ingredient. After conducting more than 20 studies over four years, it is felt that these products will only control a mild root rot infection. In side by side comparisons, nitrogen fertilizer was found to be a more effective control for root rot.

Why was the Work Undertaken?

- Root rot is one of the most serious and difficult to mange diseases of dry beans. Research at North Dakota State University indicated positive results using a biological (*Bacillus sp.)* seed treatment;
- Evaluation of Apron – MAXX, and other seed treatments that also offer reduced risk;
- Support registration of Apron – MAXX seed treatment that would be harmonized with USA registration;

Who Did the Work?

- Chris Gillard, RCAT, U of Guelph;

Foliar Fungicide Application Field Day – July 2005.

A successful field day was held at the Huron Research Station, RCAT to demonstrate application technology for foliar fungicides.

d) Evaluation of White Beans for New Value Added & Alternative Markets

What Was Accomplished?

- Literature review of white bean traits of value to food and industrial markets. Completed in 2004.

Why Was the Work Undertaken?

- Review completed research on compositional analysis of white beans that may have value to end markets

Who Did the Work?

- Dr. Lorna Woodrow, AAFC, Harrow

e) Mining Pick Beans for Bioproducts

What Was Accomplished

- Literature review and compositional analysis of white beans for components of value to bioproducts industry.

Why Was the Work Undertaken?

- Tonnage of pick beans varies significantly between years depending on harvest weather. Estimated tonnage varied from a low of 3200 t to over 10,000 t. "Pick beans" are non marketable beans due to insect, disease, weather or mechanical damage.
- Identifying a market for pick beans would improve returns to industry

What Was Accomplished?

- Literature review and some compositional analysis

Who Did the Work?

- Mia Tulaga, Student, University of Guelph

Emerging Needs and Issues

- Harmonization of registered pesticides and MRL's in North America is a priority of Ontario dry bean growers and Pulse Canada. The high cost of registration of pesticides is a barrier for expansion of 'niche market' dry beans.

- **NEW *IPM Bacterial Blight***. Bacterial blight (common & halo) is a significant disease in dry beans each year. The disease was widespread in 2005 affecting both yield and quality. A new National Bacterial blight project was started in 2005 between AAFC, Pulse Canada, RCAT (U of Guelph) that addresses developing resistant lines. A replacement seed treatment product to Streptomycin is also required. Preliminary research also indicates that further work on epidemiology is needed. Control of blight would support expansion of dry bean seed production in Ontario.

- **NEW *Pulse Innovation Project*** was developed by the pulse industry in Canada and brought to life early in 2005 through the injection of $3.2 million from the Government of Canada under the 'Agri Innovation' initiative. The project, which will run over the next three years (2005-2008), will develop a strategic approach to product innovation leading to new market outlets for lentils, beans, peas and chickpeas. The Pulse Innovation Project will be head-quartered at Pulse Canada. The project's objective is to increase pulse utilization in North America through innovation in product development, adding value to Canada's pulse crops by moving them up the value chain. The Ontario bean grower groups contributed funds to this project.

- Anthracnose was widespread in white beans in 2004. No Ontario varieties of edible beans are currently resistant to race 73 identified in 2004. Research priorities include: Screening of Ontario bean varieties for resistance; breeding to incorporate genes for resistance; IPM strategy using seed treatments and foliar fungicides and evaluation of seed treatments.

- IPM Strategy for Sclerotinia(White Mould). Ronilan (vinclozolin) fungicide trade restrictions. The USA announced in 2004 trade restrictions on import of beans from Canada on which Ronilan fungicide is used. Ronilan has been the product of choice for white mold control in dry beans, soybeans, and canola in Ontario. Vinclozolin has been associated with adverse health effects, including its ability to disrupt normal hormonal function. The product has come under review in a number of countries and a number of these have withdrawn it from the market. Ronilan is very effective on white mold, and growers liked its 'curative' effect. A new fungicide registered for 2004, Lance (boscalid), must be applied differently than Ronilan. Lance must be applied as a protectant. In 2004, growers reported control using Lance was not as good as they had become accustomed too. Research/service priorities for white mould IPM strategy needs to be reviewed

- Soybean Rust has been confirmed in several soybean-growing regions of the USA. In limited research studies, it appears dry beans are more tolerant/resistant to rust than soybeans. Further work is required to determine market class differences.

- Soybean Cyst Nematode is expanding its geographic area through the main dry bean growing areas of Ontario. Dry beans are a host for SCN, but little is known on its impact on dry beans. In order to develop effective IPM strategies for SCN including crop rotation sequences, information is required on host interaction with various classes of dry beans. A preliminary research study in 2005 conducted by AAFC, Harrow indicated a surprising level of infection on several varieties/market classes of dry beans. Yield data for the trial was to be summarized, and a greenhouse study will be undertaken this winter.

Emerging Issues without specific research priorities

1. Genetic Enhancement for Yield, Quality and Risk Management
2. Edible Bean quality evaluation and utilization
3. Integrated Pest Management for Insects and Disease
4. Integrated Weed Management
5. Agronomic & market development for existing and emerging market types

Emerging Issues without specific research priorities

1. IPM of insects and Diseases – anthracnose, potato leafhoppers, Sclerotinia, bacterial blight, soybean rust
2. Evaluation of Value Added Genetics in Dry Beans
3. Improved Nitrogen Management.
4. Direct Harvest Technologies

Tobacco

State of the Industry

The production target for 2005 was 85.314 million pounds with an additional 5 million pound trigger. The target price for 2005 is $2.21/lb., slightly lower than last year's price of $2.2365/lb. The growable percent for producers' Base Production Quota was 31%.

The future sustainability of the tobacco industry is of significant concern to Ontario tobacco growers. In April of 2005, both the federal and provincial governments contributed to the Tobacco Adjustment Assistance Program (TAAP) reverse auction that was managed by the Ontario Flue-Cured Tobacco Growers' Marketing Board (OFCTGMB). About half of Ontario tobacco quota holders submitted bids to the TAAP program. The total payment per pound for basic production quota for successful applicants to the TAAP program was $1.7190. Under this program 51 million pounds of quota representing 150 growers, were retired.

Imperial Tobacco Canada has decided to close its Canadian manufacturing operations in Guelph and Aylmer, Ontario by 2006 and 2007 respectively. Imperial is moving its manufacturing operations to Monterrey, Mexico. This will eliminate 555 positions in Guelph, 80 positions in Aylmer, and approximately 15 positions in the Montreal head office.

The OFCTGMB is currently initiating discussions with government and other key industry stakeholders regarding a full exit plan for all Ontario tobacco farmers.

Table 1: Area, market volume and total value of tobacco grown in Ontario

Year	Area (acres)	Quantity Sold		Total Value
		'000 lb	'000 kg	$ '000
2005*	34,389	-	-	-
2004	36,603	87,851	39,884	197,788
2003	35,725	93,955	42,656	213,827
2002	41,342	108,060	49,059	244,146
2001	52,977	117,094	53,161	267,683
2000	52,050	106,422	48,316	244,204
1999	56,425	142,379	64,640	308,929
1998	63,520	150,576	68,361	326,525
1997	64,005	154,913	70,330	341,928
1996	57,872	142,241	64,577	317,890
1995	62,181	152,196	69,097	316,814
1994	57,260	129,627	58,851	271,476

*Marketing of crop not yet completed

Significant Research/Service Accomplishments

Breeding

- Development of CTH2 - In 2005, yield, agronomic, chemical and quality traits of CTH2 were collected from regional and registered trials. In addition, CTH2 was tested at 9 farms as part of a small scale on-farm evaluation. The results strongly suggest that CTH2 has high yield potential, good quality traits and high economic return. It is also immune to Black Root Rot. The yield potential of CTH2 is of special interest to some of the growers who are concerned about the low yielding ability and higher production costs associated with CT157 - the most dominant tobacco variety grown in Ontario. CTH2 will be proposed for registration during the annual variety meeting on March 2, 2006.

- Development of CTH14 and CTH15 hybrids - These hybrids have potential of producing high yield and good quality traits. The economic returns of both hybrids are similar to CTH2. CTH14 will be recommended for 2006 small scale on-farm seed release. Similar to CTH2, both CTH14 and CTH15 will be of interest to those growers concerned about the low yield and higher production cost of CT157.

- The breeding program has identified a sister line of CT572 that is less susceptible to leaf spots and which is at the final year of testing.

- Haploid plants were recovered from crosses between F1 hybrids and *Nicotiana africana* and chromosome numbers of the haploid plants were doubled using leaf midvein culture. Double haploid lines immune to Tobacco Mosaic Virus (TMV) were developed and tested in the field in 2005. The haploid breeding technique is becoming an integral part of the breeding program. The advantage of this method is that it shortens the time required to develop varieties. Stable lines can be produced in one generation.

Agronomy

- Chemistry evaluation of grower leaf samples has resulted in more balanced chemistry levels of tobacco produced by growers.

- New nitrogen recommendations have been published in the Flue-Cured Tobacco Production Recommendations, 2005 supplement. This information was prepared by CTRF and OMAFRA, based on a number of recently completed studies.

- Forage millet cultivar CFPM-1 and grain millet hybrid CGPMH-1 have met industry requirements for use as a biological alternative to chemical fumigation.

- A research program is now in place to identify the N fertility requirements of potential cultivars.

- A new grower information material was drafted. It is entitled, *Flue-cured tobacco best management practices – plug tray seedling production*.

- A two-year field study at Delhi, Ontario, showed that the application of supplemental calcium, either at planting or as foliar sprays, did not ameliorate leaf bruising. However, it was found that cultivar selection is an important management tool for minimizing the problem of bruised green leaves.

- Initial germination percentage appears to be slightly higher in size #7 pelleted seed than the size #9 pelleted seed. However, very little difference was found between these pelleted sizes for final emergence percentage, number of leaves per seedling, root and shoot lengths or root and shoot dry weights.

- Results of an observational trial examining the possibility of using vapor gard to manage flue-cured tobacco productivity and quality, showed no indication of a possible beneficial effect of the product.

- The agronomy program has begun conducting $NH4^{+}$ - N and NO_3^{-} - N determinations of soil samples in its own lab.

Protection

- It was found in 2005 that treatments employing strobilurin fungicides or boscalid or Actigard lessened the occurrence of Target Spot disease (*Thanatephorus cucumeris* causal agent) in the field.

- Greenhouse applications of strobilurin fungicides (Cabrio, Quadris or Flint) to control Rhizoctonia Damping-Off disease (*Rhizoctonia solani* causal agent) could alter subsequent plant development in both the greenhouse and the field, leading to reduced plant height. The growth of boscalid or Pristine-treated plants was similar, however, to plants which were not treated or were treated with Benlate. Although growth effects were observed, the use of any of these fungicides did not adversely affect grades or yield.

- Steaming Black Root Rot (*Thielaviopsis basicola* causal agent) contaminated Styrofoam transplant production trays provided the best control of this disease in plants later grown in the field. Applications of the fungicide Senator 70WP (thiophanate-methyl active ingredient) provided intermediate levels of control.

- The Tobacco Moth (*Ephestia elutella*) and the Indian Meal Moth (*Plodia interpunctella*) were captured in on-farm pheromone traps and were widely distributed through the tobacco growing region of Ontario. The Tobacco Moth is a known pest of tobacco; the Indian Meal Moth may be resident in storages as a pest of grain products and is not known to affect tobacco.

- Blue Mold disease (*Peronospora tabacina* causal agent) was not detected in trials or on-farm in Ontario in 2005.

- Tobacco Mosaic Virus resistant breeding lines produced using haploid breeding techniques were evaluated in the field for the first time in 2005.

Alternative Uses of Tobacco - Update

Two research projects are being proposed for the 2006 field season at the Delhi research station by Dr.'s Chris Hall, Jim Brandle and Jim Todd. These projects will draw on resources from the public and private sectors to address the potential of using tobacco as a "plant factory" for production of bio-products and use of the residual biomass as a feedstock for ethanol production. Growing tobacco as a biomass crop has the potential to be economical, but only if value can be captured by marketing the high quality protein. Both bio-product and biomass uses require tobacco to be grown at high density (~100,000 plants/ac vs. the current practice of ~6000 plants/acre), and this research will address the details of planting, growing, harvesting and processing high density stands of tobacco, and amaranth, another plant that produces high quality protein and large amounts of biomass. In parallel, tobacco genetically engineered to produce recombinant antibodies with medicinal or industrial utility, will be grown at high density in the greenhouse and in the field, to determine the most cost effective and efficient way to isolate small, high value proteins from large amounts of plant material.

Emerging Needs and Issues

- Leaf Drop – There was a significant amount of leaf drop in the 2005 crop, especially with the variety CT157. Deep sucker control burn can be a contributing factor to leaf drop. There appears to be an increase in the number of applications of sucker control with the change to mechanical harvesting. Currently there are no other options besides the fatty alcohol-based sucker controls in Canada. Fatty alcohol-based sucker control products are expected to increase in price in 2006. Also, these products can be sold for more money to the lumber industry (wood preservation). Possible alternatives are: BASF 131 (diflufenzonpyr); MH (maleic hydrazide) at lower application rates; butralin and flumetralin. There were concerns raised as to the future availability of the sucker control products.
- Sucker control – *concerns are outlined above in "Leaf Drop" section*
  There is a lot of construction taking place in the US due to the hurricane damage. Therefore, the fatty alcohols are in demand from the wood industry; where the fatty alcohols can be sold for more money.
- Tobacco Moth (*Ephestia elutella*) – still a concern. More information about this pest is needed to better understand the situation. AgriCorp does not insure carryover tobacco. The current recommendation is to destroy any infested tobacco; preferably by burning. A burning permit is needed in some tobacco-growing areas. Also, MOE has received some complaints regarding the burning of tobacco.
- Re-evaluations of 1,3-dichloropropene and acephate – These products are under re-evaluation by PMRA. Many growers use these products for control of major diseases and insects in Ontario. The loss of these products is of great concern to the tobacco industry.
- Tobacco Mosaic Virus (TMV) – this continues to be a problem. The number of growers with TMV is rising and there is no geographical isolation of this virus.

- Weed control – concern was expressed by a grower that Devrinol doesn't seem to work as well as it did before. Extra time and money was invested into hoeing weeds. There are problems with both broadleaf and grassy weeds, in particular summer grass (crabgrass).
- Energy costs – the 2005 crop was an expensive crop to harvest. Also, input costs (i.e. fertilizer, fuel) are going up.
- Kiln fires – there were reports of kiln fires again this year.

Organic

State of the Industry

Production

Following are some statistics to estimate the size of the organic industry in Ontario and Canada. These statistics are based on surveys of the certification bodies (CB) in the region and attempts have been made to reduce errors caused by farms, which are certified by more than one CB. Inaccuracies are sometimes due to inconsistent statistical records between CB. 2003 is the most recent statistics available at this time.

Table 1: Estimated Acreage of Certified Organic Crops in Ontario (2003) [1]

Crop	#Producers	# Acres	Value ($M)
Hay/Pasture	279	26,733	
Soybeans	145+	12,857	$6.1
Corn	97+	3,993	$3.4
Spelt	85+	20,782	$10
Spring cereals	90+	5,796	$2
Wheat	87+	3,656	$1.3
Rye	45	943	$0.25
Buckwheat	40+	1,222	$0.25
Fruit		1,056	$2
• Apples	20	873	
Vegetables		1,311	$3
• Mixed veg/market garden	117	545	
• "Large scale" potato	19	249	
• "Large scale" sweet corn	10	142	
Herbs	11	45	
Totals all crops	487	91,047	$30+

The organic vegetables would have an approximate farmgate value of $3M and the organic fruit would be valued at approx. $2 million per yr. (Martin)

Table 2: Estimated Livestock Numbers on Certified Organic Farms (2003) [1]

	Number head	Farms
Dairy cows & heifers	3,401	46
Beef cattle	1,988	47
Sheep	620	8
Pigs	119	7
Meat birds	66,344	23+
Layers	12,959	25
Egg production	288,000 dozen	

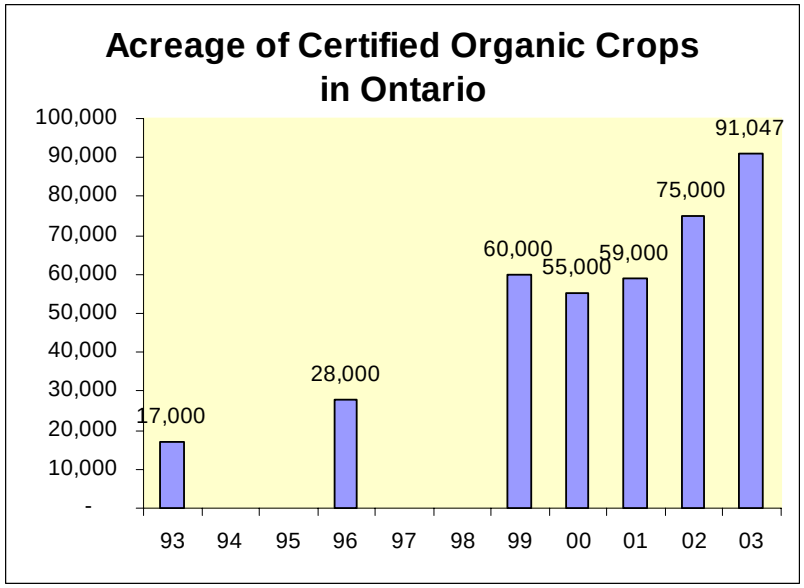
The farmgate value of the Ontario organic dairy industry has been valued at approximately $6.5 million for 2003. (Ackerman, 2004)

The production values given are estimates calculated from typical yields and prices for the industry. The data as presented estimate the total value of the organic production at approximately $40 million dollars at the farmgate. This does not include various value-added opportunities on-farm as well as off-farm value increases due to processing or added value at retail.

In 2003 there were 487 certified organic farms reported for Ontario compared to 3,317 for Canada. In addition to those farms indicated as certified, it is generally understood there are many farms are not currently certified but are generally using organic practices. There is a high turnover in the sector. Each year numerous growers fail to renew their certification, and many new farmers enter the transition period and proceed to become certified organic. The total certified organic acreage in Ontario has grown steadily in recent years (see Figure 1) and was estimated at 91,000 acres in 2003. The size of organic farms is increasing as medium sized organic farms expand and some smaller farms do not renew their certification.

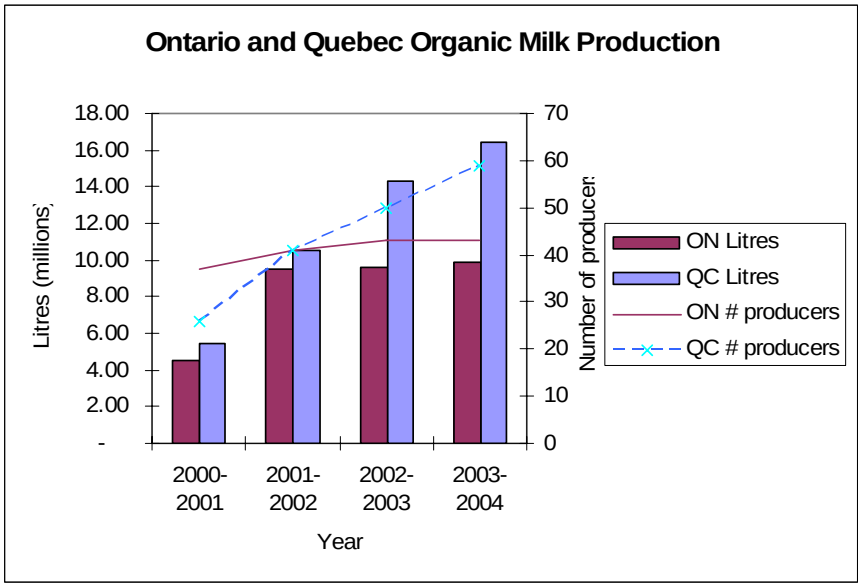
Farmers leave the sector for a variety of reasons. In some cases, the age of the farmer was a factor (retirement). Some organic producers have established markets that do not require certification (for example: sells direct to consumer) and decide to forego the certification cost and process while maintaining their organic management practices. The extra paperwork required for applications and to maintain the audit trail is also a challenge for many growers. The cost of certification varies with each farm situation, but is frequently $500 to $1,000 per farm (per year) and this is a concern on small farms. Currently there is no government requirement to be certified. Some part-time farmers find they do not have sufficient time to manage the farm organically and seek other ways to manage the farm (rent it out or farm it conventionally). In some cases farmers are frustrated by production challenges, marketing efforts, weather, etc. and decide not to continue organic production.

Figure 1: Acreage of Certified Organic Crops in Ontario



Source: COG (Macey)

Figure 2 Annual Organic Milk Production - Ontario and Quebec



Source: Data compiled by Dairy Section AAFC

Markets

The market for organic crops continues to expand. Ontario based, organic grain companies are importing large quantities of organic grains from neighbouring areas due to a lack of acreage in Ontario to satisfy their markets. The organic food processing sector is growing in Ontario but the majority of processed products that are sold in Ontario are imported, mostly from the USA. Fresh fruits and vegetables have solid markets in Ontario but larger retailers import large quantities of product, mainly

from USA for reasons of price and availability. Most dairy consumption is produced in Ontario or Quebec with product being transported both ways to meet markets. Meat marketing has had more challenges mainly due to a lack availability of processing facilities that are federally inspected and where the processing is certified organic.

Price premiums for organic fruits and vegetables are variable depending on the marketing venue and quality as well as current market supply and demand influences but can range from no premium to over double the price of conventional. In stores organic processed foods are frequently sold at similar prices to premium brands of that product. Some of the most dramatic price premiums are in the grains sector. Organic grains have consistently for the past five years sold at prices 50-150% above conventional prices. Organic soybean prices reached as high as $25 per bushel this year for high quality food grade and typically have maintained prices of least $18-$20 per bushel over the past 5 years.

Table 3: Origin of Organic Products Sold in Canada (2003)

	Canadian	US Imports	Other Imports
Produce	22%	62%	16%
Grocery	10%	60-85%	5-30%
Dairy	90%	10%	

Source: Macey 2004

"In 2002 the value of U.S. organic food product exports was estimated at between $125 million and $250 million. According to industry data, the value of organic food exported to Canada was between $75 million and $150 million, and the value of organic food exported to other destinations was between $50 million and $100 million. Major organic exports include soybeans, food ingredients, fruit juices, frozen vegetables and dried fruit. Government sources indicate that organic processed foods make up the majority of organic products exported to Canada. Canada, a partner in the North American Free Trade Agreement (NAFTA) with the U.S. and Mexico, is, by far, the largest market for U.S. organic exports. Ag Canada estimated that two-thirds of Canada's consumption of organics comes from imports, and USDA estimated in 1997 that 85 percent to 90 percent of Canada's organic imports were from the U.S." (USDA, http://www.fas.usda.gov/agx/organics/USMarketProfileOrganicFoodFeb2005.pdf)

Canadian producers export approximately 80% of our organic food production.

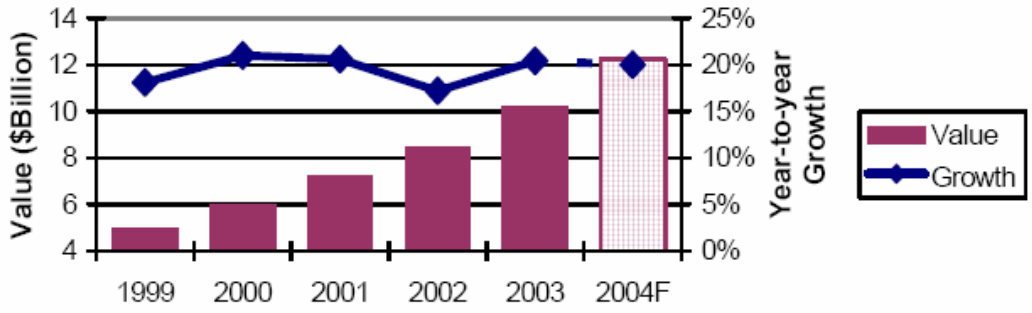
Table 4: Estimated Value and Destination of Canadian Organic Food Exports

Commodity	Value ($M)	USA	EU	Japan
Wheat	$14	25%	73%	
Flax	$6	41%	44%	
Peas	$9	42%	53%	
Soybeans	$4	10%	43%	38%
Spelt	$3	17%	83%	
Grains total	$40	41%		5%
Apples	$3	96%		
Vegetables	$2	100%		
Maple Syrup	$7	57%	30%	13%
Processed Food	$10			

Source: Macey 2004

Organic food and drink sales were estimated to have expanded by 20 percent in 2003 to reach US $11.4 billion. “The U.S. organic market is projected to reach a value of $30.7 billion by 2007, with a five-year compound annual growth rate of 21.4 percent between 2002 and 2007, compared to a 21.2 percent rate between 1997 and 2002.” (Datamonitor analysis, Datamonitor.)

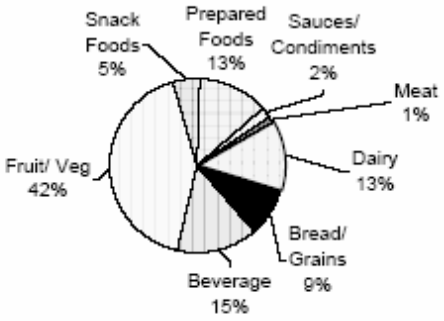
Figure 1. U.S. Organic Food Retail Sales Value and Growth, 1999- 2004



Source: OTA; Forecast: FAS

Organic Food Category Share, Consumer Sales in 2003 in $mil

Organic Food Categories	Sales ($Mil)	% Growth 2003
Dairy	1,385	+20.3%
Bread & Grains	966	+22.9%
Beverages	1,581	+19.3%
Fruit & Vegetables	4,336	+19.9%
Snack Foods	484	+29.6%
Packaged/Prepared Foods	1,326	+16.0%
Sauces/Condiments	229	+23.5%
Meat/Fish/Poultry	75	+77.8%
Organic Food Sales	**10,381**	**+20.4%**



Source: OTA’s 2004 Manufacturer Survey. Category and growth estimates derived from survey responses, Nutrition Business Journal’s organic industry model, SPINS retail data, and other sources.

Who Buys Organic?

Currently, 66% of consumers report being users of organic. More than 40% of those (or 27% of the total population) report being regular (i.e. weekly) organic users. (Hartman Group 2004).

Consumer use of organic foods

	2000	2003
Daily	8	11
Weekly	9	16
Monthly	5	10
Occasional	34	28
Never	45	34

Source: Hartman Group 2002, Hartman Group 2004

"Consumer surveys also identified the factors that influence organic food purchases. In the 1980s and 1990s, concern for the environment drove consumers to purchase organic foods. However, today's consumers purchase organic foods for a variety of reasons. Respondents to a nationwide survey cited health and nutrition (66 percent), taste (38 percent), food safety (30 percent), and the environment (26 percent) as motivating factors behind organic food purchases (Hartman Group, 2002). In another survey, consumers cited the environment (58 percent), health (54 percent), food quality (42 percent), and support for small and local farmers (57 percent) as influences (Whole Foods, 2004). In addition, surveys show that consumers of organic foods are diverse in income level and race/ethnicity. Over half of those who frequently buy organic food in the United States have incomes below $30,000,3 and African-Americans, Asian-Americans, and Hispanics use more organic products than Caucasians (Hartman Group, 2002). Price leads the list of barriers to purchasing organic products (Walnut Acres, 2001; Whole Foods, 2004; Hartman Group, 2002), and availability of organic products is the second most often cited barrier (Hartman Group, 2002).

"Academic studies have taken a slightly different tack in examining consumer behavior by complementing surveys with statistical analysis to depict the typical consumer of organic foods. According to Estes and Smith (1996), consumers consider the following factors important when purchasing fresh produce: price, size, and packaging, whether the item is on sale, and whether the item is organic. Appearance of fresh produce also matters to consumers, with the number of cosmetic defects affecting the likelihood of an organic product being purchased (Estes and Smith, 1996; Thompson and Kidwell, 1998). A consumer's age, sex, and education level has little effect on his or her decision to buy organic produce. In fact, consumers with advanced degrees are less likely to buy organic produce (Thompson and Kidwell, 1998). Consumers concerned about food safety, as well as those who enjoy trying new products, are more likely to buy organic produce (Govindasamy and Italia, 1990). Finally, households with children under age 18 are more likely to purchase organic produce (Thompson and Kidwell, 1998)."
Source: Price Premiums Hold on as U.S. Organic Produce Market Expands, USDA, May 2005, http://www.ers.usda.gov/publications/vgs/may05/VGS30801/VGS30801.pdf

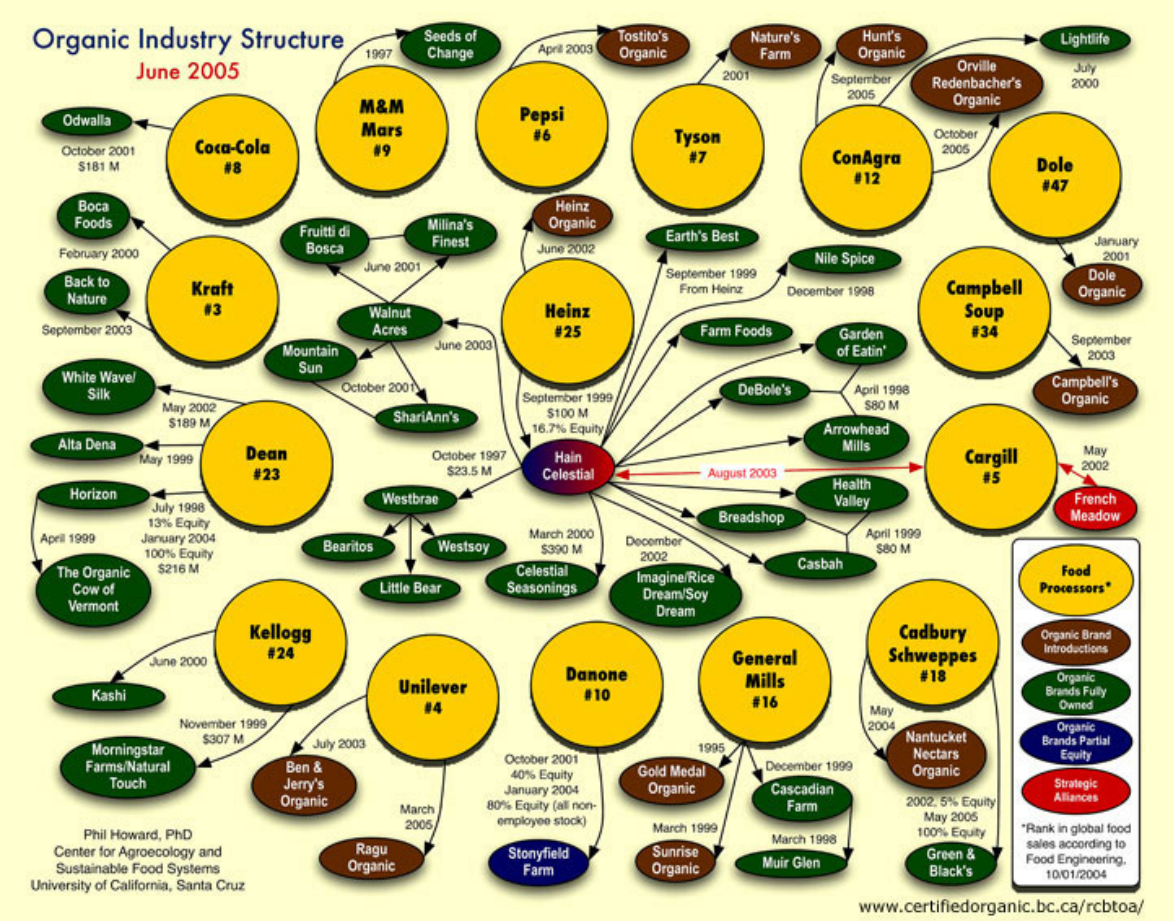
Younger shoppers appear to be the key market or organics.

- 48% of shoppers age 18-29 are organic users
- 43% of shoppers age 30-39 are organic users
- 42% of shoppers age 40-49 are organic users
  - 69% of organic shoppers are under fifty years old

Source: Health Focus International 2003

Who Own's Organic?

The organic sector is a dichotomy of producers and processors loosely association into one market. There are many small companies and producers who philosophically want to create a food system that is friendly to the environment, energy conservation, healthy food, etc. There are also many medium to large businesses expanding in the organic sector that while supporting many of those philosophies are focused on large scale growth and profitability. This provides both challenges and opportunities to the organization of the organic sector.



Source: Who Owns Organic, Howard,
http://www.certifiedorganic.bc.ca/rcbtoa/services/corporate-ownership.html

World issues

There is continued growth for organic around the world. The fuel for this growth has been consumer demand. Increasingly governments are becoming engaged not only in setting up organic regulations but in developing action plans and establishing support programs. Donor organizations and foundations have also been very supportive. Progress is being made toward the harmonization of international standards thorough efforts of CODEX and IFOAM (International Federation of Organic Agricultural Movements) and various trade agreements. All exports to the EU after December 2005 must be from countries on their "Third Country list." Such countries must have agreements with the EU on the acceptance their respective national standards by the EU. Currently Canada is not recognized, and in fact only a small group of countries outside of Europe are recognized on this list.

Globally genetic engineering remains a hot topic for organic agriculture. The thresholds and purity of seeds from GMO's and the co-existence of GMO and organic is frequently debated. The availability of organically produced seeds and variety selection is also a big issue.

Challenges for Ontario

Current issues and challenges for Ontario include

- **Lack of a national organic regulation**.

After 15+ years of discussions it now appears that Canada may have a national regulation for organic within the next year (plus a 2-year implementation period). Currently over 60 countries have national regulations on organic. Canada must have a national regulation to compete and permit trade.

- **The co-existence of genetically modified crops and organic**

Ontario produces a large acreage of GMO corn and soybeans and some canola. Seed purity, equipment cleaning – especially in the grain handling system, and appropriate measures to prevent pollen spread are challenges for the sector. Buffer zones, especially for cross pollinated crops such as corn and canola are quite large to prevent pollen spread. Who in the neighborhood is responsible for such contamination – the grower who owns the GMO crop or the grower who needs to maintain the GMO free integrity of his crop to meet markets requirements and has no control over the pollen source or dispersal? These are personal relationships between neighbours and are similar whether the GMO-free grower is organic, or meeting other GMO-free markets, or a grower of non-GMO seed varieties.

- **Lack of organic research**

To date there has been a minimum of research that has been specifically targeted to organic production systems. There needs to be more funds available from public sources for solutions that are appropriate to organic producers and processors. Agricultural research frequently offers benefits to corporate entities that have products (for example inputs) to sell and these companies (often large multinationals) are able to financially partner on the project with the hope to recover their investment from product sales at a later date. There are very few sources of this type of funding in organic, and most of the companies involved are small with capital tied up in company expansion and market development. Organic research offers benefits to all producers and offers researchers an opportunity to move "outside the box" and look at agriculture problems from a new perspective.

- **Transition to organic**

The fear of transition holds many producers back from switching to organic production. During the first 2-3 years the growers will produce a crop using organic methods of production but are usually unable to secure any premium prices. Yields and revenues are decreased. This is a time when they are learning new technologies, new crops, and innovative approaches to production problems. There are few consultants or information resources available and neighbours and family are frequently negative to their endeavours. This peer pressure places a large stress on some families during transition. Additionally many farmers are late in their careers and fear risk at a stage when they are nearing retirement. Financial organizations and programs such as Crop Insurance are also sometimes reluctant to give adequate support to relieve their financial risk.

Opportunities for Ontario

- Experience in other countries has shown that after the implementation of an organic regulation, there has been significant growth in the organic sector. Canada's regulation is expected to enhance exports, give more enforcement opportunities to protect producers from imports and to reduce confusion in the marketplace on labels and logos. We will have a symbol for Canada Organic for consumers to recognize Canadian produced organic products. The new regulations will allow certification bodies to continue many of their traditional operations but under Canadian accreditation. Currently most certification bodies need to be accredited to a number of international agencies such as USDA to permit their certified growers to export to those regions.

- Due to rapid market expansion Ontario companies are now importing significant quantities of products from other areas. Increasing production in Ontario can give more market diversification and new income opportunities for Ontario producers. There are opportunities to increase the share of fresh organic produce that is grown in Ontario to reduce imports. The grain commodities also have great opportunity for expansion for both food and feed markets.

- Up to 90% of the processed organic food products are imported. Ontario is the hub of Canada's organic food processing but this sector is still very small, many of the existing processors are very small, but there are also opportunities for larger players in the processing industry.

- Expansion of the organic sector will add value to Ontario's agricultural products, enhance our export potential, increase the incomes of Ontario farmers and reduce imports from other regions. Fostering the Ontario organic sector will diversify the Ontario agriculture sector and provide more alternatives for growers. It also has the potential to increase employment and provide Ontario consumers with the Ontario organic products they want.

References for more information:

"Certified Organic" The Status of the Canadian Organic Market in 2003, Macey 2004
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Emerging Needs and Issues

Research for organic agriculture needs to reflect the systems approach taken by organic growers. On-farm research and research on certified organic lands should be encouraged whenever possible to take advantage of the in-situ factors.

Research for organic agriculture will also have usefulness for all agriculture, and in some cases the solutions will become Best Management Practices for all farmers.

Northern Stations Report

Dr. Tarlok Singh Sahota

Variety Evaluation:

- *Barley:* Over the years, 2001-2005, *AC Klinck* (~7300 kg/ha) had an edge over *Chapais* and *Brucefield* in grain yield, had 2% point higher grain protein than *Chapais* and 20-30 % higher straw yield than that of *Brucefield* and *Chapais*. In the early maturing barley, OBS 4714-1 had the highest grain yield of 6266 kg/ha in 79 days.
- *Oats: AC Rigodon*, best variety based on the mean yield during 2003-2005, had poor grain yield (4893 kg/ha) during 2005. *QO.685.48* (~6400 kg/ha in 84 days), has been giving consistently high grain yield for the past 3 years.
- *Wheat:* Over the past 3 years, *Superb* (~5800 kg grains/ha) produced lower yield than *Sable* (6600 kg/ha) and *Hoffman* (7200 kg/ha). *Superb* (18.06% grain protein) surpassed *Sable* (16.94%) and *Hoffman* (15.81%) in protein content, but not in protein yield/ha.
- *Soybean: Gaillard* at 3438 kg/ha lagged behind *Pembina* (3911 kg/ha), *Gentleman* (3847 kg/ha), 24-51R (3693 kg/ha) and *Drako RR* (3678 kg/ha) in grain yield. *Gaillard* was, however, 2-6 days earlier in maturity than the other varieties.
- *Forage grasses:* In Timothy, *Richmond* (16.2 tonne/ha) equaled *Itasca* (16.3 tonne/ha) and was better than *Climax* (13.3 tonne/ha) in total yields for 2004 and 2005. In the 3 year (2003-2005) totals, *Brome A* (Brome grass) yield was 5, 19 and 23 % better than those of *Fleet, AC Knowles* and *Baylor*, respectively. In other grasses (orchard grass, fescue and reed canary grass) all tested varieties performed equally well.
- *Alfalfa:* In OFCC 2003 seeded trial, *Pioneer 5312* had an edge over other varieties (*Hybriforce 400, Magnum IV* and *GH777*) in the first (4474 kg/ha) as well as in the second (3225 kg/ha) cut yield. In OFCC 2004 seeded trial, highest first (5315 kg/ha) and the second (2758 kg/ha) cut yield was obtained with *Oneida VR*; though the other varieties, *Magnum IV*, *NS04-44* and *NS04-25*, were statistically at par with *Oneida VR*. In another set of experiments, considering a yield index of *2065 MF* as 100, the yield indices of other varieties were *NK 711 MF*: 140, *8925 MF: 118, OAC Superior: 112, Stealth*: 111 and Macon: 106. *It appeared that if a variety had a higher yield, it had the higher protein content as well.*

Crop Nutrition:

- Canola that was seeded on April 25 and was flooded with rain water after seeding gave higher seed yield with ammonium nitrate than that with urea. Whereas in corn, for silage, seeded on May 19, yields from ammonium nitrate and urea were similar though urea produced better quality forage, as indicated by protein and NDF contents. Rates above 100 kg N/ha had no additional yield advantage in corn. In both the crops, Agrotain failed to improve the efficiency of urea.
- Sulphur appeared to be limiting the response of alfalfa to N and B (and may be other nutrients, including K, as well). Ammonium sulphate, on an average, gave 1101 kg/ha higher dry matter yield of alfalfa than ammonium nitrate and 1456 kg/ha higher yield than urea. Protein content in first cut alfalfa was higher (18.7%) with ammonium sulphate than with ammonium nitrate/and urea (~15%). Similar trend was observed in the second cut, though the protein content differences, between the fertilizers, were found to narrow down. Both N and B improved the alfalfa protein content.
- Application of Zn @ 14 kg/ha tended to increase grain yield of wheat.

Natural Resources Management:
Lime and Wood ash:

- Wood ash maintained its lead over lime/and lime + wood ash in dry matter yield of alfalfa; the latter two were not better than the check (no lime or wood ash).
- In the first cut, there was more than 2.0% point increase in protein content with wood ash and 2.5% point increase with lime + wood ash over check. Lime alone increased the protein content by only 1.15% point as compared to the check. In the second cut, treatment differences in the protein content were not as marked as in the first cut.
- Lime lowered the alfalfa tissue B content in both the cuts and S content in the second cut. Wood ash appeared to improve the tissue B and S contents, but lowered the Mn content. Increase in tissue P and K concentration was more with wood ash than that with lime.
- Mid season soil tests indicated that both lime and wood ash increased the available Ca in the soil and raised the pH by 0.5-0.6. Wood ash also improved available P, Mg, Mn and B contents in the soil.

Dairy Manure and Wood ash/Fertilizer Nutrients:

- Wood ash increased protein content in the first cut alfalfa, by more than 2.5% point when applied alone and by 3.5% when applied with manure, over check. Manure alone increased the protein content by only 1.5% point as compared to the check. In the second cut, wood ash, but not manure, sustained its favourable effect on the protein content.
- Mid season soil tests revealed that wood ash, with or without manure, increased pH (by 0.5-0.6) and available nutrients (P, K, Ca, Mg, Zn, Mn and B). Both wood ash and manure improved the soil organic matter. Mg availability was more with manure than that with wood ash; the manure didn't improve the available Ca, P, Zn, and B contents as compared to the check (no manure or wood ash).
- Integrated use of N, S, B, Zn, Mn, manure and wood ash resulted in an 80% increase in alfalfa yield (23% by N alone @ 45 kg/ha) as compared to the application of only P and K. Deduction of NPK contribution by manure significantly lowered the alfalfa yield.

- Grain yields were in the order of oats > wheat > barley and the straw yields were in the order of wheat > oats > barley. Deducting N and NPK contribution by the manure in the fertilizer program reduced the cereals' grain yields by 24 and 28%, respectively. Grain yield with manure alone was only 66.5% of that with manure + NPK fertilizers.

Other Management Practices:

- Barley grain yield was 33.3% higher after clover than that after oats. Spread of tillage between fall and spring or various intensities of tillage starting with zero to chisel or sub-soiling or ridging or harrowing/cultivation didn't affect the barley grain yield significantly. However, one harrowing in the fall followed by spring harrowing and cultivation, before seeding, produced the maximum grain yield.
- Herbicides, such as Puma (not registered in Ontario) @ 0.77 L/ha and Achieve @ 0.5 L/ha, gave almost 100% control of wild oats in an on-farm trial at Henry Janssens's farm.
- Winter wheat (seeded on August 25) grain yield, with *25R47*, was nearly 3000 kg/ha higher than the spring, *Superb*, wheat. Frost seeding of wheat in the fall was almost a failure and spring frost seeding didn't prove better than the normal spring seeding.
- Fall seeded canola gave 23% higher yield as compared to spring seeded canola.

Strategic Directions: Research

Recommendation 1

Agronomic Systems and Environmental Stewardship

Research leading to production systems and their components which enhance competitiveness, food quality and safety and environmental sustainability.

Successful field crop production requires the integration of many complex components. The target of high yields and high quality with low environmental impact while maintaining profitability is extremely difficult in biological – based systems which operate in global markets subject to political influences. The ability to integrate decisions on cultivar/hybrid with those on planting date, tillage system, row width, seeding rate, weed management, pest management, heat unit area, soil type and a host of others plus all of the interactions between these components requires solid reliable research information. Research not only on individual components of production systems but research on the integration of those components (systems approach). Thrown into the equation are the inevitable shifts in pressures from new pests (aphids, european chafer, western corn rootworm variant), expansion of

old pests (SCN, fusarium) new weed species (problem weeds, herbicide-tolerant weeds), soil management concerns and new issues of carbon sequestration and reduction of greenhouse gases. Imposed on this background is the fundamental requirement to maintain a competitive industry.

The research priorities described below attempt to address these issues through both strategic, integrated approaches and individual targeted goals.

Specific Commodity / Discipline Based Priorities

Ontario Cereal Crop Committee

1. Agronomic Technologies and Environmental Impact

Background: Research developing and evaluating new agronomic techniques is essential to determine strategies which will maximize returns for growers and processors, yet minimize or remove any environmental impact. These technologies are far ranging in nature, from fertilizer rates, placement, and timing to tillage techniques. This is a high priority for public funding as there is little impetus or benefit for private research in this area.

Where appropriate, environmental aspects of these technologies should be an integral part of the research undertaken. An excellent example of this type of research would be the investigation of nitrogen rates for higher protein wheat production. The research could determine appropriate nitrogen rates, predictive tools like the nitrogen soil test, use of combine protein monitors, value to the end user, and also investigate any environmental impacts on groundwater.

Economic importance: The cost of tillage and other inputs makes up a large part of the cost of production of cereal crops. Reduction of these costs, or increased efficiencies of inputs, would have a positive economic impact on all producers.

Competitiveness: Increased efficiencies or reduced costs will allow the industry to be more competitive.

Environmental: Targeted applications and increased efficiencies will reduce environmental impact of agronomic practices that are investigated.

2. Reducing Production Risks

Background: Control of risk factors is critical to ensure a stable supply of sufficient quantity and quality of cereal crops. Factors such as winterkill, fusarium, sprouting, rust and other problems can cause havoc with both quantity of product available, and quality to meet market requirements. Techniques and strategies to overcome or manage these risks would have a huge positive impact on the stability of the industry.

Examples of research which fits in this category is the development of the fusarium prediction model, the rust monitoring model, improved winterhardiness techniques, and others.

Economic impact: Risk factors are responsible for many of the critical situations that occur in cereals. If techniques can be developed to overcome these risk factors, the added stability of supply should have huge economic benefits, not only to producers but throughout the processing sector.

Competitiveness: Consistent supply of quality product will allow the sector to out compete other competing jurisdictions.

Social benefit: Consistent supply will allow stability for jobs involved with the sector.

Ontario Corn Committee

1. Greater Energy and Environmental Efficiencies

Increasing energy use efficiency is critical to the health of the corn industry in Ontario. Specifically, research must continue to result in improved nitrogen use and grain drying efficiencies.

Nitrogen fertilizer represents a major input cost in corn production, is a significant component in many animal manures, and has the potential to adversely affect the quality of surface water and groundwater. Cropping system research must take an integrated approach to combine tillage, crop rotations, cover crops, manure management, soil testing, site specific technology, etc. to enhance productivity while protecting the environment.

Grain drying costs represent a competitive disadvantage to the corn industry in Ontario compared to many other jurisdictions. Research must continue to develop grain drying systems that represent reasonable capital investments while significantly improving energy use efficiencies.

Ontario Oil and Protein Seed Crop Committee

1. Control of Present and Potential Diseases and Pests.

Issue: Protecting soybean and canola production from disease, nematode, and insect losses is fundamental to high productivity and quality.

Background:
The impact of soybean aphids in 2001, 2003, and in Eastern Ontario in 2004 is a prime example of how a single pest can significantly reduce yields and adversely affect seed quality across a wide geographic area. In 2004 soybean aphids have been found to over-winter in Ontario for the first time which increases the possibility of an early infestation. Effective control measures are vital for both existing and emerging diseases and pests.

Significant Diseases and Pests include:

Soybeans:

a. Soybean Aphids
b. Soybean Cyst Nematode (SCN)
c. Soybean Rust
d. Phytophthora/ Rhizoctonia/Fusarium root rots
e. Sclerotinia (White Mould)
f. Brown Stem Rot
g. Phomopsis
h. Slugs

Canola:

a. Sclerotinia (White Mould)
b. Cabbage Seed Pod Weevil

Potentially Significant Diseases and Pests:

Soybeans:

a. Sudden Death Syndrome
b. Soybean Mosaic Virus
c. Bean Pod Mottle Virus
d. Pod and Stem Blight

Canola:

a. Swede Midge
b. Diamond Back Moth
c. Black Leg

Background:

The impact of a new soybean pest (soybean aphids) in 2001 demonstrates how a single pest or disease can drastically affect the industry. Although the degree of yield loss sustained from soybean aphids varied greatly from region to region, yield decreases in excess of 15 Bu/ac were reported in 2003, with average losses of about 7-10 bu. High aphid populations under dry soil conditions also significantly reduced seed size, reducing yield and seed quality for the IP market. Soybean aphids decrease yield by sucking plant juices from the plant, stunting and weakening it. The honeydew excreted by the aphids' causes a secondary fungal disease and the aphids are a primary vector for SMV and other viruses. More work is necessary to understand and develop tolerance and better management practices to control this devastating insect pest.

Although SCN has been present in the province for over 10 years, it remains a high priority. New resistance/tolerance traits and effective management practices are required. As SCN spreads to additional counties in Ontario and races change, a continuous effort in breeding for resistance will be required to ensure high productivity. Not enough SCN resistant varieties are present in the marketplace. There is also concern that present sources of resistant are beginning to be less effective than anticipated. An effort to incorporate multiple lines of resistance will become increasingly important.

Considerable success has been achieved in controlling phytophthora root rot by developing disease resistant cultivars. Resistance genes can be identified and incorporated into soybean varieties by relatively simple screening techniques. However, the development of new races necessitates the continuous development of new varieties with tolerance and monogenic resistance.

Sclerotinia stem rot is increasing in importance. The incidence and severity of the disease in 2003 was much higher than experienced in the last number of years in Ontario. Varieties differ in tolerance to the disease but monogenic resistance has never been identified.

2. Weed Management

Issue: The management/impact of herbicide tolerant crops in a sustainable cropping system and conventional herbicide research are still required.

Background:
The increased use of herbicide tolerant soybean varieties has resulted in concerns of weed resistance and weed population shifts. With the use of a single chemistry to control weeds on so many acres, weed resistance to glyphosate in Ontario is almost inevitable. There are also concerns over the possible environmental impacts of plants with novel traits. The control of herbicide tolerant volunteer plants in subsequent crops is also a concern.

Most food grade soybeans are conventional varieties that have not been genetically modified to tolerate specific herbicides. Weed escapes that adversely affect the quality of the harvested crop continue to be a problem, especially in years where poor weed control is widespread as it was in 2001. Nightshade staining in soybeans is a problem in some fields every year.

3. Cropping Systems Research

Issue: Developing sustainable production systems.
Background:
During the last 15-20 years important changes have occurred in Ontario soybean production practices. Production systems must be investigated for sustainable production. Some of the major trends are as follows:

a) Increased acreage - A significant increase in soybean acres has occurred in the last 15 years from the expansion of soybean production into more northern and eastern regions. A reduction in rotation in the more traditional growing areas has also increased the yearly soybean acreage. 2004 saw an estimated Ontario soybean acreage of 2.35 million acres, which is well above the previous few years.
b) Reduced tillage - Soybeans are readily adapted to a variety of tillage practices. The introduction and widespread acceptance of RR soybean varieties as well as the development of the no-till seed drill has facilitated reduced tillage for soybeans, with its beneficial environmental impact. This is especially true in the shorter growing season areas of the province. However, over the past few years some growers have reported lower yields with no-till soybeans as compared to

conventionally tilled fields. This problem is most often reported on heavier soil types and during extreme growing seasons. No-till soybean production systems must be studied and enhanced if the growth in the no-till system is to continue.

c) Narrow rows - Soybeans were traditionally grown in 30-inch rows in Ontario. The majority of soybeans are now grown in less than 22-inch rows with a large percentage grown at only 7 inches. Decreasing row widths has been shown to increase yields with no other significant increases in production costs. Narrow rows have an effect on the climate within the crop canopy and can directly affect weed populations, foliar, and root diseases. For example, white mould is more likely to thrive under narrow row conditions.
d) Reduced rotation - Although the importance of crop rotation has been shown time and time again, soybeans are still being grown too frequently in many parts of southwestern Ontario. The effect of this practice on soil structure, fertility, weeds and diseases requires additional research. The benefits of increased cereals in the rotation need to be further considered.
e) The interaction between production systems and crop diseases and insect pests needs further investigation.

The following areas need further consideration:

Soybeans

a) Increasing no-till/minimum-till success - Production difficulties have occurred with reduced tillage on fine textured soils. The exact causes of these difficulties have not been well identified to date. Soil structure, soil moisture, and plant diseases may all play a role in these production problems.
b) Soil improvements and energy efficiency under different cropping systems.
c) Inoculation improvement for cool-season new production areas.
d) High slug populations have caused some long time no-till producers in the US northeast to revert to conventional tillage because no other effective slug control measures are available.

Canola

a) Agronomic studies on new winter canola types for nitrogen and phosphorous requirements, plant populations, planting date, etc.
b) Increasing no-till/minimum-till success

4. Soil Fertility/Soil Quality/Soil Management

Issue: Optimizing crop production while protecting soil and water quality.

Background:
Water quality has become a major concern for many Ontario residents. The nutrient management act (NMA) will impact Ontario soybean growers. Residual fertilizer has become an increased concern for the farmers' return and the impact on water quality. Continuous fertilization with use efficiency as low as 15-20% during the year of application has resulted in large accumulation of phosphorus (P) levels in some soils. With the increased phosphorus level in soil, no-point source pollution from agricultural soils has been a concern on water quality. Knowledge gaps exist as to the effects of soil residual

phosphorus management and manure application. Both agronomic and environmental gaps need to be filled. Soil P test methods are also needed for high P soils.

Canola is most often grown in livestock areas and viewed as an important crop for nutrient management. Further studies on nutrient (N, P, K, etc) management are needed.

Ontario Forage Crops Committee

1. Managing Climatic-related Risk in Perennial Forage Crops –

I) Genetic/Biotechnology Improvements with respect to winter survival

II) Develop management techniques for improved winter survival of conventional and genetically altered alfalfa, and develop management techniques to enhance production of grasses during drought conditions.

Background:
Perennial forages occupy more farmland than any other crop in Ontario. They provide the feed base for virtually all dairy, beef, sheep, goat and horses farms. Winterkill can range from no significance to severe losses in all areas of Ontario. Clearly variety selection and management have a resounding influence yet producers are still concerned and always fear another bad winter will result in a shortage of hay and higher prices. Since a secure supply of forage is critical to the operation of these industries, the OFCC feels that researchers have to concentrate more effort on methods to ensure that forage supply will be adequate.

Forage and livestock producers have stated quite clearly that climate related issues, especially winter kill of alfalfa are their number one concern. Genetic progress in alfalfa over the past 20 years has focussed on disease resistance, increased yields and improved quality. However, specific efforts are required by conventional or biotechnology means to improve winterhardiness of alfalfa without deterring from other traits, especially yield, that have been improved in the past. To complement this work, improvements in the winterhardiness of orchardgrass should be made, since this grass is increasing in use with alfalfa and is the key grass species used in sown pastures in much of the province.

In addition to genetic improvements, producers want management techniques that improve the continuity of forage supply over the growing season. This would include techniques in pasture management to even forage supply during spring and summer, cope with dry weather and extend the grazing season in the fall. Certain annual forage crops have potential to produce pasture or stored forage when the growth of perennial forages is reduced by drought or the onset of autumn. For stored forages, efforts should be concentrated on ensuring that management techniques are properly matched with the needs of new genetic material introduced into the marketplace. When new traits are introduced to alfalfa or other species, the management package may need to be re-evaluated. In other cases, what is considered normal management may need to change to better ensure winter survival of currently used varieties.

The OFCC recommends that research be directed at ensuring the security and continuity of forage supply with respect to climate related risk through improved genetics and management practices.

2. Forage Preservation and Storage

Forages in Ontario are either made into stored feed as dry hay, silage, or grazed. In stored feed systems, many losses occur from the standing crop to offering the stored feed to the animal. Attempts to minimize these losses have been the subject of previous research projects in Ontario and elsewhere. New efforts in equipment design may further reduce losses during forage preservation.

The goal of making “hay in a day” has been expressed by commercial hay producers. Such a system might incorporate hay maceration plus preservatives, or microwave hay drying. Hay maceration is being studied in Quebec and in western Canada, while work on preservatives is widespread, although mostly in the private sector.

In the area of storage, much knowledge is available and extension is likely the key to progress in this area.

3. Forages and the Environment

Forages are generally quite beneficial to the environment. Studies in the past have shown improvements in soil structure, reduced soil erosion, and less runoff from fields with a perennial forage cover. New issues have arisen which need to be addressed. The use of forages as buffer strips along watercourses is common, but it is unclear what type of forage works the best or how large the buffer should be. The use of forages as a crop to store carbon in the soil is also an issue that seems likely to increase in prominence over the next few years. As the concept of full accounting gains prominence (including indirect costs of a practice or activity), the beneficial nature of forage crops on the soil, water and air could increase their value in modern crop production systems.

Another societal benefit associated with forages is the value of having livestock grazing pastures. In some parts of Europe, farmers are paid to maintain livestock on certain pastures because it increases the value of the area for tourism. While outside the scope of the OASCC system, it is reasonable that we should acknowledge the non-agricultural value of grazing livestock in the same way that we acknowledge the value of forages for soil quality and carbon sequestration.

A potential negative association between forages and the environment is the large volume of waste plastic that is generated each year from wrapped or bagged silage. It is imperative that more effort is put into recycling waste silage plastic or into creating biodegradable or photodegradable plastics that will not require land filling.

4. Corn Silage Issues

There has been a resurgence of interest in corn silage over the past number of years. This is especially true for the dairy industry. One of the key areas of interest has been corn silage varieties with modified

quality traits (high digestibility or protein). However, no organized system for comparing silage hybrids exists and there has been considerable pressure to do so. Some have proposed that corn silage be recognized as a forage crop and thus responsibility for testing and extension be turned over to the OFCC. With regards to variety testing, the OFCC supported the concept that corn silage should be evaluated as a forage crop, but also acknowledged that the Ontario Corn Committee (OCC) had the geographic locations, experienced personnel, and equipment to carry out corn silage variety testing. This was expressed by the OFCC to the chair of the OCC in writing. In the area of production and management, the OFCC production sub-committee was quite strong in stating that corn silage is a forage and that research and extension efforts are needed on this aspect of the corn crop. It was felt that the OFCC could take on this role if necessary (non-variety testing issues).

5. Weed Management in Forage Crops

Background:
As in any crop, weeds are ubiquitous in forages. During the life of a forage stand, weeds can reduce yields, affect hay drying and reduce palatability. Weeds such as witchgrass in timothy or black medick in birdsfoot trefoil and red clover fields grown for seed can make seed cleaning difficult which affects the acceptability and quality of the seed. In pastures, weeds that invade the desired forages limit productivity and carrying capacity. As well, some weeds in pastures may lower animal productivity due to toxic compounds, prickles that scratch the throats of grazing animals, weeds that impart foul odour or taste to milk and structures like burrs that cling to wool. Weed management is an integral part of overall crop management because weeds have a profound effect on productivity and feeding value. The importance of weeds in forage management is such that it needs to be specifically addressed. Forage producers are concerned with controlling the annual broadleaf and grass weeds at establishment that can impede successful implantation of the stand. Another issue of major importance is control of perennial weeds such as dandelion, quackgrass, smooth bedstraw and Canada thistle. Weed management has an impact on several other areas deemed as priorities such as yield, environmental benefits, forage crop longevity, feeding value and grading system.

Research needs: Research efforts must continue to address the effects of weeds on yield, stand longevity and forage feeding value. The environmental impact of various weed management methods for forage crops should be assessed. In addition to investigating weed management in forages, work should also be conducted on using forages as a weed management option.

- The problem of weeds at stand emergence still needs to be addressed. Some of the commonly used broadleaf herbicide products restrict grazing or feeding of the forage in the year of treatment. The manufacturers are working toward removing that restriction. New formulations of products are currently under test and should continue to be monitored.
- New products, tank mixes, adjuvants, rates and application methods must continue to be evaluated to provide forage producers with as many options as possible to control weeds at all stages in the life of a stand.
- Continued investigation is needed into integrated approaches to weed control in hay, pasture and seed crops focussing on cultural, mechanical and chemical methods. Additionally, the role of forage species, mixtures, varieties, seeding rates and dates as means of cultural control is necessary given the expanding uses for forage crops and the introduction of new forage species.

- Using forages as cover crops, inter-crops and living mulches in other crop and non-crop situations is another aspect of weed management that would promote work on forage varieties and environmental benefits.
- The effects of weeds on forage feeding value in terms of nutrients and palatability should be assessed.
- Identification of new emerging weed problems in forages, their impact on productivity and options for their management is important.

Field Crop Pest Management Committee

1. Strategic Approach to Controlling Field Crop Pests

The following list of field crop pests are placed in order of priority in terms of research needs. Strategies differ for each pest and include management, chemical controls, breeding, economic thresholds and pest biology. In most cases no single approach is warranted, but rather an integrated long-term strategy involving several approaches is advised. This should involve collaborative work with pathologists, entomologists, breeders and agronomists.

Rating system:A=High priority i.e. major concern
B -Moderate priority
C - Low priority
1 - Increase existing or establish new funding
2 - Maintain funding
3 - Decrease or drop funding

A1 **Soybean rust:** monitoring, spray application and timing, breeding for resistance, fungicide resistance, prediction methods, alternate hosts

A1 **Soybean aphid** - econ. impact, threshold evaluation, control, life cycle, wintering on primary host, prediction and monitoring presence, virus vectoring, biocontrol.

A1 **Canola insect pests:** Cabbage Seedpod Weevil, Swede Midge, Lygus spp. surveys and potential biological control agents, threshold/yield interaction, evaluation of control products especially seed treatments, management practices, resistance breeding, climate modeling for prediction of dispersal potential

A2 **Soybean Cyst Nematode** – biocontrol, population dynamics, race-shifts, spread of SCN, management procedures

A1 ***Fusarium:*** resistance breeding, new chemistries, validation of prediction models

B1 **Seed stinging pests on soy, and edible beans:** Tarnished plant bug, Lygus spp., Stink bugs thresholds and management

B1 **Slugs:** management strategy for no-till field crops, edible beans, soybeans and corn, monitoring technique for prediction method, impact of tillage practices

B1 **White mould:** across many field crops, resistance management, clonal types in relation to varietal types, early warning (prediction) and management tools

B1 **Anthracnose on edible beans:** seed treatments, evaluate new products

B1 ***Fusarium* crown rot, brown root rot** in alfalfa: surveying, testing?, economic impact assessment

B2 **Bacterial blight on soybeans:** econ. impact, resistance breeding, seed treatments

B2 **Corn leaf diseases:** (Gray leaf spot, Stewart's wilt, Northern leaf blight) monitoring, prediction of outbreaks, resistance breeding, selection of resistant varieties
B2 **Bean leaf beetle:** econ. impact, threshold, vector importance model
B1 **Dwarf bunt:** resistant varieties
B1 **Corn Ear Rots and Moulds** – breeding research for resistance
B2 **Western corn rootworm** - monitoring for variant continues, transgenic stewardship
B2 **Grubs in wheat, corn and soybeans** – decision thresholds, biology, control measures, practical seed treatment rates
B2 **Root rots on soybeans and edibles**– (*Pythium, Phytophthora, Rhizoctonia, Fusarium*) threshold, management tools, biology
B1 **Planting Dates and Pests in Wheat** – economic impact, prediction forecasting, effect of changing cropping/rotational practices, seed treatment, best management practices, plant resistance
B1 **Millipedes, Garden Symphylans in Corn**
B1 **Soybean Viruses**
B1 **Yield enhancements from products in the absence of pest**
C1 **Alfalfa weevil**: survey to determine status of biocontrol agents,
C3 **Corn stalk rots:** (*Anthracnose, Fusarium, Gibberella*) management and relationship of cropping systems to disease incidence

2. Objectives for 2006

1. Folicur registration
2. Soybean Aphid chemical control options and thresholds/guidelines. Sorting out impact, seed quality, pest complex of soybean aphids
3. Keeping track of emerging and cyclic pest issues (ie. aphids, chafer, grey leaf spot, stewart's wilt, rust etc)
4. Minor use applications (send priorities to Jim Chaput by Dec 1st)
5. Revise Publication 812 online and paperback
6. Investigate/Education Pesticide Stewardship plan for seed treatments.
7. Educate PMRA on major pest issues for field crops
8. Grower education for soybean rust. Chemical control options and guidelines. Sorting out the impact.
9. Canola Insect Management - chemical control options and thresholds/spray timing work for cabbage seedpod weevil and swede midge. Sorting out impact on yield, crop quality. Find IPM strategies including cultural and biological, crop timing etc.
10. Determine role of Crop Protection in the OMAFRA/Uof G contract. Create an ad hoc committee report documenting concerns regarding pest management exclusion in new structure. Carry report forward to OPMRSC.

Ontario Weed Committee

Field crop priorities:

1. Evaluate weed control effectiveness and crop safety of herbicides to assist registration of new products, allow minor use registration in field crops and provide information on environmental impact.

2. Develop methods to improve weed control efficiency and reduce weed control costs by determining weed specific postemergence herbicide rates and critical factors affecting their performance, and evaluating site-specific methods of application.

3. Optimisation of Integrated Weed Management (IWM) systems that incorporate the components of alternative management methods, critical period, weed thresholds, competitive cultivars and planting patterns, cropping systems and alternative non-chemical control measures to reduce the negative impacts (e.g. weed shifts and resistance) that result from dependence on single weed control strategies.

4. Develop management strategies that will be sustainable in the long term for emerging problem weeds.

5. Document occurrences of herbicide resistance in Ontario and characterize their resistance spectrum and biology so as to develop effective management guidelines and strategies.

6. Determine the impact of nutrient management programs and of soil nutrient levels on weed thresholds, weed germination patterns weed population dynamics and the effectiveness of control measures on annual weed species.

7. Develop weed control strategies within organic cropping systems.

Horticultural crop priorities:

1. Develop data supporting minor use herbicide registration, under the URMULE program, including tank mixture of herbicides with fungicides, insecticides, surfactants or foliar fertilizers.

2. Determine safe intervals between herbicide application and planting of sensitive crops (such as sugar beets, peas, sweet corn, tomatoes, etc.) by conducting re-cropping and plant-back studies and developing effective bioassays with appropriate indicator species for herbicides with residual activity.

3. . Develop Integrated Weed Management (IWM) systems that comprise mechanical control, mulches, delayed planting and no-till for horticultural and specialty crops, particularly where herbicide options are limited or unavailable.

4. Develop comprehensive management strategies for the control of problem weeds in horticultural crops.

5. Determine the impact of nutrient management programs on weed population dynamics and weed control efficiency in horticultural crops.

7. Develop weed control strategies within organic cropping systems.

The issues and priorities encompassing multiple commodities have been grouped in the Pest Management category:

1. To continue to evaluate new herbicides, new herbicide tank mixtures and new herbicide application timings for herbicide efficacy and crop tolerance in field and in horticultural crops.

2. Develop improved methods for the rapid and efficient detection of herbicide residues in relation to: (i) herbicide carry-over and crop rotation (ii) off-site contamination (drift, run-off, leaching), and (iii) applicator, grower, bystander exposure to dislodgeable foliar residues on plants.
3. Evaluate and monitor the ecological and environmental impact of herbicide tolerant crops, including (i) shifts in weed populations, (ii) development of herbicide resistant weed biotypes, (iii) transfer of recombinant genetic material to other plant or microbial species, and (iv) changes in the composition of soil microbes.
4. Study the biology of herbicide resistant weed biotypes so as to optimize prevention and management strategies in order to prevent the development of multiple-resistance.
5. Evaluate the effectiveness of cultural (e.g. crop rotation) and mechanical methods of weed control in combination with weed specific herbicide rates (minimum lethal dose) to minimize herbicide use within integrated weed management (IWM) systems.
6. Develop weed management strategies within organic cropping systems.
7. Establish economic thresholds for problem annual and perennial weeds, with consideration for crop quality, dockage, harvest moisture, and weed seedbank issues.
8. Investigate weed biology and ecology including basic research on biology, physiology, population dynamics, and weed-crop interactions.
9. Evaluate advanced sprayer technologies, including site-specific applications, which have the potential to reduce herbicide rates, spray drift, spray volume, sprayed area and effects on non-target organisms, to meet the needs of custom applicators and growers.
10. Evaluate and monitor the impact of unsprayed buffer zones along field margins on weed population dynamics and crop yields, and develop vegetation management systems for field margins, roadsides and rights of way
11. Identify new invasive weed species that displace native vegetation in non-crop habitats and are difficult to control in field and horticultural crops and, and develop management strategies.
12. Determine the environmental variables affecting the production, release and dispersal of pollen from allergenic weed species such as ragweed and develop a model predicting the timing and severity of pollen load near major metropolitan areas. This will permit the development of an accurate Pollen Load Index ensuring medication is taken at the optimum timing so it retains its effectiveness.

Ontario Pulse Committee

1. Integrated Pest Management for Insects & Disease

Issue: Developing reduced risk strategies for IPM of dry bean pests

Significant Pests include

- Potato leafhoppers
- Tarnished plant bug/stink bug
- Soybean Cyst Nematode
- Anthracnose
- Bacterial Blight
- Soybean Rust (?)
- Sclerotinia
- Fusarium Root Rot

Target Agency: University of Guelph, OMAF, AAFC, and OCPC;

Title: Development of IPM Strategies for Pest Management for Edible Beans;

Details:

- Develop IPM strategy for Bacterial Blight, Anthracnose, Sclerotinia incorporating reduced risk pesticides. Second goal of the project is harmonization of seed treatments in North America for dry beans.
- Evaluation of impact of soybean cyst nematode on various bean types.

Background

Bacterial Blight (Common & Halo) is a significant disease that occurs annually in Ontario dry beans. Trials indicate that the disease can reduce yields by 7 – 10% in addition to quality losses. OAC REX is the first white bean cultivar released that has resistance. Incorporation of genes for resistance into other varieties and market classes needs to be expanded. This work is expensive and time consuming, particularly since dry beans utilize conventional breeding technology. A replacement to streptomycin seed treatment is required. Streptomycin has an emergency use registration on imported seed only until 2008.

Anthracnose : A new seed treatment Apron – Maxim has received registration on edible beans. On imported seed, this product is expected to be the product of choice in the future. Most dry bean seed is imported from the U.S. This product does not provide adequate control of anthracnose. Alternative seed treatments show significant promise as a reduced risk pesticide.

Soybean Cyst Nematode continues to expand across soybean growing areas, including major dry bean areas of the province. Dry beans are a known host of SCN, but little research has been conducted of their impact on various dry bean classes, and to IPM strategies.

2. Weed management in edible beans

Target Agency: AAFC, U of Guelph, OMAF, and OCPC;

Title: Expand research funding to include emerging niche edible bean types;

Details:

- Evaluation of new chemistry for control of weeds in edible beans;
- Evaluation of safe rates of new/existing products on various edible bean classes. Expand research to include other niche classes including Otebo, Kintoki, and Adzuki;
- Control of problem weeds including strategies to manage resistant biotypes;

Background:

A limited number of herbicides are presently available and little new chemistry is expected to become available in the foreseeable future. Large differences in bean type tolerance to available chemistry needs further work. Research into control of problem weeds also requires additional research. Edible beans are not as competitive a crop against weeds as soybeans; thus weed control is often more difficult. Further, weeds present at harvest will cause severe staining of beans if a pre-harvest desiccant is not used. Effective weed control during early growth stages may reduce/eliminate the need for a pre-harvest spray. Having a strong IPM program for weeds increases the appeal of edible beans with end market users.

Knowing the biologically effective herbicide rate for control of problem weeds will help growers minimize herbicide use by adjusting the dose to the particular weed problem. Research trials conducted by RCAT have documented significant differences in tolerance to herbicides amongst various bean types.

Ontario Tobacco Committee

Pest management

1. Development of integrated strategies for the monitoring and control of the Tobacco Moth (*Esphestia elutella*) in the tobacco production chain (CTRF) (Short term research priority, new).

2. Evaluate and develop control measures for Bacterial Soft Rot, *Aspergillus* and moldy tobacco including the evaluation of sucker control products with improved efficacy and refinement of sucker control practices for use in a pest management program (CTRF) (Short term research priority, ongoing project).

3. Development of fumigant replacements, i.e. millet, or other nematode suppressing crops to control nematodes. Integrate biological control of nematodes into a pest management program (CTRF) (Short term research priority, ongoing project).

4. Fungicide screening for Damping-Off of tobacco caused by *Rhizoctonia solani* with a focus on resistance management (CTRF) (Short term research priority, ongoing project).

5. Investigate and test products that inhibit the growth of algae and control Black Root Rot in used plant production cell trays (i.e. algae - copper products) (CTRF) (Short term research priority, ongoing project).

6. Herbicide screening in tobacco and rye crops. (CTRF) (Short term research priority).

7. Investigate insecticides with different chemistries for the control of aphids, wireworms, white grubs, seed maggots and cutworms for the purpose of resistance management, reduced active product per hectare, and integrate into a pest management program (CTRF) (Short term research priority).

8. Fungicide screening for control of metalaxyl-insensitive blue mold, and greenhouse and field control of Target Spot and *Alternaria* with a focus on resistance and integrate into a pest management program (CTRF) (Short term research priority, ongoing project).

Crop management

1. Development and evaluation of improved methods of sucker control that are economical and longer-lasting, and minimize leaf drop and the occurrence of injury related disorders (i.e. Bacterial Soft Rot) (CTRF) (Short term research priority, new).
2. Determine the effects of different nitrogen rates on recommended and promising varieties on tobacco yield and quality (CTRF) (Short term research priority, ongoing project).

3. Identify the cause(s) and solution(s) of tobacco bruising (CTRF) (Long term research priority, ongoing project).

Ontario Organic

Soil Management

- **Soil Health** - Need to identify soil health indicators to help growers understand nutrient cycling and testing. How do we identify "healthy" soils. What are the factors (and farm management practices) to improving the health of soils? Are healthy soils more suppressive of diseases, weeds and insects? What effect do they have on long-term productivity? Are there human health implications (benefits) to eating crops grown on healthy soils?

- **Manure/compost** - What is the role of manure and compost to improving the health of soils? What are the best management practices to optimize the use of manures and composts?

- **Soil amendments** - Some non-Ontario labs now test for various soil biological factors. How reliable are these tests and their recommendations under Ontario conditions? What are the benefits of various soil amendments to the productivity of soils?

Livestock Management

- **Nutrition** – NRC standards have been developed for conventional farms but on organic farms, ingredients are sometimes limited either by the organic standards or by availability of supply. We

need more information on balancing feeds in order to maintain animal health and promote growth. How to balance the diet using forages and pasture for ruminants. Organic dairy production requires less reliance on concentrates and more on forages and pasture. However, the problem in dairy production becomes how to meet the nutrient requirements when cows are grazing, especially if they are at the peak of lactation. Not being able to meet their requirements can cause health and welfare problems, as well as a lower milk nutritional quality (for example protein content). High protein diets, for example, have been reported to promote higher levels of internal parasites and perhaps other illnesses, therefore compromising an animal's health when the feed is not medicated. What are the effects of diet, including pastures on CLA content of the product? What is the role of forages and pasture on non-ruminants?

- **Welfare standards and effect on animal behavioural needs –** Research is needed on requirements for housing, exercise and health. Questions should be raised on the effects of the organic no-antibiotic policy: Does it risk hurting the animals, when antibiotics are not used when they really should for the animals' well being? Welfare standards are being reviewed by a European Task Force and their research and findings should be reviewed for their appropriateness and impact in Ontario.

- **Herd health** – There is a need to evaluate alternative medicines and health therapies that are appropriate on organic farms. Homeopathy is an example of a practice used with reported success on many organic farms. Control of internal parasites and various external insects and diseases is challenging on organic farms. New approaches that are compatible with organic practices and standards need to be researched. Are animals (flocks) raised with organic practices (housing and space allotments, feed, indoor/outdoor access, etc) less (or more) susceptible to health risks, particularly those known to impact human health (E. coli, avian flu, parasites, etc.). How is herd health influencing milk quality and components?

- **Long term performance** – How do organic livestock systems compare over the longer term to other farm systems? What is the lifespan and performance of animals produced in organic systems? When looking at the whole farm system how does livestock complement and integrate with other operations on the farm?

- **Genetic Selection –** What are the desired traits or breeds that are most adapted to organic? Selection goals for organic livestock can be quite different than conventional farms. Need to identify characteristics to be improved, such as resistance to parasites and diseases, as well as growth rate and milk production in extensive production systems, with little or no concentrate. Research should be carried out to identify which breeds are best suited for organic production. Animal breeding research should identify not only which traits and breeds, but also which mating systems (pure vs. crossbreeding) are best suited for production systems within the organic sector. What is the role of heritage breeds or species in organic production? Are there opportunities to develop new markets with these products? Research can identify which breeds can be tied to heritage or specialty foods. This has been successfully used in France to promote some heritage breeds. Do heritage breeds have genetics for parasite resistance or higher feed conversion on pasture, for example?

Pest Management

- Pest management on organic farms requires a systems approach incorporating the benefits of cultural techniques, mechanical methods and beneficial organisms, and appropriate biopesticides when necessary.

- **Weeds** are one of the largest limiting factors to yield on organic farms for many crops. There is a need for more information on the interactions of crops and weeds on organic farms. An evaluation of various types of mechanical weed management to complement other weed management approaches is needed. The development of practical alternatives to weed management and how to reduce trips over the fields with mechanical tools are needed.

- **Bio pesticides and new products** – Research effort is needed to evaluate and facilitate the registration of new pesticides with PMRA. This is especially true of minor use products as permitted for use in organic farming, many of which are already registered for use by US organic farmers. This would include bio-pesticides, pest deterrents, and bio-stimulants. The limited expertise in this area and difficulty to register new products are limiting the choices available to organic farmers in Ontario and Canada.

- **Integrated pest management and beneficial organisms** – There is a need for more information and technology transfer on various beneficial insects, fungi, bacteria, that may assist in the control of various insects (or pathogens). As well, other potential methods for management of pests, adapted from conventional farming, may help organic farmers, as long as they are complementary with their agricultural practices. More knowledge transfer from conventional or organic research programs is needed. Which farming practices (such as field border effects) can enhance beneficial organisms? What homeopathic/herbal methods of weed/pest management are efficient and can be used in crops or livestock production? Examples of difficult to control pests in organic production are Hemiptera in pomes and strawberries, swede midge in cole crops (broccoli, cabbage etc), scab in apples, and black rot in grapes

Whole Farm Planning Systems

- **Ecosystems** - There is a need for more research into the ecological footprint of farms in Ontario including organic farms. This would include a study of various life cycles documenting the biodiversity of organisms on the farm as well as a variety of other environmental impacts such as water quality.

- **Socio-Economic –** What are the socio-economic impacts of organic farming in rural communities? Organic farming internalizes many of the input costs by using fewer off farm inputs and revenue factors are frequently quite different from non-organic farms.

- **Energy** - Energy use on the organic farm is very important to the basic philosophy of organic farming. This includes using energy efficient methods of production on the farm and an accounting of the whole energy cost of food production. There needs to be more research on the use of energy alternatives on the farm including methane digesters, wind power, hydrogen fuel for tractors and the diversity of energy sources used on the farm.

- **Transition to organic** - The transition to organic farming takes at least 3 years. During this time the organic farmer is exposed to financial hardship due to lower yields during this adjustment period and there is limited opportunity for organic price premiums. Research is needed on appropriate strategies to make the transition. Research is also needed to document the changes in soils, pests, livestock and crops during this transition period.

- **Design of farm systems** - There is a need for research into the design of farm systems to look at how various farm crops and livestock species complement each other and how to capture the synergies between enterprises. An example is to look at beneficial crop rotations to examine the beneficial and the negative factors. There is a "conventional wisdom" among organic growers that many pest and fertility problems can be avoided by correct design and management of the farming system. More research is needed to document the design and integration of these systems to optimize benefits on the farm.

Recommendation 2

Innovative and Enhanced Germplasm Development and Utilization.

This section will include crop breeding, performance evaluation, physiology and the development of new molecules, gene discovery, genomics, and bioinformatics to produce knowledge and materials to advance the industry.

The research described within this recommendation strives to develop the raw materials and the knowledge base leading to a vibrant and diverse field crop sector. It includes breeding for increased competitiveness, new markets, life-science based products and processes and improved quality. It includes basic research in the areas of genomics and bioinformatics to discover new applications and uses, to increase efficiencies of breeding systems and to dramatically broaden the utility of basic commodities. The overall goal is to produce new, higher value products for the industry and to do it quickly and more efficiently. The priorities listed also include research programs in the area of crop and plant physiology and document strong support for enhanced performance testing systems.

Ontario Cereal Crop Committee

1. Performance Testing – Ontario Cereal Crop Committee

Background: Development of new varieties for Ontario conditions is paramount to a strong agricultural sector. Registration requirements have been reduced, in order to allow for a more rapid entry into the marketplace for varieties with special traits and/or higher yield potential. While entry of these new genetics is positive, evaluation of area of adaptability and other agronomic traits is essential

to allow the industry to prosper. A strong performance testing system is the most efficient method of determining the best way to use new genetic developments. Without performance testing, it will be very difficult for the industry to move forward to the benefit of all.

Economic importance: The value of this system is difficult to determine. Conservative estimates place the increased production and quality potential at $20 million dollars annually.

Competitiveness: The identification of better yielding and area specific cereal varieties gives Ontario growers a competitive advantage to areas that do not have broad based, well designed performance testing systems. This leads to a more competitive milling and baking industry, as quantity and quality of needed products can be produced close to home, reducing transportation and storage costs.

Social benefits: Growers are less dependent on support programs with high yielding, premium quality crops. Further development of the handling and processing industry will be encouraged, leading to increased employment and prosperity.

Environmental benefits: Higher yielding crops sequester more carbon, add organic matter back to the soil, and help reduce potential erosion through improved soil structure and canopy effects.

Ontario Corn Committee

1. Genetic Improvement of Corn for Ontario

The existence of an efficient continuum from inbred development through to commercial hybrid evaluation is critical to the Ontario corn industry. Elite germplasm may be developed to increase productivity, meet specific needs of a bio-based industry, or to confer nutritional improvements. However, these advances will have little impact on the provincial economy unless a system exists for ensuring that these advances can be integrated, refined and tested across Ontario.

Many of the priorities for the corn industry depend upon the successful incorporation of genetic traits, natural or modified, into superior breeding lines (e.g. cold tolerance, pest resistance, premium market traits, etc.) Although there are large hybrid development programs in the private sector, inbred/hybrid development must also continue to be part of the public breeding programs, since it is only through locally adapted germplasm that the true value of genetic enhancements to corn growers can be properly evaluated.

Within Ontario these public programs are important sources of "early" germplasm to be fed into the private sector breeding programs and they serve as the backbone for identifying the most efficient commercial hybrids.

2. Enhanced Pest Resistance in Corn

Fusarium
Corn grown in Ontario continues to be prone, periodically, to severe infection by Fusarium ear rots. The toxins produced by these moulds seriously affect the performance and health of hogs, in particular, and may also affect the performance and/or health of other livestock, and humans. Livestock feeds still

represent the greatest usage of corn in Ontario and the usage of corn for human consumption is increasing. Thus, high priority must continue to be given to the development of corn lines with resistance to Fusarium ear rots.

Work at ECORC and University of Guelph have investigated the mechanisms of ear rot infection and identified sources of resistance. Continuing funding is needed, however, to assist with the incorporation of genes for resistance into breeding lines and then into commercial breeding material, using both conventional breeding methods and biotechnology.

Leaf Diseases
In recent years there has been a substantial increase in the use of cultural practices that leave higher levels of crop residues on the soil surface throughout the winter and subsequent growing season. The presence of corn residues on or near the soil surface increase the risk and/or severity of infection from various fungal leaf diseases, such as eyespot, leaf blights and rust. In addition, leaf diseases not currently present in Ontario are threatening to move into this province from adjacent States in the USA. Hybrids currently grown in Ontario may have little resistance to these diseases.

Sources of genetic resistance to leaf diseases need to be identified and rapidly incorporated into superior inbred lines, using both traditional breeding methods and biotechnology. Success of this breeding effort and the prevention of devastating disease infestations will require the support of a plant pathologist with expertise in corn diseases.

3. Improved Cold Tolerance in Corn

This research area is key to enhancing competitive advantages for Ontario corn production as US based breeding programs have less interest in the genetics or physiology of cold tolerance.

There is a distinct need to develop reliable techniques to assess tolerance of corn hybrids/inbreds to chilling during grain filling, and determine if chilling tolerance during grain filling is correlated to early season cold tolerance.

More information is required regarding the conditions that limit corn growth, germplasm that will prosper in cool conditions, and the relationships that exist between traits that provide superior performance under both warm and cool conditions.

Ultimately, the goal is to incorporate superior cold tolerance into superior lines in corn breeding programs.

Ontario Oil and Protein Seed Crop Committee

1. Genetic Enhancement for Production Stability and Risk Management.

Issue: Continued genetic enhancements are required to maintain competitiveness in international and domestic markets.

Background:

Genetic enhancements lead to significant increases in productivity and economic gain without large increases in production inputs. Lower provincial soybean yield averages in 2001, 2002, and 2003 have emphasized the need for the continued improvement in plant genetics.

Biotechnology and genomics research offers new opportunities for soybean and canola improvements. The continued development of biotechnology tools is necessary for use in breeding and to provide understanding of the genetic control of traits, especially complex traits. Conventional breeding programs and the processing/distribution chain will increasingly rely on molecular markers for selection of complex traits, for stacking multiple traits (especially disease resistance genes), and for cultivar identification.

There has been renewed interest in winter canola in the last two years due largely to the registration of improved cultivars from Europe. Further winter canola variety development is required to improve yield, winter hardiness, and disease tolerance.

2. Performance Testing of Varieties

Issue: Information for variety selection decisions must be available to maximize production.

Background:
The variety registration process continues to be under review. With the imminent loss of both merit and performance data requirements for soybean variety registration, even more emphasis will need to be placed on generating data which allows producers to make profitable variety decisions. Benefits to a strong variety testing system include:

a) Ontario soybean producers can grow new varieties with confidence.
b) Performance data for the shorter season areas of Ontario is especially important, as little or no other data may be available.
c) All new varieties, whether they are derived from conventional breeding programs or from biotechnology, need performance data to succeed in the industry.
d) Growers need unbiased performance data to explore the potential benefits or drawbacks to new market classes.

Ontario Forage Crops Committee

1. Improving feeding values of forages for stored feed and pasture.

I) Genetic/biotechnology improvements to energy content and/or other desirable quality traits.

II) Management of forage crops to optimize feeding potential

Background:
High quality forage is the engine that drives the dairy industry in Ontario. Similarly, the beef and sheep industries rely to a great extent on high quality pasture and hay to ensure both milk production and proper rebreeding. Efforts to increase quality in both stored feed and pasture must be made to ensure that increased animal performance can be achieved from forages.

Alfalfa is the main stored forage used in Ontario. It supplies adequate amounts of crude protein when harvested at the correct stage of maturity, but it is significantly lower in energy than grains such as corn or barley. Alfalfa that has been selected or genetically modified to have higher digestible energy content would allow it to fill a higher proportion of the ration for milking cows and thus reduce feed costs. Progress has been made in the production and assessment of alfalfa varieties with reduced NDF levels and increase cell wall digestibility. Another area of interest would be to modify the types of protein found in common forage plants.

High quality forage harvested as pasture can be a very economical method to feed beef cattle, develop beef and dairy breeding heifers, and grow market lambs. If these enterprises are to grow and prosper, more emphasis needs to be placed on managing the pasture resource to produce higher quality forage. Researchers need to focus on the forage quality requirements of the whole farm to integrate various methods and times of forage harvest into one complete system. Annual forage crops for stored feed or grazing should be considered here as well. The goal of the complete forage system should be to provide the maximum amount of nutrition from forages on a year round basis, supplementing with other feed sources only when the forage resource cannot provide those nutrients.

New species of forages need to be investigated for their ability to provide high quality forage in either pasture or stored feed systems. Before new types of alfalfa or other species are introduced to the marketplace, work should be done to ensure they can provide similar quality to existing material or else determine what management regime is needed to achieve the desired quality.

The OFCC recommends that research be directed at improving forage quality through genetic improvements, changes in management practices or evaluation of new species.

2. Continue and improve the public system of forage variety testing in cooperation with industry stakeholders.

Background:
The OFCC has been conducting unbiased evaluation of varieties for yield and persistence since the committee was established in 1956. The work was undertaken to: i) Identify the varieties which merit use by forage producers in Ontario ii) Provide relative performance information among forage varieties available in the marketplace, and iii) Provide data to Canadian Food Inspection Agency to allow the legal sale of these varieties. In 1991, the OFCC was the first provincial recommending committee to undertake quality evaluation of forage varieties in addition to yield performance.

Forage yields and quality samples are collected from OFCC registration trials at public testing centres. The OFCC worked with the Seed Trade and the Canadian Food Inspection Agency during 1997 to improve the system of support for variety registration. This allowed varieties that meet OFCC performance criteria to be supported for registration using some or all data from outside Ontario. This allowed producers to have access to these varieties 2 years earlier than under the previous system. The OFCC still conducts performance testing and still provides performance data from public trials in Ontario to producers as in the past.

A significant change could occur over the next year as the CFIA has proposed that merit-based registration be eliminated for all forage crop species. Whether a requirement for some data on

agronomic performance will be required is not clear at the time of writing. This could significantly affect the performance testing system since new varieties may no longer have a legal requirement to be tested in public Ontario tests. The OFCC has prepared a position paper to present to CFIA which recommends that some agronomic data be available to producers at the time of registration. (Appendix I) The OFCC has essentially accepted that quality testing cannot be made financially viable through the committee structure and has decided to eliminate that option for the near term. At the same time, the OFCC has redesigned its fee structure in an attempt to secure enough funds to continue public testing while still extending the results of the testing to the end user. (Appendix II) The new fee system should eventually incorporate not only the seed trade, but also commodity groups and other interested parties.The OFCC recommends that variety testing for yield and persistence be continued.

3. Forage yield

In the current situation, very little plant breeding work is being done on alfalfa or trefoil in the province. In other legume species and in the grasses there is no varietal breeding effort at the present time. Most alfalfa varieties on the recommended list are now coming from one of five breeding programs in the United States. In all other species new varieties are random arrivals from any other temperate agricultural part of the world. In other words the competitive advantage of Ontario's forage industry in terms of superior varieties is largely a lottery of arrivals.

It is a concern of the OFCC that so little effort is directed at improvements in the yield of forages being grown in the province. Clearly advances have been made from multiple pest resistance in alfalfa to improvements in winter hardiness of red clover. Some varieties have been truly outstanding, such as Climax timothy released in 1947 and still on the list....but is it time to reemphasize the importance of remaining competitive in all of the forage species? The grass breeding program at the Ottawa station has been terminated. None other exists in eastern Canada.

Ontario Pulse Committee

- **Genetic Enhancement for Yield, Quality and Risk Management**

Issue: Continued Genetic enhancements adapted to Ontario are required to maintain competitiveness in International and domestic markets

Source**:** Variety Subcommittee, Ontario White Bean Producers, Ontario Coloured Bean Growers, Ontario Bean Dealers, Pulse Canada.

Target Agency: AAFC, OASCC, U of G, OMAF

Title: Funding support for bean-breeding position located at the University of Guelph. Continue to fund bean breeding and food quality evaluation of edible beans at AAFC, Harrow.

Details**:** Full funding for a bean breeding position located at the University of Guelph.
The detailed objectives are listed in order of priority; cultivar release and germplasm improvement through intra- and inter-specific hybridization followed by conventional and biotechnology-aided selection methods.

In 2003 registration of the first bacterial blight resistant variety of white beans OAC Rex is a significant step forward for the dry bean industry. A new national NSERC project with AAFC researchers in Manitoba and Saskatchewan to develop other bean types with resistance to CBB was started in 2004. Results from 2004 indicate that CBB resistance increased yields, on average by 7%.

1) Conventional breeding of cultivars for:

- Yield and yield stability;
- Quality traits include cooking and canning quality, seed colour and size, mechanical damage, etc.;
- Agronomic traits including upright plant architecture, harvestability, row spacing, disease resistance, environmentally friendly production;
- Improved yield potential with early to full season maturity and upright plant archetype;
- Cooking and canning quality acceptable for domestic and international trade;
- Increased resistance to common and halo bacterial blight, white mold and root rot diseases;
- Pyramiding resistance to anthracnose and bean common mosaic virus races prevalent in Ontario and other major genes controlling resistance to pests;
- Transfer of resistance to potato leafhopper to dry beans adapted to Ontario;
- Testing lines/cultivars in cooperative trials to identify superior lines for registration and to generate performance data;

2) Application of biotechnology to improve efficiency in cultivar development through:

- Identification of RAPD markers linked to common bacterial blight resistance genes aiding molecular marker assisted selection;
- Integrating selection methods based on molecular estimates of genetic distance with conventional selection techniques to accelerate simultaneous improvement of yield, adaptation, quality and pest resistance;

3) Germplasm improvement and utilization through:

- Multi-cycle intermatings of adapted and donor germplasm sources (within and between Meso-American and Andean races, and utilization of tepary bean and scarlet runner beans) to widen the germplasm base;
- Release of improved germplasm to breeders of private and public institutions.

<u>Background.</u>

University of Guelph removed funding support for bean breeding position and pathology work. Cultivar development of varieties best suited to Ontario growing conditions is critical for Ontario to retain its competitive advantage and international reputation for dry edible beans. Although white bean acreage has been shrinking over the past 10 years, coloured bean acreage is expanding. Bean breeding programs in Ontario has been highly successful in producing high yielding, high quality cultivars, with improved disease tolerance/resistance. Dry edible beans have a value of $40 M to Ontario producers. Over 85% of the dry bean crop produced is exported. Buyers are moving toward ISO9000 trade specifications that demand accountability for high bean quality. In order for Ontario to remain competitive, identification of superior varieties is paramount. Some markers have been found in recent years and are now being used in breeding programs. There is currently no di-hploidy development or transformation research occurring. Pulse Canada in its research strategy proposal is proposing that edible bean breeding focus in Ontario be on white beans, kidney, cranberry, and black beans, and

alternative types. Gene mapping and marker assisted selection was identified as a high priority under biotechnology section of the Pulse Canada strategy. Edible beans add to the diversity of crops, which supports good crop rotations, agricultural diversity and risk management principals.

Ontario Tobacco Committee

Development of high quality cultivars with: a) good manageability, balanced leaf chemistry, mature leaf style, and less off-grades; b) resistance to pests and diseases (Root-Lesion Nematode; Black Root Rot; Blue Mould, curing disorders- Bacterial Soft Rot, Pole Rot, Aspergillus; Target Spot; Rhizoctonia Damping- Off; Tobacco Mosaic Virus (TMV); Aphids; and White Mould) and, c) suitability for machine harvesting. Traits to consider are: uniform leaf maturity, reduced sucker growth, minimal leaf drop, high yield and returns (CTRF) (long term research priority, ongoing project).

1. Development of high quality cultivars with: a) good manageability, balanced leaf chemistry, mature leaf style, and less off-grades; b) resistance to pests and diseases (Root-Lesion Nematode, Black Root Rot, Blue Mould, curing disorders (Bacterial Soft Rot, Pole Rot, Aspergillus), Target Spot, Rhizoctonia Damping- Off, Tobacco Mosaic Virus (TMV), Aphids, and White Mould) and, c) suitability for machine harvesting. Traits to consider are: uniform leaf maturity, reduced sucker growth, high yield and returns (CTRF) (long term research priority, ongoing project).

2. Determine the effects of different nitrogen rates on recommended and promising varieties on tobacco yield and quality (CTRF) (short term research priority, ongoing project).

Ontario Organic Committee

Plant Genetics

- **Breeding for resistance** – Organic farmers need new cultivars that are resistant to pests and have good agronomic traits and market oriented qualities that are appropriate for organic farms. Growers need a diversity of genotypes available for managing pests.

- **Co-existence of organic and GEO** - The interface of organic and genetically engineered crops creates problems to maintain genetic purity in organic crops at the low levels demanded by the marketplace. Production techniques need to be developed to assist producers on methods of reducing ‘contamination’ to maintain the value of the crop. Adequate buffer zones and equipment cleaning procedures are examples of information needed by growers. These issues extend to both the commercial crop and to seed production systems.

- **Adaptiveness to organic** – Is the relative performance of varieties different in organic and conventional production systems. Do differing levels of fertility or plant protection materials common in conventional variety evaluation methodology affect this? Can particular plant traits such as height, plant type, root characteristics, pubescence, or other leaf parameters be key indicators of adaptiveness? For example, is there a difference in the tolerance of varieties to weeds which can be characterized by leaf structure or architecture types so that growers can select varieties that may be adapted to organic based on these plant traits?

- **Heritage species/varieties** – There are some unique markets in organic that can best be served with heritage species or varieties. There are reports of enhanced taste, quality, pest resistance or tolerance to soil conditions. We need to quantify and validate this information.

Recommendation 3

Market Responsiveness

Research strategies to address market development, new product development, food safety and enhancement.

Competing in traditional commodity markets will become more difficult for Ontario producers in the next several years. This will require increasing emphasis on the development of new higher-value markets for Ontario field crops with the integration of the producer up the value-chain. Research in these areas has been ongoing for several years, however, with the increasing emphasis on life-sciences and food quality and safety, further targeted efforts are required. Most of this work will strive to take advantage of the history of I.P. crop production in Ontario and the existing and developing infrastructure to support these markets.

Ontario Cereal Crop Committee

1. New Markets

Background: Development of new markets is a way to expand acreage and value of the crops grown. When successful, efforts of this nature often have great benefit. Milling oat and malting barley are two areas that are currently underway within the sector. This has the potential to expand production by up to 100,000 acres, into a premium market. Other opportunities exist that should be investigated.

Economic importance: Premiums for this type of market often run from $10 to $40 per tonne to the producer, and can develop whole new processing opportunities. Care must be taken, however, to discern actual acreage that could be affected by these developments. Development of high value biotech components that require very small acreage, while beneficial, have far less overall economic impact to the sector.

2. Improvement to Grading System

Background: Grain grading has tremendous impact through the industry. Grain downgraded reduces the price paid to the producer, may restrict export options, and grain that is not graded properly due to factors like fusarium can become unusable by millers once actual vomitoxin levels are known.

Despite the importance of grain grading to the industry, it has remained a subjective test, relying on visual inspection for colour and other parameters. With the vagaries of human eyesight, this has led to many inconsistencies within the grading system. This was proven by a study undertaken in 2000 by Dr. Art Schaafsma.

Development of an objective grain grading system is essential to ensure proper streaming and returns of grain produced and processed across the industry.

Economic importance: Grain graded as feed that is actually of milling quality reduces the price paid to the producer by $15/tonne. Grain that is accepted as milling quality, which is subsequently found to be above acceptable limits for vomitoxin, is of no value to the miller and must be removed from the system at significant cost.

Competitiveness: A consistent and accurate grain grading system would ensure that buyers of Canadian grain abroad would receive the quality of product that they expected. This would further enhance the Canadian reputation for quality, and premiums attached. This grading system would also ensure that both producers and end users in the province are treated fairly.

Ontario Corn Committee

1. Develop Value Added Markets for Corn

Food grade quality corn represents a major value-added market for Ontario corn that has the potential to expand significantly. Currently, much of the market is being filled with corn or corn products from the U.S.A. Development of food grade quality corn suitable for production in Ontario represents a significant import-replacement opportunity, as well as an important export market.

Research has begun within the University of Guelph, primarily at Ridgetown College, directed toward breeding early white, food grade corn inbreds and hybrids, suitable for production in Ontario and toward identifying yellow corn hybrids of food grade quality, in co-operation with the private sector.

Long-term funding is required to enhance the technical support for these programs and to ensure the continuation of this work.

Ontario Oil and Protein Seed Crop Committee

1. Development of Speciality Soybeans and Alternative Uses

Issue: Research is required to develop areas that will increase the utilization and value of Ontario soybeans.

Some of the main areas of interest include:

a) Industrial Utilization
   I) Biodiesel
   II) Enzymes
   III) Solvents

IV) Waxes
V) Plastics

b) Health Benefits
c) Food Use
I) Food grade soybeans
II) Food Ingredients
III) Organic production
d) Functionality
e) Nutraceuticals and Pharmaceuticals
f) Increasing crush value

Background:
Soybean oil and protein are used in the manufacture of human food, animal feed, and various industrial products. New and existing areas must be explored to increase the utilization and value of Ontario soybeans.

Ontario Forage Crops Committee

1. Forage Grading System

- The importance of a well defined grading system in the buying and selling of agricultural commodities is undisputed. In contrast, no uniform grading system for legume, grass or mixed hays exists in Canada nor in the U.S. Hay purchasers located in areas with no consistent hay grading system must evaluate each hay lot purchased. They can apply the hay grading system of their choice, sample hay and run chemical analyses to evaluate hay quality, or visually inspect hay and make an informed opinion of the hay. The best method involves combining visual judging with chemical analyses. With many components to evaluate the problem becomes one of simplifying the values to establish a grade that satisfies both seller and buyer.

- The problem is particularly acute in Ontario where hay may be shipped long distances. Markets exist not only in the southern U.S., but also overseas. The OFCC regards this issue as an important one that requires a system parallelling the benefits of other commodity grading systems such as corn or wheat. The OFCC defines this issue as one of pulling existing information together and arriving at a consensus rather than one that requires an expansion of research efforts.

Ontario Pulse Committee

1. Edible Bean quality evaluation and utilization

Issue: Edible beans have significant health benefits that can improve the Health of Ontarians. Research into the health benefits, compositional analysis needs to continue/expanded to identify traits that may have special value;

Source: Variety Sub-committee;

Target Agency: AAFC, U of Guelph, CARC, Pulse Canada, ARIO, and OASCC;

Title: New funding is required to conduct literature review, and compositional analysis of dry beans;

Details:
Funding is required to conduct a literature review of research on quality components, compositional analysis, traits that may have special value.
Research to address standard methodologies in conducting analysis.
Compositional analysis to identify unique inherent traits that may have health benefits, neutraceutical, or industrial uses.

Background:

The Ontario government has identified improving the health of Ontarians as a priority. Dry beans can play a role in a healthy diet of consumers.

Health Benefits identified include:

- Circulation System – reduced risk of atherosclerosis, heart attack, high blood pressure
- Complex Carbohydrates, Low fat, and lowers cholesterol – Weight control, Diet, low risk of food allergy to beans; Reduced risk of osteoporosis
- Diabetes
- Digestion system health
- Reduced risk of colon and breast, ovarian cancer.

Customers of edible beans are placing more value on quality traits. The industry needs to examine the composition of edible beans for traits of special value for food, neutraceuticals, or industrial uses. Examples would include screening for components such as Biofavonoids, Saponins, Oligosaccharides. Ontario is well positioned to grow premium priced speciality bean types and have the identity preserved production system and marketing to support them.

There is a shift from producing a commodity to a 'market or buyer' driven bean that has unique or novel output traits. The value of such traits must return incremental margins to all sectors of the industry. The special quality characteristics for food and industrial use are largely unknown. It is recognized that edible beans contain some unique starch, protein and fiber characteristics. Health professionals have recognized the value of edible beans for their health benefits. However only a few researchers have studied pulse utilzation for food and industrial uses. Little is known of the compositional traits that may be of special value.

<u>Current Research/Extension Activities</u>

Work at AAFC, Harrow and University of Guelph has focused on developing, and evaluating germplasm and varieties for canning quality. Efforts have also been directed to factors that have an influence on flatulence, and altered sugar content and quality. Ongoing research is working on expanding the germplasm base.

2. Evaluation/development of alternative pulses, specialty market types.

Target Agency: AAFC, U of Guelph, Pulse Canada, OMAF, ARIO, CARC;

Title: Expand present research funding of alternative pulses to also include niche market types currently being grown on a limited number of acres in Ontario;

Details:

Expand breeding/agronomic research to include other niche pulses grown in Ontario. Examples include Kintoki, Otebo, Adzuki, and large white.

Background
Statistics Canada estimates that Ontario acreage of specialty type dry beans (eg. Kintoki, Adzuki, Otebo, Large White, etc.) has expanded significantly to 36,000 acres in 2005. This represents 1/3 of the acreage of coloured bean types. Acreage of several niche market classes of dry beans including Adzuki, Otebo, Kintoki has expanded in Ontario. AAFC, Harrow has developed varieties of Mung Beans and Pigeonpeas suitable for Ontario. Several other market classes grown on limited acres offer new market opportunities. However no breeding/ agronomic research into expanding the market opportunities of these high value pulses is being done. Good demand for these market types exists both domestically and internationally.

Ontario Tobacco Committee

Improving crop quality

1. **Quality Assurance Priorities**

2. Leaf Quality Assurance Program (including control of the Tobacco Moth) (CTRF) (ongoing project).
3. Non-Tobacco Related Materials program.
4. Analysis of green and cured tobacco leaves for the presence of Blue Mold oospores (CTRF) (ongoing project).
5. Further development of measures to reduce TSNA's in cured tobacco (CTRF).

Ontario Organic Committee

Food Safety and Quality

- **Pathogens** – Some reports have indicated there is an increased risk of pathogens in organic foods due to greater use of manures in crop production. There have been few reports so far of food safety issues on organic farms. What are the risks of pathogens on organic produce? Are current composting procedures effective strategies to manage pathogens on organic farms? Research is needed to identify food safety risks and appropriate management practices for organic farms.

- **Antioxidants** – Some research has indicated increased levels of antioxidants or similar health promoting compounds in organic foods. Some antioxidants are effective to reduce human disease. What management practices are effective to elevate antioxidants and other beneficial food components in organic foods? For example organic standards require organic livestock to have access to pasture and pastured animals have been reported to produce products with higher levels of conjugated linoleic acid (CLA).

- **Nutritional Quality** – Research summaries have been inconclusive to indicate if organic foods have nutritional advantages for various nutrients when compared to other farming methods. Research is needed to identify potential nutritional benefits of organic foods for consumers.

Markets and Farm Economics

- **Barriers** -- There are many barriers to growth of the organic industry as reported by organic farmers. These include a variety of infrastructure policies that are part of the Ontario agri-food industry that was designed before organic growers were part of the industry. These policies inadvertently create obstacles and barriers to the success and growth of the organic food production sector. Barriers to growth also come from lack of support for the organic industry through formal education, research, extension education, demonstration projects, etc.

- **Economic Analyses** -- There is need for more statistical collection on the organic sector in Ontario to assist with policy and market development in the growth of the sector. Enterprise budgeting tools (for example crop and livestock budgets) that take into account whole farm systems need to be developed for appropriate use on organic farms. At the farm level, there is a need to collect data on the acreage of various crops being grown, crop yields per unit area, total production tonnage or volume, numbers of breeding livestock, numbers and live weights of market animals, livestock access to pasture, grazing management (techniques for livestock control, grazing season, re-seeding procedures, etc.). Beyond the farmgate, there is a need to determine market opportunities and growth potential in domestic and foreign markets for a wide range of organic products in raw, semi-processed, and fully processed form (e.g., flax, flaxseed oil, margarine and salad oils based on flaxseed oil).

- **Market Research** -- There is a need for more consumer research to look at who is buying organic products and why, what the characteristics of organic product consumers are, what the characteristics of organic products are that makes them attractive to consumers. This will assist the industry with developing improved marketing strategies for organic products, and with determining areas with best growth potential. What is the benefit and effect of private labels in the market place? What is the marketing margin (between farmgate and food retail) for different organic products, what are the marketing costs, and how are the marketing margins shared amongst the various participants in the supply chain?

Service Priorities

Service priority 1: Extension and information validation

Background: As new technologies become available, information about these technologies must be disseminated throughout the sector. These technologies must also be assessed for wide area adaptability, or specific geography or situations were they perform to the benefit of the user. Without this extension and validation of new technologies, advancements may never be accepted by the industry, or uptake may be slowed dramatically.

While extension efforts are often assumed to be intrinsic within the development of new technologies, this is rarely the case. Many research personnel are simply too busy to make this occur, or lack the network to promote the technology effectively. It is essential that this extension link exist, both to speed uptake and to make the research community aware of new and emerging problems and opportunities.

Economic importance: promoting uptake of the best new innovations ensures rapid acceptance and adoption of these technologies. This ensures that the full value of new enhancements is realized. Extension services are considered "GATT green", indicating that all countries accept the tremendous value that extension efforts have.

Ontario Cereal Crop Committee

- Frost Seeding: research has shown up to 42% yield increase. Extension and demonstration of this technology is required to increase uptake.
- DONCAST: Improve grower confidence and understanding of improved model.
- Extension and Information Validation: tillage, seeding rates, herbicide and fungicide information, timing and placement of fertilizers.
- Segregation of Wheat Types: articles, presentations on the need and reasons to maintain purity in the various classes of wheat.

OCCC Objectives for 2005

1) Fusarium ratings system that offers both breeders, researchers and growers better information
2) Replacement of the Oat Breeding position at AAFC
3) Education of growers, elevators and millers on the need to maintain class (type) purity
4) Improved nitrogen management
5) Continued delivery of performance test information
6) Expansion of market opportunities, especially in malt barley
7) Screening of current varieties of wheat for tolerance to the new strains of stripe rust.

Ontario Oil and Protein Seed Crop Committee

1. Publication and Distribution of Educational Material

Issue: One of the most efficient ways of transmitting information to producers is through educational material either through printed publications or the Internet.

Background:
In the past information was primarily distributed through printed publications. Although this continues to be the primary means of getting information to producers the World Wide Web has become increasingly important. The following list of publications are key sources of new information to Ontario producers.

a) Printed publications such as The Ontario Soybean Variety Trials Report
b) Web based information such as The OOPSCC web page, the OMAF web page and the Plant Health Initiative
c) Extension publications such as regular newsletters.

2. Field Scale Validation/Demonstration Trials

Issue: As new pests emerge pertinent information must be communicated to stakeholders.

Background:
As new and emerging pests become a significant production issue in Ontario producers must be made aware of the biology and best management practices to control these pests. For example although these insects are relatively new they have quickly become a major economic concern to growers. Best management practices must be conducted "in the field" to demonstrate and verify to producers these BMP's. This requires field scale verification/demonstration trials whenever feasible. New technology to address existing production difficulties must also be assessed in the field. The following is a list of the main issues that need to be addressed.

a) Soybean Aphids - foliar insecticide applications
- Insecticide seed treatments

b) Soybean Rust-foliar fungicide application

c) Soybean Cyst Nematode
- evaluation of races and site specific variety performance

d) Root Rots (Phytophthora/ Rhizoctonia/Fusarium)
- fungicide seed treatments

3. Educational Conferences

Issue: Conferences are key sources of information for producers and agribusiness.

Background: Although publications distribute information efficiently meetings and conferences are important to explain topics and issues more in depth. They are also vital

in educating Agi-business and establishing contacts with industry members. Some of the key meetings in Ontario include the Southwest Ag Conference, Excellence in Soybean Production, Diagnostic Days, Farmsmart etc.

Field Crop Protection

- **Field crop pest monitoring and prediction models**- summer monitoring for pests such as E. chafer, slugs as an early warning tool and wireworm densities in summer monitoring program. This will help aid growers in making seed trt decisions at seed sale time in the fall to promote sound IPM.

- **Fungicide Education**: application methods, proper timing, resistance management, IPM, rotation of chemistries, impact of each disease

- **Research Updates at Annual Meetings** - continue presenting field crop protection research funded from last year's priority list

Ontario Pulse Committee

Extension of research information through field trials/ demonstrations, educational activities that promote sustainable agronomic practices that enhance returns for dry bean industry.

Issue: Extension of information to Ontario dry bean industry is vital for it to remain competitive, responsive and environmentally sustainable

Activities/efforts

- Printed publications including: Crop Pest, Ontario performance trials, information bulletins (eg. Anthracnose Scouting Guide 2005)
- Web based information. – eg. Agronomy Guide, Insect Disease Guide, OMAFRA Edible Bean page
- Field days/ events : eg Fungicide Application Day, SWAC, Farm Smart, Diagnostic Days

Field Evaluation/Demonstration Trials

Issue: Field validation and demonstrations to support extension of research and best management practices to ensure industry remains competitive.

Issues include:

- Sclerotinia control – fungicide(s) with/without calcium
- Nitrogen rate
- Root Rot Control with Biologicals
- Harvest Desiccants – evaluation of timing, products.

Niche Market Classes

Issue: Niche market classess often carry increased production risks due to lack of management information and experience, adaptability of varieties, fewer registered pesticides.

Activities/efforts. Support management practices for niche market classes through field tours, field diagnostics, trials, education.

IPM for Insects/Diseases

Issue: As new and emerging pests become a problem, it is critical to be at the leading edge in scouting, field surveys, field diagnostics, and management to control these pests. For example a field survey by OMAFRA in 2004 identified Race 73 of anthranose in Ontario. In 2005, a field survey identified fusarium as the main root rot present in dry beans.

- Anthracnose was common in white bean fields in 2004. In addition a new race of the disease has been confirmed in Ontario. Few white bean varieties carry resistance genes to known strains of anthracnose. In 2003 two new foliar fungicides were registered that control anthracnose. Scouting and management strategies need to be field tested and refined. Samples of infected seed will need to be collected and tested for race identification.
- IPM of tarnished plant bug/stink bugs.
- Extension of white mould management strategies
- SCN is becoming more widespread in dry bean growing regions, with little knowledge of its impact on dry beans, SCN populations, or management strategies.

Ontario Tobacco Committee

- OMAFRA to provide consultative extension and act as the lead in transferring research results to growers.
- OMAFRA to continue to provide adequate staffing levels and farm visits.
- Increase OMAFRA tobacco PY's to historical levels.
- Continue the publication of Publication 298: Flue-Cured Tobacco Production Recommendations every year if required, and include the year of publication on the front cover (OMAFRA).
- Publication 298 should be made electronically available on the OFCTGMB website (OMAFRA/OFCTGMB).
- Consultative services to be provided to growers to assist with curing techniques and skills (OFCTGMB).

COMMITTEE MEMBERSHIP

ONTARIO CEREAL CROPS COMMITTEE – MAIN

ORGANIZATION	INDIVIDUAL	CONTACT
OCCC Variety Subcommittee Voting Members (in no particular order)		
(Chair)	Mr. Peter Tuinema	tuinemap@ntl.sympatico.ca
(Secretary)	Ms. Wanda Walton	wanda@advantageseeds.com
Quality SubCtee	Mr. Glenn Wright	gwright@newlifemills.com
OMAFRA	Mr. Peter Johnson	peter.johnson@omafra.gov.on.ca
OSCIA	Mr. Gerald Beaudry	fbeaudry@onlink.net
OSGA	Mr. Paul Szentimrey	paulsz@execulink.com
Public Plant Breeder	Dr. Duane Falk	dfalk@uoguelph.ca
Production SubCtee	Mr. Mark Etienne	metienne@hylandseeds.com
Disease Coordinator (one of)	Dr. Allen Xue Dr. Lily Tamburic	axue@agr.gc.ca ltamburi@ridgetownc.uoguelph.ca
Variety SubCtee	Mr. H.D. Voldeng	VOLDENGHD@agr.gc.ca
Commercial Plant Breeders	Mr. Tim Welbanks Alt. Ellen Sparry	welbanks@phibred.com esparry@redwheat.com
OBCO	Mr. Martin Harry	mharry@sympatico.ca

Organization ***Representative***

APPENDIX I (b)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE – VARIETY

C.P.B., C.S.T.A.	➢ Mr. A.R. McElroy, Chairman
University of Guelph, O.A.C.	➢ Mr. J. Rowsell, Secretary
Millers' Rep.	➢ Mr. G. R. Carson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. K. M. Ho
Kemptville College	➢ Dr.G. J. Hoekstra

University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
Crop Technology, OMAFRA	➢ Mr. P. Johnson
Crop Technology, OMAFRA	➢ Mr. S. Banks
C.G.C.	➢ Mr. J. Lowe
C.S.G.A.	➢ Mr. M. Mackinnon
University of Guelph, O.A.C.	➢ Dr. D.E. Falk
E.C.O.R.C.	➢ Dr. R. S. Pandeya
Quality Co-ordinator	➢ Dr. L. Pietrzak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S.	➢ Mr. J. Rowsell
Disease Co-ordinator	➢ Dr. A. Xue
Ridgetown College	➢ Dr. A. E. Smid
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
O.P.C.R.S.C., O.C.P.C.	➢ To be Appointed
O.S.G.A.	➢ Mr. P. Szentrimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
Thunder Bay Research Station, OMAFRA	➢ Mr. G. Scheifele
E.C.O.R.C.	➢ Dr. H. Voldeng

APPENDIX I (c)

ONTARIO CEREAL CROPS COMMITTEE - QUALITY, OF THE SUBCOMMITTEE VARIETY

P.R.C.	➢ Dr. L. Pietrzak, Chair
Robin Hood Multifoods	➢ Mr. G. R. Carson
Quaker Oats Co. Ltd.	➢ Mr. M. Morrison
Corporate Foods	➢ Mr. N. Woodbeck
C.G.C.	➢ Mr. J. Lowe
Reid Milling	➢ Mr. M. Mak
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
A.D.M.	➢ Mr. M. Neale
Hayhoe Flour Mills	➢ Mr. M. Hayhoe

APPENDIX I (d)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE - PRODUCTION

Kemptville College	➢ Mr. G. J. Hoekstra, Chair
O.M.A.F.R.A.	➢ Mr. S. Banks, Secretary
North West Ontario	➢ Mr. G. Scheifele

C.S.G.A.	➢ Mr. M. MacKinnon
University of Guelph, O.A.C.	➢ Dr. L. A. Hunt
University of Guelph, O.A.C.	➢ Dr. D. Falk
Ag & Rural Division, O.M.A.F.R.A.	➢ Mr. P. Johnson
K.E.F.	➢ Mr. L. Guillemette
E.C.O.R.C.	➢ Dr. A. R. McElroy
E.C.O.R.C.	➢ Dr. T.M. Choo
E.C.O.R.C.	➢ Dr. R. Pandeya
O.W.P.M.B.	➢ Mr. P. Tuinema (C. Sherk, alt.)
N.L.A.R.S. (O.S.M.R.S.C.)	➢ Mr. J. Rowsell
C.S.T.A.	➢ Ms. G. Harris (J. Reid, alt.)
E.C.O.R.C.	➢ Dr. A. Xue
E.C.O.R.C.	➢ Dr. H. Voldeng
Ridgetown College	➢ Dr. A. E. Smid
O.S.G.A.	➢ Mr. P. Szentimrey (L. Trepanier, alt.)
University of Guelph, O.A.C.	➢ Mr. R. A. Upfold
C.P.B., C.S.T.A.	➢ Mr. L.P. Shugar (T. Wellbanks, alt.)
O.S.C.I.A.	➢ Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
C & M Seeds	➢ Ms. E. Sparry
W.G. Thompson & Sons Limited	➢ Mr. M. Etienne
O.P.C.R.S.C., O.C.P.C.	➢ To be appointed

Ontario Corn Committee (November 2005)

Name	Affiliation	Address	Telephone	FAX	E-mail
Mr. Greg Stewart	OMAFRA (chair)	c/o Plant Agric. Dept. , U of G, Guelph, ON N1G 2W1 Ext. 4865	519-824-4120	519-763-8933	greg.stewart@omaf.gov.on.ca
Mr. David Morris	OCC, Secretary	R. R. # 2, Owen Sound, Ont. N4K 5N4	519-376-1304	376-1304	dtmorris@bmts.com
Jean-Marc Beneteau	OCPA	R.R.#1, Woodslee Ontario NOR 1VO	519-727-3310		benjmc@aol.com
Jeff Davis	OCPA	R.R.#8, St. Thomas Ontario. N5P 3T3	519- 633-7506	519-633-9588	jeff.davis2@sympatico.ca
Mr. Ryan Brown	OCPA (Alt)	100 Stone Road West, Suite 201, Guelph, N1G5L3	519-837-1660	519-837-1674	rbrown@ontariocorn.org
Mr. Paul Vogel	OSCIA	R R # 2, 3995 Lafleur Rd., Apple Hill ON K0C 1B0	613-528-4045	613-528-1048	vogelseeds@on.aibn.com
Pat Lee	OSCIA (alt.)	RR 1 Otterville, N0J 1R0,	519-842-9635	519-842-7945	plee@oxford.net
Dr. Lana Reid	Agric. & Agri-Food Canada	ECORC, Bldg. 99, Central Experimental Farm, Ottawa, ON K1A 0C6	613-759-1619	613-952-9295	reidl@agr.gc.ca
Dr. Liz Lee	Plant Agric. Dept., Crop Science, Bldg. U of G Guelph, ON N1G 2W1 ext. 53360		519-824-4120	519-763-8933	lizlee@uoguelph.ca
Mary Lynn Santavy	Seed Corn Growers of Ontario, 825 Park Ave. W., Chatham ON N7M 5J6		519-352-6710	352-0526	msantavy@seedcorngrowers.on.ca
Mr. David Baute	Maizex Inc., (CPBA alt.)	R.R. #2, Tilbury, ON NOP 2L0	519-682-1720	682-2144	maizex@netrover.com
Marty Vermey	Hyland Seeds, (CPBA)	2 Hyland Drive, Blenheim ON N0P 1A0	519-676-8146		519-676-5674 MVermey@HylandSeeds.com
Mr. Gary Bauman	Syngenta Seeds (CSTA)	15910 Medway Rd. R.R. #1 Arva N0M 1C0	519-461-0074	461-0770	gary.bauman@syngenta.com
Dr. Arend Smid	Ridgetown College	Ridgetown, Ont. N0P 2C0	519-674-1633	519-674-1600	asmid@ridgetownc.uoguelph.ca
Mr. Randy Ross	(Treasurer)	Box 1258, Ridgetown, Ont. N0P 2C0	519-674-3932 or 519-352-6840 ext 289		rross@ciaccess.com
Scott Jay	Ridgetown College	Ridgetown, ON N0P 2C0	(519) 674-1608	(519) 674-1600	sjay@ridgetownc.uoguelph.ca
Bruce Humphries	Huron Research Station	R.R. #1, Exeter, N0M 1S4	(519) 235-4075	(519) 235-3164	bhumphri@ridgetownc.uoguelph.ca
Byron Good	Crop Science Building	Univ. of Guelph, Guelph, N1G 2W1	(519) 824-4120 Ex 58572	(519) 763-8933	bgood@uoguelph.ca
George McDiarmid	ECORC, Building 99, Agriculture and Agri-Food Canada Ottawa, ON K1A 0C6		(613) 759-1546	(613) 992-9295	mcdiarmidg@agr.gc.ca
Cheryl Wightman	Kemptville College	Kemptville, Ontario K0G 1J0	613-258-8336 x681	613-258-8410	cwightma@kemptvillec.uoguelph.ca

Ontario Oil and Protein Seed Crop Committee
COMMITTEE MEMBERS

Group Identifiers:
VSC - Variety Subcommittee members
ROC - Rest of Committee (additional main committee members)
CSS - Canadian Seed Sponsors
CSC - Canola Seed Committee
CANO - Canadian Organisations
USAO - USA Organizations

VSC

Name	Tel	Fax	E-mail
Dr. Gary Ablett	519 674-1505 cell: 519-355-8551	519 674-1515	gablett@ridgetownc.uoguelph.ca
Dr. Terry Anderson	519-738-2251, x 426	519-738-2929	andersont@em.agr.ca
Mr. James Beer	519-848-3488	519-848-3857	
Mr. Dan Brown	519-844-2426	519-844-2424	63575@mnsi.net
Dr. Dick Buzzell	519-738-2251, x 470	519-738-2929	buzzelld@wincom.net
Dr. Elroy Cober	613-759-1610	613-759-6597	coberer@em.agr.ca
Mr. Neil Driscoll	519-638-3252	519-638-5420	
Ms. Louise Duke	613-225-2342 x4387	613-228-6629	lduke@ncrh.em.agr.ca
Mr. Chris Gillard	519-674-1632	519-674-1600	cgillard@ridgetownc.uoguelph.ca
Mr. Ron Guillemette	613-759-1611	613-759-6597	guillemettr@em.agr.ca
Ms. Gail Harris	613-225-6891	613-225-6422	seed@secan.com
Mr. Bob Hart	519-537-5157; 888-537-5157	519-537-5169	proseeds@oxford.net
Mr. Alejandro Hernandez	519-821-0781	519-821-7522	ahernandez@soybeans.com
Dr. Dave Hume	519-826-3800	519-826-3841	dhume@research.uoguelph.ca
Dr. Howard Love	705-324-3293	705-324-2550	hlove@swseed.ca
Mr. John Madill	613-258-8347	613-258-8384	jemadill@magi.com
Mr. Brad Martin	519-343-3035	519-343-4589	bradm@wcl.on.ca
Mr. Don McClure	519-461-0072, ext 232	519-461-0770	don.mcclure@syngenta.com
Mr. Jim Olmsted	519-676-8146	519-676-5674	JOlmsted@wgthompson.com
Mr. Rene Petroski	519-352-7730	519-352-8983	petroskir@soybean.on.ca
Dr. Vaino Poysa	519-738-2251 x 467	519-738-2929	poysav@em.agr.ca
Dr. Istvan Rajcan	519-824-4120 x 3564	519-763-8933	irajcan@plant.uoguelph.ca

Mr. Rob Templeman..... 519-345-0169; cell 276-9818 519-345-0169
rob.templeman@pioneer.com
Mr. Albert Tenuta ..... 519 674-1617 ..... 519 674-1564
atenuta@omafra.gov.on.ca
Dr. Pierre Turcotte ..... 450-653-4413, ext 228 450-441-5694
pierre.turcotte@agr.gouv.qc.ca
Mr. John Van Herk, Jr 519-676-8146 519-676-5674
jvanherk@wgthompson.com
Mr. Tom Welacky..... 519-738-2251 x 469..... 519-738-2929 .....welackyt@em.agr.ca
Mr. Tim Welbanks..... 519-352-6350..... 519-436-6753
tim.welbanks@pioneer.com
Mr. Bill Zubrinic..... 905-527-9121..... 905-527-3162 .....

CSS

Name ..... Tel..... Fax .....E-mail

Dr. Gary Ablett 519 674-1505
cell: 519-355-8551..... 519 674-1515
gablett@ridgetownc.uoguelph.ca
Mr. Christian Azar..... 450-799-2326..... 450-799-2328 .....azarc@co-op.ca
Mr. Dave Baute..... 519-682-1720..... 519-682-2144 .....maizex@netrover.com
Mr. Arthur Bolton..... 519-527-0455..... 519-527-0787 .....
Mr. Peter Bonis..... 705-324-0544..... 705-324-2550 .....sloffice@seed-link.ca
Mr. Norm Bradner ..... 519-352-4178.....
abradner@netrover.com
Mr. Dan Brown..... 519-844-2426..... 519-844-2424 .....63575@mnsi.net
Ms. Helene Chretien ..... 450-469-5744..... 450-469-4547
helene.chretien@prograin.qc.ca
Dr. Elroy Cober ..... 613-759-1610..... 613-759-6597 .....coberer@em.agr.ca
Mr. Peter Craig ..... 705-324-6273..... 705-324-1803 .....pcraig@pickseed.com
Mr. Grant Craven..... 519-354-3210 x 213..... 519-354-8155
kingagro@ciaccess.com
Mr. Stuart Cullen ..... 888-537-5157..... 519-537-5169 .....proseeds@oxford.net
Mr. Eric Denotter..... 519-798-3839 x 249..... 519-798-3222 .....eric@lacoop.com
Ms. Julie Durand..... 819-362-8823..... 819-362-3385 .....semilabo@ivic.qc.ca
Mr. Marc Eberle ..... 519-351-5101..... 519-354-8603
meberle@odyssey.on.ca
Mr. Donald Ferguson..... 519-776-5779..... 519-776-9319
Mr. John Gibson ..... 905-814-4266..... 905-814-4383
jgibson@growmark.com
Mr. Thierry Gripon ....
Mr. Ron Guillemette..... 613-759-1611..... 613-759-6597 .....guillemettr@em.agr.ca
Ms. Gail Harris ..... 613-225-6891..... 613-225-6422 .....seed@secan.com
Mr. Bob Hart..... 519-537-5157; 888-537-5157..... 519-537-5169 .....proseeds@oxford.net
Dr. Brad Hedges ..... 519-352-2700, x 6720

mobile 358-5806 519-380-2008
bradley.hedges@pioneer.com

Mr. Alejandro Hernandez 519-821-0781 519-821-7522
ahernandez@soybeans.com

Mr. Chris Hildreth ..... 519-268-8001 ..... 519-268-8013 ..... childreth@uap.ca

Mr. Ron Kowalski 705-324-9591 705-324-0882
rsi@lindsaycomp.on.ca

Mr. Roger Latour ....
rlatour@agrocentrebelcan.com

Mr. Rejean Laquerre .... 418-339-2474 .....

Ms. Delores Leader .... 519-351-6671 .....

Mr. Brian Legassicke 519-740-1759 519-740-1759
brian.c.legassicke@monsanto.com

Mr. Patrice Levesque 519-685-5152 519-681-4557
pglevesque@dowagro.com

Mr. Sandy Liddle 519-528-2092 519-528-3542
soybean@hurontel.on.ca

Mr. Ron Lloyd ..... 705-424-1410 ..... 705-424-3837 ..... maplefar@bconex.net

Dr. Howard Love ..... 705-324-3293 ..... 705-324-2550 ..... hlove@swseed.ca

Mr. Reinhdt von Martels 519-674-0054 519-674-0388
vonmartels@on.aibn.com

Mr. Don McClure ..... 519-461-0072, ext 232 519-461-0770
don.mcclure@syngenta.com

Mr. Henry Mergl ..... 519-737-6851 ..... 519-737-9601 .....

Mr. Larry Miehls ..... 519-723-4476 ..... 519-723-2146 ..... miehls99@mnsi.net

Mr. Larry Morris ..... 519-262-3002, ext 321 ..... 519-262-2317 ..... lmorris@hdc.on.ca

Mr. Jim Olmsted 519-676-8146 519-676-5674
JOlmsted@wgthompson.com

Mr. Dale Petrie ..... 519-352-4443 ..... 519-352-9559 ..... dale@directseeds.com

Mr. Rene Petroski 519-352-7730 519-352-8983
petroskir@soybean.on.ca

Dr. Vaino Poysa ..... 519-738-2251 x 467 ..... 519-738-2929 ..... poysav@em.agr.ca

Dr. Istvan Rajcan ..... 519-824-4120 x 3564 519-763-8933
irajcan@plant.uoguelph.ca

Mr. William Reymer ..... 519-764-4220 ..... 519-765-4220 .....

Mr. Dave Salenbien ..... 519-627-2681 ..... 519-351-2516 .....

Mr. Ross Simpson ..... 519-354-3210, ext 285 519-354-9390
rsimpson@soygenetics.com

Mr. Fred Sinclair ..... 519-354-3210 ext 274 519-354-8155
fsinclair@prideseed.com

Ms. Ellen Sparry 519-343-2126 519-343-3792
esparry@redwheat.com

Mr. David Stanley .... 519-537-5169 ..... proseeds@oxford.net

Mr. Albert Tenuta ..... 519 674-1617 ..... 519 674-1564
atenuta@omafra.gov.on.ca

Ms. Cecile Tetreault ..... 450-799-3225 ..... 450-799-3229 ..... nlanoie@semico.ca

Mr. Robert Thom ..... 905-729-2202 ..... 905-729-2623 ..... parseed@bconnex.net
Mr. Gilles Tremblay ..... 450-653-4413 ..... 450-441-5694 .....
Dr. Pierre Turcotte ..... 450-653-4413, ext 228 450-441-5694
pierre.turcotte@agr.gouv.qc.ca
Mr. Bill van der Vlist ..... 519-627-1491 ..... 519-627-2990 ..... billvan@mnsi.net
Mr. John Van Herk, Jr 519-676-8146 519-676-5674
jvanherk@wgthompson.com
Mr. Bryan Van Oostveen ..... 519-349-2600 ..... 519-349-2688 ..... BWVan-oostveen@dowagro.com
Mr. Roy van Wyk 519-528-2431 519-528-3518
advantag@hurontel.on.ca
Mr. Marty Vermey 519-352-4316 519-352-5983
marty.vermey@na2.monsanto.com
Dr. Harvey Voldeng ..... 613-995-3700 ..... 613-759-1701 ..... voldeng@em.agr.ca
Mr. Bill Webster ..... 800-265-5289 ..... 519-681-4557 .....
Mr. Jamie Williamson 519-528-2431 519-528-3518
advantage@scsinternet.com

CSC

Name	Tel	Fax	E-mail
Mr. Allan Eadie	519-622-0410 Ext 235	519-622-9184	
Dr. Dave Hume	519-826-3800	519-826-3841	dhume@research.uoguelph.ca
Dr. Howard Love	705-324-3293	705-324-2550	hlove@swseed.ca
Mr. Brad Martin	519-343-3035	519-343-4589	bradm@wcl.on.ca
Mr. Chris Meier	888-768-4395	705-324-0882	rsi@lindsaycomp.on.ca
Mr. Joe Omielan			jomielan@uoguelph.ca
Mr. Jim Olmsted	519-676-8146	519-676-5674	JOlmsted@wgthompson.com
Dr. Ottmar Philipp	204-822-4956	204-822-4958	
Ms. Linda Piper	519-291-4811	519-291-5111	
Mr. Robert Thom	905-729-2202	905-729-2623	parseed@bconnex.net
Mr. John Van Herk, Jr	519-676-8146	519-676-5674	jvanherk@wgthompson.com

ROC

Name	Tel	Fax	E-mail
Mr. John W. Clarke	519-436-3190	519-436-3195	jclarke@cgc.ca
Mr. David Forster	416-761-4175	416-761-4452	dave.forster@sympatico.ca
Dr. Mark Gijzen	519-663-3552	519-663-3454	gijzenm@em.agr.ca
Dr. Stephen Molnar	613-759-1687	613-759-1701	molnarsj@em.agr.ca
Mr. John Rowsell	705-647-6701	705-647-7008	
Dr. Harvey Voldeng	613-995-3700	613-759-1701	voldeng@em.agr.ca
Dr. Kangfu Yu	519-738-2251, ext 479	519-738-2929	yuk@em.agr.ca

CANO

Name	Tel	Fax	E-mail
Dr. Steve Bowley	519-824-4120 ext. 8704	519-763-8933	sbowley@crop.uoguelph.ca
Mr. Dick Speare	Tel-519-338-3840	Fax-519-338-2510	
Dr. Pierre Turcotte	450-653-4413, ext 228	450-441-5694	pierre.turcotte@agr.gouv.qc.ca

USAO

Name	Tel	Fax	E-mail
C. R. Carr (Ande)	800-233-3379		
	Mobile 419-351-6861	419-822-3312	
	Res: 419-893-3603	Res: 419-822-5444	
Mr. Jeff Griffeth	219-567-9141	219-567-2645	
Mr. Mark Lawson	815-758-9326	815-758-4106	mlawson@dekalb.com
Mr. Brian Legassicke	519-740-1759	519-740-1759	brian.c.legassicke@monsanto.com
Mr. Mitch Ray	800-257-7333	517-725-8356	

Mr. Dennis Shultzeschultze@mycogen.com

ONTARIO FORAGE CROPS COMMITTEE
MEMBERSHIP OF CENTRAL AND SUB-COMMITTEES, 2004

Central Committee - eight members, four members nominated from each sub-committee

Mr. Matt Bowman (V)	Chair (03-06)New Liskeard A. R.S -U.G.
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Mr. Bruce Whale (P)	OFC
John Kinghorn (V)	OSCIA
Dr. D. Yungblut (V)	OFC
Mr. Chris Gillard (V)	Ridgetown College-UG
TBA (P)	

Production Sub-Committee (See Page 6)

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Dr. Tarlok Singh Sahota		Thunder Bay Research Station
Ms. Sher Bushell (observer)		Variety Reg'n, CFIA

ONTARIO FORAGE CROPS COMMITTEE
MEMBERSHIP OF CENTRAL AND VARIETY COMMITTEES, 2005

Central Committee

Mr. Matt Bowman (V)	Chair (03-06)	New Liskeard A. R.S -U.G.
Mr. Joel Bagg (P)	Secretary	OMAF
Bob Dippel (P)	CSTA	
John Kinghorn (V)		OSCIA
Dr. D. Yungblut (V)	OFC	
Mr. Chris Gillard (V)	Ridgetown College-UG	
Ms. Joan McKinlay		OFC

Variety Sub-Committee

Mr. Matt Bowman	Chair 03-06	New Liskeard R.S -UG
Mr. John Madill	Secretary/Treasurer	(non voting)
Dr. Steve Bowley		Plant Agr. U. of G.
Mr. Chris Gillard		Ridgetown College-UG
Ms. Wendy Asbil		Kemptville College-UG
Mr. Joel Bagg	OMAF	
Mr. John Kinghorn	OSCIA	
Mr. Tim Welbanks	CSTA	
Mr. Jay Hackney		Commercial Plant Breeders
Ms Joan McKinlay		OFC
Dr. D. Yungblut		OFC (alternate)
Dr. Tarlok Singh Sahota		Thunder Bay Research Station
Ms. Sher Bushell (observer)		Variety Reg'n, CFIA

OFCC Central Committee Membership- 2005

Mr. Matt Bowman Chair 03 - 06 **New Liskeard Agricultural Research Station** **Box 6007, 340 Armstrong Street** **New Liskeard, ON P0J 1P0** **Telephone: (705) 647-8525** **Fax: (705) 647-7008** **bowmanme@ntl.sympatico.ca**	**Mr. Joel Bagg, - Secretary, OMAF** **322 Kent St. W.** **Lindsay, Ontario. K9V 4T7** **Ph:(705) 324-6125 Fx:(705) 324-1638** **jbagg@omaf.gov.on.ca**
Ms. Joan McKinlay **Ontario Forage Council** **6651 Mockingbird Lanes** **Mississauga, Ontario, L5N 5K2** **jmckinlay@bmts.com**	**Mr. Chris Gillard, Ridgetown College** **Ridgetown, ON N0P 2C0** **Ph: (519) 674-1632** **cgillard@ridgetownc.uoguelph.ca**
Dr. Douglas Yungblut **Ontario Forage Council (alternate)** **6651 Mockingbird Lanes** **Mississauga, Ontario, L5N 5K2** **doug.yungblut@sympatico.ca**	**Mr. John Kinghorn** **Ontario Soil and Crop Improvement Assoc.** **1030 Cambray Road, R. R. # 3 Woodville Ontario K0M 2T0** **Phone 705 374-4323** **kinghornjrr3@nexicom.net**
Mr. Jack Kyle, - OMAF alternative **322 Kent St. W.** **Lindsay, Ontario. K9V 4T7** **Ph:(705) 324-6125 Fx:(705) 324-1638** **jack.kyle@omaf.gov.on.ca**	

OFCC Variety Subcommittee Membership 2005

Mr. Matt Bowman Chair 03 - 06 **New Liskeard Agricultural Research Station** **Box 6007, 340 Armstrong Street** **New Liskeard, ON P0J 1P0** **Telephone: (705) 647-8525** **Fax: (705) 647-7008** **bowmanme@ntl.sympatico.ca**	**Dr. Steve Bowley,** **Dept. Plant Agric., Crop Sci. Bldg.** **U of Guelph, Guelph, ON N1G 2W1** **Ph: (519) 824-4120 Fx: (519) 763-8933** **sbowley@uoguelph.ca**
Ms. Donna Hancock, U. Of G. Alternate **Dept. Plant Agric., Crop Sci. Bldg.** **U. of Guelph, Guelph, ON N1G 2W1** **Ph: (519) 824-4120 Ext. 58309 Fx: (519) 763-8933** **dhancock@uoguelph.ca**	**Ms. Wendy Asbil,** **Kemptville College, U. of Guelph** **Kemptville, ON K0G 1J0** **Ph: 613-258-8336 Ext. 340** **wasbill@kemptvillec.uoguelph.ca**
Mr. Chris Gillard, Ridgetown College **Ridgetown, ON N0P 2C0** **Ph: (519) 674-1632** **cgillard@ridgetownc.uoguelph.ca**	**Mr. Joel Bagg, OMAF** **322 Kent St. W.** **Lindsay, ON K9V 4T7** **Ph:(705) 324-6125 Fx:(705) 324-1638** **jbagg@omaf.gov.on.ca**
Mr. John Kinghorn **Ontario Soil and Crop Improvement Assoc.** **1030 Cambray Road, R. R. # 3 Woodville Ontario K0M 2T0** **Phone 705 374-4323** **kinghornjrr3@nexicom.net**	**Mr. Jay Hackney - Commercial Plant Breeders Rep.** **Pickseed Canada Inc.** **1 Greenfield Rd. Lindsay, ON K9V 4S3** **Ph: (705) 8789240 Fx: (705) 878-9249** **jhackney@pickseed.com**
Mr. Tim Welbanks, Canadian Seed Trade Association - Alternate **Pioneer Hi-Bred Ltd.** **Box 730, Chatham, ON N7M 5L1** **Ph:(800) 265-9435 Fx: (519) 436-6753** **Tim.Welbanks@pioneer.com**	**Mr. Barton MacLean, Ontario Forage Council** **R. R. #1 Napanee, Ontario** **K7R 3K6** **Phone (613) 354 2759** **Fax (613) 354 1642** **bmaclean@horizons.net**
Ms. Sher Bushell, Observer Canadian Food Inspection Agency Plant Products Division, Variety Registration 59 Camelot Dr., Nepean, ON K1A 0Y9 Ph: (613) 225-2342 Fx: (613) 228-6629 sbushell@inspection.gc.ca	**Dr. Tarlok Singh Sahota** **Thunder Bay Agricultural Research Station** **435 James St South, Suite B012** **Thunder Bay, ON P7E 6S7** **Phone: 807 475 1373 Fax: 807 475 1313** **Email: tarloksahota@tbaytel.net**
Ms. Joan McKinlay **Ontario Forage Council** **6651 Mockingbird Lanes** **Mississauga, Ontario, L5N 5K2** **jmckinlay@bmts.com**	**Mr. John Madill, Non voting Secretary/Treasurer** **Phone (613) 283-1231** **Fax (613) 283-0192** **jemadill@ca.inter.net**

MEMBERS OF THE FIELD CROP PEST MANAGEMENT COMMITTEE
February, 2001

NAME	ADDRESS & NUMBERS	
UNIVERSITY OF GUELPH		
Art Schaafsma	Ridgetown College University of Guelph Ridgetown, Ontario N0P 2C0 P - 519-674-1624 F - 519-674-1600 aschaafsma@ridgetownc.uoguelph.ca	(chair)
Greg Boland	University of Guelph 3234 Edmund C. Bovey Laboratory Building Guelph, Ontario N1G 2W1 P - 519-826-4120 ext 2755 F - gboland@uoguelph.ca	
Mark Sears	University of Guelph 1106 Edmund C. Bovey Administration Building Guelph, Ontario N1G 2W1 P - 519-826-4120 ext 3921 F - msears@evb.uoguelph.ca	
AGRICULTURE AND AGRI-FOOD CANADA		
Bruce Broadbent	Agriculture and Agri-Food Canada P - 519-457-1470 ext. 251 F - 519-457-3997 broadbentb@em.agr.ca	
Peter Mason	Agriculture and Agri-Food Canada P - 613-759-1908 F - masonp@em.agr.ca	
Paul Mailloux	Agriculture and Agri-Food Canada	
ONTARIO MINISTRY OF AGRICULTURE, FOOD AND RURAL AFFAIRS		
Tracey Baute	Entomology Program Lead, Field Crops OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1696 F - 519-674-1564 tracey.baute@omafra.gov.on.ca	
Adam Hayes	Soil Management Specialist, Field Crops OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1621 F - 519-674-1564 adam.hayes@omafra.gov.on.ca	

Albert Tentuta	Pathologist, Field Crops Program Lead OMAFRA c/o Agronomy Building, Ridgetown College 120 Main St. East, Box 400 Ridgetown, Ontario N0P 2C0 P - 519-674-1617 F - 519-674-1564 albert.tenuta@omafra.gov.on.ca	

Peter Johnson	Cereals Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-8180 F - 519-273-5278 peter.johnson@omafra.gov.on.ca	
Brian Hall	Alternate Production Systems Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-0083 F - 519-273-5278 brian.hall@omafra.gov.on.ca	
Horst Bohner	Soybean Specialist OMAFRA 581 Huron St. Upper Stratford, Ontario N5A 5T8 P - 519-271-5858 F - 519-273-5278 horst.bohner@omafra.gov.on.ca	
Brent Kennedy	Manager, Field Crops OMAFRA 3rd Floor S, 1 Stone Road West Guelph, Ontario N1G 4Y2 P - 519-826-3257 F - 519-826-3567 brent.kennedy@omafra.gov.on.ca	
Greg Stewart	Corn Industry Program Lead OMAFRA c/o University of Guelph Crop Science Bldg., Dept. of Plant Agriculture Guelph, Ontario N1G 2W1 P - 519-824-4120, ext. 4865 F - 519-763-8933 greg.stewart@omafra.gov.on.ca	
Hugh Martin	Organic Crop Production Program Lead OMAFRA 1st Floor NW, 1 Stone Road West Guelph, Ontairo N1G 4Y2 P - 519-826-4587 F - 519-826-4964 hugh.martin@omafra.gov.on.ca	

Ian McDonald	Applied Research Co-ordinator, Field Crops OMAFRA c/o University of Guelph Crop Science Bldg., Dept. of Plant Agriculture Guelph, Ontario N1G 2W1 P - 519-8240-4120, ext. 6707 F - 519-763-8933 ian.mcdonald@omafra.gov.on.ca	
Jim Chaput	Minor Use Co-ordinator OMAFRA 1 Stone Road West, 3rd Floor Guelph, Ontario N1G 4Y2 P - 519-826-3539 F - 519 jim.chaput@omafra.gov.on.ca	

Kelly Ward	Product Development Specialist OMAFRA 1 Stone Road West, 3rd Floor Guelph, Ontario N1G 4Y2 P - 519-826-4094 F - 519- kelly.ward@omafra.gov.on.ca	
Gilles Quesnel	IPM Program Lead, Field Crops OMAFRA Box 2004, Concession Rd. Kemptville, Ontario K0G 1J0 P - 613-258-8250 F - 613-258-8392 gilles.quesnel@omafra.gov.on.ca	
Scott Banks	Emerging Crops Specialist OMAFRA Box 2004, Concession Rd. Kemptville, Ontario K0G 1J0 P - 613-258-8359 F - 613-258-8392 scott.banks@omafra.gov.on.ca	
Joel Bagg	Forage Specialist OMAFRA 322 Kent. St. West Lindsay, Ontario K9V 2Z9 P - 705-324-5856 F - 705-324-1638 joel.bagg@omafra.gov.on.ca	
ONTARIO MINISTRY OF THE ENVIRONMENT		
Doug Mewett	OMOE 135 St. Clair Ave. West, Suite 100 Toronto, Ontario M4V 1P5 P - 416-314-9235 F - 416-314-9237 doug.mewett@oeb.gov.on.ca	
COMMODITY ASSOCIATION MEMBERS		

Ken Hough	Ontario Corn Producers' Association 90 Woodlawn Rd. West Guelph, Ontario N1H 1B2 P - 519-837-1660 F - 519-837-1674 khough@ontariocorn.org	
Don McCabe	Ontario Corn Producers' Association R. R. # 1 Inwood, Ontario N0N 1K0 P - 519-844-2482 F - 519-844-2603 dmccabe@xcelco.on.ca	
Matt McLean	Ontario Soybean Growers' Marketing Board Box 1199 Chatham, Ontario N7M 5L8 P - 519-352-7730 F - 519-352-8983 mclean@soybean.on.ca	
Greg Devries	Ontario Soybean Growers' Marketing Board P - 519-683-4587 F - 519- gpdev@mnsi.net	
COMPANY REPRESENTATIVES		
Brian Woolley	Aventis CropScience Canada 578 Krug Street Kitchener, Ontario N2B 1L7 P - 905-854-4465 F - 905-854-4478 brian.woolley@aventis.com	
Wayne Barton	BASF Canada 9 Pamela Place Guelph, Ontario N1H 8C8 P - 519-637-3696 F - 519-637-3697 bartonw@basf.com	
Scott MacDonald	BASF Canada 9 Pamela Place Guelph, Ontario N1H 8C8 P - 519-824-2724 F - 519-824-5632 macdonsr@basf.com	
Luc Bourgeois	Bayer Inc. 23 Cedar St. Eden Mills, Ontario N0B 1P0 P - 519-856-2652 F - 519-856-9067 luc.bourgeois.b@bayer.com	
Leo Blydorp	Bayer Inc. 23 Cedar St. Eden Mills, Ontario N0B 1P0 P - 519-856-2652 F - 519-856-9067 leo.blydorp.b@bayer.com	

Nancy Desousa	Dow AgroSciences Canada Inc. 305 Consortium Court London, Ontario N6E 2S8 P - 519-681-0925 F - 519-681-4557 ndesousa@dow.com	
Al McFadden	Dow AgroSciences Canada Inc. 305 Consortium Court London, Ontario N6E 2S8 P - 519-681-0925 F - 519-681-4557 aggmcfadden@dow.com	
Rene Petroski	Dupont Canada Inc. Box 233 Streetsville Postal Station Mississauga, Ontario L5M 2J4 P - 905-821-5029 F - 905-821-5505	
Lesley Wright	Engage Agro Corp. 315 Woodlawn West Guelph, Ontario N1H 7K8 P - 519-826-7878 F - 519-826-7675 lpwright@attcanada.com	
Brenda Nailor	Engage Agro Corp. 315 Woodlawn West Guelph, Ontario N1H 7K8 P - 519-826-7878 F - 519-826-7675 brendanailor@engageagro.com	
Gabe Ferguson	Global Agricultural Business Enterprises Inc. 8192 Petrolia Line Alvinston, Ontario N0N 1A0 P - 519-847-5516 F - 519-847-5515 gabe@xcelco.on.ca	
John Gibson	Growmark Inc. 5600 Cancross Court Box 3020, Station A Mississauga, Ontario L5A 3A4 P - 905-826-0200 F - 905-814-4341 jgibson@growmark.com	
Tim Moyes	Gustafson Partnership 5-160 Research Lane Guelph, Ontario N1G 5B2 P - 519-767-3366 x 224 F - 519-767-9598 tmoyes@gustafson.com	

Edwin Pensaert	Gustafson Partnership #10-2712 37th Ave. N.E. Calgary, Alberta T1Y 5L3 P - 403-735-2505 F - pensaert@gustafson.com	
Louis Caron	Norac Concepts Inc. P. O. Box 62023 Orleans, Ontario K1C 7H8 P - 613-841-2907 F - 613-841-2908 lcaron@noraconcepts.com	
Harold Wright	Syngenta Crop Protection Canada Inc. 140 Research Lane Research Park, University of Guelph Guelph, Ontario N1G 4Z3 P - 519-836-5665 F - 519-823-0504 harold.wright@syngenta.com	
Wayne Bennett	Syngenta Crop Protection Canada Inc. 140 Research Lane Research Park, University of Guelph Guelph, Ontario N1G 4Z3 P - 519-836-5665 F - 519-823-0504 wayne.bennett@syngenta.com	
Jim Anderson	Syngenta Crop Protection Canada Inc. P - 519-878-7491 F - jim.m.anderson@syngenta.com	
Patty Turner	United Agri Products (UAP) 789 Donnybrook Drive, R. R. # 2 Dorchester, Ontario N0L 1G5 P - 1-800-265-4624 P - 519-268-8001 F - 519-268-8013 pturner@uap.ca	

Keith Lockhart	Uniroyal Chemical 440 Dorland Road Oakville, Ontario L6J 6B1 P - 416-616-8052 F - 905-845-0478 keith_lockhart@uniroyalchemical.com	
Richard Groen	Valent Biosciences Canada Ltd. 19 Wildan Dr., Box 19 Freelton, Ontario L0R 1K0 P - 905-659-0886 F - 905-659-0885 richard.groen@valent.com	

Ontario Weed Committee membership
Committee membership

Organisation	NAME	ADDRESS
AAFC	Al Hamill	Greenhouse & Processing Crops Research Centre Harrow, ON, N0R 1G0
AAFC	Susan Weaver	Greenhouse & Processing Crops Research Centre Harrow, ON, N0R 1G0
AAFC	Stephen Darbyshire	Eastern Cereal & Oilseed Research Centre Ottawa, ON, K1A 0C6
AAFC	Diane Lyse Benoit	AAFC Horticultural R & D Centre Saint-Jean-sur-Richelieu, PQ, J3B 3E6
Health Canada	Ross Pettigrew	Pest Management Regulatory Agency Guelph, ON, N1G 4S9
University of Guelph	J. C. Hall	Dept. of Environmental Biology Guelph, ON, N1G 2W1
University of Guelph	John O'Sullivan	Dept. of Plant Agriculture Guelph, ON, N1G 2W1
University of Guelph	Clarence. J. Swanton	Dept. of Plant Agriculture Guelph, ON, N1G 2W1
University of Guelph	François Tardif	Dept. of Plant Agriculture Guelph, ON, N1G 2W1
University of Guelph	Wendy Asbil	Kemptville College Kemptville, ON, K0G 1J0
University of Guelph	Peter Sikkema	Ridgetown College Ridgetown, ON, N0P 2C0
University of Guelph	Darren Robinson, Chair (2004-2008)	Ridgetown College Ridgetown, ON, N0P 2C0
OMAF	Jennifer Llewellyn	Nursery Crop Specialist University of Guelph Guelph, ON, N1G 2W1
OMAF	Leslie Huffman, secretary	Crop Technology c/o AAFC 2585 County Rd. 20 Harrow, ON, N0R 1G0
OMAF	Gilles Quesnel	Field Crop IPM Program Lead Kemptville, ON, K0G 1J0

OMAF	Mike Cowbrough	Weed Specialist (Field Crops) Dept. of Plant Agriculture Guelph, ON, N1G 2W1
OME	Geoff Cutten	40 St. Clair Ave. W., 7th Floor Toronto, ON, M4V 1M2
OME	Mark Chappel	40 St. Clair Ave. W., 7th Foor Toronto, ON, M4V 1M2
OMNR	Michael Irvine	Forest Management Branch Sault Ste Marie, ON, P6A 6V5
Ontario Pesticide Advisory Committee	Doug Mewett	Executive Secretary ON Ministry of Environment 135 St. Clair Ave. W., Suite 100 Toronto, ON, M4V 1P5
Ontario Pesticide Advisory Committee	Clayton M. Switzer	Chairman, OPAC 16 Tamarack Pl. Guelph, ON, N1E 3Y6
Ontario Pesticide Advisory Committee	Don Lobb	OPAC 1009 Boston Mills Rd. Terra Cotta, ON, L0P 1N0
Crop Life Canada	Luc Bourgeois	Bayer Inc. Eden Mills, ON, N0B 1P0
Crop Life Canada	Scott MacDonald	BASF Canada Guelph, ON, N1H 8C8
Member at Large	Patrick Lynch	Cargill Consulting Shakespeare, ON, N0B 2P0
Member at Large	Gabrielle Ferguson	Global Agricultural Business Enterprises Alvinston, ON, N0N 1A0
Certified Crop Advisor	Craig Chapple	W.G. Thompson & Sons Ltd. Blenheim, ON, N0P 1A0
Innovative Farmers Association of Ontario	Rob Helm	R. R. # 1 Tiverton, ON, N0G 2T0
Ontario Canola Growers' Association	Brad Martin	137 Inkerman St. W. Listowel, ON, N4W 1B8
Ontario Corn Producers' Association	Larry Cowan	R.R. #1 Mount Brydges, ON, N0L 1W0
Ontario Corn Producers' Association	Don McCabe	R. R. # 1 Inwood, ON, N0N 1K0
Ontario Seed Corn Growers' Marketing Board	Dean Martin	2155 Smith Road, R.R. #5 Harrow, ON, N0R 1G0

Ontario Soybean Growers	Jay Robson	Box 1199 Chatham, ON, N7M 5L8 e-mail: mclean@soybean.on.ca
Ontario Soybean Growers	Matt McLean	Box 1199 Chatham, ON, N7M 5L8
Ontario Soil and crop Improvement Association	Leigh Cohoe	386105 New Durham Rd., R.R. #1 Burgessville, ON, N0J 1C0
Ontario Soil and crop Improvement Association	Keith Black	R.R. #1 Belgrave, ON, N0G 1E0
Ontario Wheat Producers' Marketing Board	Claire Sherk	R.R. #1 Cottam, ON, N0R 1B0
Ontario White Bean Growers	Larry Anderson	R.R. #3 Kent Bridge, ON, N0P 1V0
Ontario fruit and Vegetable Growers' Association	Jeff Wilson	R. R. #3 Orton, ON, N1K 1S5
Ontario Tender Fruit Producers' Marketing Board	Wayne Roberts	Box 100 Vineland Station, ON, L0R 2E0
Ontario Processing Vegetable Growers'	John Mumford	435 Consortium Crt. London, ON, N6E 2S8
Ontario Vegetation Management Association	Nancy Cain	5 Kingham Rd. Acton, ON, L7J 1S3

Ontario Pulse Committee

Main Committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Chris Gillard, Secretary	Ridgetown College, U of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-1632/674-1600 cgillard@ridgetownc.uoguelph.ca
Tino Breuer	OMPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566/652-9607 tbreuer@ontariobeans.on.ca
Brian Hall (chair)	OMAFRA	Stratford Resource Centre, 581 Huron St. Stratford, ON, N5A 5T8	(519) 271-0083/273-5278 brian.hall@omaf.gov.on.ca
Tom Smith	Plant Ag, U of Guelph	Plant Ag. Dep., Univ. Of Guelph, Guelph, ON N1G 2W1	(519)824-4120(ext8339)/763-8933 tsmith@uoguelph.ca
Soon Park	AAFC -Harrow	Harrow Research Centre Harrow, Ontario, N0R 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Peter Pauls	Plant Ag. U of Guelph	Plant Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120
Grant Watson (observer)	CFIA	59 Camelot Drive, Nepean	gwatson@em.agr.ca
John Van Herk Jr.	CPBC CSTA	Hyland Seeds P.O. Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146 676-5674 jvanherk@wgthompson.com
Grant Jones	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	519 652-3566
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455 527-0787(fax)
Bob Fotheringham	OBPMB (alt)	4206 Raney Cres. London Ont. N6L 1C3	(519) 233-9196 rfother@tcc.on.ca

Bernadine Wolfe	OCBGA	R.R. # 5, Mitchell, Ont.	(519) 348-4141/348-8165 wbwolfe@orc.ca
Mike Donnelly	OCBGA(alt)	R.R. #4, Thamesford, Ont. N0M 2M0	519-461-1055 mdonvan@odyssey.on.ca
Mike Tu	AAFC	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 738-2251/738-2929 tum@em.agr.ca
Rick Vandewalle	Ont Bean Dealers	W. G. Thompsons	rvandewalle@hdc.on.ca

Variety Sub-Committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Chris Gillard, Chair	Ridgetown College, U of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-1632/674-1600 cgillard @ridgetownc.uoguelph.ca
Tino Breuer	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566 tbreuer@ontariobeans.on.ca
Tom Smith	Plant Ag, U of Guelph	Plant Agriculture Department, Univ. Of Guelph, Guelph, ON N1G 2W1	(519) 824-4120(ext8339) tsmith@uoguelph.ca
Peter Pauls	Plant Ag. U of Guelph	Plant Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120
Brian Hall	OMAFRA	Stratford Resource Centre, 581 Huron St. Stratford, ON, N5A 5T8	(519) 271-0083/273-5278 brian.hall@OMAF.gov.on.ca
Soon Park	AAFC -Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Grant Jones	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566
Grant Watson (observer)	CFIA	59 Camelot Drive, Nepean	gwatson@em.agr.ca
Rick Vandewalle	Ont Bean Dealers	W. G. Thompsons	rvandewalle@hdc.on.ca

John Van Herk Jr.	CPBC CSTA	Hyland Seeds P.O. Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146/ 676-5674 jvanherk@wgthompson.com
Mike Donnelly	OCBGA(alt)	R.R. #4, Thamesford, Ont. N0M 2M0	519-461-1055 mdonvan@odyssey.on.ca
Bob Fotheringham	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 233-9196 rfother@tcc.on.ca
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455/527-0787
Jeff Allan (alt)	OSGA	R.R.#1 Brucefield	(519) 233-9846 allan@toc.on.ca
Stuart Alyesworth (obs)	Gen-Tec Seeds		(519) 975-2557 gentec@on.acba.com
John Alyesworth (obs)	Gen-Tec Seeds		(519) 975-2557
Mike Wood (obs)	Norvartis Seeds Inc. Nampa Idaho		(208) 465-8533 mike.wood@seeds.novartis.com
A. Crasta (obs)	H.J. Heinz Co. Ltd	H.J. Heinz Co Ltd Erie St, South, Leamington, Ont. N8H 3W8	(519) 322-4024/322-4104

Research Planning and Assessment Sub-committee

NAME	REPRESENTATION	ADDRESS	PHONE/FAX/E-MAIL
Chris Gillard, Secretary	Ridgetown College, U of Guelph	Ridgetown College Main St. E. Ridgetown,	(519) 674-1632/674-1600 cgillard @ridgetownc.uoguelph.ca
Brian Hall chair	OMAF	Stratford Resource Centre, 581 Huron St. Stratford, ON, N5A 5T8	(519) 271-0083/273-5278 brian.hall@OMAF.gov.on.ca
Tino Breuer	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 652-3566

Tom Smith	Plant Ag, U of Guelph	Plant Agriculture Department, Univ. Of Guelph, Guelph, ON N1G 2W1	(519) 824-4120(ext8339) tsmith@plant.uoguelph.ca
Peter Pauls	Plant Ag. U of Guelph	Plant Ag Dept. Univ of Guelph, Guelph, Ont N1G 2W1	(519) 824-4120 ppauls@plant.uoguelph.ca
Soon Park	AAFC -Harrow	Harrow Research Centre Harrow, Ont. N0r 1G0	(519) 735-2251/738-2929 parks@em.agr.ca
Rick Vandewalle	Ont Bean Dealers	W. G. Thompsons	rvandewalle@hdc.on.ca
John Van Herk Jr.	CPBC CSTA	Hyland Seeds P.O. Box 130, Blenheim, Ontario, N0P 1A0	(519) 676-8146 jvanherk@wgthompson.com
Bob Fotheringham	OBPMB	4206 Raney Cres. London Ont. N6L 1C3	(519) 233-9196 rfother@tcc.on.ca
Art Bolton	CSGA	R.R.#1, Dublin	(519) 527-0455
Jeff Allan	OSGA	R.R.#1 Brucefield	(519) 233-9846 allan@toc.on.ca
Art Schaafsma	Ridgetown College, U. of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-5456
Peter Sikkema	Ridgetown College, U. of Guelph	Ridgetown College Main St. E. Ridgetown, N0P 2C0	(519) 674-1500
Lorna Woodrow	AAFC Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 738-2251
Kangfu Yu	AAFC Harrow	Harrow Research Centre Harrow, Ont. N0R 1G0	(519) 738-2251
Greg Boland	U. of Guelph	Dept. of Enviornmental Biology University of Guelph	(519) 824-4120 Ext. 5-2755 gboland@uoguelph.ca

2005 Membership of the Ontario Tobacco Committee (OTC)-Main Committee

Dr. Hussein Haji, **CHAIR** Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 257 Fax: (519) 582-3678 Email: hhaji@ontarioflue-cured.com	Dr. Godfried Amankwa, **Secretary** Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 282 Fax: (519) 582-3678 Email: gamankwa@ontarioflue-cured.com
Jim Todd, Transition Crops Specialist Ontario Ministry of Agriculture, Food and Rural Affairs P.O. Box 186 711 Schafer Road Delhi, Ontario, N4B 2W9 Phone: (519) 582-7220, Ext. 264 Fax: (519) 582-4504 Email: tim.mcdowell@omaf.gov.on.ca	Dr. Ron Brammall Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 261 Fax: (519) 582-3678 Email: rbrammall@ontarioflue-cured.com
Dan Van Hooren Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 271 Fax: (519) 582-3678 Email: dvanhooren@ontarioflue-cured.com	Denise Beaton, IPM Specialist (Specialty Crops) Ontario Ministry of Agriculture, Food and Rural Affairs P.O. Box 186 711 Schafer Road Delhi, Ontario N4B 2W9 Phone: (519) 582-7220, Ext. 263 Fax: (519) 582-4504 Email: denise.beaton@omaf.gov.on.ca

2005 Membership of the Tobacco Production Practices Sub-Committee of OTC

Dr. Ron Brammall, **CHAIR** Tobacco Production Practices Sub-Committee of OTC Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 261 Fax: (519) 582-3678 Email: rbrammall@ontarioflue-cured.com	Denise Beaton, **SECRETARY** Tobacco Production Practices Sub-Committee of OTC Ontario Ministry of Agriculture, Food and Rural Affairs P.O. Box 186 711 Schafer Road Delhi, Ontario, N4B 2W9 Phone: (519) 582-7220, Ext. 263 Fax: (519) 582-4504 Email: denise.beaton@omaf.gov.on.ca
Peter D. Smith CropLife Canada c/o Bayer CropScience 36 Denis Court Tillsonburg, Ontario N4G 2P3 Phone: (519) 688-2695 Cell: (519) 428-5709 Fax: (519) 688-6896 Email: peter-d.smith@bayercropscience.com	Robert Hopkins Cargill Courtland, Ontario N0J 1E0 Phone: (519) 688-2151 Fax: (519) 688-2153 Email:
Dan Van Hooren Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 271 Fax: (519) 582-3678 Email: dvanhooren@ontarioflue-cured.com	Dr. Godfried Amankwa Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 282 Fax: (519) 582-3678 Email: gamankwa@ontarioflue-cured.com
Dr. Hussein Haji Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 257 Fax: (519) 582-3678 Email: hhaji@ontarioflue-cured.com	Julie Côté Imperial Tobacco Leaf Inc. 3711, St-Antoine St. Montreal, Quebec H4C 3P6 Phone: (514) 932-6161, Ext. 2465 Fax: (514) 934-5928 Email: gdupless@itl.ca
Al Ratavicius Imperial Tobacco Leaf Inc. P.O. Box 201, 10 Clearview Drive Tillsonburg, Ontario N4G 4H5 Phone: (519) 688-9840, Ext. 229 Fax: (519) 688-9855 Email: aratavic@itl.ca	Randy Corneillie JTI-Macdonald Inc. P.O. Box 310, No. 3 Highway West Tillsonburg, Ontario N4G 4H8 Phone: (519) 688-4125 Fax: (519) 688-0148 Cell: (519) 842-0073 Email: randy.corneillie@jt-int.com

Mark Stephen Rothmans, Benson & Hedges Inc. P.O. Box 101 Tillsonburg, Ontario N4G 4H5 Phone: (519) 842-6431 Fax: (519) 842-4313 Email: mstephen@rbhinc.ca	Dave R. E. Thomas Rothmans, Benson & Hedges Inc. 174 Kennedy Road South Brampton, Ontario L6W 3G6 Phone: (905) 595-3009 Fax: (905) 595-0992 Email: dthomas@rbhinc.ca
Steve Chapman Rothmans, Benson & Hedges Inc. 174 Kennedy Road South Brampton, Ontario L6W 3G6 Phone: (905) 595-3013 Fax: (905) 595-0992 Email: schapman@rbhinc.ca	Jim Hogg Rothmans, Benson & Hedges Inc. P.O. Box 101 Tillsonburg, Ontario N4G 4H5 Phone: (519) 842-6431 Fax: (519) 842-4313 Email: jhogg@rbhinc.ca
John Dumanski Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com	Richard Van Maele Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com
Linda Vandendriessche Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com	Roger Geysens Agricorp Phone: (519) 582-2439 Fax: (519) 582-4987 Email: roger77@kwic.com
Ron Paret (observer) Agrospray Limited 85 Spruce Street P. O. Box 130 Tillsonburg, Ontario N4G 4H3 Phone: (519) 842-8408 Fax: (519) 699-0456 Email: agro@oxford.net	

2005 Attendees Representing the Membership of the Ontario Flue-Cured Tobacco Variety Evaluation Sub-Committee of OTC

Dr. Hussein Haji, **CHAIR** Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 257 Fax: (519) 582-3678 Email: hhaji@ontarioflue-cured.com	Dr. Ron Brammall **(SECRETARY)** Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 261 Fax: (519) 582-3678 Email: rbrammall@ontarioflue-cured.com
Dan Van Hooren Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 271 Fax: (519) 582-3678 Email: dvanhooren@ontarioflue-cured.com	Dr. Godfried Amankwa Canadian Tobacco Research Foundation P.O. Box 1 711 Schafer Road Delhi, Ontario N4B 2W8 Phone: (519) 582-2370, Ext. 282 Fax: (519) 582-3678 Email: gamankwa@ontarioflue-cured.com
George Howard Imperial Tobacco Leaf Inc. P.O. Box 201, 10 Clearview Drive Tillsonburg, Ontario N4G 4H5 Phone: (519) 688-9840, Ext. 229 Fax: (519) 688-9855 Email: ghoward@itl.ca	Dave R. E. Thomas Rothmans, Benson & Hedges Inc. 174 Kennedy Road South Brampton, Ontario L6W 3G6 Phone: (905) 595-3009 Fax: (905) 595-0992 Email: dthomas@rbhinc.ca
Lori Long Rothmans, Benson & Hedges Inc. P.O. Box 101 Tillsonburg, Ontario N4G 4H5 Phone: (519) 842-6431 Fax: (519) 842-4313 Email: llong@rbhinc.ca	Steve Chapman Rothmans, Benson & Hedges Inc. 174 Kennedy Road South Brampton, Ontario L6W 3G6 Phone: (905) 595-3009 Fax: (905) 595-0992 Email: schapman@rbhinc.ca
Randy Corneillie JTI-Macdonald Inc. P.O. Box 310, No. 3 Highway West Tillsonburg, Ontario N4G 4H8 Phone: (519) 688-4125 Fax: (519) 688-0148 Email: randy.corneillie@jt-int.com	Linda Vandendriessche Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com
Tom McElhone Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com	John Dumanski Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com

Rick Cerna Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com	Stan Symons Ontario Flue-Cured Tobacco Growers' Marketing Board P.O. Box 70 Tillsonburg, Ontario N4G 4H4 Phone: (519) 842-3661 Fax: (519) 842-7813 Email: cjacob@ontarioflue-cured.com
Sharon Balcom Davis Seed Co. P.O. Box 173 Otterville, ON N0J 1R0 Phone: (519) 879-6432 Fax: (519) 879-6273	Kip Vickery L & C Vickery Seed Co. Ltd 69 Hemingway Crescent Unionville ON LR3 2S4 Phone: (905) 477-3142
Andrew and Andy Gilvesy Seedcoat Technologies Inc. 39 North St. East Tillsonburg, Ontario N4G 1B4 Phone: (519) 688-3533 Fax: (519) 688-3533	

Voting Membership of the Flue-Cured Tobacco Variety Evaluation Sub-Committee

Representatives	Number of Votes
Manufacturing and Buying Companies	
• Imperial Tobacco Canada Limited	2
• JTI Macdonald Corp.	2
• Rothmans, Benson & Hedges Inc.	2
• Tobacco Exporters Association	1
The Leaf Producers' Associations	
• Ontario Flue-Cured Tobacco Growers' Marketing Board	3
• Canadian Tobacco Seed Producers for C.S.G.A.	1
Research	
• Canadian Tobacco Research Foundation	2
Provincial Agencies	
• Ontario Ministry of Agriculture and Food, Agriculture Division	1

Ontario Organic Research Advisory Committee Membership

Ecological Farmers Association of Ontario **Karen Maitland** Member Services Co-coordinator 5420 Highway 6 North RR5 Guelph, ON N1H 1R9 Phone: 519-822-8606 Email: info@efao.ca Web: www.efao.ca	Ecological Farmers Association of Ontario **Gayl Creutzberg** Saugeen River Farm 032750 S.R. 5 Ext RR1 Neustadt, Ontario N0G 2M0 Phone. 519.799.lamb (5262), Fax. 519.799.5263 Email: saugeenriver@bmts.com
Ecological Farmers Association of Ontario **Ann Slater**, R.R.#1 Lakeside, ON N0M 2G0 Phone: 519-349-2448 Email: aslater@quadro.net	Ecological Farmers Association of Ontario **Ken Marisett** R.R.#1, Picton, ON, K0K 2T0 Phone 613-476-5758, Fax 613-476-6790
Canadian Organic Growers (Ottawa) Padgeberry Farm **Ross Batstone** P.O. Box 302, Osgoode, Ontario K0A 2W0 Phone: 613-826-2286, Fax: same Email: batstone@magma.ca **Tomas Nimmo**, 115 First Street, Suite 450 Collingwood, Ontario, L9Y 4W3 Phone: 705-444-0923; Fax 705-444-0380 Email: organix@georgian.net	Biodynamic Gardening and Farming Society **Johnann Kleinsasser** RR#3, Acton, ON L7J 2L9 Phone: 519-856-1384 Email: jkleinsasser@hotmail.com Organic Crop Producers and Processors Inc. **Larry Lenhardt** RR#1, Lindsay, Ontario K9V 4R1 Phone: 705-324-2709; Fax: 705-324-4829 Email: ocpp@lindsaycomp.on.ca Website: www.ocpro-certcanada.com/
Great Lakes Organic Inc. **Mark Magee** 4359 Petrolia Line, Unit # 4 Petrolia, Ontario N0N 1R0 Phone: 1-519-882-4526, Fax: 519-882-0355 Email: greatlakesorganic@on.aibn.com Website: www.greatlakesorganic.com	Great Lakes Organic **Roger Rivest**, 4280 Hwy. #77, Staples, Ontario N0P 2J0 Phone: 519-687-3522, Fax: 519-687-3745 Email: greatlakesorganic@sympatico.ca Website: www.greatlakesorganic.com
Ontarbio Organic Farmers' Co-operative Inc. **Terry Ackerman** RR#5, Guelph, Ontario N1H 6J2 Phone: 519-767-9694, Fax: 519-767-0978 Email: ackerman@ontarbio.com Website: http://www.ontarbio.com/	Ontarbio Organic Farmers' Co-operative Inc. **Andrea Ramlogan**, RR#5, Guelph, Ontario N1H 6J2 Phone: 519-767-9694, Fax: 519-767-0978 Email: ramlogan@ontarbio.com Website: http://www.ontarbio.com/
Sunopta Inc. **Richard Graham**, 2838 Highway 7, Norval, Ontario L0P 1K0 Phone: 905-455-2528 (x135); Fax: 905-455-2529 Email: rgraham@sunopta.com	**Patrick Johnson** RR#1 Clarksburg, N0H 1J0 Phone: 519-599-6177 Fax: Email: Gbos@bmts.com

Website: www.sunopta.com	
Homestead Organics **Tom Manley**, 1 Union Street, Berwick ON, K0C 1G0 Tel: (613) 984-0480, Fax: (613) 984-0481 Email: tom@homesteadorganics.ca Website: http://www.homesteadorganics.ca	Wehrmann Farms Ltd. **Harro Wehrmann** R.R. # 1, Ripley, Ontario N0G 2R0 Phone: 519-395-3126, Fax: 519-395-3126 Email: ingasven@hurontel.on.ca
Harmony Organic **Lawrence Andres** R.R.#1, Tiverton, Ontario N0G 2T0 Phone: 519-368-7417 Email: harmonyorganic@cyg.net Wesite: www.harmonyorganic.on.ca	Pfennings Organic Vegetables Inc. **Wolfgang Pfenning** RR#2, Baden, Ontario N0B 1G0 Phone:519-662-3468, Fax 519-662-4083 Email: pfennings.organic@sympatico.ca Website: www.pfenningsorganic.com
Organic Transition Services Ecosystems etc. **Garry Lean**, 246 Ranchers Rd. Cameron, Ontario K0M 1G0 Phone: 705-887-5230 Email: garrylean@sympatico.ca	Organic Agricultural Centre of Canada **Ralph Martin**, P.O. Box 550, Truro, Nova Scotia, B2N 5E3 Phone: 902-893-6679, Fax: 902-893-3430 Email: rmartin@nsac.ns.ca Website: www.organicagcentre.ca
Department of Plant Agriculture University of Guelph, **Ann Clark**, Guelph, Ontario, N1G 2W1 Phone: 519-824-4120 (x52508), fax: 519-763-8933 Email: eaclark@uoguelph.ca Website: http://www.plant.uoguelph.ca/faculty/eclark/	Department of Plant Agriculture University of Guelph, **Duane Falk**, Guelph, Ontario, N1G 2W1 Phone: 519-824-4120 (x53579), fax: 519-763-8933 Email: dfalk@uoguelph.ca Website: www.plant.uoguelph.ca/faculty/dfalk/
Department of Plant Agriculture University of Guelph, **Helen Fisher** Vineland Phone: 905-562-4141 x202 Email: hfisher@uoguelph.ca	Department of Land Resource Science University of Guelph, **Paul Voroney**, Guelph, Ontario, N1G 2W1 Phone: 519-824-4120 (x53057), fax: 519-824-5730 Email: pvoroney@lrs.uoguelph.ca
Department of Agricultural Economics and Business, University of Guelph, **Spencer Henson** Guelph, Ontario, N1G 2W1 Phone: 519-824-4120 (x53134), fax: 519-767-1510 Email: shenson@uoguelph.ca Website: http://www.uoguelph.ca/OAC/Agec/faculty_henson.html	
Silvina Fernandez	**Rozzi, Paola**,

44 Kipling Ave., Guelph Ontario N1H 8C2 Phone: 519-836-3043 Email: fernands@uoguelph.ca	12 Augustine Court, Guelph, Ontario N1G 2Y8 Phone/Fax 519-837-1640 Email: Prozzi@uoguelph.ca
Kemptville College, University of Guelph, **Wendy Asbil**, Kemptville, Ontario K0G 1J0 Phone: (613) 258-8336 (ext. 340); Fax: (613) 258-8401 e-mail: wasbil@kemptvillec.uoguelph.ca Website: www.kemptvillec.uoguelph.ca/research2/researchers/wendyasbil.htm	Ridgetown College, University of Guelph, **John Zandstra** Ridgetown, ON N0P 2C0 Phone: 519-674-1627; e-mail: jzandstr@ridgetownc.uoguelph.ca Website: www.ridgetownc.uoguelph.ca/
Collège d'Alfred de l'Université de Guelph **Simon Lachance** 31 rue St-Paul, Alfred, ON, Canada, K0B 1A0 Tel.: (613) 679-2218 poste 604 Fax: (613) 679-2420 Email: slachance@alfredc.uoguelph.ca	Agriculture Agri-Food Canada **J.H. (Jeff) Tolman** Research Scientist, Environmental Health / Integrated Pest Management Agriculture and Agri-Food Canada Southern Crop Protection and Food Research Centre Telephone: 519-457-1470 x 232 Facsimile: 519-457-3997 1391 Sandford Street London, Ontario, Canada, N5V 4T3 Email: tolmanj@agr.gc.ca
Innovation and Risk Management Branch Ontario Min of Agriculture, Food and Rural Affairs **Stuart Budd**, 1 Stone Rd West, Guelph, Ontario N1G 4Y2 Phone:519-826-4189Fax: 519-826-4211 Email: stuart.budd@omaf.gov.on.ca Website: www.omafra.gov.on.ca/english/research/index.html	Crop Technology Branch Ontario Min of Agriculture, Food and Rural Affairs **Hugh Martin**, 1 Stone Rd West, Guelph, Ontario N1G 4Y2 Phone: 519-826-4587Fax: 519-826-4964 Email: hugh.martin@omaf.gov.on.ca Website: http://www.omafra.gov.on.ca/english/crops/organic/organic.html
Livestock Technology Ontario Min of Agriculture, Food and Rural Affairs **Lynn Philp** 1 Stone Rd West, Guelph, Ontario N1G 4Y2 Phone:519-826-3584Fax: Email: lynn.philp@omaf.gov.on.ca	