

**ONTARIO FIELD CROPS
RESEARCH AND SERVICES COMMITTEE**

2004 ANNUAL REPORT

TO

**ONTARIO AGRICULTURAL SERVICES
COORDINATING COMMITTEE**

February 23, 2005

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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 produced farm cash receipts totaling \$8.5 billion in 2003. This represented approximately 24.8% of the total cash receipts for field crops grown in Canada in 2003, which is calculated to be \$34 billion. Acreage of field crops grown in Ontario continues to be dominated by corn, soybeans, forages and cereals (Figure 1). Based on available data for Ontario from 2003, cereal crops were seeded on approximately 17% of the land available for field crops and produced 17.4% of the total farm gate value. Corn was grown on 21.2%, soybeans on 20.6% of the acreage and produced 33.3% and 23.2% of the Ontario farm gate value, respectively. Forages produced 17.9 % of farm gate value (Figures 1 and 2). The estimated farm value (value per hectare) from the field crop sector in Ontario for 2003 was approximately \$2.7 billion (Table 1). This is in comparison to farm cash receipts of \$1.5 billion from dairy, \$2.7 billion from other livestock, and farm values of \$0.19 billion from commercial fruit crops, and \$0.74 billion from commercial vegetables (including green house crops and mushrooms).

In addition, Ontario field crops are a major source of exports. In 2003, \$2.3 billion in grains and oilseeds products and animal feeds were exported and \$2.4 billion imported. Exports account for approximately 85% of the white bean crop and 25% of the soybean crop annually. Although 4.2% of the corn crop is exported, Ontario is a net importer of corn. Of total corn usage in Ontario, 21% was imported and 33% 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 2004:

- 55% of the winter cereal acreage was planted to soft red winter wheat. This is a major shift from the once dominant soft white winter wheat acreage
- in research trials conducted in 2003 and 2004, frost seeding significantly improved grain yields for barley and spring wheat

- corn acreage remained stable and produced record provincial yields
- soybean acreage increased and provincial yield records were set
- discovery of Asian soybean rust in the southern United States may have significant consequences for Ontario soybean and pulse crop production
- the potential for increased canola production was threatened by the closure of Can Amara in Hamilton. ADM in Windsor is now the only crusher accepting canola in Ontario
- lack of forage research and concern over the future of performance testing
- IPM strategies for pests and weeds continue to influence research priorities particularly in reference to the registration of pest management technologies
- white bean acreage remained stable however, commodity price was strong because of global shortages
- several niche market opportunities for Ontario grown coloured beans has resulted in an expansion of production
- declining tobacco production and sustainability of the tobacco industry are of significant concern to Ontario tobacco growers. The federal government has announced a program to buyout tobacco quota and provide transitional assistance for tobacco growers
- new research efforts need to be directed towards the development of bio-based industrial products from Ontario field crops

Fig. 1 Field Crop Trends 1984 - 2004

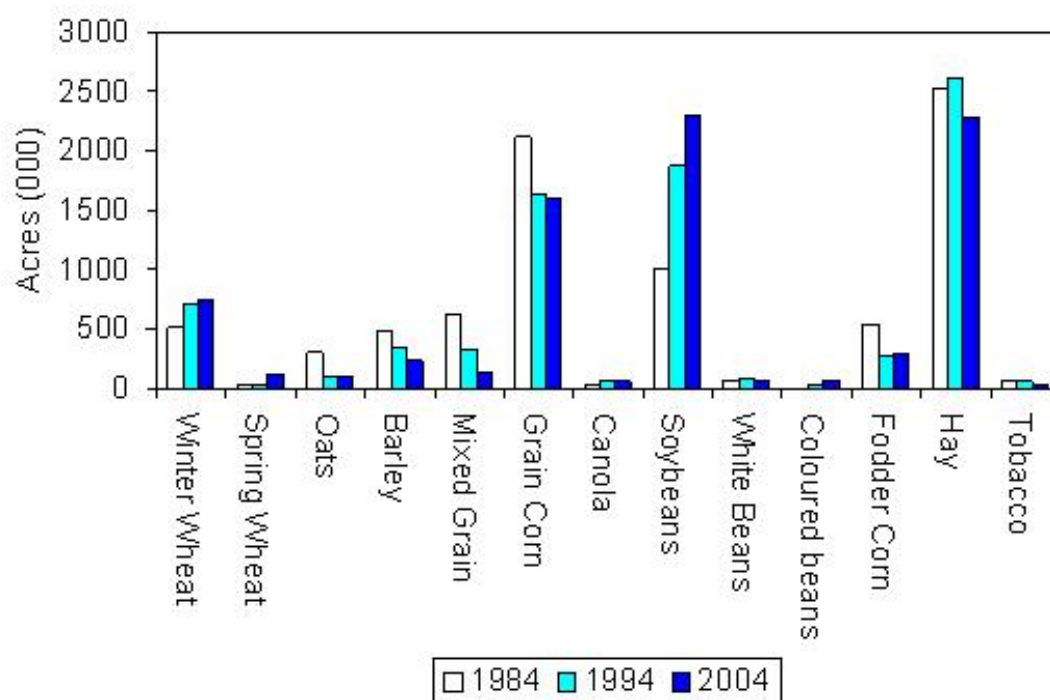


**Fig. 2 Major Field Crops
Relative Farm Gate Value - 2003**

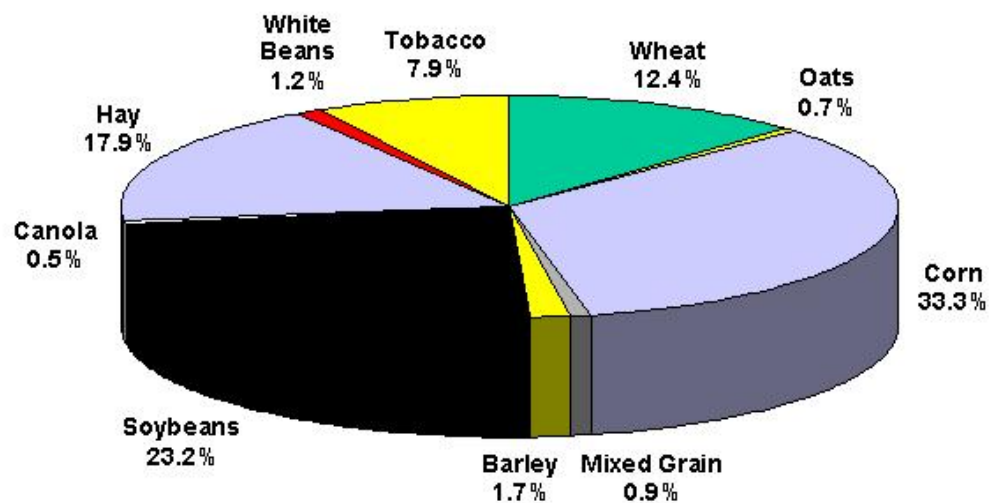


Table 1. Estimated Area, Production and Farm Value of Specified Field Crops, Ontario, 2002, 2003 and 2004.

Crop	Year	Units	Area		Production		Farm Value	
			Seeded (acres)	Harvested (acres)	Yield (units/acre)	Total (‘000 units)	Per Unit (\$)	Total (\$’000)
Winter Wheat ^a	2002	bu	580,000	580,000	72.1	41,800	4.19	175,100
	2003	bu	990,000	990,000	76.3	75,500	4.04	304,800
	2004	bu	750,00	750,000	72.5	54,400	...	...
Spring Wheat	2002	bu	170,000	170,000	50.6	8,600	5.66	48,700
	2003	bu	115,000	115,000	52.2	6,000	5.10	30,600
	2004	bu	120,000	120,000	50.8	6,100	...	...
Fall Rye ^a	2002	bu	70,000	60,000	31.3	1,875	3.20	6,000
	2003	bu	65,000	60,000	40.0	2,400	3.64	8,700
	2004	bu	65,000	65,000	36.9	2,400	...	...
Oats	2002	bu	115,000	100,000	67.0	6,700	2.49	16,700
	2003	bu	120,000	110,000	72.7	8,000	2.25	18,000
	2004	bu	105,000	90,000	70.0	6,300	...	...
Barley	2002	bu	335,000	320,000	56.9	18,200	3.09	56,200
	2003	bu	265,000	255,000	63.5	16,200	2.76	44,800
	2004	bu	255,000	235,000	63.8	15,000	...	...
Mixed Grain	2002	bu	210,000	190,000	62.1	11,800	2.25	26,600
	2003	bu	190,000	175,000	66.9	11,700	2.17	25,400
	2004	bu	155,000	140,000	67.5	9,450	...	...
Grain Corn	2002	bu	1,925,000	1,910,000	113.1	216,000	3.96	855,400
	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	...	...
Canola	2002	bu	60,000	60,000	32.5	1,950	8.83	17,200
	2003	bu	50,000	50,000	36.0	1,800	7.93	17,300
	2004	bu	55,000	55,000	37.3	2,050	...	...
Soybeans	2002	bu	2,075,000	2,065,000	33.9	70,000	8.50	595,000
	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	...	...
Dry White Beans	2002	cwt	85,000	85,000	18.5	1,575	23.00	36,200
	2003	cwt	55,000	55,000	20.0	1,100	30.10	33,100
	2004	cwt	60,000	60,000	19.0	1,140	...	...
Coloured Beans	2002	cwt	75,000	75,000	16.0	1,200	...	...
	2003	cwt	50,000	50,000	21.0	1,050	...	...
	2004	cwt	65,000	65,000	20.5	1,330	...	...
Fodder Corn	2002	tons	325,000	325,000	12.3	4,000	24.40	97,600
	2003	tons	325,000	320,000	14.4	4,600	23.60	108,600
	2004	tons	300,000	290,000	15.9	4,600	...	...
Hay (b)	2002	tons	2,500,000	2,350,000	2.2	5,150	89.44	460,600
	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	...	...
Tobacco Flue Cured	2002	lbs	44,300	44,300	2,450	108,060	2.26	244,100
	2003	lbs	35,725	35,725	2,630	93,955	2.28	213,827
	2004	lbs	36,603	36,603	...	...	...	...

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

Research and Service Priorities

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).

Table 2. Research Priorities by Commodity and Discipline

Priority	Cereals	Corn	Oilseeds	Forages	Pulse crops	Tobacco
1	Breeding and management for disease resistance	Breeding for improved cold tolerance	Genetic improvement for prod'n stability & risk management	Reducing climate related risk through breeding and management	Genetic improvement for agronomic and quality traits	Breeding for cultivar quality
2	Cultivar performance evaluation	Breeding for pest and disease resistance	Pest and disease control	Genetic improvements for feeding value	Quality evaluation and utilization	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	Alternative and specialty markets	Nitrogen management
6	Market development and grading systems	<i>Cultivar performance evaluation*</i>	Cropping systems research	Forages and the environment		Water use efficiency
7	Production and crop rotation systems	<i>Weed management</i>	Soil fertility, quality and management	Corn silage		Harvesting systems
8	Micronutrient management	<i>Pest and disease control*</i>		Market grading system		
9	<i>Pest and disease control*</i>			Weed management		
	<i>Weed management*</i>			<i>Pest and disease control*</i>		

* 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' Association 150 Research Lane, Suite 205

Ontario Coloured Bean Growers' Association Guelph, Ontario N1G 4T2

Ontario Corn Producers' Association

Ontario Forage Council

Ontario Soil & Crop Improvement Association

Ontario Soybean Growers Phone: (519) 767-1919

Ontario Wheat Producers' Marketing Board FAX: (519) 767-2466

Ontario White Bean Producers

Seed Corn Growers of Ontario

The following issues are of particular interest to the members of the Coalition:

- **Enhanced Genetics** – Last year the OFCRC completed its study “Enhancing the genetic capacity and diversity of Ontario field crops”. Following this study, the coalition also developed a draft *Vision* for the genetic enhancement of the Ontario field crop sector, which was subsequently circulated to field crop committee chairs, and leaders within OMAF IRMB, University of Guelph and AAFC for discussion and comment. The draft vision discussion document calls for the establishment of a Field Crops Bio-economy Institute and Bio-Products Specialists. The OFCRC intends to continue to work with these industry partners to best determine how to move forward with this important issue.
- **OMAF Services** – Field crop producers in Ontario highly value the many valuable extension services provided by OMAF.
 - The Southwest Ag Conference, CROPTALK, CROPPEST, and CROPLINE are excellent and timely approaches to sharing agronomic information. The OMAF website resources continue to be increasingly useful. Producers appreciate the support of these services and the commitment of those involved. With the several new and ongoing production challenges that producers have faced over the last few years it has become increasingly evident that such services need to be maintained and also enhanced where necessary. The coalition recognizes the overwhelming demands on current OMAF staff and recognizes a need for additional staff resources (and maintained resources for summer student assistance) in order that issues are appropriately addressed opportunities for enhancing Ontario field crop production are not lost.
 - Field validation of promising research is an important OMAF role. Once technologies are proven to be useful and economic at the field and farm level, producers will be quick to adopt them. New commercial products, services and biased marketing campaigns have never been more prevalent. OMAF has a vital role in working cooperatively with farmers to evaluate

new technologies and share the results. Continued cooperation is vital for Ontario agriculture to excel in this competitive global industry.

- OMAF continues to play a key role in the annual evaluation of field crop varieties in Ontario. OMAF could further assist the field crop sector in capitalizing on “bio-products” opportunities by establishing “Bio-Product Specialist” lead positions to operate out of the University of Guelph main or satellite campuses (with adequate technical help).
 - Weather data can be vital to optimal crop management. For example, the Ontario Weather Network’s rain/temperature-based Fusarium forecasts improve the likelihood of effectiveness of Folicur application in wheat. As new pest pressures (Soybean Rust for example) become a problem these types of forecasting models will become increasingly important. Recognizing that weather data can be costly, a balance in these services and the resulting value must be found.
 - Concerns remain regarding low producer awareness of pending nutrient management regulations. Producers need to be updated on the status of the regulations and the management recommendations that are now available. More research is necessary to develop science-based solutions where there are currently voids.
 - OMAF’s role in seeking emergency-use pesticide registrations in the field crop sector has become increasingly important in recent years – the OFCRC is very appreciative of the assistance and effort that has gone on in this area and truly values this support.
- **Research funding** – The level of funding to field crop research continues to remain a high priority within the OFCRC. The coalition is very encouraged by the Provincial government’s recent announcement to provide continued R&D funding to the sector. As we move ahead, the OFCRC looks forward to working with both the provincial and federal governments to maintain the necessary R&D investment needed to ensure that the Ontario field crop sector remains at the leading edge of innovation and market responsiveness.
 - **ARIO Strategic Review** – The OFCRC is appreciative of being kept informed of the Agricultural Research Institute of Ontario’s Strategic Review. The coalition was updated on the ARIO Strategic Recommendations for the Ontario’s Agri-Food R&D System at its last meeting. The OFCRC is supportive of the recommendations and moving forward with the implementation of the suggested R&D system in Ontario. In particular, the coalition is very supportive of ARIO taking over ownership of all OMAF research stations. It is felt that this transfer of ownership will best ensure the alignment of Ontario’s research infrastructure with its strategic research priorities.

Cereals

State of the Industry/ Significant Research/Service Accomplishments

Thank goodness for RED WHEAT! Another disaster of near 1996 proportions was narrowly averted in 2004, due primarily to the shift to soft red winter (SRW) wheat. In 1996, over 90% of the crop was downgraded to feed or sample due to extreme levels of fusarium, with virtually all the crop being soft white winter wheat (SWW). Over the last 10 years, the industry has seen a major shift, primarily to soft red winter, with a smaller increase in hard red winter (HRW). The makeup of the 2004 crop constituted 55% SRW, 25% SWW, and 20% HRW. Conditions were ideal for fusarium to develop in 2004, almost to the epidemic proportions of 1996. Fully 75% of the SWW crop was downgraded to feed from fusarium, 40% of the HRW crop was downgraded from fusarium, yet only 25% of the SRW was downgraded. The shift by growers to SRW has allowed the industry sufficient supply of milling quality wheat, that would have not existed otherwise. Combined with fungicide use and excellent harvest management, Ontario is building a reputation as a quality wheat supplier throughout the northeastern United States as well. Simply put, thank goodness for red wheat.

Acreage and Yields

Planted acreage was a solid 760,000 acres in the fall of 2003, with much of the crop late planted due to wet fall conditions. Winterkill destroyed about 5% of the crop, with 725,000 acres left through to harvest. Despite the late plantings, yields were exactly on trend line, at 73 bu/ac.

This marks the sixth consecutive year with provincial average yields above 70 bu/ac, and maintains a remarkable 1 bu/ac/year trend line yield increase. From a 50 bu/ac average in 1982, to 73 bu/ac in 2004, the progress has been constant.

Planted acreage in the fall of 2004 remained stable at 775,000 acres. Had weather in late October allowed, an even larger acreage would have been planted. The trend to the SRW class continues, with industry estimates at 65% SRW, 18% HRW, and 15% SWW planted this fall. Much of the crop was planted on time, and entered the winter in good shape. This bodes well for yield potential next year.

Spring Cereals

Acreage of spring wheat, barley and mixed grain declined dramatically, with the oat crop barely maintaining a stable level. Acreage of spring wheat dropped to 95,000 acres. The crop was hard hit by fusarium in the western production area, with both fusarium and mildew impacting the crop in the east. 50% of the crop was downgraded to feed, with mildew causing some grade discounts to a #3. Yield of spring wheat dropped well below trend line, at only 45 bu/ac.

Barley acreage dropped to 260,000 acres and mixed grain to 160,000 acres. Yields were a disappointing 64 and 68 bu/ac respectively. Oat acreage held steady at 105,000 acres, with near average yields of 72 bu/ac.

The revitalization of the oat industry in the province is a major accomplishment within the industry. Quaker Oat of Peterborough has consistently used a significant proportion of quality Ontario oat in their mill over the past several years. This has been made possible by three factors: genetics, production and handling. Dr. Art McElroy of AFFC Ottawa (retired Sept, 2004) was successful in breeding and selecting high yielding oat that fit the Quaker quality requirements. With the help of the Oat and Barley Council of Ontario, and OMAF extension staff, growers have been made aware of the management techniques more likely to produce suitable quality oat. Last, the move to sourcing Ontario oat only from elevators, and not off farm, has allowed the best quality oat to be moved into the milling channels. By all players in the industry working together, the oat industry in Ontario has moved from being deemed the “last of the cultivated weeds” to a profitable, beneficial industry contributing significantly to the provincial agri-food sector.

Marketing

The move by the Ontario Wheat Producers Marketing Board (OWPMB) away from a single desk selling agency, to a free market approach, has had an amazing impact. Winter wheat acreage appears to be stabilizing, and at a significantly higher level than might be expected. Given the late soybean harvest and wet October conditions of both 2003 and 2004, normal expectations would have been for only 550,000 to 600,000 acres of wheat to be planted each of those falls. Both times, wheat acreage was near 775,000 acres planted, with grower intentions near 900,000 acres had weather co-operated. This increased interest and acreage of wheat is attributed to the greater level of control growers now feel in marketing their wheat, along with the perception of higher prices with immediate payment, rather than the 16 month payout timeframe of the single desk selling system.

Whether real or perceived, this increased and more stable wheat acreage is of benefit to the entire industry. The grain trade will be able to find and supply markets on an ongoing basis, millers will have supply to meet demand, and wheat producers will benefit from improved rotations and higher yields. Hopefully this more stable, increased acreage will continue to prevail.

Fusarium

Fusarium continues to be the nemesis of the wheat crop. However, significant advances have been made. Improved genetics lead the charge, with FT Wonder and 25W41 the most recent varieties showing improved fusarium tolerance. Hyland Seeds have made a major commitment to fusarium genetics, trademarking the FT (fusarium tolerance) logo, and actually dropping their highest yielding soft red wheat line, Whitney due to very poor fusarium scores. The trend to better fusarium tolerance in varieties is evidenced in all wheat breeding programs.

Grower management for fusarium has also improved. The increased use of Folicur (15% of the crop was sprayed in 2004), coupled with excellent combine setup at harvest, have further reduced fusarium levels and toxins in the grain. The development and extension of correct application and timing technology for Folicur is a tremendous research and service accomplishment. Helmut Speiser (Engineer, OMAF) and Dr. Art Schaafsma (Ridgetown College, University of Guelph) combined forces with industry to determine the optimum

application technique. With “sprayer rodeos” over 3 years, and extension of the findings through OMAF’s “CROP” group of extension vehicles, efficacy and practicality of application has been improved dramatically.

Dwarf Bunt

Another significant accomplishment has been the findings of Dr. Allen Xue (AAFC, Ottawa) and Albert Tenuta (Provincial Pathologist, OMAF). In the third and final year of trials, management recommendations appear feasible to help growers reduce their risk of dwarf bunt infection to levels nearing zero. (This disease has a zero tolerance). Resistant germplasm has been identified, and when resistance is coupled with a minimum rate of the appropriate seed treatment, virtually no infection occurs. If varieties are grown that have no resistance (very susceptible), then a higher rate of seed treatment is required.

Frost Seeding

Phenomenal! Trials by Dr. Duane Falk, supported by field scale experiments by the OMAF cereal specialist, have shown from 10% (barley) to 42% (spring wheat) increase in yield. To date, frost seeding has never resulted in a yield loss, but has shown moderate to monstrous yield gains. All that remains for this technique is to prove to growers that it is possible, and increase grower uptake.

2004 Ontario Wheat Opportunities Conference

Sponsored by the OWPMB, the Wheat Opportunities Conference was held in May of 2004, in conjunction with the Canadian National Baking Council Annual Meeting and Trade Show. This was an excellent effort by the OWPMB to involve end users in the update and to build a more “team” approach with the industry. It met with limited success, as the number of bakers and end users in attendance increased, but only marginally. Hopefully the industry will find a way to build on these beginnings.

Emerging Needs and Issues

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 only about 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 wheats 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 2005

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
- B1: Market Development: milling oat, malting barley, hull less grain
- B2: Grading Systems: DON (deoxynivalenol 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, copper, 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 acreage in Ontario held relatively steady in 2004, but yields were significantly higher than the recent five-year average. (Table 1)

Production was most seriously threatened by poor planting conditions, delayed planting, and lower than average heat unit accumulation in the June 1 to August 31 period. However, stress free conditions at pollination (mainly adequate moisture) and fewer low temperature stresses during grain filling (excellent September weather) resulted in above average yields for all but the shortest season parts of the province.

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

YEAR	AREA (ac) (Million)	YIELD (Bu/ac)	PRODUCTION (Million Bu)	\$VALUE (Million)
2005/06 ¹	1.7	117	199	607
2004/05 ¹	1.6	130	208	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	238	702
1997/98	1.8	115	207	800
1996/97	1.8	108	188	838
1995/96	1.7	117	202	929
1994/95	1.6	121	193	619
1993/94	1.7	108	180	602
1992/93	1.4	97	136	371
1991/92	1.9	111	209	558

1 Forecast

Grain Corn Supply and Demand

Since 1999 the most dramatic increases in grain corn use has been on the industrial side (See Table 2). This demand has levelled off recently but the industry is anticipating increased demand if and when proposed new ethanol plants are constructed within the province. These proposed new plants or expansions are: Commercial Alcohols, Chatham (expansion), Integrated Grain Processors, Brantford (new), Seaway Valley, Cornwall (new), and Suncor, Sarnia (new). The industry will be paying particular attention to how the provincial government administers ethanol incentives.

Monsanto and CASCO have entered into a relationship whereby certain “identified “ hybrids will be preferentially delivered to CASCO, London during the month of February 2005. These hybrids are identified by Monsanto as being high in extractable starch. Producers are anticipating a \$.10/bushel premium for the shipments to CASCO during this pilot project. The project will involve approximately 2 million bushels of corn being processed by the London plant.

Table 2. Grain corn production, imports and usage in Ontario (million bushels).

	2005/06	2004/05 ¹	2003/04	2002/03	2001/02	1995-1999 (average)
Ontario Production	199	208	216	215	194	213
Ontario Imports	45	42	54	52	57	16
Feed Use	160	165	166	175	162	142
Industrial Use	82	82	85	84	83	63

1 Forecast

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 trials was strong in 2004, 13 companies representing a total of 277 unique hybrids are featured in the 2004 performance trial report.

A database containing all of the OCC performance trials from 1987 to present has been assembled. This database will now be posted on the Internet so that growers can do on-line inquiries into hybrid performance. Users will be able to select up to four hybrids and four growing season, the database will then present a table which summarises the performance of these hybrids in head to head trials over the years selected. The database will also be used by OCC to evaluate trends in hybrid performance across the various locations in the province.

Hybrids with genetically modified traits made up a significant portion of the market in 2004. Bt hybrids are estimated as having been grown on 45 % of Ontario’s corn acreage while glyphosate tolerant hybrids reached 12 % of the provincial market. The Ontario Corn Committee has discussed in some detail the concerns over testing herbicide tolerant hybrids in separate performance trials in order to allow hybrid-specific herbicides to be used. OCC and OMAF initiated and co-funded with other industry partners a research project to evaluate herbicide impacts on hybrids under conditions that would mimic performance testing. Results to date have

not indicated a need for the OCC to run separate (hybrid/herbicide specific) trials in order to accurately rate hybrid performance.

Emerging Needs and Issues

The OCC struck a sub-committee in November 2003 to examine the potential for establishing output trait performance testing. Members of the committee are pursuing testing protocols, output traits of significance, and potential clients for this sort of testing. The following represents a list of some of the potential output traits that could be immediately considered for this sort of initiative:

High Amylose Corn

High Oil Corn

High Oleic

High Oil Corn

Waxy Corn

High Starch Corn

High Lysine Corn

Nutritionally Dense Corn

White and Yellow Food Corn

To date OCC has been unable to view any particular opportunity for testing or evaluation that would have benefit to the industry. Future efforts on behalf of the OCC will be directed towards evaluating opportunities for testing high starch or high fermentable hybrids.

Seed Insecticide

A new seed applied insecticide (Poncho 250) received registration in December 2003 and was used virtually on all hybrids entered in the 2004 performance trials. Enthusiasm for this product has been high and there has been considerable interest in examining this years agronomic results. OCC received funding from Bayer CropScience for a seed treatment applicator and to conduct research using Poncho in 2004. This research was conducted at Elora by Dr. Liz Lee and focused on the impact Poncho seed treatments might have on planter performance.

Corn and Energy

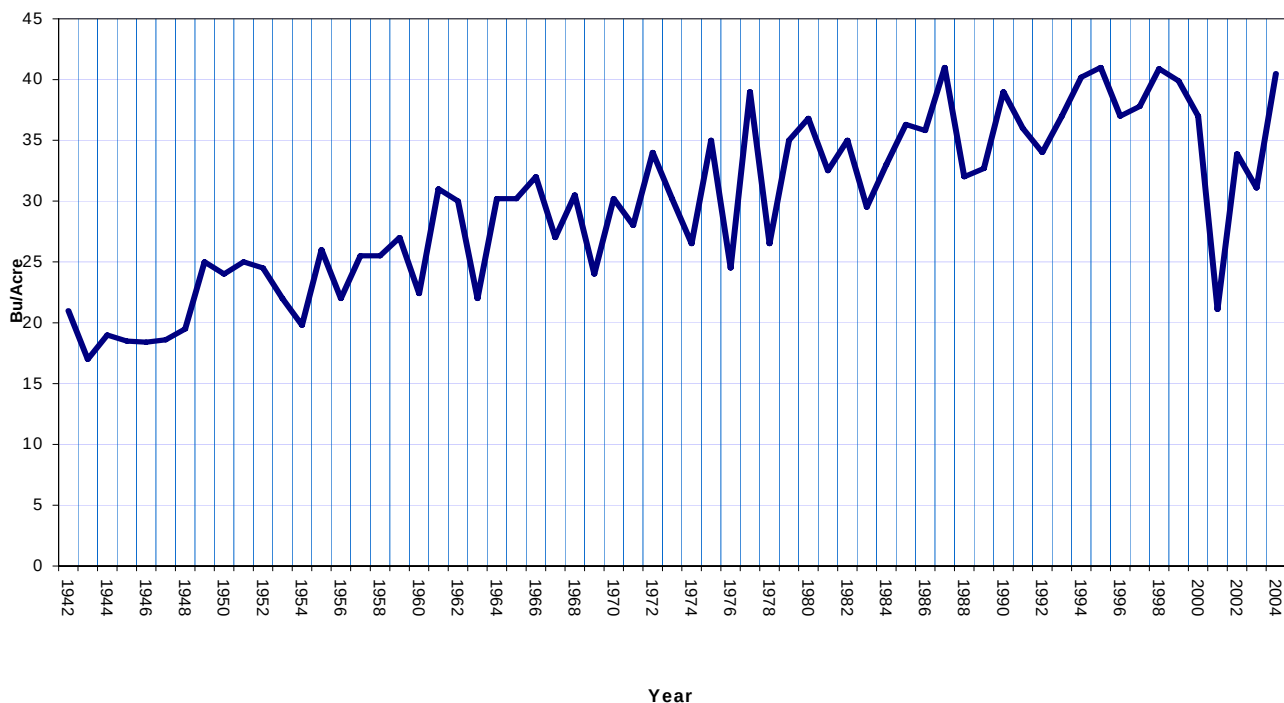
Record low corn commodity prices and high energy costs are making profitable corn production very difficult. Several of the OCC research priorities deal with promoting research in the areas of energy efficiencies (i.e. hybrids better adapted to cold environments, lower drying costs, increase N use efficiency). OCC will be sponsoring a “Corn and Energy Symposium” March 10th with the aim of bringing together research, government, industry, and producer stakeholders to share ideas on improving the sustainability of corn production from an energy perspective.

Oilseeds

State of the Industry – Soybeans

- Soybean acreage increased significantly in 2004 to approximately 2.35 million acres. This was up from 2.0 million acres in 2003. This increase was mainly driven by high soybean prices in the spring of 2004. For a short time prices were above \$14.00 per bushel. Unfortunately, prices in the autumn of 2004 had fallen below \$6.00 per bushel. These low prices are expected to put negative pressure on soybean acreage for 2005.
- Low yields in 2003 across the US mid-west pushed prices high this spring. (>\$14.00/bu) A large crop along with a high Canadian dollar have been two of the main factors why prices are at such extreme lows this fall.
- Despite a very challenging planting season and a cool wet summer the provincial average yield will be above the long-term AFY (average farm yield). Approximately 28% of total soybean acres have been reported to date. The average yield on this 28% is 40.6 bu/ac. The AFY of Ontario producers is 38.05 bu/ac. These above average crops surprised many growers in southwestern Ontario. Good yields are being attributed to excellent weather during September and above normal rainfall during July and August. Please see the graph below to compare this year to the last 62 years of production. Growers in Eastern Ontario harvested average yields.

Average Ontario Soybean Yield



- Soybean aphid populations did not reach threshold numbers in western Ontario this year. However, significant populations did emerge in Eastern Ontario and a considerable number of acres were sprayed. Of the available research trials (26 farm strip trials) an average yield increase of 5.0 bu/ac was realized when a foliar insecticide was applied.
- It's important to note that soybean plants did not suffer from a lack of moisture in eastern Ontario during 2004. A considerable amount of rainfall occurred in both July and August. This would suggest that soybean aphids might cause considerable yield reductions even when moisture is not limiting if the aphid numbers are above 250 aphids/plant and increasing in numbers. It's also important to note that some of the trials were sprayed relatively late in the season (past R4, full pod) and still saw substantial yield increases.
- The soybean aphid strip trial results from 2004 would suggest that a threshold of 250 aphids per plant with increasing numbers of aphids is a reasonable in-field threshold. It also appears that even if moisture is sufficient aphid numbers should not be allowed to grow significantly beyond 250 aphids/plant. Even at levels as low as 300 aphids per plant significant yield benefits were realized when spraying at some sites.
- Soybean aphids have now been found to over-winter on Buckthorn plants in Ontario. This is the first time they have been discovered to over-winter in Ontario. This could be significant in that soybean aphids may invade soybean fields earlier than we have previously experienced in Ontario. This could mean higher populations earlier in the season, which would require earlier control measures.
- An emergence registration was granted by PMRA for soybean aphids for the product "Matador"
- Soybean Rust has now been confirmed in 9 southern US states. The first discovery was made very late in the season (November 9th) so yield impact was minimal in 2004. The disease has also been found on the Kudzu plant, which is present in much of the southern United States. This will mean that inoculum will be present during next years growing season. Soybean rust may cause significant yield losses and is a major concern to the soybean and edible bean growing regions of North America
- The discovery of Asian soybean rust in 9 southern US states is expected to reduce soybean acreage in the US and put positive pressure on Chicago soybean prices.
- The PMRA (Pest Management Regulatory Agency) has approved "emergency" registration for 4 fungicide products to help control this disease in 2005. These products include: Headline, Tilt, Folicur, and Quadris.
- Identity Preserved (IP) soybeans have been a key component of Ontario's soybean industry. Demand for specialty food grade soybeans and non-GM soybeans continues to grow.

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. However, lower quality and low yields caused considerable difficulties in 2001, 02, and 2003. Quality in 2001 was very poor due to drought and insect damage. Many exporters could not meet their export obligations. In 2002 'green soybeans' caused the downgrading of a large percentage of IP soybeans and in 2003 many soybeans were extremely small. This year seed size and quality have generally been good.

- There has been renewed interest in IP soybeans due to low soybean prices and better yields in 2004.
- 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 approximately 55% of the crop was GR and it may have been as high as 60% in 2004. 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.
- In those parts of the province where yields have been low for several years no-till production is being blamed for some of the decrease. Some producers have reported that conventionally tilled soybeans yielded more this year than no-till fields. This has led to more fall tillage this year and may lead to an increase in the percentage of conventionally tilled soybean fields in 2005. Long-term research indicates that no-till and conventional till fields yield the same on average.
- The OOPSCC website www.oopsc.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.
- A strong performance testing system is key 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.
- Soybean pests continue to cause considerable damage to Ontario production.
 1. Slugs caused significant damage in some reduced tillage fields.
 2. This was one of the worst years for white mould in recent memory especially in Eastern Ontario.
 3. Soybean Aphids caused considerable yield reductions in Eastern Ontario.

State of the Industry – Canola

- There is considerable concern in the industry that CanAmera in Hamilton will no longer accept canola into their crushing facility in 2005. ADM in Windsor will be the only crusher accepting canola in Ontario.
- There were approximately 45 000 acres of canola planted in 2004. The average yield for spring canola was approximately 1650 lbs/acre. The long term AFY (Average Farm Yield) is 1750 lbs/acre.
- An estimated 5000 acres of European hybrid (Kronos) was harvested in 2004. About twice that acreage was planted this fall.
- Sclerotinia (white mould) was prevalent this year as was alternaria in spring canola.
- Cabbage Seedpod Weevil caused considerable damage in the winter canola crop this spring as well as being present in some spring canola fields. All of the winter canola in the province was sprayed but weevil numbers rebounded several weeks after spraying. More research is needed to for IPM strategies to control this pest.
- Swede Midge has now been reported in most of the major spring canola growing areas of the province. Its impact on canola is still unclear.
- 75% of Ontario's canola crop is Roundup Ready (RR) leading to potential weed resistance problems as well as the problem of controlling volunteer canola in following crops. There is also concern with cross-pollination between non-GMO and GM crops.
- 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.
- Producing non-GM seed is an issue -- again the threat of cross-pollination. As a result this seed is grown in isolated areas.

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) Plant Genomics. 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

Alfalfa winterkill this spring was greater than normal in some parts of the province, and was quite extensive in eastern Ontario. In parts of the Ottawa Valley, as much as two-thirds of the crop was affected to some extent. Reasons for this include extensive harvesting during the 2003 Critical Fall Harvest Period, poor winter hardening due to a warm wet weather conditions during late autumn 2003, alfalfa root disease complexes and crown heaving. Flat heavier clay soil types, new seedings that had experienced high levels of potato leafhopper damage, and diseased older stands, were more susceptible to winterkill. Winter survival of 2003 summer seedings was poor where dry conditions reduced or delayed emergence going into the fall.

Spring carry-over forage **inventory levels** were below normal in some areas. Forage yields were average to above average in most areas, bringing inventories to adequate levels. Yields were significantly lower in eastern Ontario and Algoma due to alfalfa winterkill.

Similar to 2003, **cool wet spring weather** delayed forage growth considerably. The cool weather slowed the growth and development of the legumes much more than the grasses. 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.

Laboratory analysis of first-cut indicated many samples with higher than normal NDF and lower CP levels, but with closer to normal NDFD (fibre digestibility).

In general, 2004 **forage quality** was reduced. Early first-cut harvest was delayed in many areas due to frequent rainfall. Due to difficult drying conditions, considerable amounts of haylage and baleage were made. There were numerous reports of baled hay that heated during storage. Propionic acid was applied to dry hay at baling by some producers to prevent mould. Very little dry hay was made without rain damage or mould until July. This has resulted in a short supply of "horse quality" hay for the domestic and export markets. Much of the beef quality hay is also rain-damaged or mouldy.

With reduced forage quality, dairy producers may find it more difficult to achieve high milk production per cow, but higher than normal cow numbers will compensate.

The cool, wet spring conditions resulted in **some alfalfa seeding failures**, with poor emergence and stunted growth, particularly on poorly drained fields. The alfalfa seedling diseases Phytophthora root rot, Pithium, and Aphanomyces root rot likely played a role. The fungicide seed treatment metalaxyl (Apron) is effective against Phytophthora and Pithium, but not Aphanomyces. Resistant varieties are available for Phytophthora and Aphanomyces.

Some **alfalfa weevil** was reported at threshold levels in the south-west, but limited spraying was required.

Potato leafhopper levels were high across the province, particularly in the lake Erie area. Damage to new seedings and second-cut regrowth was extensive in some areas. Potato leafhopper damage is partially responsible for the failure of many 2003 spring alfalfa seedings. While producer awareness of this damaging insect pest is increasing, further management is required, by scouting and spraying at threshold levels, or by the use of resistant varieties.

Moisture conditions at the time of **summer seedings** were good in most areas of the province. However, drier weather soon followed in mid-August and September, which delayed emergence and reduced establishment.

Pasture production was very good for most of the season. The cool spring delayed early development. When cattle were turned out according to the calendar rather than the development of the pasture, some damage was done. Adequate rainfall supported good early summer pasture growth. Drier conditions in late August and September slowed pasture growth. Good pasture conditions reduced the need for feeding stored forage during the summer. Some pastures have been severely injured by continuous over-grazing in situations where livestock inventories have exceeded forage supplies (such as Aigoma).

With the dry September weather and a lack of quality first- and second-cut dry hay, 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.

Corn silage yield and quality were generally adequate. Despite the potential for extensive immature corn silage, frosts did not occur until the first week of October. Corn silage harvested and stored in piles or bag silos provided a good late season forage option for dairy and beef operations requiring additional forage inventories.

Challenges for 2005

Potato Leafhopper

Potato leafhopper (PIH) levels are frequently high in some parts of the province (such as the lake Erie counties), resulting in significant damage, yield loss and seeding failures. New alfalfa seedings are

particularly affected. Potato leafhopper damage in alfalfa is frequently underestimated. More scouting of alfalfa fields needs to be done, with insecticide applied when scouting thresholds are exceeded. PLH resistant varieties should be considered in areas where PLH levels are traditionally high.

Managing Alfalfa Winterkill

Alfalfa winterkill continues to be a serious issue in some parts of the province, particularly in eastern Ontario. There are many contributing risk factors, including the weather, soil type, drainage, disease complex, potato leafhopper damage, variety selection, fertility, as well as the critical Fall Harvest Management Period and cutting management.

Harvest Management For Quality Dry Hay

Frequent rains and narrow haying windows resulted in reduced amounts of quality dry hay without rain damage or mould. Predicting the weather can be frustrating, but proper conditioner maintenance and adjustment, strategic windrow management, raking and the use of propionic acid as a hay preservative, can assist producers reduce the risk of poor quality hay.

Evaluation of Forage Quality Using NDF & NDFD

Improvements have been made in determining forage quality. Neutral Detergent Fibre (NDF) and Fibre Digestibility (NDFD) are a much more accurate measure of digestible energy than Acid Detergent Fibre (ADF). This can result in more accurate ration formulations and forage intake predictions. Producers of high quality forage should request NDFD analysis from laboratories. Corn silage should also be analysed for starch and NDFD to more accurately estimate digestible energy.

Rotational Grazing

Changing from a continuous grazing system to rotational grazing by subdividing fields and moving livestock can result in significantly more production. A rotational grazing system can double the forage production over a continuous grazing system, and reduce the amount of hay fed during the dry summer slump. Rotational grazing with 5 or 6 paddocks, 5 to 7 days grazing, and 28 to 30 days of rest works well. Even a less intensive 4 paddock, 10 days grazing, 30 day rest system can increase production over continuous grazing.

Production Committee Concerns

There was considerable discussion at the Production Committee meeting on the relevance of the Production Subcommittee, its representation, its role in identifying forage research priorities, and its duplication of efforts of the Ontario Forage Council. It was moved and seconded that "the Production Subcommittee be discontinued, and that the Ontario Forage Council will determine forage production research priorities and report them to the OFCC Central Committee". Motion was carried.

Variety Committee Concerns

Variety Subcommittee issues were dominated by the budgeting and funding challenges of the Elora Research Station variety testing program.

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. In terms of variety registration, the variety office of CFIA has still yet to make a definitive statement on it's position as to whether forages should be in schedule "B" that is performance testing required or in schedule "C", performance testing not required for registration. The OFCC has urged both the Expert Committee on forages and CFIA to support evidence of performance requirements. (Appendix I)

The OFCC has requested that reed canary grass be placed in schedule "A" because of concerns regarding alkaloids in Ontario. CFIA variety office has turned down this request in the interests of a uniform national policy.

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

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 has it's benefits has been undertaken. The membership fee is \$1,750.00 per year and the benefit is inclusion in 42,000 copies of the brochure that is well circulated as well as being posted on the internet. Companies are encouraged to pay early by April 30 for a reduction to \$1,500.00. Sixteen companies paid the membership for the 2004 brochure. Companies not wishing to be in the brochure may have their varieties tested without the need to be a member. Details of services, fees and memberships are given in appendix II.

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.

University cutbacks have resulted in the closing of the station at Thunder Bay, This was a noteworthy loss since the station had been providing a large component of data to the committee due to a very good success rate in the forage tests. It 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.

Kapuskasing may accept entries, however none have been put forth by the seed trade.

Due to financial constraints quality testing is no longer being offered. The committee is reviewing the possibility of including other publicly/privately generated data that may assist growers in their selection of varieties.

Field Crop Protection

State of the Industry and Significant Research/Service Accomplishments

Corn - Poncho seed treatment was registered to control corn rootworm (high rate), wireworms, chafer, seed corn maggot, black cutworm (low rate). Poncho and thresholds worked well for chafer but at high densities the high rate may be required. Control of cutworm was highly variable. There is a concern of use of seed treatment in absence of an economic level of pest across the province. Strip trials conducted in 2004 suggest inconsistent yield response (only 2 -5 bu/ac) on a provincial level. Seed treatment use should focus on fields/soils at potential risk of these pests (ie. sandy soils, continuous corn fields, rotation from sod etc). A Growers Handbook, second edition was created this year by the Canadian Corn Pest Coalition to provide information to the growers on IRM plans for rootworm Bt and ECB Bt corn as part of a strategy for the stewardship of transgenic crops. Rust, Anthracnose, Northern Leaf Blight were more prevalent this year. Some newer hybrids are more vulnerable to many of the leaf diseases. Stewarts' wilt/flea beetle prediction models were tested this year but flea beetle populations were too low to validate models.

Soybeans - Emergency use registration of Matador and Warrior were granted emergency use again for 2004. Soybean aphid infestations were low for much of the province with the exception of Eastern Ontario where thresholds were reached. 26 strip trials were conducted by OMAF to test new thresholds with a 5 bu/ac yield advantage realized. Data collected played a vital role in the revision of North American thresholds for 2005 with spraying window being expanded to the R5 stage of soybeans. Soybean Rust has been confirmed in 9 states as of December 6, 2004. It has not arrived in Ontario yet, however significant preparation was taken by OMAF in the event of its arrival. Emergency use registrations for four fungicides have been granted for 2005 and extension literature has been created for education and monitoring purposes. Lack of a registered product that gives control option for seedcorn maggot is still a concern. Registration of commercial seed treatments need to take place earlier in the fall for grower availability. SCN is still spreading though more producers are using resistance varieties. White mold, Phytophthora, Rhizoctonia were also prevalent this year.

Wheat - Folicur was granted emergency use again for 2004. Environmental conditions, inaccurate weather forecasting and logistical issues had an impact on the effectiveness of the DONcast prediction model. Leaf diseases favoured under cool weather like powdery mildew etc were noticed.

Forages - Seeing an increase in root rots which can be partly blamed for poor winter survival rates. Survey will be conducted in 2005 to determine level of incidence in province.

Edible Beans - Potato leafhoppers are a continuous problem for growers. Research continues to assess the combination of seed treatment and foliar sprays for control. Seed treatments may reduce the number of applications of foliar insecticide required. White mold was a huge concern for growers this year. Lance fungicide must be used in a preventative manner to be effective against this disease with proper timing of application being an issue for growers this year. Ronalin fungicide has some curative activity but export issues to the US limit its use in Ontario. Many companies have found markets to utilize Ronalin applied beans. Anthracnose was also a problem where populations of new races may be developing which will have implications on management strategies.

Canola - Cabbage seedpod weevil continues to cause yield loss, especially to winter canola fields. Preliminary work was done in 2004 to improve spray timing and validate thresholds. Work will continue in 2005. Provincial canola survey showed swede midge injury incidence is increasing. Headlands in some fields had extreme damage possibly due to delayed crop development in those areas. Research proposal to evaluate potential control products, crop phenology, resistance breeding and climate modeling for prediction of dispersal potential was submitted for 2005. White mold was an issue this year. Prediction models are needed to aid growers in well-timed fungicide applications.

Emerging Needs and Issues

Integrated Pest Management Research in the new OMAF–UofG Research Program

Structure. At this point, Faculty in the OMAF–UofG Research Program conducting research of relevance to this sector, largely participate in the Plants Program, which has three sub-programs, Field Crops, Horticulture, and Pest Management. The OMAF–UofG Research Program is being restructured and members of the Plant and Animal Programs will be merged into the new “Sustainable Production Systems” within the new ‘Value Chain Series’ of Research Programs.

Details:

Most integrated pest management researchers (entomologists, plant pathologists, weed scientists) conduct research on specific pests or specific approaches to pest management, including investigations of the biology and ecology of the pests in question, and are not limited to particular crop groups. Further, IPM research involves working through cropping systems and ecology, rather than through a single value chain towards an end game for one commodity such as grain corn. As such, it is unclear how IPM research would fit into the proposed value chain structure, particularly if value chains are formed along commodity lines.

Recommendation:

The FCPSC recommends that the OMAF–UofG Research Program Administration conduct formal discussions of the future place of IPM researchers in the new Value Chain Series that UofG Faculty members currently conducting research related to IPM are included in such discussions.

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 to 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 is necessary.

On Farm Treatment options - need to clarify issues around why on-farm application of insecticides is not an option. If it is possible, look into research on treaters and custom applicators role. This will allow growers to make a within season decision on pest management.

Pest Management – Weeds

State of the Industry

In general, weed control with herbicides was good in 2004. Soil applied herbicides worked very well in all field crops, as moisture was adequate early on. Post-emergent herbicide programs also worked well, as weed growth was adequate during application. There was no hardening off of weeds due to stress that often limits the efficacy of foliar herbicides. Some injury to soybeans and edible beans was observed due to splashing of soil that had previously been treated with PRE herbicides such as dimethenamid or metribuzin.

Weed Control Results and Overall Crop Report

Weed Control: Overall weed control was very good as there was plenty of moisture and plant growth to allow herbicides to perform well. Those who were able to get the crop and PRE herbicides in time found the weed control to be exceptionally good. However a number of "pounding" rainfalls (i.e. 2-4") resulted in mid-late season weed escapes due to some of the soil-applied herbicides moving down in the soil profile. Delayed crop establishment also contributed to late season weed escapes as many of the soil applied herbicides started to "lose steam" or run out of residual activity.

The cool and wet weather also helped the activity of POST emergence herbicides, as the weeds were not hardened off. In some soybean fields, late emerging weeds due to rain forced some growers to do multiple applications or to suffer some yield losses.

Favourable weather for weed control also contributed to increased instances of crop injury, particularly with metribuzin in soybeans. In some cases, pounding rain after soybean and edible emergence caused some splashing injury. This was particularly acute with metribuzin, which had been applied at higher rate in order to control ragweed. By and large, the crop overcame this herbicide injury.

About 15% of the corn acres and 60% of the soybean acres in Ontario were planted with "Roundup Ready" seed. Glyphosate drift onto non-target crops was a significant concern this past season as well.

Trends

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.

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. Downy brome and cleavers were also identified as potential future problem weeds. Giant hogweed and dog strangling vine are two invasive species which are triggering more inquiries.

Herbicide Resistance

Testing: Samples of red root and green pigweed, common ragweed, Eastern black nightshade and lambs-quarters were sent into the University of Guelph following the 2004 season as it was presumed that they were resistant to Group II herbicides. These samples are currently being tested by François Tardif, University of Guelph.

Concerns: There has been no incidence of any glyphosate resistant weeds at this time although weed scientists, growers, extension and agronomists continue to scout for any "odd" performance issues. Some have seen increase in the abundance of velvetleaf and lambsquarters escape, likely as a result of increased glyphosate usage. There is some awareness of the risk of resistance among farmers, especially with widespread use of glyphosate, and wider adoption of recommended resistance management techniques. Guidelines on resistance prevention should be made available early in 2005.

Oddly enough, triazine resistance continues to cause some problems. This happens when farmers are renting land with unknown history or when a new generation is taking over the farm.

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> ..

Extension Activities at OMAF, Crop Technology

The new organization of extension services across Ontario has now been in place for the 3rd season. Currently OMAF has 2 provincial weed management specialists, one for field crops and one for horticultural crops. OMAF also has engineering specialists in application technology, and crop specialists for each crop who handle all aspects of production, including weed management.

- The 2004-2005 Guide to Weed Control (Pub 75) was revised by the Ontario Weed Committee on November 5 and will be available on February 1st. New product registration occurring in-season (April to July) will be posted on the OMAF Web Site. Most of the information from this publication is online at <http://www.gov.on.ca/OMAFRA/english/crops/pub75/pub75toc.htm>
- Ontario Weeds (Pub 505) is nearing the end of revision but no publication date has been set. Most of the information in this book is online at <http://www.gov.on.ca/OMAFRA/english/crops/facts/ontweeds/weedgal1.htm>
- New Factsheets were published on Wild Mustard, and Prickly Lettuce. These can be found on our website <http://www.gov.on.ca/OMAFRA/english/crops/facts/03-041.htm> <http://www.gov.on.ca/OMAFRA/english/crops/facts/03-043.htm>
- The Ontario Weeds page online at www.gov.on.ca/OMAFRA/english/crops/insects/weeds.html. (French version <http://www.gov.on.ca/OMAFRA/french/crops/insects/weeds.html>) A free subscription service was added last year for notices of new content posted, and currently we have almost 1200 subscribers.

Pulse Crops

State of the Industry

White Bean State of the Industry:

Ontario acreage has remained steady at 55,000 acres in 2003 and 2004. Dry beans were an interesting story in 2004. Strong global commodity prices skyrocketed prior to the planting season which almost ‘shut out’ dry bean acreage. A backward spring in the Great Lakes basin (Ontario & Michigan) encouraged some increase in acres of dry beans. An unseasonably warm and dry September ‘made’ cash crops including dry beans. Average yield estimates for the 2004 crop are 1900 lbs./acre, the second highest on record. The estimated value of this year’s crop is \$29 million. Tight world supplies of dry beans resulted in strong harvest prices. Contract marketing through dealers continues to increase at the expense of the pool with an estimated

89% now marketed off board. The average weighted net producer price of all white pea beans in 2003 was \$23.65/cwt or \$521.41/MT. Manitoba who has become a major supplier in North America of white pea beans had a poor growing season, and early forecast of a 1 million cwt has dwindled to less than half a crop. A favourable return in dry beans this year, combined with low commodity prices in other field crops has resulted in strong interest in dry beans for 2005. Acreage will likely only be limited by the availability of seed.

The world white bean market has gradually shifted from being an open market of price discovery to a managed market, in which more and more production is grown under contract, with 3 main processors, Bush Brothers, Premier Foods, Heinz, that manage over 60% of world white bean supplies. Increasingly everything from seed, through inputs and husbandry practices including harvest and delivery requirements are contractually spelled out. Grower contracts exist for partial or whole crop contracts and in some instances for multi-year contracts. The primary processors (dealers) have positioned themselves to be extensions of the individual end users (canners). Global utilization has been static and is estimated at between 6 to 7 million bags - averaging around the 6.2 million-bag mark. This year's production is variously guessed at between 3.4 and 4.2 million bags. Estimates for carry-over stocks range from 800,000 to 1.5 million bags.

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

Year	Ont.	Mich.	Min/Dak.	Man.	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	80000	150000	235000	109000	574000
2000	50000	135000	225000	140000	550000
2001	58000	48000	125000	115000	346000
2002	95900	85,000	240,000	140000	565,000
2003	47,500	40,000	111,000		
2004	60,000				

* 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	20.20	15.7

- Figures supplied by Ontario Bean Producers Marketing Board

Coloured Bean State of the Industry:

Ontario coloured bean acres continues 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. Overall production in other North American areas has declined somewhat. 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 economies of production are required as new production regions emerge. In Ontario, the 2004 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, Root Rot Trials, leafhopper seed treatment trials, starter/ foliar fertilizer trials, Performance and Variety Trials and Weed Control programs. Joint consumer promotions with the Ontario White Bean Producers Marketing Board were undertaken throughout the year. 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(estimate)	55,000	20

- Figures supplied by Agricorp

Significant Research/Service Accomplishments

- a) Canadian Pulse Research Workshop – November 28 –29th, 2004, London, Ont. 120 researchers, extension, industry and growers attended the 5th conference. Evaluations of the conference were very positive. Highlights include a presentation by Dr. David Yeung General Manager-Global Nutrition of H.J. Heinz Co. and Professor, University of Toronto on human nutrition and pulses. Dr. Yeung highlighted research indicating the positive impact of dry beans on colon cancer, improved attention of students at school when they ate beans for breakfast and improved health of those with aids. Proceedings of the conference will be posted @ <http://www.ontariobeans.on.ca>
- b) Ontario Pulse Committee collaborated with Pulse Canada in developing a national pulse research strategy. An action plan of the top twelve priorities for pulse work was presented to PMRA and AAFC. In the area of dry beans these included, harmonization of MRL differences between countries, insect management, capacity for minor use efficacy work in AAFC, post-emergent weed control options, disease management, herbicide registration on a broad dry bean class rather than class by class basis.
- c) Field Validation of the Common Bacterial Resistance Genes.

Accomplishments

2004 trial results to determine the yield advantage of common bacterial blight (CBB) resistant dry bean lines over CBB susceptible lines. Using a simple % yield index calculation, it appears that the CBB resistance provides an average yield increase of 7.6%, under moderate to severe CBB disease pressure.

Why was this work undertaken?

CBB occurs each year throughout dry bean growing regions of Canada. The yield impact of CBB is not well documented. The development of a CBB resistant white bean cultivars (OAC Rex & HR76) provided the opportunity to evaluate the economic benefit of incorporating CBB resistance into dry bean varieties.

Who did the work and how was it extended

C.L. Gillard¹, R. Conner², R. Howard³, K.P. Pauls⁴, L. Shaw⁵, A. Vandenberg⁶.

¹ Ridgetown College, University of Guelph, Ridgetown ON N0P 2C0, Canada

² Agriculture Agri-Food Canada, Morden MB R6M 1Y5, Canada

³ Alberta Agriculture CDC South, S.S. #4 Brooks AB T1R 1E6 Canada

⁴ University of Guelph, Guelph ON N1G 2W1, Canada

⁵ Agriculture Agri-Food Canada CSIDC, Box 700 Outlook SK S0L 2N0, Canada

⁶ University of Saskatchewan CDC, Saskatoon SK S7N 5A8

Number of Benefactors

Yield and seed quality improvements of dry beans. Potential to expand dry bean seed production (value added).

d) Evaluation of Seed Treatments for Control of Anthracnose**Accomplishments**

DCT alone, and several other products tested when combined with thiophanate methyl are the most effective products for anthracnose control.

Why was this work undertaken?

Maxim – Apron seed treatment received registration on dry beans, and is expected to be the product of choice on dry bean seed imported from the USA. Most coloured bean seed is imported, while Ontario typically produces only 1 –2 generations of white bean seed. Harmonization of seed treatments will reduce trade barriers to seed trade.

Who did the work and how was it extended?

Chris Gillard, RCAT- University of Guelph.

Funding received from OMAF, Pesticide Co.

Number of Benefactors

Growers benefit from control of anthracnose. Harmonization of seed treatments with the U.S.A.

Dollar Impact.

Outbreaks of Anthracnose in the past have caused serious yield and quality losses to the dry beans.

e) **The Selection of dry bean cultivars by Leafhoppers by visual cues**

Accomplishments

Potato leafhoppers preferred Dutch Brown bean type 2 to 1 over the white bean cultivar in the trial. Leaf reflectance differences between the bean types was primary reason for this selection difference by potato leafhoppers. Leaf reflectance may hold some promise for screening dry bean cultivars for tolerance to leafhoppers.

Why was this work undertaken?

Determine if migrating PLH preferentially select dry bean varieties based on leaf colour.

Determine if differences in cultivar leaf colour can be quantified using wavelength reflectance values.

Who did the work and how was it extended?

S. Bullas-Appleton¹, C. Gillard¹, G. Otis² and A.W. Schaafsma¹ University of Guelph. Presentations to agronomists, growers, extension, & researchers; Published paper; Poster presentations.

Number of Benefactors.

Growers and public may realize benefits from reduced risk practices for leafhopper control.

Emerging Needs and Issues

- a) **Anthrachnose** was widespread in white beans in 2004. An OMAF survey identified a race not previously known to exist in Ontario; race 73. Screening of Ontario bean varieties for resistance to this race needs to be completed. Genes for resistance to this race exist and will need to be incorporated into new/existing varieties. Two new fungicides, Headline and Quadris received registration for foliar protection. An IPM strategy needs to be developed that incorporates new/existing seed treatments in combination with foliar products. DCT seed treatment is the most effective seed treatment currently registered. The seed industry in North America is shifting to newer seed treatments including Apron MAXX RTA. Ontario imports almost all coloured bean seed and some of its white bean seed requirements from the USA. Harmonization of seed treatments, that included a product effective on anthracnose, is a priority.
- b) **Ronilan (vinclozolin) fungicide trade restrictions.** The USA announced 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. The E.U. is conducting a review and will rule on its use in February 2005. 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 to. Research/service priorities for white mould IPM strategy needs to be reviewed.

- c) **Soybean Rust** has been confirmed in several soybean-growing regions of the USA. The disease can also affect all dry bean types.
- d) **Soybean Cyst Nematode** is expanding its geographic area into 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 strategy for SCN including crop rotation sequences, information is required on host interaction with various classes of dry beans.
- e) A replacement to lindane for seedling insect control is required.
- f) Harmonization of registered pesticides and MRL's in North America is priority of Ontario dry bean growers and Pulse Canada.

Emerging Issues without specific research priorities

1. Genetic Improvement, and Cultivar Development of White and Coloured Beans
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. Technology transfer priorities
2. IPM of insects and Diseases – leafhoppers, anthracnose, potato leafhoppers, soybean rust
3. Evaluation of Value added Genetics in Dry Beans
4. Soybean Rust has been identified in several USA soybean growing areas. Rust can also affect dry beans, although little is known about its impact on dry bean production in Canada.
5. Flatulence. As the population ages, individuals develop more intolerance to high fibre diets. High fibre consisting of complex carbohydrates and partially hydrated starch contributes to flatulence.
6. Weed Control. Weed control herbicides available in edible beans relies on testing of herbicides registered for soybeans. The focus of herbicide research in soybeans has shifted from development of new active ingredients to introduction of novel trait herbicide resistance. In the next 5 years no new chemistry is expected to become available. This is of concern because of the reliance on group 2 chemistry, and the rapid increase of certain resistant weed biotypes. In addition limited chemistry exists for the control of certain

problem weeds.

Tobacco

State of the Industry

The declining crop production size and sustainability of the tobacco industry are of significant concern to Ontario tobacco growers. The uncertainties in the tobacco industry are causing a major economic impact to the local communities in south-western Ontario. The tobacco industry has lost 229 growers from 2001 to 2004 (752 growers remain). The production target for 2004 was 87.9 million pounds, which is 6.5% lower compared to last year. The target price for 2004 is \$2.2367/lb, similar to last year's price of \$2.2365/lb.

The federal government is providing a program to buyout tobacco quota and provide transitional assistance for tobacco growers. Discussions are taking place currently to finalize the details of the program.

One of the most important causes of declining production in Ontario has been the significant increase in the amount of tobacco imported by Imperial Tobacco Canada Ltd.

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
2004*	36,603	-	-	-
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

1. Development of CTH1 and CV159-3 strains - CTH1 is the first Canadian hybrid developed by the Canadian Tobacco Research Foundation (CTRF), whereas CV159-3 is an open pollinated variety. Both strains were tested in small-scale on-farm trials in 2004. The results from these trials show that CV159-3 was more preferred by growers. Both strains have potential for registration.
2. Development of CTH2 hybrid - This hybrid was developed by CTRF and tested in the regional registration trials for 2 years. CTH2 produces high yield, good quality traits and high economic return. In addition, it is immune to Black Root Rot. These characteristics are important to growers concerned about the higher production costs associated with CT157, which is the most dominant tobacco variety grown in the tobacco area.
3. Development of CTH4 hybrid - This hybrid has the potential of producing high yield and good quality traits. It produces an economic return similar to CTH2. It is a potential candidate for growers concerned about the higher production costs associated with CT157.
4. CT572 is the second most dominant variety grown in south-western Ontario. Leaf spots caused primarily by ozone are a concern to some growers. The breeding program has identified a sister line of CT572 that is less susceptible to leaf spots.
5. Successful integration of haploid breeding techniques in the breeding program and successful development of several haploid plants immune to TMV.
6. Successful incorporation of the male sterility (ms) gene into 5 registered commercial varieties that will be used in the future for hybrid development and F1 seed increase.
7. A machine harvesting trial concluded that there are no differences in yield and quality traits between machine and hand-harvested tobacco.

Agronomy

1. Chemistry evaluation of grower leaf samples has resulted in more balanced chemistry levels of tobacco produced by growers.
2. New nitrogen recommendations based on studies recently completed have been drafted and approved by OSMRSC.
3. Forage millet cultivar CFPM-1 and grain millet hybrid CGPMH-1 have met industry requirements for use as a biological alternative to chemical fumigation.
4. A research program is now in place to identify the N fertility requirements of potential cultivars.

Protection

1. The fungicide Senator 70WP received emergency registration for the control of Rhizoctonia Damping-Off of tobacco in 2004. The registration was granted based upon studies conducted by CTRF on: 1) the efficacy of the product, and 2) on the levels of residues of the product on cured leaf following its use.

2. Black Root Rot, caused by the pathogenic fungus *Thielaviopsis basicola*, was found to affect several crops and originated from infection of the tray-produced transplants in the greenhouse. The pathogen was isolated from new, unopened bags of peat rooting substrate and from trays used to raise the plants. The disease caused significant stunting of plants in the field, slowed maturation and greatly increased the variability in growth and development of the affected crops.
3. Haploid breeding techniques have been successfully used to introduce Tobacco Mosaic Virus resistance into several Canadian tobacco lines. A procedure for screening resistant individuals has successfully been evaluated.
4. Blue Mold infected plant material collected in 2004 was determined to be free of oospores. Canadian tobacco must be certified as being oospore-free in order to be eligible for export to China.
5. The fungicides Pristine and Endura were found to be efficacious against Rhizoctonia Damping-Off disease.
6. The fungicides Ridomil Gold and Truban were found to be effective against Pythium Damping-Off disease.
7. The fungicide Pristine was determined to be effective against both Target Spot disease and Blue Mold disease.

Emerging Needs and Issues

- Black Root Rot (BRR -*Thielaviopsis basicola*) - During the 2004-growing season OMAF and CTRF received calls regarding stunted plants in the field. Growers noticed the problems in the field approximately 3 weeks after transplanting. The transplants appeared normal in the greenhouse. Dr Brammall confirmed the organism (*T. basicola*) on the roots of the plants, in the greenhouse trays, and in greenhouse media. The problems with BRR were associated with dry tray greenhouses. Dr. Brammall mentioned that washing/dipping trays in a chemical sterilant may spread the disease throughout the trays. Steam sterilization of trays may be a control for this organism.
- Curing Diseases: Pole Rot (*Rhizopus arrhizus*) and Bacterial Soft Rot (*Erwinia carotovora*) – The prevalence of these two diseases appears to be increasing. The temperatures and humidity associated with curing favour the development of these diseases. These diseases do not appear to be variety specific, however, some cultural practices (i.e. sucker control burn) may increase the risk of disease development (Bacterial Soft Rot).
- White Mold (*Sclerotinia sclerotiorum*) is becoming more common. To date there have not been significant yield losses from this disease. However, more growers are reporting this disease in their fields. Growers who have had this disease previously are seeing it spread throughout their crop and to other areas on their farm. Currently, there is no control for this disease. With the increase in susceptible crops (i.e. soybeans) being grown, there may be an increase in disease pressure from this organism in the tobacco crop.

- Tobacco Mosaic Virus (TMV) is still a concern. There was one new case reported to OMAF this year. TMV had not been a problem on this farm before and no equipment was borrowed. It appeared that the disease occurred very early, at or before transplanting.
- Aphid control – alternative chemistries need to be researched. Assail (neonicotinoid chemistry group) has been proposed as an alternative. Review of smoke tests is required.
- Leaf drop – There was a significant amount of leaf drop during the 2004-growing season. Some growers had it so severe that the leaves had fallen off up to the thirds. Growers who had this problem were growing either CT157 or an American variety. Some growers are considering changing varieties to get away from this problem.
- Wireworm control – the only option for wireworm control is Orthene. Lindane is not registered for the 2005-growing season, another option is needed.
- Damping-Off (Pythium) – is becoming more of a problem in float greenhouses. Research needs to be done to develop and evaluate control measures for this disease.
- White grubs (European chafer) are becoming a more persistent problem. The insecticide, Poncho may have the potential as a transplant water treatment.
- Other emerging issues were: increasing cost of tobacco production, the risk mitigation measures proposed for 1,3-Dichloropropene by PMRA and the loss of registered pesticides.

Northern Stations Report

Northern Stations Report to FCRSC
December 8, 2004

New Liskeard Agricultural Research Station, Emo Agricultural Research Station (Seasonal),
Verner Test Site (Serviced from NLARS)

- Interest in afforestation continues to build amongst forest products companies
 - short rotation forestry (<20yrs)
 - pressure on wood from private lands
 - Canada's commitment to Kyoto
 - Forest 20/20- establish 1,200ha in 2005
- Thunder Bay Research Station- Formerly UofG
 - NOHFC funding to 2007
 - successful season in 2004
 - would like to invite researchers to discuss collaborative work
 - contact Dr. Tarlok Sahota (807)475-1373

- Concern about CFIA Directive 94-08 (Dir94-08) Assessment Criteria for Determining Environmental Safety of Plants With Novel Traits.

- winter hardiness, end use characteristics, crop range, crop diversification.

“A new variety of a species is subject to the notification and authorization requirements of the Seeds Regulations when it possesses trait(s) novel to that species in Canada, i.e.,

- i) the new trait is not present in stable, cultivated populations of the plant species in Canada, or
- ii) the trait in the plant species is present at a level significantly outside the range of that trait in stable, cultivated populations of that plant species in Canada.

- Canada has a product-based regulatory system for plants with novel traits. It is the presence of a novel trait in a plant, irrespective of the method used to introduce it, which will trigger the notification and authorization requirements under the Seeds Regulations. PNTs may be developed through mutagenesis, somaclonal variation, intra-specific and inter-specific crosses, protoplast fusion, recombinant DNA technology, or other techniques.
- Conventional breeding may produce a plant with a novel trait requiring notification and authorization of its release, depending on the selected trait's level of expression in comparison with similar existing traits present in stable, cultivated populations of the plant species in Canada. For example, an increase in yield in a new wheat line, similar to increases seen historically in wheat lines cultivated in Canada, may not be considered to be a PNT. However, a new sclerotinia resistant canola line exhibiting a resistance many folds higher than that currently grown in Canada would likely be considered a PNT. The introduction of a trait from wild biotypes or from germplasm originating outside of Canada, is more likely to produce a PNT than conventional breeding with germplasm already in use in the Canadian environment.”

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 phosphorus management needs to be filled. Canola is most often grown in livestock areas and viewed as an important crop for nutrient management. Further studies on nitrogen 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.

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

Soybean aphid - econ. impact, threshold evaluation, control, life cycle, wintering on primary host, prediction and monitoring presence, virus vectoring, biocontrol, release of parasitoids for organic crops and food grade soybeans

Canola insect pests: Cabbage Seedpod Weevil, Swede Midge 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

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

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

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

Slugs: management strategy for no-till field crops, edible beans, soybeans and corn, monitoring technique for prediction method, impact of tillage practices – how much is sufficient?

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

Anthracnose on edible beans: seed treatments, evaluate new products

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

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

Corn leaf diseases: (Gray leaf spot, Stewart's wilt, Northern leaf blight) monitoring, prediction of outbreaks, resistance breeding, selection of resistant varieties

Potato leafhoppers on edible beans and alfalfa: thresholds, evaluation of products, econ impact, management profiles.

Bean leaf beetle: econ. impact, threshold, vector importance model

Dwarf bunt: seed treatments, resistant varieties

Western corn rootworm - monitoring for variant continues, transgenic stewardship

European chafer in wheat – decision thresholds, biology, control measures, practical seed treatment rates

Root rots on soybeans – (*Pythium*, *Phytophthora*, *Rhizoctonia*, *Fusarium*) threshold, management tools, biology

Barley yellow dwarf on winter wheat – economic impact, prediction forecasting, effect of changing cropping/rotational practices, seed treatment, best management practices, plant resistance

Alfalfa weevil: survey to determine status of biocontrol agents,

Cereal leaf beetle: survey to determine status of biocontrol agents

Corn stalk rots: (*Anthraco*se, *Fusarium*, *Gibberella*) management and relationship of cropping systems to disease incidence.

2. Objectives for 2005

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
6. Clarify grower access to seed treatments for wireworms and seedcorn maggot. Look into on farm options (ie. setting up treatment facilities for spring application of treatment on seed)
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.

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 alternative management methods, such as cultural or mechanical, in order 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.

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. 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.
3. 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 such as Callisto, Converge and FirstRate.
4. Develop comprehensive management strategies for the control of problem weeds in tomatoes, grapes, strawberries, onions and carrots.
5. Determine the impact of nutrient management programs on weed population dynamics and weed control efficiency in horticultural crops.

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

1. To continue herbicide efficacy and residue work leading to registration of minor use herbicides under the URMULE program in horticultural crops, specialty field crops and for problem weeds not currently on product labels in field crops.
2. 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.
3. Develop improved methods for the rapid and efficient detection of herbicide residues in relation to: (i) off-site contamination (drift, run-off, leaching) (ii) herbicide carry-over and crop rotation, and (iii) applicator, grower, bystander exposure to dislodgeable foliar residues on plants.
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. Establish economic thresholds for problem annual and perennial weeds, with consideration for crop quality, dockage, harvest moisture, and weed seedbank issues.

7. Investigate weed biology and ecology including basic research on seed biology, population dynamics, physiology, weed-crop interactions and impact of composting on seed viability.

8. 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.

9. 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

10. 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.

11. 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

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

Title: Continue funding development of IPM strategies for Pest Management for Edible Beans

Details:

- **NEW** - Develop IPM strategy for Anthracnose 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.
- Evaluation of seed treatments to replace lindane.
- Evaluation of IPM strategies for potato leafhopper

Background:

- **Leafhoppers** are important insects in edible beans for which up to 3 applications are required for control in a season. Research work conducted by RCAT with seed treatments indicate excellent early season control that may replace/reduce the need for sprays. Investigate alternative foliar pesticides to the only registered active, dimethoate. Research/extension efforts are required to develop an IPM program.
- **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.
- A replacement to lindane insecticide is required for control of two important seed/seedling pests of edible beans, wireworm, seedcorn maggot and occasionally white grub and others.

- **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 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).
2. Fungicide screening for Damping-Off of tobacco caused by *Rhizoctonia solani* with a focus on resistance management (CTRF) (Short term research priority, ongoing project).
3. 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).
4. Herbicide screening in tobacco and rye crops. (CTRF) (short term research priority).
5. 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).

6. 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).
7. 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).
8. Insecticide screening for the control of harvester ants with the focus on resistance management (CTRF) (short term research priority).

Crop management

1. Evaluate different irrigation practices that use water more efficiently (i.e. trickle irrigation, fertigation) (CTRF) (short term research priority).
2. Evaluate the effects of plant populations and varieties under an automatic harvesting system on yield and quality (CTRF) (short term research priority).
3. Identify the cause(s) and solution(s) of tobacco bruising (CTRF) (long term research priority, ongoing project).

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

1. Cultivar Development and Genetic Improvement of White and Coloured Beans

Source: Variety Subcommittee, Ont. 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 by an average 7%

1) Conventional breeding of cultivars for:

- Yield and yield stability
- Quality traits includes 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 coop. 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.

Background: 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. It 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

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).

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 paralleling 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

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, nutraceutical, or industrial uses.

Background:

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, nutraceuticals, or industrial uses. Examples would include screening for components such as Bioflavonoids, Saponins, oligosaccharides. Ontario is well positioned to grow premium priced specialty bean types and have the identity preserved production system and marketing to support them.

There is a shift in from producing a commodity to a ‘market or buyer’ driven bean that have 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 utilization for food and industrial uses. Little is known of the compositional traits that may be of special value.

Current Research/Extension Activities:

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:

- Continue to fund research into mung beans and pigeon peas. Both crops show promise as niche pulse crops with high value.
- Expand breeding/agronomic research to include other niche pulses grown in Ontario. Examples include Kintoki, Otebo, Adzuki, and large white.

Background

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

1. Improving crop quality

Quality Assurance Priorities

1. Leaf quality (CTRF) (ongoing project).
2. Analysis of green and cured tobacco leaves for the presence of blue mold oospores (CTRF) (ongoing project).
3. Further development of measures to reduce TSNA's in cured tobacco (CTRF).

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 where 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) Dwarf Bunt management techniques
- 2) Fusarium ratings system that offers both breeders, researchers and growers better information
- 3) Replacement of the Oat Breeding position at AAFC
- 4) Education of growers, elevators and millers on the need to maintain class (type) purity
- 5) Improved nitrogen management
- 6) Continued delivery of performance test information
- 7) Expansion of market opportunities, especially in malt barley

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 Agri-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

1. Extension of research information through field trials/ demonstrations, educational activities that promote sustainable agronomic practices that enhance returns for dry bean industry.
2. Support management practices for niche market classes (e.g. Japanese types)
3. IPM for Insects/diseases :
 - 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.

- 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.
4. Dry Bean growers report positive benefits to include 30 to 60 lbs./ ac of nitrogen in fertility programs, although research has not demonstrated the same benefit unless root rot was prevalent. Additional field trials to investigate grower reports are required.

Ontario Tobacco Committee

1. OMAF to provide consultative extension and act as the lead in transferring research results to growers.
2. OMAF to continue to provide farm visits.
3. Increase OMAF tobacco PY's to historical levels.
4. 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 (OMAF).
5. Publication 298 should be made electronically available on the OFCTGMB website (OMAF/OFCTGMB).
6. Consultative services to be provided to growers to assist with curing techniques and skills (OFCTGMB).

COMMITTEE MEMBERSHIP

ONTARIO CEREAL CROPS COMMITTEE - MAIN

Organization

OMAFRA
Ridgetown College
OCCC Production Subcommittee
Public Plant Breeders
O.W.P.M.B.
OCCC Variety Subcommittee
C.S.T.A.
O.S.G.A.
Commercial Plant Breeders
O.S.C.I.A.

Representative

- Mr. P. Johnson, Chair
- Dr. A.E. Smid, Secretary-Treasurer, exofficio
- Dr. G. Hoekstra
- Dr. D.E. Falk
- Mr. P. Tuinema (C. Sherk, alt.)
- Mr. A.R. McElroy
- Ms. G. Harris (J. Reid, alt.)
- Mr. P. Szentimrey (L. Trepanier, alt.)
- Mr. L. P. Shugar (T. Welbanks, alt.)
- Mr. G. Beaudry (S. Ryzebol, alt.)

APPENDIX I (b)

ONTARIO CEREAL CROPS COMMITTEE SUBCOMMITTEE – VARIETY

C.P.B., C.S.T.A.
University of Guelph, O.A.C.
Millers' Rep.
K.E.F.
E.C.O.R.C.
Kemptville College
University of Guelph, O.A.C.
Crop Technology, OMAFRA
Crop Technology, OMAFRA
C.G.C.
C.S.G.A.
University of Guelph, O.A.C.
E.C.O.R.C.
Quality Co-ordinator
O.W.P.M.B.
N.L.A.R.S.
Disease Co-ordinator
Ridgetown College
C.S.T.A.
O.P.C.R.S.C., O.C.P.C.
O.S.G.A.

- Mr. A.R. McElroy, Chairman
- Mr. J. Rowsell, Secretary
- Mr. G. R. Carson
- Mr. L. Guillemette
- Dr. K. M. Ho
- Dr.G. J. Hoekstra
- Dr. L. A. Hunt
- Mr. P. Johnson
- Mr. S. Banks
- Mr. J. Lowe
- Mr. M. Mackinnon
- Dr. D.E. Falk
- Dr. R. S. Pandeya
- Dr. L. Pietrzak
- Mr. P. Tuinema (C. Sherk, alt.)
- Mr. J. Rowsell
- Dr. A. Xue
- Dr. A. E. Smid
- Ms. G. Harris (J. Reid, alt.)
- To be Appointed
- 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.)
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.
C & M Seeds
W.G. Thompson & Sons Limited
O.P.C.R.S.C., O.C.P.C.

- Mr. G. Beaudry (Mr. S. Ryzebol, alt.)
- Ms. E. Sparry
- Mr. M. Etienne
- To be appointed

Ontario Corn Committee (March 2003)

		Name	Affiliation	Address	Telephone	FAX	E-mail
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Mr. David Morris	OCC, Secretary	Box 104, 10 Cambrai Rd., Markdale,	N0C 1H0	519-986-2385	519-986-2385		dtmorris@bmts.com
Mr. Larry Cowan	OCPA	R R #1, 7882 Longwoods Road Mt Brydges,	N0L 1W0	519-289-2106	519-289-5659		lcowan@wwdc.com
Mr. Ken Hough	OCPA (Alt)	90 Woodlawn Road, W., ON	N1H 1B2	519-837-1660	519-837-1674		khough@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
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ROC - Rest of Committee (additional main committee members)

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Bob Dippel (P) CSTA	
Mr. Bruce Whale (P)	OFC
John Kinghorn (V)	OSCIA
Dr. D. Yungblut (V) OFC	
Mr. Chris Gillard (V) Ridgetown College-UG	
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Dr. E. Ann Clark Crop Science, UG	
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Mr. Chris Gillard	Ridgetown College-UG
Ms. Wendy Asbil	Kemptville College-UG
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Mr. Tim Welbanks CSTA	
Mr. Jay Hackney	Commercial Plant Breeders
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