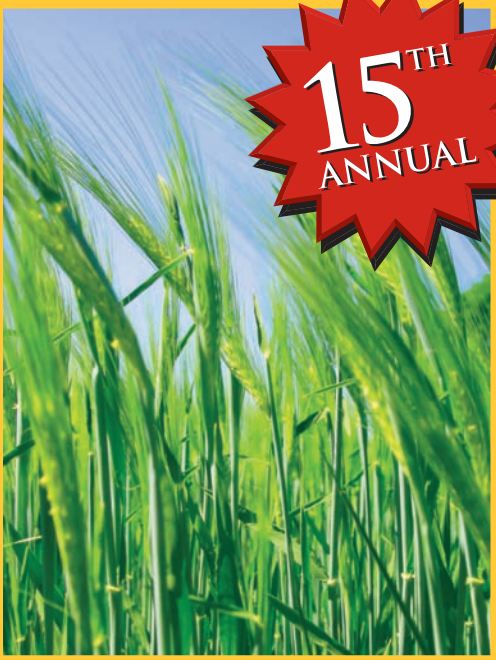
The Southwest Soil and Crop Improvement Association and the Ontario Ministry of Agriculture, Food and Rural Affairs in partnership with the Agri-Food Innovation Forum

present...



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January 3rd - 4th • 2008

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SOUTHWEST AGRICULTURAL CONFERENCE

January 3, 2008

Welcome to the 2008 Edition of the Southwest Agricultural Conference. This, the 15th year of the Conference will bring many special extras to the event. We can look back on our history with the slide show that has been prepared and with many of the premier thinkers in agriculture over these next two days envision where we are heading. We have partnered with the Agri-Food Innovation Forum allowing us to enhance our program and bring more innovative speakers to share their ideas and knowledge and technology to evaluate. Challenging convention, changing methods, inventing and creating new uses and products along with improving production and profits is what the future holds.

We have also teamed with Ontario Soil and Crop Improvement Association to showcase the benefits of membership and invite everyone to become a member of this excellent and worthwhile organization. Take a moment and read the Insert in your registration package, stop by the display or visit the website.

Improved conference facilities and online registration this year available for the first time and new website audio recording of sessions features continue to evolve to bring value added to this excellent Conference which is clearly a success through the efforts of many people.

It is the combined efforts of the Steering Committee, who give direction, OMAFRA staff doing the legwork for the program ideas and speaker suggestions and the logistics handled by the Ag Business Centre and the entire University of Guelph, Ridgetown Campus that bring this Conference together. It is the support of the Local Soil and Crop Improvement Associations along with Agribusiness sponsors, Speakers, Chairs, Volunteers that make it run. Last but certainly not least it is those of you who pay your registration fee to attend this event who bring this Conference to Life. Thank you to everyone who has contributed in every grand or small way to bring us to this 15th Anniversary Celebration.

We hope you take home some valuable information from the Conference and we thank you for attending. All the best in 2008 and Look forward with promise to the future.

Dean Van Arenthals

Middlesex County Soil and Crop Improvement Association

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Feature Speakers

MODERN AGRICULTURE: AN ENVIRONMENTAL SOLUTION

Alex examines the argument that modern farming practices provide the solution to the environmental woes created by society.

Alex A. Avery

Hudson Institute's Center for Global Food Issues

THURSDAY, JANUARY 3, 2008

- Director of Research and Education for the Center
- Represented the Center at the 1996 United Nations World Food Summit in Rome
- Has appeared on Fox News, CNNfn, and Showtime and has been published in numerous publications including The Wall Street Journal, USA Today, Western Producer

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PESTICIDE EXPOSURE AND HUMAN HEALTH

An enlightening discussion of pesticide toxicology and testing that will explore misconceptions regarding pesticide exposure and health effects such as cancer.

Dr. Donna Houghton

Syngenta Crop Protection Canada Inc., Guelph

FRIDAY, JANUARY 4, 2008

- Senior Toxicologist and Technical Registration Manager responsible for planning and reviewing studies to test the safety of pesticides
- Graduate of the University of Guelph, with a BSc Agr and a PhD in toxicology and pesticide exposure assessment
- Her presentation will put the toxicity of pesticides into perspective.

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SOUTHWEST AGRICULTURAL CONFERENCE JANUARY 3 & 4, 2008

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Session #1
Corn: Research Meets Realism

Pat Lynch Cargill	Greg Stewart OMAFRA

Research and experience combine to provide innovation in a variety of corn production topics.

Please use the balance of this page for notes.

Session #2
Profitable Soybeans for 2008

Jim Beuerlein
Ohio State University

Please use the balance of this page for notes.

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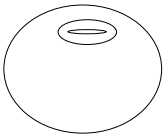
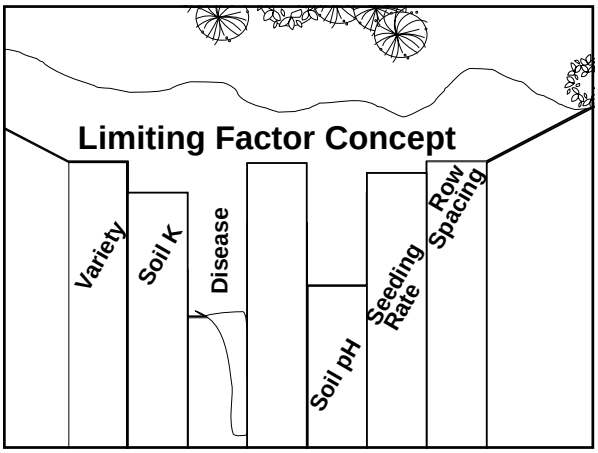
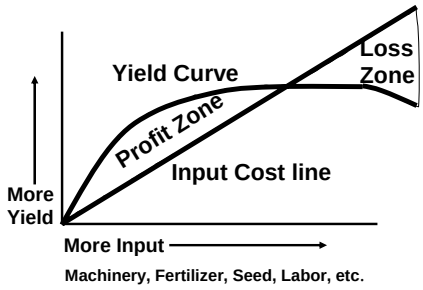
Soybean Ecomomics For 2008



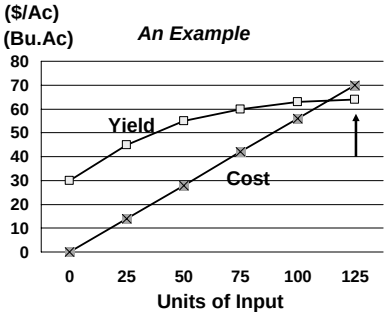
By Dr. Jim Beuerlein
The Ohio State University



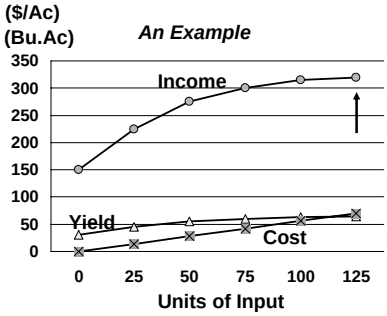
Law of Diminishing Returns



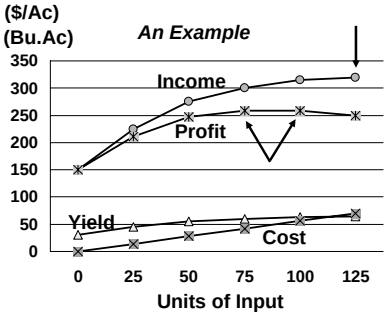
Input vs Yield vs Profit



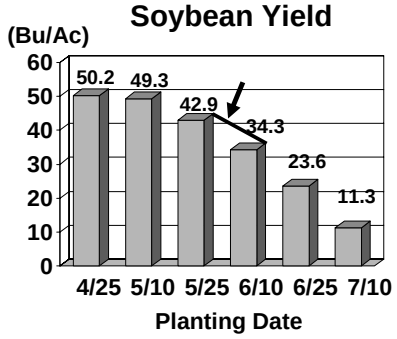
Input vs Yield vs Profit



Input vs Yield vs Profit



Effect of Planting Date on Soybean Yield



Value of time spent planting Soys

Planting 5/25 – 6/10

(8.6 bu/ac) /15 days = 0.57 bu/ac/day.
0.57 bu/ac/day X $6.00 = $3.44 $/ac/day

For a 12 hour day:

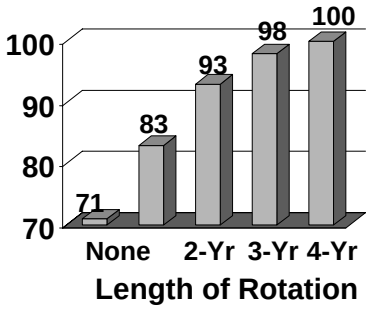
Planting 10 ac/hr = $41.28/ hr. $495/day
Planting 20 ac/hr = $82.56/ hr. $990/day

Starting a 12-day planting season one day early is worth $7,425 to $14,850.

Solve a Tillage Problem

The cost to chisel and disk my land before planting is $28 per acre. If corn and soys are $2.00 and $6.00 per bushel, how many bushels of each could I loose per acre and still maintain the same net income per acre using No-Till and assuming yield does not change?

Value of Crop Rotation



Crop Rotation Problem

I farm 1500 acres with half in corn and half in soys. Average corn and soy yields have been 160 and 50 bu/ac. If I cut my corn & soy acreage by adding 500 acres of wheat to the rotation, my corn and soybean yields will increase 5%. How much extra income will I get from corn & beans together if corn and beans are worth $2.00 and $6.00 per bushel respectively.

Soybean Variety Selection:

Variety A yield = 57.5 bu / ac
Variety A cost $22 / 50 pound unit $33

Variety B yield = 61.5 bu / ac
Variety B cost $44 / 50 pound unit $66

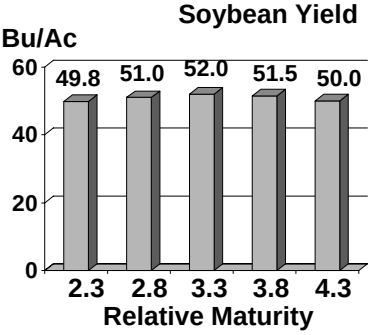
If you seed 75 # / ac, then which variety would you select if beans are worth $6, $8, $10 / bu?

Soybean Variety Selection:

The seed companies that participate in University variety performance trials are telling you what their best varieties are.

Those companies that do not participate can't afford to participate or feel their varieties are inferior to all the other varieties.

Effect of Relative Maturity on Soybean Yield

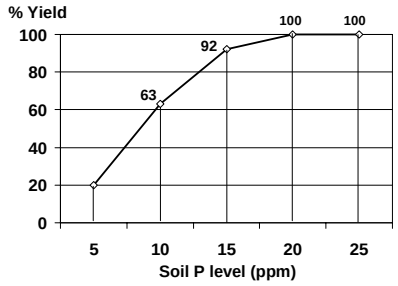


Effect of Planting Date and Variety Relative Maturity on Harvest Date

Planting Date	Acres Planted	Relative Maturity	Physiological Maturity	Harvest Date
4/25-31	100	2.2	8/10	9/1
5/1-5	150	2.5	8/15	9/7
5/6-10	200	3.0	8/22	9/15
5/11-15	200	3.4	8/28	9/22
5/16-20	200	3.7	9/2	9/28
5/21-25	100	3.7	9/5	10/1
5/21-25	50	4.0	9/8	10/5
	1000		29 days	34 days

60 ac / day for 17 days

Effect of Soil P level on Soybean Yield

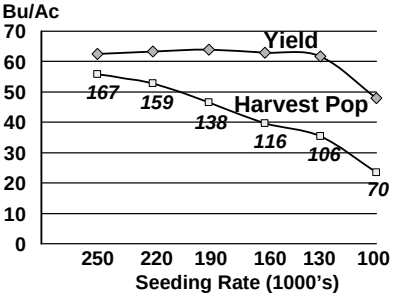


Effect of Soil P level on Soybean Yield

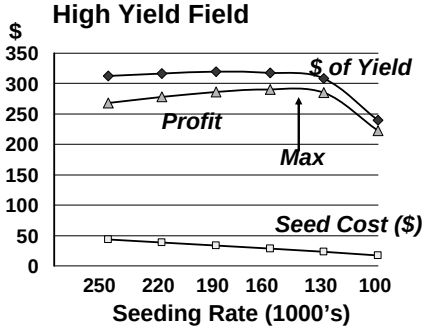
Increasing the Soil P level from 15 to 20 ppm will require 100 pounds of P or 200 Pounds of P_2O_5 at a cost of $64 and can increase my soybean yield by 8% or 4.0 bu/ac which is a value $32/ac.

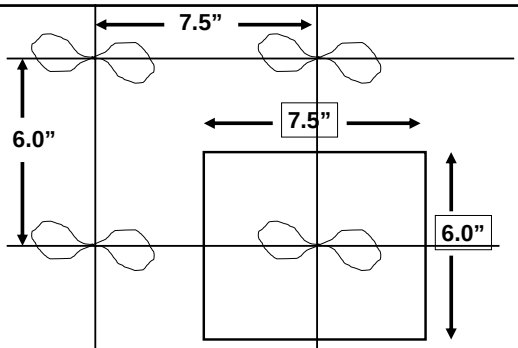
Should I raise my soil test level?

Effect of Soybean Seeding Rate On Yield, High Yield Field



Economic Analysis for a High Yield Field





Each Plant has 45 sq. in. of space

6,272,640 / 45 = 139,392

I want to plant 217,500 seeds per acre in rows spaced 11 inches apart. I need to know how many seeds there should be in 10 feet of row so I can calibrate my home-made planter.

$$\frac{6{,}272{,}640 \text{ sq in/ac}}{217{,}500 \text{ seeds/ac}} = 28.8 \text{ sq in/seed}$$

$$\frac{28.8 \text{ sq in/seed}}{11 \text{ in}} = 2.6 \text{ in between seeds}$$

$$\frac{12 \text{ in}}{2.6 \text{ in}} = 4.6 \text{ seeds/foot of row or } 46 \text{ seeds in 10 feet of row.}$$

Ohio Soybean Fungicide Seed Treatment Summary, 2001-2006, (thirty-six test)

Year	No. Treat.	UTC Yld	Fung. Yld	Fung. Range
2001	10	56.9	58.6	57.8 - 60.6
2002	8	49.7	49.3	48.5 - 50.4
2003	9	49.7	53.1	50.1 - 53.8
2004	8	60.6	62.8	62.0 - 65.8
2005	8	56.5	56.5	55.1 - 57.8
2006	8	54.5	56.1	54.5 - 57.6
Average		54.7	56.0	54.7 - 57.7

Over time, Fungicide seed treatments have produced $2.5 for each $1 spent. Some materials produced a 500% profit.

2448 plots

Ohio Soybean Inoculation Summary, 2001-2006, (six locations per year).

Year	No. Treat.	UTC Yld	Inoc. Yld	Inoc. Range
2001	14	56.4	58.5	58.1 - 59.4
2002	16	49.6	49.2	49.1 - 50.6
2003	17	50.0	51.5	50.5 - 52.6
2004	20	59.8	62.6	61.6 - 63.7
2005	19	55.2	56.9	55.7 - 58.6
2006	24	53.5	55.1	53.5 - 56.9
Average		54.0	55.7	55.0 - 57.0

Over time, Inoculation has produced over $3 for each $1 spent. Some materials produced a 500% profit.

5696 plots

WWW.agcrops.osu.edu

The Ohio Agronomy Team Web site where you can find everything you need to know about crop production and management.

Questions ?

beuerlein.1@osu.edu

Session #3
Unlocking Wheat's Incredible Yield Potential!

Jim Orson
Research and Technical Director
The Arable Group
Norfolk, UK
jim.orson@thearablegroup.com

A recent history of yield improvement in the UK

Yields of wheat in the UK have doubled over the last forty years and now average 8.0 t/ha (120 bu/ac), with the best growers consistently achieving over 10.0 t/ha (150 bu/ac).

The start of unlocking the yield potential of the crop was set in the early 1970s when effective herbicides for the control of annual grass weeds were introduced. These allowed wheat to be grown more regularly on the land most suited to its production and also allowed the adoption of earlier sowing dates in the autumn, hence increasing yield potential and enabling the operation to be carried out when the soil was normally drier.

Shortly afterwards wheat cultivars containing the semi-dwarfing gene were introduced. These increased the harvest index (the proportion of above ground biomass in grain) and often reduced the risk of lodging. The increased yield potential of cultivars introduced from the early 1970s onwards has been associated with more grain numbers per unit area of crop. Initially, this was through increased numbers of grain per ear and directly associated with the introduction of the semi-dwarfing gene. More recently increases in grain number per unit area in new cultivars have come from improved growth rates prior to anthesis (the start of grain fill) and this has also provided a larger source for grain filling through increases in stem soluble carbohydrate reserves. The improved growth rates are probably due to increase efficiency in solar radiation use.

Fungicides for the control of cereal leaf diseases were introduced in the late 1970's and thus the final piece of the jigsaw was in place. More nitrogen could be applied because the yield potential was higher, the crops were less prone to lodging and the additional levels of some diseases due to the more succulent crops could be controlled. Nitrogen doses doubled between the mid-1970's and mid-1980's.

Yields have plateaued over the last ten years

Yields have increased only marginally over the last ten years. There may be several reasons for this, including the fact that yields may be approaching the maximum for the UK's soils and climate. However, plant breeders are confident that slow but sure progress can be made in the foreseeable future. Over recent years the slowing of the

rate of yield improvement has resulted in the UK farmer concentrating on reducing the cost of production. This has been mainly through reductions in labour and machinery costs and so the size of management units for combinable arable crops has increased significantly. Paradoxically, this in itself may also have resulted in some loss in the rate of yield improvement.

What is the potential for wheat yields?

The field record for the UK is somewhere between 12.0 and 13.0 t/ha (180-195 bu/ac). The world record is 15.36 tonnes/ha (228.5 bu/ac) from a UK bred variety in New Zealand. Higher yields are possible in New Zealand because, like in the UK, conditions allow for sufficient growth prior to anthesis (the start of grain fill) but also provide better conditions during grain fill, provided that there is sufficient water supply to the crop.

Grain fill for UK varieties is controlled by thermal time and lasts around 700 day degrees centigrade. Yields are largely dependent on the amount of solar radiation that can be trapped by the crop during this time. In New Zealand the period of grain fill can be cool and so can last for the same or an increased number of days than in the UK. However, solar radiation per day can be around 20-30% above that received during grain fill in the UK. Hence, in the UK at least, the key to increasing yields further is to improve the production of assimilate (source) to fill the grains because it appears that the cultivars are providing a sufficient capacity (sink) to store it.

High temperatures can reduce the number of days of grain fill without the commensurate increase in solar radiation. In addition, very hot weather, particularly at or shortly after anthesis, can cause temporary water shortages in the crop and can potentially reduce yield despite the soil being well supplied with water.

A typical management regime for winter wheat in the UK

Half the area of winter wheat is established after non-inversion tillage. This may not be classified as minimum tillage because typically the primary cultivation moves all of the top 15 cm of soil.

The crop is sown from 1 September to 15 October unless there is a delay caused by harvesting the previous crop. Usually yield potential is similar throughout this period of time. However, there can be yield penalties for delaying sowing on light soils beyond mid-September when autumn/winter growth is limited and there is a drought in the spring. Second and third wheats are sown in October to reduce the root disease 'take-all'.

Seed rates are adjusted in order to establish around 125 plants/m^2 for early September sown crops and around 250 plants/m^2 for mid-October sown crops. In the UK, wheat is

generally unresponsive to seed rates above the minimum required to optimise returns. This does not appear to be true for wheat in more hostile environments where seed rates appear to be a more crucial issue because excessive plant numbers can reduce yield potential due to increased moisture loss.

Herbicides are often applied for annual grass weed control, certainly early post-emergence of the crop, and are commonly preceded by a pre-emergence herbicide. Surviving broad-leaved weeds are treated in the spring prior to the first node detectable stage.

Plant growth regulators are applied in the spring according to lodging risk. Their application is often combined with herbicides and/or fungicides.

Around 220 kg/ha nitrogen (195 lbs/ac), usually as ammonium nitrate, are typically applied to feed wheats. Doses are considerably lower on organic soils or after organic manures have been applied. The first dressing is made at the start of rapid spring growth in mid-February to early March. The main dressing is applied in mid-April at around the first node detectable stage and the final dressing when the crop has two nodes in early May. Milling wheat usually receives additional nitrogen in order to boost protein levels at the second node detectable stage or as foliage applied urea at the watery to milky ripe stage.

The seed typically receives a fungicide dressing for seedling diseases and, in second or third wheats, for take-all control. Foliage applied fungicides are applied in the spring. The main disease is *Septoria tritici* (*Mycosphaerella graminicola*) and the aim is to provide adequate control on the final three leaves of the crop which trap the solar radiation during grain fill. This is achieved by two or three applications of fungicide mixtures, the first of which is applied when the final leaf three has emerged, usually at the second node detectable stage. A second application is made after the emergence of the final (flag) leaf and a third is usually made at mid-anthesis. Doses and product choice will be adjusted according to cultivar susceptibility, the risk from other diseases and also the amount of rain (*S. tritici* is spread by rain splash). This programme will normally control other diseases but earlier applications in the spring will be necessary should yellow (striped) or brown (leaf) rust or high levels of powdery mildew be present.

Crops drilled early in the autumn will be seed dressed and/or foliage sprayed with an insecticide according to the assessed risk from aphid transmitted viruses. Insecticides may be sprayed in the summer for the control of orange blossom midge and/or grain aphids.

Session #4
Production Pundits

Deb Campbell Syngenta Seeds	Pat Lynch Cargill	Peter Johnson OMAFRA

Looking for top technical advice? Get your crop production questions ready!

Please use the balance of this page for notes.

Farm Credit Canada

Session #5
Early Planting Pays, Right?

Peter McClary Arva, Ontario	Percy Harrison Durham, Ontario
Grower TBA	Adam Hayes, OMAFRA, Moderator

Presenter Peter McClary

In the past twenty-five years, we have planted as early in the spring as possible. In the beginning, the number of acres we had to plant was a strong reason to plant early. Now, as soon as the soil is ready, the corn and soybeans go in. With the improved hybrids, spring frosts have not been a problem. It is our experience that the plants will take a frost in the early spring better than in the fall. With early planting, the corn and soybeans benefit from more exposure to available heat units. We are very satisfied with the increased yield.

The land we are farming is mainly London loam and we leave the heavy clay fields to the last of planting. Soil readiness is the crucial factor in deciding when to start planting. We wait until moisture conditions are ideal. Temperature is not a major factor. With careful assessment of soil conditions, it has been our experience that early planting consistently provides potential for higher yields.

Presenter Percy Harrison

KEY POINTS TO CONSIDER FOR SPRING FROST SEEDING

1. Fall Burn Down of Perennial Weeds
- most important
- eliminates early established weed competition

2. Equipment Requirements
- no-till drill works best
- floatation tires or duals properly inflated

3. Crop Rotation
- good rotation minimizes risk for any crop
- planting into soybean or canola stubble preferred

4. Residue Distribution

- care in setting combine chopper pattern important to prevent chaff and straw trails across field that may harbour slug populations especially with headers in excess of 25 feet
- chaff spreader an asset

5. Treated Seed

- seeds will be in the soil longer before germination
- value of seed treatment becomes evident

6. Starter Fertilizer

- 50 to 70 pounds of MAP
- even with good soil fertility

7. Boost Seeding Rate

- plant by population or pound?
- 5 to 10% increase in rate

8. How to Plant the Field

- type of soil
- amount of frost
- time of day
- head lands first or last?

9. Annual Weed Control

- weed control timing may surprise you
- tends to be earlier

Session #6
Nutrient management of dry beans: Nutrients to shovel and those to sip

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Brian Hall
OMAFRA

Dry beans have been considered a high value crop so fertility research has been done in recent years to determine crop nutrient needs and their response to applied fertilizer.

To assist in nutrient budgeting we determined nutrient uptake (contained in the whole plant) and removal in the seed for a 1250 lb/ac white bean crop and a 2300 lb/ac pinto bean crop. The amount of nutrients removed in the seed of these 2 crops varied from 45-70 lb N/ac, 14-32 lb P_2O_5/ac and 23-48 lb K_2O /ac. The uptake and removal amounts for these and other nutrients is reported in Table 1 scaled according to nutrients per cwt produced and compared to values adapted from the CFI Canadian Fertilizer Institute (CFI) 'Nutrient Uptake and Removal' charts for Eastern Canada (1998), a commonly used reference for fertility planning.

Table 1. Nutrient uptake and removal per cwt of seed yield produced.

	Manitoba –based on 12.5 and 23 cwt/ac		CFI based on 18 cwt/ac
Nutrient	Uptake*	Removal**	Removal**
	lb of nutrient per cwt seed yield		
N	3.9-4.7	3.0-3.5	4.2
P_2O_5	1.4-1.6	1.1-1.4	1.4
K_2O	3.9-4.1	1.9-2.1	1.4
S	0.28-0.34	0.22	0.28
Ca	0.6-3.0	0.07-0.37	0.11
Mg	0.54-0.70	0.2-0.5	0.11
Zn	0.005	0.0034	
Fe	0.02-0.06	0.005-0.007	
Mn	0.004-0.014	0.001-0.002	
Cu	0.0007-0.0013	0.0005-0.0009	
B	0.005	0.0013-0.0022	

When values are scaled by the yield produced values are generally similar to those of the CFI guidelines. It also illustrates the very small uptake by micronutrients, and that soil depletion with bean harvest would be very slow. Some of our crop advisors use such guidelines when developing nutrient budgets for fertilizer programs for growers.

The nutrients that have been recently studied in Manitoba for response are nitrogen, phosphorus and zinc.

Nitrogen

Dry beans are rather inefficient at fixing N and typically obtain less than half of their N requirements through Rhizobium fixation. Recent field studies indicate treatment with rhizobium inoculant is rather ineffective on current dry bean cultivars grown in Manitoba. Conversely, bean response to applied N fertilizer has been large and recommendations have been developed based on the soil N test and expected bean yield (Table 2). The field bean production system influences the response to applied N, with narrow row beans being more responsive than beans in wide rows. When beans are grown in wide rows with inter-row cultivation to hill plants and control weeds, mineralization of organic N is encouraged due to soil disturbance and aeration. When beans are grown in narrow rows the applied N modifies the plant architecture to make it more suitable for direct combining. Plants are up to 3" taller and pods are held higher off the ground which increases the harvestable yield.

Table 2. Nitrogen recommendations for dry beans in Manitoba (spring applied N).

		NITROGEN RECOMMENDATION (lb/ac)					
Target Yield lb/ac		1,200		1,800		2,400	
Production system		Wide row	Narrow row	Wide row	Narrow row	Wide row	Narrow row
Fall Soil NO_3-N Lb/ac in 0-24 in	Rating						
20	VL	0	40	35	70	50	100
30	L	0	30	30	60	45	90
40	M	0	20	25	50	40	80
50	M	0	10	20	40	35	70
60	H	0	0	15	30	30	60
70	H	0	0	10	20	25	50
80	VH	0	0	5	10	20	40
90	VH	0	0	0	0	15	30
100	VH+	0	0	0	0	10	20

(Soil Fertility Guide, Manitoba Agriculture, Food and Rural Initiatives)

High N rates on beans were feared to cause problems with delayed maturity and increase in white mold severity. However research trials and on-farm-tests have shown only a minor impact on maturity and white mold (Table 3). White mold is more prevalent in high yield potential crops regardless of N application, so growers should scout fields and apply fungicides when warranted. Nitrogen removal is high through increased yield and bean protein concentration, however high N rates may raise levels of residual soil N. So post-harvest fall soil sampling for residual nitrate is important for Manitoba growers to fertilize succeeding crops accordingly.

Table 3. Influence of applied N on bean yield, maturity and white mold incidence (mean of 7 studies).

Applied N lb N/ac	Yield Lb/ac	Days to mature	White mold incidence (plants in 10)	Protein Content %
0	2470	99.5	2.3	22.3
45	2795	99.6	3.0	22.3
90	3050	100.2	3.6	23.2

(McAndrew, AAFC-Morden)

Phosphorus

Although beans are known to be sensitive to seed-placed fertilizer, many new growers do not have specialized planters and are used to seeding narrow row crops with seeders which single shoot or seed-place fertilizer. Five studies of phosphorus (P) placement on dry beans showed stands were significantly reduced when more than 9 lb P_2O_5/ac were seed-placed. Yield was significantly reduced with seed-placed P at one of the 5 sites. Hence recommendations restrict a maximum safe P rate of 10 lb P_2O_5/ac for narrow row beans (<15" wide rows) and none for wide row beans. Many growers avoid this problem by pre-plant banding or broadcasting phosphorus or side-banding at seeding.

Zinc

A number of Manitoba studies with dry beans were initiated in 2000 to derive the critical value for zinc (soil extractable DTPA) and to assess various Zn fertilizer products for either soil and/or foliar application. Beans only responded to zinc application on soils containing less than 0.5 ppm DPTA extractable Zn with an average yield response of about 20% with no influence observed in maturity. This critical level is substantially less than those critical levels reported in Alberta recommendations (1.5 ppm DPTA-Zn on medium-fine textured soils and 3.0 ppm DPTA-Zn on sandy soils). Plant tissue sampling for zinc was not consistent and less useful in determining deficiencies. Navy beans are normally considered zinc inefficient and had lower plant Zn concentrations than pinto beans. Beans on deficient soils responded to foliar zinc with increased yield at one of 3 sites. Dry bean yield was consistently increased with broadcast and incorporated application of 5 lb Zn/ac as zinc sulphate.

Table 4. Bean response to zinc fertilizer on 3 deficient sites (<0.5 ppm DPTA-Zn).

Site	Check – no Zn	Foliar Zn (0.3 lb Zn/ac)	Broadcast/Incorp Zn (5 lb Z/ac zinc sulphate)
	lb/ac		
St. Jean 2000	1876	1644	2115
Miami 2000	1915	2300	2714
Altona 2002	2515	2485	2593

(from Goh and Karamanos, 2003)

Summary

Fertilizer recommendations for beans are based on soil sampling. In Manitoba beans frequently are grown in rotation with crops such as corn and potatoes which typically receive high rates of fertilizer. In such cases beans tend to do well with moderate fertilizer rates and coasting on residual fertility.

Bean yield tends to be most response to nitrogen with slight response to phosphorus. Response to zinc was observed at low soil test levels and was best corrected with soil applications.

Session #7
Pasture Strategies in Dry Years

Mike Earley Kerwood	Jack Kyle OMAFRA

Finding ways to manage your pasture crop in dry years.

Please use the balance of this page for notes.

Session #8
Getting Down to the Grass Roots

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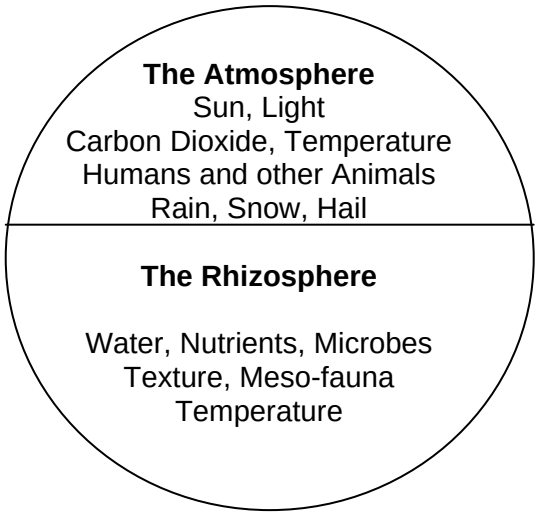
Every one is familiar with leaves, stem and fruit of the plants we grow for food, fodder, and, now, energy. And now, the rest of the story…



A plant "sees", interacts, with more things in the soil than it does above ground. Although roots comprise, at most, 20% of a plant's biomass, they have 80% or more of the plant's surface area. Roots provide a plant with water, and nutrients while providing anchorage. If you look at, an alfalfa or pasture plot, everything looks relatively uniform. That is because, with the exception of animals that browse or things that fall from the sky, there is not much for the shoot to interact with. What we cannot see below ground is the huge diversity of things that the plant has to interact with through its root system. For instance, if there is a drought and you choose to water the plants you do not give the shoot water directly, you irrigate the roots. Because the soil is opaque (light does not penetrate), the farmer cannot see when things are going wrong with the roots. Usually it becomes obvious that there is a problem when the shoot wilts, turns a color other than green, or stops growing. That is usually too late. However, something can be done to provide an earlier, and more specific warning that there is a problem.

What IS a root?

With only a couple of exceptions, all plant root systems have the same kind of roots and rooting patterns. As seedlings, all root systems look alike.

- Tap Root
- Basal Root (Seminal)
- Shoot Borne Root (Nodal)
- Lateral Root (branch off another root)

Because grass roots do not thicken as they age, grasses rely more on shoot borne roots than do broad-leafed species. It is this reliance on shoot-borne roots that gives mature grass root systems the aspect of a shallow dense root system. With in a functioning root system, there are two distinct types of lateral root. Long lateral roots contribute to the spread of the root system, and short lateral roots (less than 2 cm long and generally less than 0.5 mm in diameter), provide the majority of water and nutrient uptake.

Become familiar with your ROOTS

Beginning with the coming season, keep a shovel with you, and dig up a plant or two of each species in your plantings, every couple of weeks. Do this with every field you work with, every year. Soon, you will begin to see differences in growth patterns between cultivars, species, and soils. With both grasses and broad-leafed plants, you will see relatively fewer fine roots in a shovel full of soil if the crop is healthy. If the crop is suffering, you will see a proliferation of fine roots in a shovel full of soil. Of course the relative amounts differ with cultivar and species, so you have to follow their development and become familiar with the “optimum”-growing growing pattern.

Farmers:

Be outstanding in your field (with a shovel).
How deep are your roots? Approximately 2+ meters for all crops, depending, of course, on soil conditions.

Ask the seedsmen, breeders, consultants what the specific characteristics of the root systems of the cultivars they recommend are. They probably can’t answer, but if you ask enough they will find out and eventually be able to tell you.

Different cultivars can have dramatically different mature root systems that can help the plants adapt to differing soil conditions. The reason a cultivar works in one field, and a different cultivar gives better yields in another just may be because of better root system structure. Knowing your roots will tell you.

Pasture and turf systems

These have some unique problems and opportunities.
What happens to the plant when it is grazed or clipped/mowed? Most frequently a number of the smallest roots die off within 24 hours, to be replaced by new roots within 72 hours. The number of roots that die back is dependent on the severity of the clipping, the growing conditions, and the cultivar/species. Many cultivars initiate the replacement roots closer to the root surface. This would effectively reduce drought tolerance towards the end of a growing season with multiple clipping or grazing cycles.

Many grass species have an adaptation that allows them to survive water logging or high water tables. They develop pores in their roots (aerenchyma) that allow air (oxygen) to diffuse to roots that are under water. Some species/cultivars do this all the time (constitutive), while others do it only when confronted with excess water (facultative).
Some cultivars develop large numbers of fibers in their roots. Not only does this help them penetrate heavier soils, but also it adds slowly degradable materials to the soil, improving soil quality and sequestering more carbon.
Nearly all species develop an association with mycorrhizae, a fungus that grows in the roots and out in the soil, moving nutrients and water to the roots. Different cultivars respond differently to different species of these fungi. Many are more or less positive relationships.

There is another type of fungus (endophyte) the lives in the shoots of most turf and pasture grass species. This endophyte has been shown to increase the exudation of chemicals from the roots to improve disease tolerance, drought tolerance, and nutrient uptake. Unfortunately the endophyte is Tall Fescue in mildly toxic to cattle.

- Do you know the characteristics of the species in your pastures or turf plots relative to the above?
- Does your seed company know? Does your consultant?
- Choosing appropriate cultivars can take advantage of these conditions and situations.

Session #9
The Challenges of Growing Organic Corn

Paul Watson
Great Lakes Organic

The challenges that faced our forefathers to grow corn are similar to the challenges that face the organic farmer today.

Many of you said that you were farmers. How many of you have never grown corn before?

To you conventional corn growers: what are the tools you have been given to use and what tools seem to be promoted the most?

- Seed genetics (stacked)
- Chemicals for weed control
- Equipment and technology from planting to harvest including grain conditioning at the end
- Fertility program

Everyone uses the tools he has to the degree he can afford within the bounds the tools are allowed. These tools may vary somewhat growing seed corn or sweet corn or some IP varieties. Every speciality market has its quirks and hoops to jump through. Certified Organic is no different – it is just the "Organic Twist" to corn growing.

Let's go back to the list of tools a conventional grower has and see how they differ from an Organic Corn Grower.

Genetics

Who remembers open pollinated corn. We as Organic Growers, may consider this an option if we have a specific goal in mind, ie. Protein. But we also have a wide selection of hybrid corn varieties to choose from and in some instances if the variety you want cannot be found as organic seed, you may be able to use it anyway, if it is untreated and not genetically modified, depending on the market you are selling into.

The Organic industry, like the Conventional industry, is ever evolving and presently, I believe the lack of seed treatment in the Organic world puts the Organic Grower at a disadvantage to the Conventional Grower. I also believe this will be short lived. Demand has always driven availability and as the demand for Organic Corn Seed increases, the agronomists will look for ways to improve their seeds that will be accepted by the Organic Standards to meet the needs of the grower. As you may know, any GMO

traits that have been engineered into many of the corn varieties are not accepted in the world of organics.

In conclusion, Organic Farmers have good quality seeds to work with, but they are looking forward to advancement in insect control through seed treatments for early planting protection.

Chemical Weed Control

This is probably one of the major differences between conventional corn growing and Certified Organic farming. As organic farmers, we look towards mechanical weed control much like your fathers did. We, however, have the advantage of this age of technology we are in, from GPS for accuracy to the very efficient row cultivators of the present, the rotary hoe, tine weeders, propane burners and OOOh yes, hand weeding. We have many weed control tools to use. They are, however, more time consuming methods that the 150 foot sprayer boom. These mechanical methods are very time sensitive, not unlike the sprayer counter part, but if done properly can produce satisfactory results. Once again, I feel we have tools in this category that make farming without chemicals today much easier and more successful than our fathers.

Equipment Technology

I have mentioned how this has helped in weed control. The rest of the technological benefits are utilized by the corn grower, whether he is conventional or organic. The fancy planter, the harvesting equipment and the drying and storage equipment. Available to all.

So we have many similarities as well as a few differences. What's next??

Fertility

Organic Farmers farm without fertilizer – right?? WRONG

I was raised in the conventional ways of farming using soil testing methods and meeting the goals derived with this knowledge. Organic farming is just as precise. Over the years, I have teamed up with a U.S. group called MBA. Their slogan is **M**ineralized **B**alanced **A**griculture. Through them, I can buy a complete fertility program with approved products.

- Starting with a soil correction (gypsum or lime).
- Soil building program say Potash, Phospate
- Supplemented with a spring application of nutrients to meet that crops' needs, either broad-cast or band near the row with the planter.

The sources of our plant nutrition will vary, however from conventional. For example, Organics cannot use MAP or DAP. The methods used to make these products more water soluable are not acceptable Organic methods. We, therefore, must use just the finely ground phosphate rock, for example. And so it is with many of the mined minerals which are applied conventionally to the crop of corn.

I believe this is when the conventional farm and the organic farm tend to differ – unless you are a Biological Farmer. To make these added minerals available to the Organic Farmer, we must depend on our soil biology. The more active, alive and healthy our soils are the quicker the breakdown of the minerals and plant material in our soils. Our soil health is one of our most precious resources and our method of farming will directly affect the livelihood and survival of this biology.

The nutrient I have not mentioned yet is nitrogen. This is where our biggest differences lie. If an Organic Farmer wants to buy nitrogen, he must purchase manure or compost or some low nitrogen source such as fish. Nitrogen management is one of great focus to an Organic Farmer. One of our best sources is from a legume crop grown the previous year. Another source would be a green manure crop worked in just before planting and therefore crop rotation is very important to an organic farmer. How similar is this to the way our fathers farmed.

Compost and manure end up being an Organic Farmer's best friend, but you must recall all the reasons why you the Conventional Farmer has gotten away from manure in the past. There are still challenges. Everything has a trade off, but for us we need the N factor.

So you are an organic farmer:

The OM of your soil is between 3 – 5% due to the building program you have been implementing. You have corrected your soil imbalances through your soil sampling program. Your soil biology is alive and well and has the kind of numbers that enhance the digestion of minerals and plant material at a rapid enough rate to produce the availability of nutrients needed to grow a good crop of corn. You feel confident with the tools you have to maintain proper weed control and you have purchased the best seed you could to grow the best crop you can.

Does it all just happen? NO. It all comes back to you ,the management component. Just as in Conventional Farming, the management is what pulls it all together to make it successful.

Session #10
Manure Application BMPs

Bill Deen University of Guelph	Christine Brown OMAFRA

When commercial fertilizer prices are rising to over $0.50/lb for nitrogen and phosphorus, the obvious best management practice for manure is to maximize its nutrient value.

Available Nutrients in the Year of Application and Value of Livestock Manure

Animal Type	DM %	Useable N[1] lbs	P_2O_5[2] lbs	K_2O lbs	Year 1 Value $	Year 2-4 Value[3] $
Liquid Hog	4	27 /1000 gal	12	19	25.45 /1000 gal	7.75 /1000 gal
Liquid Dairy	8	18 /1000 gal	8	26	21.25 /1000 gal	5.80 /1000 gal
Solid Cattle	27	3.7 /ton	3.6	11	7.25 /ton	3.05 /ton
Poultry layers	34	21 /ton	16	17	24.90 /ton	11.05 /ton
Poultry broilers	69	24 /ton	25	33	36.85 /ton	18.25 /ton
Sheep	34	6 /ton	5.2	17	11.75 /ton	3.85 /ton
Horses	37	2.6 /ton	2.8	9	6.25 /ton	2.30 /ton

[1] Amount of N a crop can use assuming spring application incorporated within 24 hours
[2] Represents the 40% of the phosphorus in manure that is available in the year of application
[3] Value based on N-P205-K20 equivalent (N=$0.55/lb, P_2O_5=$0.50/lb, K_2O=$0.35/lb) Year 2-4 Value represents the additional nitrogen and the remaining phosphorus.

Best management practices (BMP's) are defined as proven, practical and affordable approaches to conserving soil, water and other natural resources in rural areas.

BMP's often seem to be the common sense approach, but sometimes BMP's conflict and sometimes the question gets asked – Is this practice really better?

During the past few years some of the manure application practices have been studied to verify the potential benefits and to fine tune the understanding of nutrient availability and environmental losses. This presentation will go over some of the results from these studies. A few highlights:

- Manure applied to cover crops can increase the biomass produced by 33-50% which decreases soil nitrate in the fall, but does this reduce fertilizer N requirements of the next crop?

- What is the profit impact of nitrogen rate? Is it possible that liquid hog manure applied at any rate between 4,500 and 8,000 gallons/acre can be within $10/ac of the maximum economic return on nitrogen (MERN)?

- How does the type of manure and the timing of application impact nutrient availability? Is it better to apply solid manure in the fall to maximize nitrogen availability the following spring? Is side-dressing of liquid manure a good option?

- Ammonia Losses with Liquid Manure: What have we learned about ammonia loss during different parts of the growing season? What is the impact of surface applied liquids compared to manure that is injected, cultivated or applied using an aerway?

- BMP's that suggest manure be incorporated as quickly as possible and BMP's that suggest no-till or minimum till for residue management in erosion control are conflicting. Is there a compromise that can incorporate both BMP's?

- Spring applied manure on wheat: 2/3 manure 1/3 commercial N gives better results than just commercial N alone.

- Manure applied onto forages after 1st or 2nd cut: Can we consistently increase forage yield by applying manure?

Session #11
Fine Tuning Combines for Food Grade and Identity Preserved Crops

Henry Denotter, Kingsville	John Deere STS
Dave McCallum, Iona Station	John Deere STS
Dave Ward, Strathroy	Case IH Rotary
Rick Willemse, Park Hill	Case IH Rotary

Getting Started

- The operator's manual is a good place to start to know how to set your combine for specialty crops
- Once in the field, adjustments will have to be made given the crop, the conditions and the harvest sample
- Second requirement to do a good job is Patience, Patience, Patience

Getting Ready Starts before the Field is Planted

- The field needs to be in good shape even before you plant
- Fields should be smooth to minimize dirt pickup
- Previous crop residues, such as corn stalks, can cause harvest issues
- Soybean fields should be free of weeds
- Narrow row soys seem to grow higher off the ground than wide row beans
- Combining narrow row beans straight on feed great and you won't have to set air reel at high speed
- Wait a couple of days when planting conventional beans so that the food grade are ahead of the rest

Header Cleanout

- Heads are best cleaned out dry, and disconnected from the combine.
- This lets you blow out from the back and middle more thoroughly and also helps with feeder house cleanout. Make sure to get all the nooks and crannies
- The grain head cleans fairly easy but most forget the inside of the table auger
- If you own an F series JD head, you will get lots of junk out of the auger

Header Setup

- Make sure the knife is sharp and adjusted properly. A badly worn knife will tend to drag beans and can cause them to lay on the knife resulting in mechanical damage and header loss.
- Make sure the air reel is aimed properly (if you have one)
- Make sure header height is not set too low to prevent a good lift response as this can drag dirt or mud from excess weight on the knife

- In narrow rows, try to combine with the wobble box on the outside as much as possible to avoid flattening adjacent uncut rows, which can add dirt or mud tag.
- If pushing dirt is a problem, try tilting the head back on its heel slightly.
- Good time to get under skid plates and in the corners before tying it up
- Air reels are great. They help feed in grain on those big heads but add dirt.
- Keep air reels up and slow them down

Feeder House Cleanout

- With the header removed, lift the feeder house to the top and open the stone trap.
- Use an air hose with a long wand (i.e. 3 ft. brake line) to get all the way in and over top of slats and shafts. Be thorough, even front and back corners.
- Blow everything that's left in the feeder house into the rotor cone then start up the separator and run the rotor at high speed using the draft from the impeller to suck up anything lying in the transition cone.
- Be sure and check front and back corners of the feeder house
- Look at the concave or front beater depending on your machine

Feeder House Setup

- Make sure the feeder drum height is adjusted properly. Keep it up slightly to minimize mechanical damage to seeds.
- A low drum with a loose chain can damage seed coats when running empty.
- Feeder house chains and elevator chains need to be properly tensioned
- Slapping and dragging feeder house chains will break soys

Clean Grain Elevator Cleanout

- Blow out thoroughly with an air hose.
- **If you have a yield monitor, don't forget to clean out the moisture meter auger.**
- Look at hinge points of fold down extensions to remove trapped grain

Clean Grain Elevator Setup

- Adjust the clean grain chain to leave it slightly loose as this seems to help reduce mechanical damage.
- A good rule of thumb for elevators is that the chain needs to sit in the sprocket but you should still be able to turn the roller with your fingers
- A smaller drive sprocket can be installed to slow down the clean grain elevator to minimize less seed damage.
- Soybeans do not require the volume and capacity of corn and the elevator should dump just as well as at full speed.

Grain Tank Cleanout

- After opening the sump cleanout door, run the unloading auger to throw out any remaining crop and blow the remaining grain out of the bin with an air hose.
- At this point, the inspection plate near the elbow of the unloading auger can be removed and the auger can be packed with wood shavings or sawdust. Running the auger will clean out whatever grain is in the tube.
- Straw can also be used to cleanout unloading augers
- Stuff three slabs of straw in the unloading auger while it is shut off and then run it through. Maybe do it a couple times with new straw
- This works on transport augers as well but you might need more straw

Grain Tank Setup

- Unloading gates in the grain tank can be set about 2/3 open so as not to pack the grain too tightly in the vertical auger which should result in less mechanical damage.
- It's also a good practice to unload at half-speed.

***** Remember: BEANS + AUGERS + SPEED = DAMAGE !***

Rotor Cleanout

- First, blow out all debris in the return auger under the sieves.
- Take some sawdust and pack the return boot full and start the machine. This will clean out the return sump at the top of the return leg. This should be done before cleaning anything else.
- Once the feeder house has been cleaned thoroughly, the outside of the rotor cage should be blown off; especially on top as lots of trash usually collects there.
- Remove the front covers at the bottom of the auger bed after running the rotor and separating unit at high speed to clean out the transition cone and auger beds.
- Next, use the air hose to blow out any remaining trash which should fall out onto the front axle.
- Blow off the ripple deck sending any trash into the clean grain auger. Usually, there is a small hole where air can be directed to blow air under the clean grain auger which should clean out thoroughly right to the elevator.
- Don't forget to repeat this with the return auger. Once this is done, the threshing area should be clean, but keep in mind that different models have different areas where grain can lay, so adjust this procedure accordingly.

Rotor Setup

- Always remember that **Beans Thresh Easily!**
- The only reason for speed in soys is to get tough straw through the rear of the rotor. Otherwise, try to run rotor speed as low as possible.
- IH 40/60 can be as low as 300- 400 rpm, 80 series can be 240-350 rpm.
- **Be careful since the combine can plug easily at slow rotor speeds!**
- An aid in reducing rotor speed is the addition of Gordon Bars, as these rotor pad replacements will add more surface area.
- Concave fillers are used frequently, but these add-ons reduce the separating area and keep beans in the rotor longer which can add mechanical damage.
- It's important to remember that the faster the seed can make it to the separating area the better, to minimize damage and tag.
- Once the beans are threshed, the less they are handled, the better.
- Another consideration is installing slotted grates in the separating area of the rotor. This will keep more pods in the rotor cage to send them out the straw spreader.
- It also yields more beans and less pods on the sieves making for a better separation, a better sample, and less chance for mud/dirt tag from trash.

Cylinder & Concave Setup

- Most will set up for wheat which is OK because wheat will help polish and clean out little strays and a quick blow out after wheat you are good to go
- Start with a slow cylinder speed and increase speed till you are cleaning out almost all the soys with a of minimum cracks
- Concave setting will depend on seed size so you need to know the variety and do a little for a sample (e.g. Kents, 671, 1843, etc.)
- Some combines have very aggressive rethreshing. systems and might as well be hammer mills

Fan Cleanout

- Look down through the sieves to make sure that there is no grain sitting on any ledges where the air exits the fan.
- Also, make sure that the fan housing has no grain sitting in the bottom.

Fan Setup

- Fan speed should be as high as possible without blowing the grain out the back.
- The principle is to fluidize the un-cleaned mass as it falls onto the sieve and let it flow out like water. As it flows and evens out, the heavier grain will drop to the bottom and the chaff will come to the top and exit out the rear.
- The idea is to have this process take place over as much of the sieves as possible, so the sieve can be set tighter and do a better job of separating.
- Less trash in the sample means less possibility of dirt/trash tag

Sieve Cleanout

- When cleaning out the sieve area make sure that all previous trash and grain is removed by opening the sieves all the way
- Check under both sieves and the clean grain auger area and remove any material

Sieve Setup

- Set sieves as normal - keeping in mind that they need to be set so that as little as possible goes back into the return leg.
- Keeping the sieve setting as tight as possible will cause the grain mass to spread over more of the sieve area giving a better separation and a cleaner sample.
- Close the sieve down to throw seed on top and open till they fall through, then set top a little wider.
- It is best to keep returns to a minimum

Cleaning the Combine

- Cleaning the machine is important but dose not have to be a major issue
- Blow down the grain tank
- Best tool for this job is a good size engine-driven air compressor with at least 40 CFM delivery at 100 PSI and a long hose
- **Pressure washers are also useful but results in dirt sticking, cleaning things dry is better**
- Cleaning program should start in June or July just before wheat
- This way the combine is blown clean and put away in the fall or winter after the last crop harvested.
- Summer is warm and the combine gets a complete cleaning
- Open up all covers and sumps and clean thoroughly
- Put chopper up and drop deflector doors
- Pull out sieves and pressure wash completely, check for sharp edges
- There are panels under augers drop them
- Blow out engine compartment
- Pull out your bin window and clean with compressed air and Windex
- Blow out rotor and work down to grain pans or in JD you have augers on a pan and you need to get right into the corners
- Once in the bottom of the machine, get the pressure washer and flush everything out the bottom doors
- Get a 2 inch fire hose from a tanker and flush everything out
- Some dirt resticks due to the splashing
- Now is also the time to wash the body, a great job for the kids
- Every thing is clean and dry so now is the time to set it up

Combining Sequence

- Combining order makes life easier. Try to do food grade soys first before RR soys so a slightly earlier soy variety or planting date is important
- A new machine first crop this will help, no cleanout is needed but everything is sharp and aggressive and this will test you.
- That is why it is nice to run some crop through first, like wheat

- Do not pick up dirt. Dirt will stick in the combine somewhere and tag your soys and they will get rejected
- If you get dirt, work on cleaning it out check you elevator bottoms and your bin augers and of course under the table auger
- If you pick up dirt clean it out and dump soys in a separate wagon
- Green weeds and green soys will stain and get your soys rejected
- Do headlands and weedy spots first and dump into a separate wagon and then go for sample. This is also time to fine-tune the combine
- Once you find the settings that are giving you the job you like, write it down. The best place to do this is on the machine with a permanent marker – record sieve settings, concave setting and cylinder speed
- This will change with seed size and the year but everything helps
- Green stalks on soys this year caused some tagging even in the cleanest fields
- When storing soys in a bin for latter delivery keep a sample from each load going into the bin
- Keep combine full when harvesting if possible
- Having a few pods in the sample is not an issue, it lets you produce a sample with less splits or cracks

- When you start food grade or I. P. beans do three or four starts and stops in the field
- Dump these into a separate slush wagon
- These beans should go to the crusher

- Buyers want food grade soybeans to be 14% moisture
- Combining at this moisture content is helpful in getting good samples but not always possible but 10% M.C. makes it a challenge

Other Considerations:

Grain can sit in some strange spots and then rattle into cracks and crevices contaminating an otherwise good cleanout job. Take time to clean off the remainder of the combine to minimize this potential. It's also good hygiene to keep engine compartments and other areas as clean as possible to minimize fire hazards and down time. This also gives the chance to look at the mechanical well being of the machine as bearing and belt problems can sometimes be hidden under debris.

In addition to a good cleanout and setup, daily maintenance is also a must. The harvest window for IP soys is narrow and usually limited to daylight hours. A breakdown at this time is frustrating and can waste a good combining day. Take five minutes every day to look at bearings, belts and pulleys. It's also a good idea to check the shaker arms for damage to the rubber bushings on a daily basis as sometimes these are not easy to get at and are better fixed at night when you can't combine anyway.

Grain buggies, hopper wagons, wagon tarps, transfer augers, dump pits, elevator legs and storage bins also need a thorough cleanout to remove remaining soybeans. Attention to detail and a good cleaning plan will aid in getting a near perfect cleanout of stray beans.

The following page is a sample of an ***Identity Preserved Contract Grower Check List.***

NOTES:

Identity Preserved Contract Grower Check List

Grower's Name (please print) _____

Identity Preserved Soybean Variety _____

Acres Planted _____ **Seed Units Purchased** _____

New Grower: Yes No #Yrs._____ **Do you grow RUR soys Yes No # Yrs**_____

The grower hereby certifies and warrants the following procedures and practices were followed:

At time of planting:

1. Confirm certified seed of the contracted variety was used. **Grower must retain all seed tags for each seed lot number** and the purchase invoice. **1.** ☐
2. It is a requirement to have a **written record** of crop rotations in place to ensure the previous crop grown will not affect the Identity Preserved Crop grown under the agreement of this contract. It is expected that sound management practices be in place to deliver a clean harvested soybean of the specified variety. **2.** ☐
3. Planter was thoroughly cleaned prior to planting; all soybean seeds of other varieties and other crop types were removed to ensure varietal purity. **3.** ☐
4. A minimum of 1 metre spacing was maintained between fields of different soybean varieties and fields of other crops. **4.** ☐
5. Grower will not plant where sewage/sludge has been spread putting the crop at risk for levels of heavy metals that may be considered to be harmful to human health. **5.** ☐

During the growing season (circle)

6. Weed pressure? None Light Moderate Heavy
7. Pest control measures (please state pesticide used and application rates):
   Burndown: _____
   Pre-emerge: _____
   Post - emerge: _____
   Insecticides: _____
   Fungicides: _____
8. Volunteer corn? Yes / No **IF YES, ALL CORN MUST BE REMOVED**
9. Canadian registered pesticides have been used at approved label rates. **9.** ☐

During harvest and storage:

10. Combine was thoroughly cleaned to remove seeds of other soybean varieties and other crop types prior to combining an IP variety field. **10.** ☐
11. All wagons, trucks and conveyance equipment used to deliver and transport IP variety soybeans were inspected by grower for cleanliness, and cleaned thoroughly prior to filling. **11.** ☐
12. If stored on farm, storage bin was thoroughly cleaned, of sound quality and clearly identified as storing an IP variety soybean prior to filling with IP soybean variety. A record of previous storage must be kept. **12.** ☐
13. Product does not contain Foreign Material that are allergens as defined by Health Canada **13.** ☐
14. Ensure that the product was not artificially dried with heat. **14.** ☐
15. I am aware that a delivery sample of my IP contracted soybeans will be retained by the receiving elevator for inspection and genetic identification as required. **15.** ☐

At ALL times:

Grower to ensure, to the best of their ability, that the above Identity Preserved variety is not contaminated with soybeans of other varieties at any time during the production, harvest or storage periods. Please note that your delivered crop must still meet all other quality criteria as detailed in your contract. I have read and understand all the conditions of this checklist.

Growers Signature _____ ***Date:*** _____

Session #12
Getting More Out of the Technology

Jamie McGrail McGrail Farm Equipment	Mike Strong Better Cropping Solutions	Karon Tracey-Cowan Ag Tech GIS

Please use the balance of this page for notes.

AgTech GIS

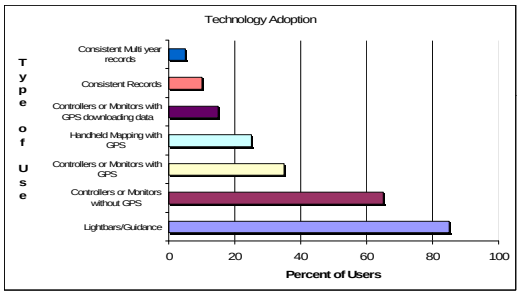
Getting the Most out of Technology

Karon Tracey-Cowan
www.agtechgis.com

The Guiding Principles

- Find out ALL possible functions
- Log Information with Location
- Office based software is the key
- There is no avoiding improving computer literacy
- Technology is not a one time purchase

Coffee shop statistics



What can it DO?

If you have a lightbar or guidance/GPS:

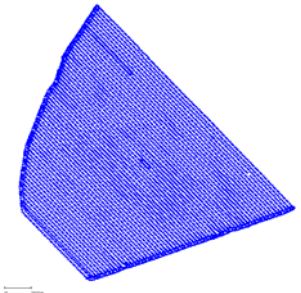
READ THE MANUAL

- Calculate area on first round?
- Store A-B lines?
- Fine tune settings?
- Diagnose GPS quality?
- Create coverage maps?
- Download jobs?
- Create field maps?
- Control or monitor rates?
- Connect to other systems?

Knowing where you are going

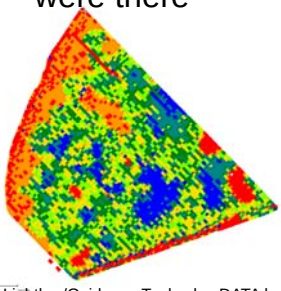
With Lightbar/Guidance Tools

Knowing where you have been



With Lightbar/Guidance Tools plus position logging
(site verification or coverage mapping)

Knowing what you did while you were there



With Lightbar/Guidance Tools plus DATA logging

(Rate Monitoring from a Controller)

Log information with location

- Connect a GPS with a logging device
  - Controller for as applied
  - Yield monitor
  - Field mapping software on handheld
  - Integrated mapping/record keeping software
- Most devices only ask you to identify field/job or product: the rest is automatic

You can learn from it <u>if</u> you log it

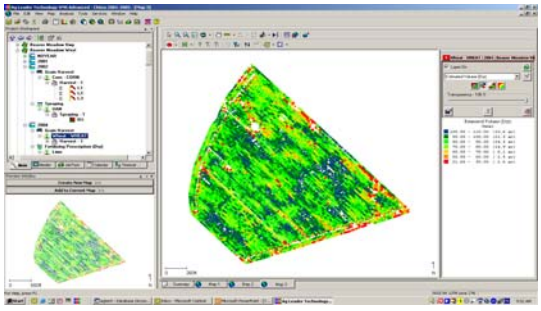
- Log varieties/application data both chemical and fertilizer/yield data
  - Compare yield by variety, yield by field area or fertility zones, year to year
  - Understand performance by field condition; slope, soil characteristics, fertility program
- All the analysis happens in software in the office
- Office software allows queries, comparison, analysis, permanent storage and <u>communication</u>

The Real Secret

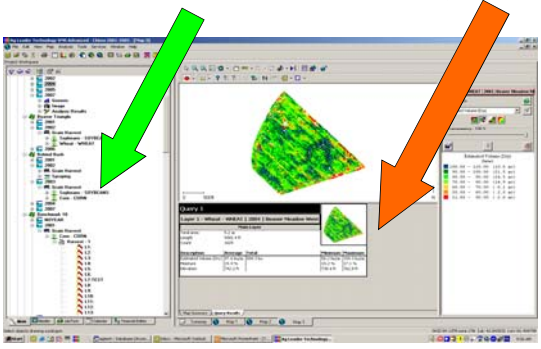
- Name your farms and fields consistently
  - **Grower/Client (that is the entire operation)**
    - **Farm (All fields or field groupings)**
      - **Field (the cropping entity: think "If I want to track this area year after year, I have to 'keep it together' and name it the same every time"**
- Name your jobs and fields as completely as possible so anyone will understand what you did, even years from now
- There is no way to over-emphasize this crucial organizational imperative
- Disorganized data is the single biggest impediment to moving forward

Office Software is Designed to Organize

By field, By year, By crop, By operation



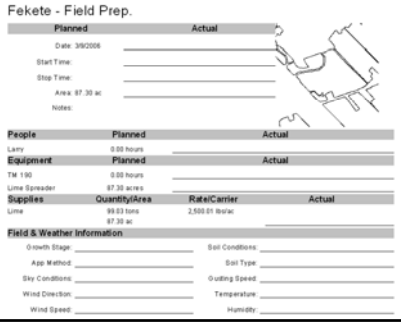
If you organize then you can analyze



Maps are a communication tool

- Overview maps illustrate field location for product delivery, support efficiency
- Emailed map-based data assist your agronomic service providers, support financial information to bank or share production status to staff/partners
- Clear picture to define due diligence/best practices

Communicate with maps


Fekete - Field Prep.

Planned	Actual
Date: 3/9/2006	
Start Time:	
Stop Time:	
Area: 87.30 ac	
Notes:	

People	Planned	Actual
Larry	0.00 hours	
Equipment	**Planned**	**Actual**
TM 190	0.00 hours	
Lime Spreader	87.30 acres	

Supplies	Quantity/Area	Rate/Carrier	Actual
Lime	99.83 tons	2,500.01 lbs/ac	
	87.30 ac		

Field & Weather Information

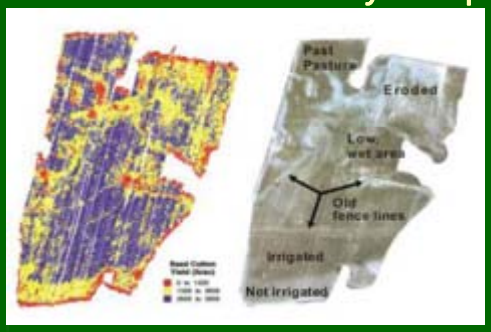
Growth Stage:	Soil Conditions:
App Method:	Soil Type:
Sky Conditions:	Gusting Speed:
Wind Direction:	Temperature:
Wind Speed:	Humidity:

Technology is a continuum

- Regular upgrading is essential
  - Hardware advancements
  - Software enhancements
  - Computer skills to keep pace with new tools
  - Pass knowledge to others in our organization

How to Make Your Data Collection Work for You

There Really is a Story Behind Those "Pretty" Maps



Source: University of Georgia

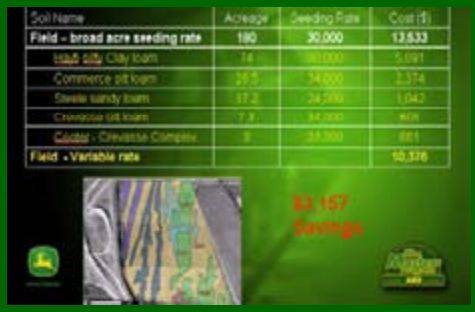
Planting Costs

Crop	Seed costs	Seed Treatment	Tech fee	Total	Per acre costs
Cotton BT2/RRFlex	$0.47 1000 seeds	$0.24 1000 seeds	$1.82 1000 seeds	$2.53 1000 seeds	$113.85 45000 sd
Corn	$1.55 1000 seeds	$.22 1000 seeds	$.88 1000 seeds	$2.55 1000 seeds	$77.00 30000 sd
RR Soybean 3000 seeds per lbs.	$0.12 1000 seeds	$0.012 1000 seeds	$0.10 1000 seeds	$0.232 1000 seeds	$34.80 120000 seeds
Peanut	$0.60 lb seed	0.04 lb seed	No	$0.64 lb seed	$64.00 100 lb seed

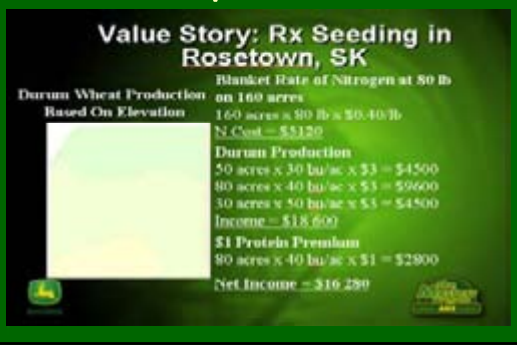
Impact of Incorrect Seeding Rate

Crop	Low rate	High rate
Cotton	Weed control difficulties; vegetative growth	Disease; stress causing fruit shed
Corn	Lost yield potential	Root and stalk strength; water utilization
Soybean	Weed control difficulties	Lodging and diseases
Rice	More intensive management of N and flooding	Diseases and lodging

Variable Rate Corn Example



Lets Talk About Other Inputs …



Now Using Variable Rate …

Record Keeping Made Easy

Summary

- Profitability of variable rate input technologies depend largely on yield increases or input dollars saved.

Session #13
Which Inputs Really Pay

Rob Templeman Pioneer Hi-Bred Ltd.	Jerry Winnicki Clark Agri Service Ltd.	Gilles Quesnel OMAFRA

Listen to these renowned agronomists battle over what, when and how!

Please use the balance of this page for notes.

Session #14
Clean Water Act – Agony or Opportunity

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Bob Bedggood
Thames-Sydenham & Region Source Protection Committee

Clean water is everyone's right and responsibility. Through the Source Protection Planning process many landowners and business will need to take action to protect drinking water sources. Agriculture is well placed to deal with the Clean Water Act as it unfolds. For more than twenty years the environment has been on the radar of agriculture. The agricultural organizations have taken charge of the issues through the Environmental Farm Plan and their response to the Nutrient Management Act. Other sectors of society are not as well versed in environmental protection.

The Rural Water Quality Program is one example of how if supported agricultural can take steps to improve and protect water quality. The Rural Water Quality Program was the first source water protection program in Ontario funded by municipalities. The program began in 1998 in the Region of Waterloo and has expanded to include The County of Wellington, the City of Guelph, County of Brant, City of Brantford and funding from both the federal and provincial governments. The program provides an illustration of what could be developed through Source Water Protection. The program has provided over five million dollars to agricultural landowners to implement more than 2000 best management practices that improve and protect surface and groundwater. The Grand River Conservation Authority provides technical expertise and delivers the program on behalf of the partners.

The program is built on partnerships with the agricultural community and recognizes the role of the landowner as steward of the land. There is an intrinsic understanding that practices carried out on agricultural lands can maintain and protect water quality for the future. It is a program with a broad vision that empowers and embraces the actions of landowners, rather than laying blame and laying charges. This presentation will highlight the types of actions that landowners can expect to see encouraged through Source Protection Planning.

Clean water is everybody's business and the Rural Water Quality Program illustrates the type of projects that might satisfy the Source Water Protection. This presentation will celebrate the success of the program and provide you with ideas for taking action.

Drinking Water Source Protection
A Locally Developed Source Protection Plan

Thames - Sydenham and Region

Southwest Agricultural Conference

Ridgetown

January 2008

Presentation Outline

Source Water Protection

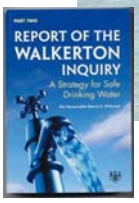
Clean Water Act

Source Protection Committee

Source Protection and the Agriculture Sector

What is Source Protection?

- Protect public health
  - Multi barrier approach to protecting drinking water
  - Prevention rather than remediation
- Maintain and enhance the ecological, recreational and commercial values of water
- Focus on reducing risks to municipal drinking water sources
  - other designated systems



Clean Water Act

- Reducing risks by addressing threats to drinking water quality and quality
- Regulations – Source Protection Areas and Regions, Source Protection Committees, Terms of Reference and Time Limits
- Designed to promote voluntary initiatives but requires mandatory action where needed

Source Protection Regions

- 19 Regions
- Groups of Conservation Authorities
- Additional areas added to some regions
- Covers most of Southern Ontario
- 5 northern Conservation Authorities

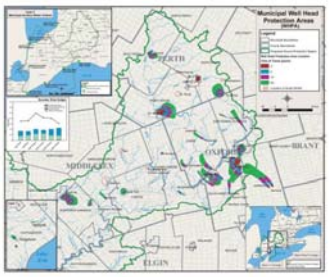
Roles and Responsibilities
Source Protection Region

- Thames -Sydenham and Region
  - Lower Thames Valley Conservation Authority
  - Upper Thames River Conservation Authority
  - St Clair Region Conservation Authority
- Facilitate plan development
  - Providing resources to the committee
    - Technical, Financial, Administrative
- Source Protection Committee

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Clean Water Act Focus

- Reducing significant risks to Drinking Water
  - Municipal water sources
- Vulnerable Areas
  - Wellhead Protection Area
  - Intake Protection Zones
  - Highly Vulnerable Aquifers
  - Recharge Areas
- Plans to reduce significant risks to acceptable levels and prevent future significant risks



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Describing and Characterizing the Watershed

- What do we know now?
- Includes:
  - Physical description of watershed
  - Water quality
  - Water use

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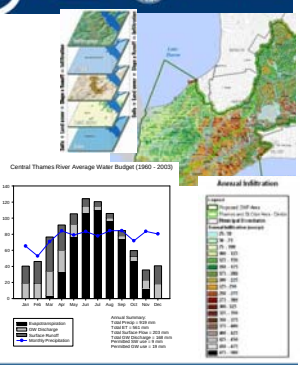
ACT FOR CLEAN WATER

Water Use

- Identify areas of potential water supply stress -
- Determine where more analysis is needed to quantify water supplies



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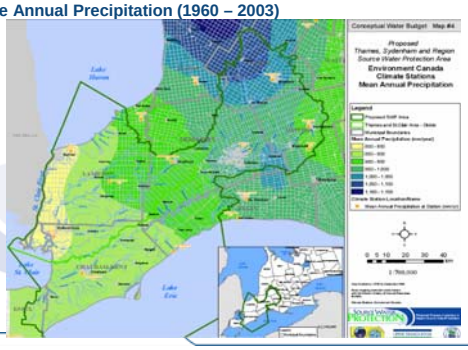
Average Annual Precipitation (1960 – 2003)



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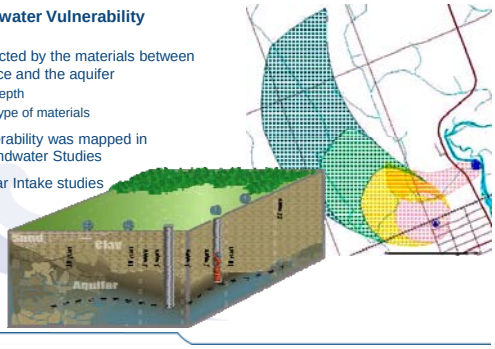
ACT FOR CLEAN WATER

Groundwater Vulnerability

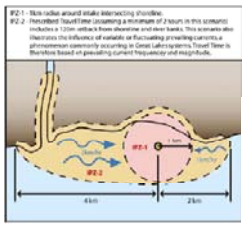
- Protected by the materials between surface and the aquifer
  - Depth
  - Type of materials
- Vulnerability was mapped in Groundwater Studies
- Similar Intake studies



DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Intake Protection Zones Vulnerability

- Zone 1
  - Minimum 1 km radius
- Zone 2
  - Minimum 2 hr travel to intake
  - Allow adequate time to shut intake
- Needs to consider the local issues related to the Intake
- Closer to the intake is more vulnerable



Intake Type	Zone Vulnerability Factor (VFz)			Source Vulnerability Factor (Modified) (VL)
	Intake Protection Zone – 1 (IPZ-1)	Intake Protection Zone – 2 (IPZ-2)	Total Water Contributing Area (TWCA) or IPZ-3	
Great Lakes Great Lakes connecting channels	10 10	7 to 9 7 to 9	NA NA	0.3 to 0.7 0.7 to 0.9

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Potential Threats

- Abandoned water wells
- Oil and gas wells
- Aggregate extraction
- Mines and mine tailings
- Storage tanks
- Chemical use
- Small / medium enterprises
- Pesticides
- Contaminated sites
- Waste disposal facilities
- Hazardous industrial waste
- Biosolids and septage
- Manure/fertilizer application
- Septic systems
- Road salt
- Storm water
- Waste water
- Non-point sources
- Land drainage
- Private water wells

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Source Protection Planning

- Focus on reducing risk to municipal drinking water source
- Locally developed plan to reduce risk to drinking water
- Developed by the Source Protection Committee

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Roles and Responsibilities
Source Water Protection Committee

- Representatives from stakeholder groups
- 22 members from across the Source Water Protection Region
- Develop terms of reference
- Responsible for the development of the plan

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Participation Pyramid

- Transparent
- Link each part of the process
- Many opportunities for involvement

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Agricultural Stakeholder Role

- Participate in plan development
  - Committee representation
  - Work group participation
  - Participation in forums
  - Input and constructive feedback
  - Consider implementation alternatives through development of plan
- Local and provincial scale
- Plan implementation
  - Including continued stewardship efforts with consideration of risks to drinking water sources

DRINKING WATER SOURCE PROTECTION
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Ways of protecting drinking water sources

- Education
- Stewardship
- Incentive programs
- Best management Practices
- Existing Initiatives
  - Clean Water Program
  - Healthy Watersheds
- Negotiated Risk Management Plans

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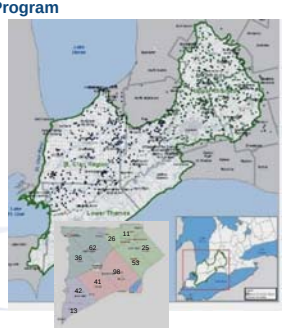
UPPER THAMES RIVER CONSERVATION AUTHORITY

Healthy Watershed / Clean Water Program

- $ 4.7 million in grants
- 1900 projects
- $13.6 million contribution by landowners



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Integration with other programs

- Environmental Farm Plans
- Nutrient Management
- Best Management Practices
- Clean Water/Healthy Watersheds Programs

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UPPER THAMES RIVER CONSERVATION AUTHORITY

Thank you

- Bob Bedggood
- Thames - Sydenham and Region Source Protection Committee Chair
- (519) 461-1567

Session #15
Dealing with the Impact of Soil Disruption from On-Farm Construction

Jerry Burns	Leonard McMurphy	Rick Kraayenbrink
Croton	Thamesville	

In "Dealing with the impact of Soil Disruption from On-Farm Construction" it must be understood that dealing with that issue starts months if not years before the actual physical ground work begins. In fact that work that is done in negotiating the disruption is what will determine the end results with regard to soil disruption.

Issues to be dealt with as a result of the construction:

- Negotiation Process
- Dealing with Land Agents
- Establishing time lines
- Establishing suitable working conditions
- A dispute resolution mechanism in place
- Having land owner representatives involved in operations procedure

Session #16
Fertilizer vs. Manure – A Nutrient Showdown

Tom Bruulsema International Plant Nutrition Institute	John Lauzon Deaprtment of Land Resource Science, University of Guelph University of Guelph

Moderator: Keith Reid, Soil Fertility Specialist, OMAFRA

Many of you will have manure on your farm, or have access to manure. When are the most economical nutrients going to come from manure, or when are you better to stick with commercial fertilizer? The following information will provide some background, but look for some lively debate between our experts!

Factors affecting Nutrient availability To THE CROP from organic Materials (Excerpted from soil fertility handbook, chapter 5)

Nitrogen

Nitrogen uptake by crops is in the mineral form, as either nitrate (NO_3^-) or ammonium (NH_4^+). This means the ammonium portion of the manure is immediately available to the crop while the organic nitrogen needs to be mineralized before it can be used. For optimum use of the nutrients in manure, they should be available where and when the crop can utilize them, but it is not always easy—or even possible—to meet this goal with current manure management options.

Ammonia Volatilization

Ammonium nitrogen can easily convert to ammonia gas when the manure is exposed to the air, resulting in the loss of a large part of the available N from the manure. Conditions that favour rapid loss of ammonium-N from the surface of the soil are high concentration of ammonium in the manure, warm temperatures, dry soils, and windy conditions. Crop canopy or residue has an inconsistent effect on ammonia volatilization, reducing the amount of loss from manure placed below the cover, but loss can actually increase from manure spread on top of the canopy because of increased surface area. Incorporation of the manure effectively stops ammonia volatilization, since any ammonia that is released is quickly re-absorbed in the soil water and adsorbed on the surfaces of clay particles.

Mineralization

The organic nitrogen in manure needs to be converted to ammonium before it is available for plant uptake. This happens when microbes feed on the organic compounds, and release ammonium as a waste product, so the rate of mineralization increases when conditions are favourable for microbial activity. The nature of the organic materials in the manure will also affect the rate of mineralization. About 20% of

the organic N from ruminant manure is considered to be available in the first cropping season after application, while up to 30% of the organic N from poultry manure is available. Swine manure is intermediate.

Mineralization will be slow when soil conditions are cool. This can lead to temporary nitrogen deficiency during cool spring weather in crops that are planted on manured fields. A starter application of nitrogen can help to overcome this.

Typical C:N ratios of some common materials	
Soil micro-organisms	7-9
Soil Organic Matter	10-12
Alfalfa	13
Fall Rye Vegetative Flowering Mature	 14 20 80
Cereal Straw	80
Corn Stalks	60
Sawdust	200-400
Paper Mill biosolids Primary Secondary	 80-100 7-10
Distillers Grains	9
Solid Cattle Manure	20-30
Solid Poultry Manure	10
Composted Manure	10-40
Yard Waste Compost	25-40
Spent Mushroom Compost	25-30

Immobilization

When materials high in carbon are added to the soil (such as very strawy manure or primary papermill biosolids), soil nitrogen can be immobilized by microbes while they break down the carbon compounds. This can reduce the nitrogen availability to crops if these materials are applied before planting. There is potential for using these materials to tie up soil nitrogen in the fall, to reduce leaching losses over winter, but the effectiveness has not been proven.

Phosphorus

Most of the phosphorus in manure is associated with the solid portion, and is found in either in the orthophosphate form (PO_4^{3-}) or in readily degraded organic compounds. This means that, chemically, the phosphorus in manure does not differ greatly from the phosphorus in fertilizer. Despite this, phosphorus from manure is assumed to be less available than fertilizer to crops in the year of application. In Ontario, the availability of manure P, in the year of application, is assumed to be 40% that of fertilizer P.

Recent greenhouse studies have shown that equal amounts of phosphorus from either liquid hog manure or fertilizer, when mixed evenly with the soil, result in equal plant uptake. The difference in apparent availability of the phosphorus could stem from the inability to place the manure in a band close to the seed for maximum availability, and to uneven application rates across the field.

Nutrient management plans in Ontario credit 80% of the total P in the manure towards building soil fertility. Other jurisdictions may use a figure of up to 100%. Regular soil testing is the best way to track the actual build-up of soil P in individual fields.

Many municipal biosolids are treated with alum, iron sulphate or lime during the secondary treatment process to remove phosphate from the discharge water. A similar treatment is used in some poultry barns. This results in a high proportion of the P tied up in insoluble aluminum, iron or calcium phosphates, which can greatly reduce the nutrient availability from these materials in both the short and long term.

Potassium

Essentially all of the potassium in manure is in soluble forms, and available to crops. With solid manure losses can occur from storage, if the runoff is not contained. High rates of manure application on dairy farms can result in luxury consumption of K by alfalfa, and mineral imbalances for dry cows in the dairy ration. Sewage biosolids contain very little potassium, since it is not retained with the solids during the treatment process.

Phosphorus and potassium content of manure varies significantly from farm to farm. The best estimates come from lab analysis.

Secondary and Micronutrients

In addition to NPK and organic matter, manure contains significant quantities of calcium, magnesium, sulphur, and micronutrients. Deficiencies of these elements are uncommon on livestock farms that regularly apply livestock manure.

Biosolids also contain micronutrients. The levels will often depend on the mix of residential, institutional and industrial contributors to the system. With sewer use bylaws, industrial contributions to sewage systems are often lower in contaminants than those from other sources.

Some of the micronutrients are regulated under the Environmental Protection Act (e.g. zinc, copper). The levels of these elements are limited in biosolids, and if the level of any of the elements is too high, the material cannot be used for land application. Most manure is low in these elements, unless they have been added to feed to reduce antibiotic use. The rate or frequency of manure application may need to be limited for these specific manures.

Average amounts of available nutrients from solid manure (AS APPLIED)							
	Average dry matter	**Available Nitrogen**				**Available P_2O_5**	**Available K_2O**
		Late Summer	**Late Fall**	**Spring, not incorp-orated**	**Spring, Immediate Incorporation**		
	%	**kg/t (lb/ton) fresh weight**					
Hog	28.2	2.3 (6.1)	2.3 (6.1)	2.6 (5.6)	3.6 (7.9)	5.5 (12)	7.7 (17)
Dairy	24.2	1.5 (3.3)	1.7 (3.7)	1.2 (2.7)	1.8 (4.0)	1.3 (2.9)	5 (11)
Beef	28.6	1.8 (3.9)	2.0 (4.4)	1.3 (2.8)	1.6 (3.6)	1.3 (2.9)	6.4 (14)
Broiler	60	7.8 (17)	7.3 (16)	7.8 (17)	10.0 (22)	8.2 (18)	11.8 (26)
Available phosphate is calculated as 40% of total phosphate in the manure. Available K_2O is calculated as 90% of the total K2O.							
Data from manure analysis performed at University of Guelph, Stratford Agri-Analysis, A&L Canada Labs and Agrifood Labs between 1991 and 2003.							

Average amounts of available nutrients from liquid manure (AS APPLIED)							
	Average dry matter	**Available Nitrogen**				**Available P2O5**	**Available K2O**
		Late Summer	**Late Fall**	**Spring, not incorp-orated**	**Spring, Injected**		
		incorporated					
	%	**lb/1000 gal**					
Liquid hog							
6–10%	7.5	15	30	24	43	22	27
2–6%	3.5	9.4	20	16	30	12	20
0–2%	1.3	5.3	11	9.6	18	4.6	13
Average	3.8	9.2	19	16	29	12	18
Liquid dairy							
10-18%	13.6	14	20	15	24	13	35
6–10%	8.1	10	15	12	20	7	26
2–6%	4.5	7.3	10	8.7	15	6.4	21
0–2%	1.0	2.9	4.1	3.8	6.8	4.6	13
Average	8.5	10	15	12	19	8.3	26

Liquid beef							
Average	7.1	9	13	10	17	7	22
Liquid poultry							
10–18%	13.8	25	49	41	72	35	37
6–10%	8.2	21	41	35	63	25	31
2–6%	4.4	13	26	23	42	11	24
Average	10.6	22	42	36	64	28	32
Liquid runoff							
Average	0.6	1.2	2.5	2.0	3.6	1.5	9.6

Available phosphate is calculated as 40% of total phosphate in the manure. Available K2O is calculated as 90% of the total K2O.

To convert pounds per 1,000 gallons to kilograms per cubic metre, multiply by 10.

Data from manure analysis performed at University of Guelph, Stratford Agri-Analysis, A&L Canada Labs and Agrifood Labs between 1991 and 2003.

Session #17
Getting the Most from your Soil Tests

Alan McCallum McCallum Agronomic Service	Keith Reid Soil Fertility Specialist OMAFRA

This workshop session will give you the chance to understand your soil test results better, and to make better use of the information included in your soil test. Your questions will guide most of the discussion, but here are some topics we will likely touch on:

How can sample collection influence the soil test results?

Which soil test results are actually measured, and which are calculated from other numbers on the report?

I changed my cropping plans…can I use the same soil test results?

Why are the recommendations on the report different from in the Agronomy Guide?

The attached factsheet provides some background information. Further detail is available in OMAFRA publication #611, **Soil Fertility Handbook**.

FACTSHEET
ISSN 1198-712X

Agdex#: 533 Publication Date: 03/06
Order#: 06-031 Last Reviewed: 03/06

Title: Soil Sampling and Analysis for Managing Crop Nutrients

History:

Written by: Keith Reid - Soil Fertility Specialist/OMAFRA

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2. Soil Sampling
   - Sampling Area
   - Sample Depth
   - Sample Collection
   - Sampling Equipment
   - Sample Frequency
   - Sampling Time
   - Sample Analysis
3. Using the Results

Introduction

Soil testing plays an important role in crop production and nutrient management. On farms that use commercial fertilizer as the main nutrient source, it is the best way to plan for profitable fertilizer applications. On livestock farms, knowing how much nutrient is present in the soil to start with is critical. Only then can a nutrient management plan be developed to properly manage both the nutrients that have been generated on-farm and any nutrients that are being imported to the property as biosolids or commercial fertilizer.

Soil testing is really a three-step process: the collection of a representative sample from each field or section, proper analysis of that sample to determine the levels of available nutrients, and use of the results to determine optimum fertilizer rates. Keeping records is an integral part of the soil-testing process; they will help determine if soil test levels are increasing, decreasing or being maintained over time.

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Soil Sampling

The sample that is sent to the lab for analysis normally weighs about 400 gm (1 lb), but this sample must accurately represent up to 20,000 t of soil — the amount of soil in 10 ha (25 ac). Clearly, care in the sampling process is necessary.

Sampling Area

Choice of the area to be included in the sample can have a large impact on the accuracy of the soil test. Where fields are small, it is relatively simple to collect a sample for each field, but larger fields must be divided into smaller sampling areas. As much as possible, ensure that each sampling area is uniform and separate from areas that are obviously different.

Variation in soil fertility can occur because of differences in the native fertility of the parent material, the

texture of the soil, the amount of nutrient removal by crop growth or the position in the landscape. By far the largest variation, however, comes from past applications of nutrients, either as fertilizer or manure. When the variation is small, include several cores in each sample; when the variation is large, sample areas separately. Where past field boundaries are known, use them to divide large fields into smaller units. Base further subdivision, or divisions where past field boundaries are not know, on soil type or topography. The maximum area included in a single sample should be 10 ha (25 ac).

There is no minimum size for the area that can be represented by a single sample, so precision sampling, site specific sampling or grid sampling are permitted but not required for nutrient management.

Any areas that have obviously different nutrient levels from the balance of the field should not be included in the composite sample for the field. This could include dead furrows, eroded areas, laneways or areas where manure or lime has been piled. If these areas are large enough to be managed separately, sample and analyze them separately.

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Sample Depth

The normal sampling depth for nutrients is about 15 cm (6 in.) because most plant roots grow to that depth, and tillage mixes most nutrients into the soil to about 15 cm deep. Subsoil is normally much lower in nutrient content, so sampling too deep will produce a sample that is not representative of the field.

However, when sampling for soil nitrates, a sample down to a depth of 30 cm (1 ft) will provide a more accurate indication of the amount of nitrate available to the crop, since nitrate will move more easily with soil water than other nutrients will.

Sample depth is not changed in a no-till system, even though the nutrients are no longer being mechanically mixed into the soil, with the possible exception of pH samples. It may be appropriate to collect a shallow sample (5 cm or 2 in.) to check for acidification in the surface layer if nitrogen is being surface applied. Do not use these samples for nutrient analysis, since they will overestimate the nutrient availability from the soil.

Sample Collection

A representative sample from a field must include enough cores, collected randomly from across the entire area. Too few cores increase the risk that a non-representative core could skew the result for the whole field. Non-random sampling increases the risk that a bias could be introduced into the sample. The most efficient way to achieve random sampling is to follow a zig-zag pattern around the field. Collect a minimum of 20 cores to produce the composite sample and one additional core per acre for fields larger than 20 ac.

Often the most overlooked step in collecting a soil sample is the thorough mixing of soil cores before the sub-sample is collected. Sampled soil cores should be mixed in the bucket until no evidence of soil cores exist. Heavy clay soil cores sometimes need to be dried before they can be sufficiently mixed to allow for a suitable sub-sample. The sub-sample should be no more than 400 gm or about 1 cup of soil.

Store collected samples at room temperature, with the exception of soil nitrate samples, which should be kept cool (below 4°C) and delivered to the lab within one day for immediate analysis. Freeze any samples that will not be analyzed immediately as soon as possible.

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Sampling Equipment

While it is possible to collect samples using a shovel or spade, it is much more efficient to use a sampling probe or auger. These should be constructed of stainless steel, particularly if the samples are going to be used for micronutrient testing. Many agricultural retailers will lend sampling probes for soil sample collection.

Collect soil cores in a clean plastic pail. Galvanized pails will contaminate the samples with zinc, which will make the analytical results for micronutrients unusable. Avoid pails that have contained sanitizers or detergents, since phosphates from these materials can be carried over into the samples.

A sturdy stainless steel or aluminum trowel works well for mixing the cores before collecting a sub-sample. A screwdriver is also useful for dislodging any soil cores that might get stuck in the sampling tube.

Sample Frequency

Collect samples frequently enough to detect changes in the soil test for a field, before they become large enough to significantly affect crop yields or fertilizer requirements. For most farms, once every three years is adequate for this purpose, and this often works out to once in the rotation, at the same point in the rotation.

Rapid changes in soil test values can occur where the soil has a low capacity to hold nutrients or when crops that extract large amounts of a particular nutrient are grown. More frequent sampling will be necessary on coarse-textured soils or where crops that remove large quantities of potassium are grown such as alfalfa, corn silage or processing tomatoes.

What Does the Regulation Say About Sampling Frequency?

Ontario Regulation 267/03 states that a sample must be collected and analyzed from each field area prior to the completion of each nutrient management plan, and that the results from this sample must be used in the preparation of the plan. This would normally mean the maximum sampling interval would be 5 years, unless a change in the operation made the preparation of a new plan necessary. The exception is a plan for a new operation, where there are default values provided that are high enough to place maximum restriction on nutrient application.

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Sampling Time

There is some variation through the year of soil pH and nutrient content, particularly related to soil moisture, but these differences are not large enough or consistent enough to impact a nutrient management plan. Taking soil samples at the same time of year each year eliminates seasonal variation as a factor in comparing soil test results over time. More importantly, if the samples are taken immediately after harvest, the results will be back in plenty of time for planning the fertilizer program for the next crop.

Sample Analysis

Samples for a nutrient management plan must be analyzed at an OMAFRA-accredited lab, using the OMAFRA-accredited tests. The accreditation process assures quality analysis using Ontario-proven methodology.

Table 1 lists accredited labs in Ontario.

Soil testing for available nutrients involves extracting a portion of the nutrient from the soil and then analyzing the extract. The value measured by this process is not the exact physical quantity that is available to the plant. The complexity of soil chemistry and plant uptake is too great to make this measurement possible. Instead, the value measured is related to the amount of nutrient that a plant root can extract. These values can vary widely with different tests. You cannot use the results from different tests with Ontario recommendation tables. The accredited tests have been chosen to provide accurate results in the range of soil conditions found across the province.

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Laboratory	Address	Telephone/Fax
A & L Canada Laboratories Inc.	2136 Jetstream Rd London, ON N5V 3P5	tel: (519) 457-2575 fax: (519) 457-2664 e-mail: aginfo@alcanada.com
Accutest Laboratories	146 Colonnade Rd Unit #8 Nepean, ON K2E 7Y1	tel: (613) 727-5692 fax: (613) 727-5222 e-mail: phaulena@accutestlabs.com

Agri-Food Laboratories	503 Imperial Rd Unit #1 Guelph, ON N1H 6T9	tel: (519) 837-1600 1-800-265-7175 fax: (519) 837-1242 e-mail: lab@agtest.com
Brookside Laboratories, Inc.	301 South Main St New Knoxville, Ohio 45871	tel: (419) 753-2448 fax: (419) 753-2949 e-mail: nfisher@blinc.com
Soil and Nutrient Laboratory	University of Guelph P.O. Box 3650 95 Stone Rd W Guelph, ON N1H 8J7	tel: (519) 767-6226 fax: (519) 767-6240 e-mail: nschrier@lsd.uoguelph
Stratford Agri Analysis (A Daco Laboratories Ltd. company)	1131 Erie St Box 760 Stratford, ON N5A 6W1	tel: (519) 273-4411 1-800-323-9089 fax: (519) 273-4411 e-mail: saa@dacolabs.com

The soil test value is used in the OMAFRA fertilizer recommendations tables that are calibrated to relate the extractable nutrient with the amount of fertilizer required to achieve optimum crop yields.

The OMAFRA-accredited test for phosphorus uses a sodium bicarbonate solution for the extraction. This method, which is often referred to as the Olsen method, has been found to provide accurate results across the wide range of soil pH found in Ontario. Other methods that are used in neighbouring states or provinces, such as the Mehlich-3 or Bray methods, provide inconsistent results in alkaline soils, and so are not accredited for use in Ontario. They also give results on a different scale, so the output from one of these methods cannot be used with the OMAFRA fertilizer recommendation tables.

Available potassium is measured using an ammonium acetate extract. The ammonium displaces cations, such as potassium, from the negatively charged soil particles so they can be measured in solution. The same extract can be used to measure the quantity of available magnesium, calcium and sodium, if desired.

Another important parameter to be measured in a soil test is soil pH. This is a measure of the acidity or alkalinity of the soil, which in turn influences the availability of many nutrients, the ability of crops to grow and the activity of many herbicides. The pH should be measured in a soil-water paste that has just enough water to saturate the soil pores. More dilute suspensions will provide readings that are higher than the actual soil pH, particularly in coarse soils. A soil pH test is required where biosolids are to be applied.

OMAFRA-accredited tests are also available for zinc and magnesium. These are useful when comparing a good area of a field to one suspected of having a deficiency, as well as for predicting the need for supplemental nutrients but are not required for a nutrient management plan.

Nutrient management plans for biosolid application require testing for the content of regulated metals in the soil. These quantities are measured in an acid digest of the soil sample, where all the soil minerals and organic compounds are dissolved. Labs that perform this analysis must be accredited under a separate accreditation program to meet ISO/IEC 17025 standards.

What Does the Regulation Say About Required Analyses?

Samples for a nutrient management plan that includes manure application must be analyzed at an OMAFRA-accredited lab for available phosphorus and available potassium. Plans that include biosolid application must be analyzed for the same parameters, plus soil pH and regulated metals (Ontario Regulation 267/03).

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Using the Results

There is more to soil fertility than a soil test report, which is a picture in time. Soil health, which includes tilth, soil structure and crop rotation will also impact nutrient cycling in the soil. Where soil samples have been collected and analyzed, these results should be used to prepare a nutrient management plan for that field. This can mean comparing the results to the OMAFRA fertilizer recommendation tables to determine fertilizer rates, or inserting the test results into a nutrient management computer program (like NMAN) or

onto the Nutrient Management Worksheet, where the nutrients from all sources can be considered to calculate application rates for nutrients.

Soil sample results are also useful in a recordkeeping role for comparing the analysis data to results from previous years. Determining the increasing or decreasing soil fertility levels helps evaluate the effectiveness of the overall fertilizer program or nutrient management plan.

Using the results becomes more complex when multiple samples have been collected for a field or single management zone. Multiple sample results can come from fields that have been grid sampled. If the field size is larger than 10 ha (25 ac), it may be desirable to fertilize the entire field as one block. Table 2 gives the pros and cons of a number of options for dealing with multiple sample results.

Option	Pros	Cons
Treat each area separately, applying manure or fertilizer according to the soil test for that area.	Most precise matching of nutrients to requirements	Complex to manage, particularly if varying multiple nutrients
Use average of soil test values for entire area to set fertilizer and manure rates.	Single application rate, therefore, simple to manage Nutrient application rates close to requirements for most of the field	May result in part of the field being under-fertilized May result in nutrient losses to the environment from parts of the field with excessive nutrients
Use highest soil test values from the available samples to set fertilizer and manure rates.	Most environmentally conservative application rates	May result in part of the field being under-fertilized
Use lowest soil test values from the available samples to set fertilizer and manure rates.	Minimized risk of yield losses from under-fertilization	May result in nutrient losses to the environment from parts of the field with excessive nutrients. High fertilizer costs, without increasing yields

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In any averaging, the results must be weighted to reflect the area included in each sample. This is done by multiplying the sample result for each parameter by the number of acres represented by that sample, and then adding the products of that multiplication for each sample in the field. This total is then divided by the total acres in the field to give a weighted average for this entire field. This process prevents a single sample from a small area skewing the results if it is widely different from the rest of the field.

Sample Calculation

Field Section	Soil P test	Area of Section	Weighting
Front West	16	15 ac	16 x 15 = 240
Front East	32	4 ac	32 x 4 = 128
Old Barnyard	92	1 ac	92 x 1 = 92
Back West	8	25 ac	8 x 25 = 200
Back East	6	25 ac	6 x 25 = 150
TOTAL		90 ac	810

In this example, the weighted average soil P test is 9 (810 ÷ 90). If the soil test values were simply averaged, the high values for the old barnyard and the front east field would skew the number upwards and give a result of 31. On a farm that was using commercial fertilizer as the nutrient source, this represents a difference in phosphate fertilizer recommendations from 0, for the simple average, to 70 kg/ha, for the weighted average.

Where sample results are combined for a nutrient management plan, the method that is used must be noted on the plan so that anyone reviewing the plan can understand how the numbers used in the plan were derived.

See the OMAFRA website: www.omafra.gov.on.ca/crops to find the current list of accredited soil test laboratories.

This Factsheet was reviewed by Donna Speranzini, Horticulture Crops, and Christine Brown, Nutrient Management Field Crops Lead, OMAFRA.

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Session #18
Rhizobotany: The Root of Agriculture

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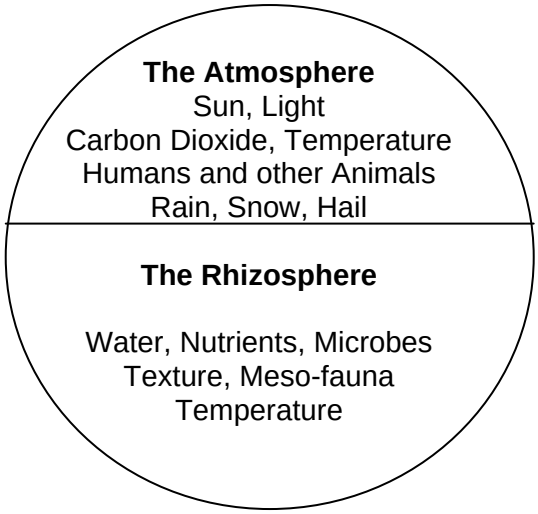
Every one is familiar with leaves, stem and fruit of the plants we grow for food, fodder, and, now, energy. And now, the rest of the story…



A plant "sees", interacts, with more things in the soil than it does above ground. Although roots comprise, at most, 20% of a plant's biomass, they have 80% or more of the plant's surface area. Roots provide a plant with water, and nutrients while providing anchorage. If you look at a corn or soybean field, an alfalfa or pasture plot, everything looks relatively uniform. That is because, with the exception of animals that browse or things that fall from the sky, there is not much for the shoot to interact with. What we cannot see below ground is the huge diversity of things that the plant has to interact with through its root system. For instance, if there is a drought and you choose to water the plants you do not give the shoot water directly, you irrigate the roots. Because the soil is opaque (light does not penetrate), the farmer cannot see when things are going wrong with the roots. Usually it becomes obvious that there is a problem when the shoot wilts, turns a color other than green, or stops growing. That is usually too late. However, something can be done to provide an earlier, and more specific warning that there is a problem.

What IS a root?

With only a couple of exceptions, all plant root systems have the same kind of roots and rooting patterns. As seedlings, all root systems look alike.

- Tap Root
- Basal Root (Seminal)
- Shoot Borne Root (Nodal)
- Lateral Root (branch off another root)

Because grass roots do not thicken as they age, grasses rely more on shoot borne roots than do broad-leafed species. It is this reliance on shoot-borne roots that gives mature grass root systems the aspect of a shallow dense root system. With in a functioning root system, there are two distinct types of lateral root. Long lateral roots contribute to the spread of the root system, and short lateral roots (less than 2 cm long and generally less than 0.5 mm in diameter), provide the majority of water and nutrient uptake.

Become familiar with your ROOTS

Beginning with the coming season, keep a shovel with you, and dig up a plant or two at each growth stage or every other week, which ever is more frequent. Do this with every crop you work with, e very year. Soon, you will begin to see differences in growth patterns between cultivars, species, and soils. With both grasses and broad-leafed plants, you will see relatively fewer fine roots in a shovel full of soil if the crop is healthy. If the crop is suffering, you will see a proliferation of fine roots in a shovel full of soil. Of course the relative amounts differ with cultivar and species, so you have to follow their development and become familiar with the “optimum”-growing growing pattern.

Farmers:

Be outstanding in your field (with a shovel).

How deep are your roots? Approximately 2+ meters for all crops, depending, of course, on soil conditions.

Ask the seedsmen, breeders, consultants what the specific characteristics of the root systems of the cultivars they recommend are. They probably can’t answer, but if you ask enough they will find out and eventually be able to tell you.

Different cultivars can have dramatically different mature root systems that can help the plants adapt to differing soil conditions. The reason a cultivar works in one field, and a different cultivar gives better yields in another just may be because of better root system structure. Knowing your roots will tell you.

Seedsmen:

What do you know of the potential for different cultivars to high water tables, plough pans, heavy clay subsoils, droughty soils, and shallow soils?

Shouldn't you know?

Breeders:

What differing rooting characteristics do you have in your germplasm base? With hybrids you can specifically identify and select for important characteristics. With bulk breeding you can enrich the populations with a mixture of characteristics to get broader adaptability.

Consultants:

You can make better diagnoses when you know what the most important half of the plant is doing. Most problems and solutions involve some aspect of the root system. A shovel can discover many problems, and suggest solutions. Become familiar with the root of the problem.

In General

- Tillage practices change rooting patterns.
- Irrigation practices change root patterns
- Cultivation practices change rooting patterns
- Fertilizing practices change rooting patterns

AND different cultivars can respond to these in very different ways.

Did you know that for most crops not specifically adapted to winter survival, their roots will not grow into soils with a temperature below 18 degrees centigrade? You would be surprised how many Ontario, New York, Ohio, and Michigan soils are effectively shallow soils because the temperature at 50 centimeters is too cold. Every once in a while get out a backhoe or just a shovel, and find out how deep the roots go!

Session #19
Cover Crops – Red Clover and More!

Bill Deen	Laura VanEerd
University of Guelph	University of Guelph, Ridgetown Campus

Field and horticultural crop producers are expressing renewed interest in cover crops. This is motivated by concerns over high nitrogen costs, negative effects of poor rotations, declining soil quality and soil erosion. Cover crop research conducted in Ontario and adjacent states will be reviewed and the practical application of the results to Ontario producers discussed. Topics will include

- Red clover nitrogen credit, corn yield, and soil quality benefits
- Poor red clover stands – What's the solution?
- N credits for the next crop –A cover crop myth?
- Potential cover crop benefits in rotations dominated by soybeans
- Why all the interest in ryegrass in the Midwest?
- Oilseed radish, rye, oats…. Which cover crop should you plant?
- Insects, weeds and disease. Do cover crops help or hinder?
- Biofumigation for nematode control
- Potential cover crop role in an emerging bioeconomy
- Cover crops and climate change

Session #20
Reach Your Business Potential

Bruce Riddell AAFC	Carl Moore Farm Financial Advisor	Carl Fletcher OMAFRA, Guelph

Each and every farm business has a different business potential. It is up to you to define and realize the potential.

The Canadian Farm Business Advisory Service(CFBAS) offers a one on one individualized, totally confidential and private assessment of your business and assistance to develop a unique set of goals and action paths to achieve these goals.

After you choose a consultant from a list of certified contractors and apply to become registered for the service, you, and members of your family, sit down with the consultant to review the history of your business, identify strengths and areas for potential improvement, develop goals for the next several years, work out potential options to achieve these goals and analyze the probable financial and personal impacts on the business and the family.

Your business is unique. In order to survive and prosper, you have been successful in many areas of finance, production, marketing and reinvestment of profits either on or off the farm. There is no one right answer or action to achieve success. Your degree of success is the total of all your decisions and actions over all the years of your career. It is not some “magic bullet” that will guarantee everything you desire for the future.

Success is always in the eye and outlook of the beholder. To some successful farmers, a line of machinery with no piece over four years of age is the pinnacle of success; to others, new livestock buildings fulfill a life’s dream. To a neighbor, older, well maintained machinery and buildings, coupled with a million dollar portfolio of RRSPs and off farm investments is the true measure of success. Perhaps you can achieve both, or neither. The business assessment is a tool that describes your likely potential to achieve goals based on your balance sheet and stated goals.

Perhaps your last three years of financial records can provide the foundation for developing future goals and planning realistic steps to achieve them. These records can range from financial statements prepared by an accountant and complete with balance sheets, to CAIS statements and income tax filings, to production and financial records kept up to date and verified with bank statements on a monthly basis. The secret to developing a firm foundation on which to develop the road map to future is reliability of records. These are not the coffee shop analysis of records prepared for community boasting rights, but the real thing that pays the bills and can point you in a realistic

direction. In many cases, you are richer and a better manager than you think. Your consultant has seen and analyzed many similar real businesses with all their warts and strengths. You will often rank much higher than your self assessment based on hearsay. Confidence in the future is based on success in the past. Make sure you know just how successful you are. Of equal importance, financial records point out the shortcomings of the past and offer financial clues that can point to areas of potential future improvements.

Once the past is documented, analyzed and understood, personal and business goals for your family and business can be developed and acted on. Unless your family is on side and willing to participate in future projects, the probability of success in reaching your business potential is very low.

Set specific goals and then work backwards with specific actions that will achieve them. If the goal is to have $200 per acre profit on corn production, every step in production and marketing must be accurately listed and costed with various alternatives and combinations. High yields and quality, low cost of production and high sale price of the crop are the basic blocks of the equation. Various seed, fertility, pesticide, planting date, machinery, labor, land, drying, storage, trucking, marketing costs and a marketing plan are but some of the items that can fit together in various combinations in your business. Development and carrying out a simple marketing program that can be accomplished within your cash flow, tolerance to risk and access to specific markets will determine gross income per acre. The purpose of any marketing program is to achieve the average annual price for the commodity. Few producers achieve this goal. Fewer still exceed it over the long term.

The various cost and return alternatives are analyzed to determine which specific combinations might fit into your business and come closest to achieving the desired goal. The cost or contribution of any particular item is on paper and can be recombined with all other items to determine its exact positive or negative effect in any particular combination. Each combination will have a different outcome that will determine its probability of achieving the specific goal. These paper combinations are really field trials conducted with your computer. The cost to produce these results is your time. The results can point to many thousands of dollars of potential costs or benefits.

This system can be used in any livestock or crop business or in combinations of enterprises. The biggest hurdle is to believe the effects on your business in order that you can act on them in order to meet the specific goals of your business. That new dairy barn or combine will increase costs by a known amount. It may still fit into your overall goals that will reach your desired potential of the business.

A successful business person is the one who has the ability to set realistic goals and then use all of the assets available in constantly changing combinations to achieve these goals.

The CFBAS program has the people available to assist you in developing, fine tuning and challenging the systems that will assist you to reach your business potential. A call to 1-866-452-5558 will start the process.

Presenter Carl Fletcher

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Canadian Agricultural Skills Service (CASS)

Helping farm families acquire skills and training for the road ahead.

CASS eligibility is based on two levels of requirements.

Do I qualify as an active agricultural producer?

In general, you can qualify if you have annual gross farm sales of at least $10,000. Even if you are a beginning farmer, you can qualify by showing you have a solid plan to farm and can show that you will have at least $10,000 in annual gross farm sales within 6 years of start-up.

Do I qualify based on my net farm income?

If you are an established producer, you qualify on the basis of your average net family income during the previous 3 years. If you are a beginning farmer, you qualify on the basis of your net family income for the previous year only. Using these baselines, if your total net family income was no more than $45,000, you may qualify for the full range of CASS benefits.

CASS Benefits

1) Skills & Needs Assessment

Your first activity will be an assessment of your existing skills and learning needs. This assessment will be conducted by a qualified Skills Assessment Advisor. It will focus on

understanding your existing skills, plans and goals, and provide you with a clear path on how to achieve them.

2) Individual Learning Plan

The output from your skills and needs assessment will be a plan—your Individual Learning Plan. When your Individual Learning Plan is complete, it will identify and detail the specific learning activities that you intend to follow in order to achieve your learning objectives.

3) Financial Benefits

Financial assistance may be available to help you carry out the learning activities outlined in your Individual Learning Plan. Both you and your spouse or common-law partner are eligible for the maximum benefits based on your net family income. For example, a producer and spouse with a three-year average net family income of no more than $35,000 may each receive up to $16,000 in financial benefits for approved learning costs. Family Income average $35,001 to $40,000 may each receive up to $12,000 per participant; family income $40,001 to $45,000 may each receive up to $8,000 per participant.

For more information or to receive an application form, please contact the
CON*NECT CASS Centre,
180 Dundas Street, Suite 504
Toronto, Ontario
M5G 1Z8
Tel: 416-340-0200
Toll Free: 1-877-830-0200
Fax: 416-340-0300
Email: casscentre@collegeconnect.on.ca

or visit the federal website at www.agr.gc.ca/cass or the provincial website at www.ontario.ca/cass

Session #21
Commercializing Agri-Food and Health

Dr. John Kelly MaRS Landing	Mark Walpole Vinifera for Life	David Hendrick Hendrick Seeds

Experiences in building a health-focused niche market business.

Please use the balance of this page for notes.

Session #22
Energy Crops and Residues for BioHeat Applications

Roger Samson
Executive Director
Resource Efficieint Agricultural Production-Canada
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Frank Dohleman
University of Illinois

Canadian farmers have had a long history of using wood to heat their farmsteads, buildings and greenhouses. When fossil fuels became relatively inexpensive however, many farmers switched to propane, natural gas and heating oil, particularly those with large farming operations where energy demands grew with the size of livestock buildings, greenhouses and crop drying needs. In recent years the rising costs of fossil-fuel energy in Canada has created strong interest in fuel switching and on-farm energy conservation, particularly for heat-intensive operations such as greenhouses. Farmers are once again looking at using biomass for heating, but with new fuel sources and much greater efficiency and convenience. Farmers are also finding other solutions to supplying their on-farm thermal energy needs from renewable sources such as geothermal, solar walls and solar hot water heating. These technologies along with energy conservation strategies may be used in combination with bioheat as the best low cost and low risk strategy for meeting on-farm energy needs.

Did you know?
Bioheat is not a new concept. It is one of the oldest of all energy uses, beginning with the controlled use of fire to provide heat, light and cooking for early humankind. The production of processed fuels for bioheat also dates to ancient civilizations that used charcoal-burning forges to make metal tools. At one time in Canada, the combustion of biomass (usually wood) was the principal method for heating, cooking and providing energy for industrial purposes.

The modernization of the use of biomass for heat (otherwise known as bioheat) is now well underway in many industrialized countries. There has been rapid growth in this industry in the last 5 years in Europe. Both Sweden and Germany each have more than 70,000 pellet boilers installed. In contrast, Canada is estimated to have less than 200 installed pellet boilers.

For the production of bioheat, feedstock can be directly harvested and densified into pellets or larger briquettes or cubes. The process of making pellets involves coarsely chopping the raw material (to about 8cm), then placing it through a fine grinder. Through a combination of heat and compression, a pelleter then bonds the fine raw material into dense pellets, briquettes or cubes. Overall, pellets are generally preferred for burning as their small-size allows for the flexible, efficient addition of the fuel for combustion into pellet boilers.

Energy Feedstocks for Bioheat production

There is an enormous opportunity to develop bioheat from the agricultural sector. To meet growing demands for bioheat resources, two main energy feedstocks can be produced by the farming sector: 1) residues from crop production and crop milling such as oat hulls, wheat bran and flax shives; and 2) dedicated energy crops, particularly energy grasses like switchgrass or big bluestem. Once densified, these fuel sources can be combusted in high efficiency boilers, furnaces and stoves to replace heating oil, natural gas and coal in residential, commercial and industrial heating applications around the country. The increasing interest in bioheat alternatives is expanding the potential raw material supply and scale of this industry, particularly in eastern

Canada where the cost of importing natural gas and coal commodities is more expensive than in western Canada.

The demand for biofuels traditionally used for heating, including waste wood products such as sawdust, wood chips and construction wood is rising, yet supplies are becoming increasingly limited. Wood is a popular fuel as it is relatively easy to burn and many farmers have ready access to cord wood from their own woodlots. Advanced wood boilers are also being introduced to emit much less smoke than the infamous "outdoor" furnace. In combustion appliances, wood can be used with a minimum of pre-processing. Some farmers are recovering forest thinnings from their woodlots and using a wood chipper to downsize this material for producing their own on-farm fuel for heat. Solid wood can still be a good solution for some farmers whose heat demands are modest. However, as fossil fuel prices increase, so too does the demand for woody materials. In some areas of Canada, the supply of surplus wood residues has dwindled and the quality of available material is deteriorating while prices continue to increase. The pulp and paper industry is increasingly using wood residues both as a fibre and a fuel source, meaning that less material is available. Transport costs are also becoming uneconomical, as the cost of shipping wood residues beyond a 200-km radius is becoming prohibitive. Wood residue availability is increasing in British Columbia and is expected to continue over the next 10 years as the pine beetle outbreak continues to affect large areas of forest. This is, however, only considered a short-term surplus and other sustainable heat solutions must be developed.

Low quality feed grains are potential feedstocks. Normal market values cannot be attained for feed such as cereal grains (often corn and wheat), beans and peas that have been damaged. Crops with mycotoxin levels above the allowable limit may be rejected as feed or else sold considerably below conventional feed prices. Farmers have opportunities to sell these products at a greater value in the bioheat market as feedstocks for direct combustion. Although a useful option for these grains, supplies of this material can only cover a fraction of the heat demands of the agricultural sector.

1) Crop residues and crop milling (agro-fibre) residues

Crop milling residues are left over after agricultural products are processed. Commonly available crop milling residues include hull (oat, soybean) and bran (wheat, corn, oats) along with wheat middlings, pin oats and corn screenings. Crop residues or field residues are the materials that remain on a field after harvesting. Common crop residues include straw from wheat, oat, corn, barley, rye and soybean, as well as corn stover (leaves, stalks and cobs). Some entrepreneurial farmers are now using these materials for on-farm heating and selling densified pellets from crop milling residues as a commercial boiler fuel. Other materials being used in Canada on a limited basis include sunflower hulls and corn cobs recovered from the combine or from corn stored in cribs. With recent increases in farm commodity prices, feed grains such as corn and barley have become too expensive for use as fuel for most applications. Of the feed grains, rye has the best potential because of its ease of cultivation and relatively low selling value. However, in general the use of grains as fuel is limited to small scale heating applications such as household pellet stoves and boilers or on a commercial scale using spoiled or off-spec grains. Overall, it is estimated that 1.4 million tonnes of crop-milling residues could be procured annually in Canada, with Ontario being the leading producer. This volume of material is equivalent to the size of the existing wood pellet industry in the country.

Why is biomass quality important?

Historically, the main problem with the use of agricultural biomass resources for combustion has been that, unlike wood, they are not easy to burn over sustained periods in conventional boilers because of their high ash, potassium and chlorine content. These elements, when exposed to high temperatures, vaporize from feedstocks, creating clinker and corrosive salt formations on boiler walls, resulting in serious performance and operating problems for boilers. Most farmers are well aware of the detrimental impacts potassium chloride (KCl) fertilizer can have on farm equipment if it is left in contact with steel over a prolonged period, which is a similar process to what goes on inside the boiler. The other problem with burning these materials is the pollution they can cause with potassium, chlorine, sodium, sulphur, lead and zinc producing highly polluting aerosol-forming compounds.

This technical problem can now be resolved because of advances in combustion technology coupled with improved crop management to reduce the chlorine, alkali and silica content of fuel materials. Within agri-fibre materials, there are considerable differences in biomass nutrient contents and resulting fuel quality, which has led to opportunities to develop agricultural feedstocks that have lower levels of these elements. For example, various components of crops have distinct quality differences. Delayed harvesting of energy crops and crop residues can improve fuel quality. Blending different agri-fibres and using agri-fibre fuels mixed with wood residues can increase the acceptability of agricultural feedstocks in commercial boilers.

Biomass quality of grains, straw and milling residues (Samson et al., 2006)

Residue Type	Energy (GJ/ODt)	Bulk Density (kg/m3)	Ash (%)	N (%)	K (%)	Cl (%)
Straw Residues						
Wheat	18.5	79	8	0.48	1.3	0.32
Oat	18.1	-	8	0.64	2.4	0.78
Corn	18.4	-	7	0.8	1.1	0.30
Barley	19.2	82	7	0.64	2.1	0.67
Rye	18.3	-	6	0.64	1.0	0.24
Soybean	19.1	-	6	0.8	0.6	-
Grains						
Wheat	18.8	668	2	2.24	0.4	0.09
Oat	17.7	498	4	2.08	0.5	0.11
Corn	18.8	640	2	1.44	0.4	0.05
Barley	17.5	614	3	1.92	0.6	0.18
Rye	17.1	641	2	1.92	0.5	0.03
Milling Residues						
Wheat Bran	-	216	7	2.72	1.4	0.05
Wheat Middlings	17.2	310	5	3.04	1.4	0.05
Oat hulls	19.5	128	7	0.64	0.6	0.08
Pin Oats	-	-	6	1.28	0.6	-
Corn Cobs	18.4	272	2	0.48	0.8	0.16
Corn Bran	17.5	208	3	1.76	0.1	0.13

Of the agricultural residues available for bioheat applications, crop milling residues have much higher quality compared to straws/stalk of the same plants, containing an average of 60% less potassium and 87% less chlorine than field crop residues. Of these materials, oat hulls and pin oats appear to have the highest combustion quality. Within the field crop residues, soybean stalks may have the best quality for combustion. Feed grains such as barley and rye also have modest levels of potassium and chlorine which makes their use feasible in boilers and stoves adapted for

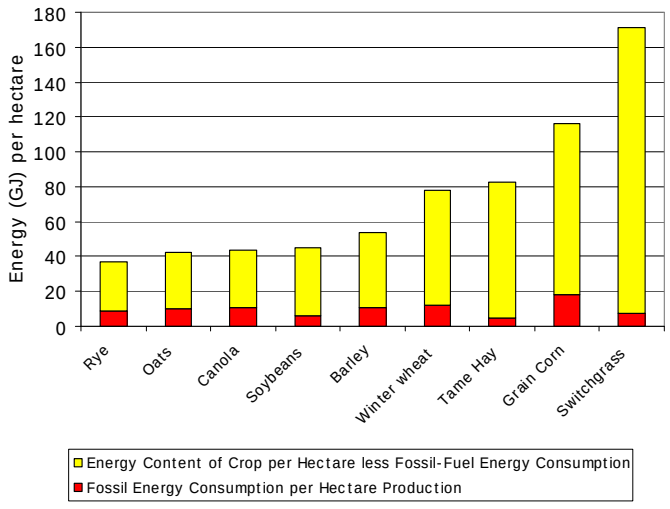
burning grains. However, they are not economically viable as a biomass feedstock because they are a much higher valued commodity. Spoiled feed grains, particularly those unfit for animal consumption, may be used for direct combustion in bioheat applications as they are competitively priced. Note that the biomass quality of various agricultural feedstocks differs regionally due to varying climatic and soil conditions within Canada. Generally, fuels with less than 0.2% potassium and 0.1% chlorine can be successfully used in most commercial coal or pellet boilers or power plants. However, boiler manufacturers should be consulted about the specific types of fuels they recommend for their boilers. Some pellet manufacturers in Europe and Canada are also adding additives to help reduce the clinker and corrosion problem in boilers when using agro-pellets. This is commonly done by adding 1% lime.

Energy crops

Energy crops are crops grown specifically for their energy value. They ideally involve perennial cropping systems requiring limited inputs and providing farmers with an economically viable crop.

Native, perennial warm-season energy grasses appear to be the next wave in agri-fibre pellet fuel development. Grasses are ideal feedstocks that can be produced in reliable quantities and which make efficient use of low cost marginal farmland. They are relatively easy, inexpensive, and low-risk perennial crops to produce. For energy use, they can be readily combined with other biomass materials like corn or waste paper. They also have minimal energy loss during conversion to the end product and are efficiently combusted in both advanced and simple-to-use devices that replace expensive high-grade energy forms for heating.

Perennial warm season grasses native to the Canadian tall-grass prairies represent the most efficient means to capture and store solar energy for use as heat with the lowest expense and minimal energy requirements. In comparison to other crops, switchgrass has been found to produce 65% more net energy gain per hectare than grain corn in Ontario, the next best option. In Europe, other energy crop options such as whole plant corn and winter rye grown for silage for biogas production is becoming popular.



Solar energy collection and fossil energy requirements of Ontario crops (Samson et al. 2005)

The main reason warm season species like switchgrass, grain corn and sorghum produce more energy per hectare than other crops is that they are warm season, or C_4, plants and have a more efficient photosynthetic cycle than C_3 plants like wheat, canola and bromegrass. Under optimal temperatures, C_4 crops use solar radiation 40% more efficiently than C_3, or cool season, species. As a result, they use half as much water per tonne of biomass produced. This is the main reason why biomass energy scientists are focusing on warm season species in both tropical and temperate regions of the world.

Because of their drought tolerance, perennial nature and deep root system, warm season grasses are well adapted to marginal farmlands. In the prairies, which once covered western Canada and parts of southern Ontario, these species grew across a range of moisture conditions. Much of the land base that could be used for cultivating these grasses could be marginal cropland and forage lands, creating an energy grass pellet industry that could have major implications for Canada's energy security. Converting 20% of Canada's agricultural land (cropland and forage land), roughly 13.6 million hectares, to energy grass cultivation could potentially produce 80 million tonnes of grass pellets annually.

Historically, the main problem with using field crops as bioheat feedstocks has been their high ash content which makes them difficult to burn. Farmers and scientists have now found new ways to "wash" these chemicals from energy crop feedstocks like switchgrass through improved stand and harvest management. It has been found that thinner stemmed and early maturing grasses leach these chemicals when the plants go dormant in the fall. In addition, it is possible to leach approximately 95% of these chemicals out of the grasses by delaying harvest until spring.

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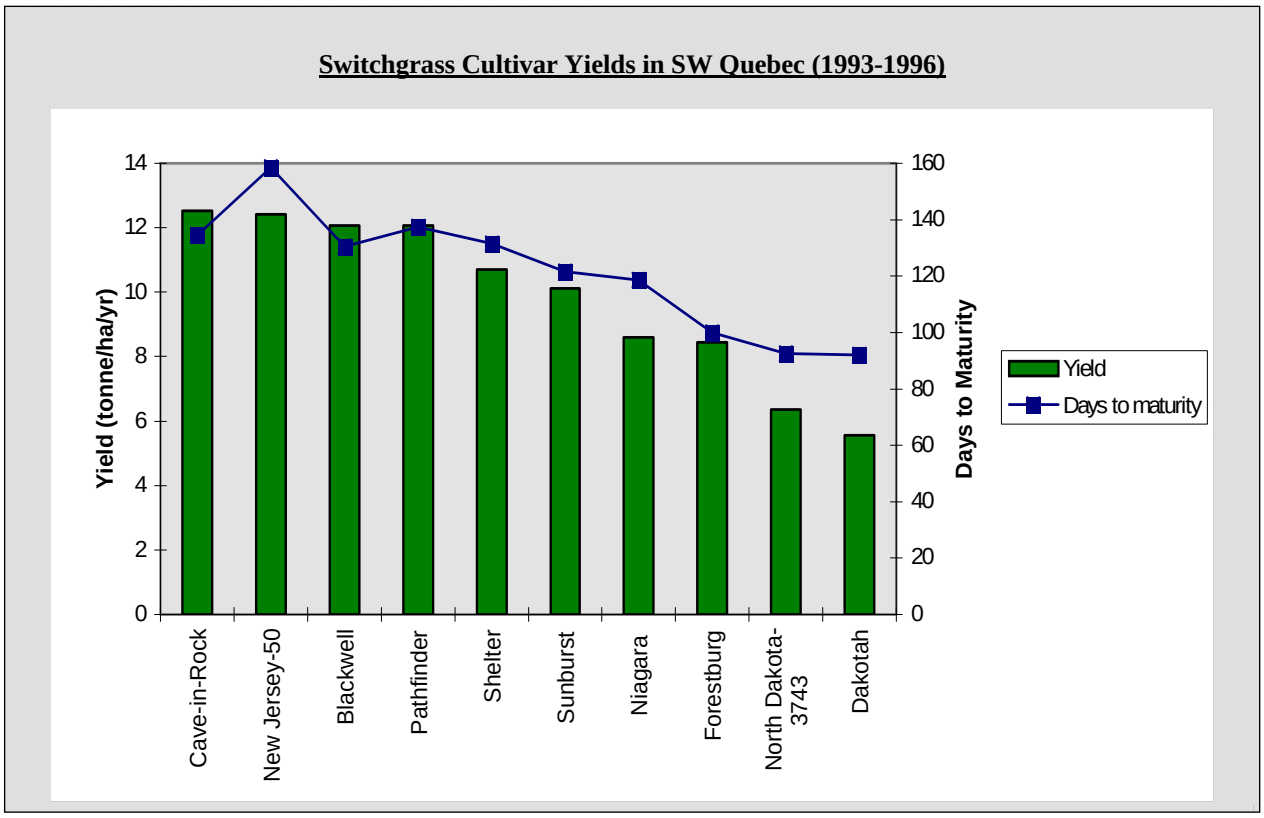


Another promising system includes mowing the material in swaths with a haybine in late fall and baling material directly off the windrow in spring. In most areas in Canada, farmers should be able to have dry (less than 12% moisture) material available for harvest in early May. A big advantage to spring harvest is that it enables the material to be field dried to 12-14% moisture, making it well suited for safe storage and pelletizing without supplementary drying costs.

Biomass Quality of Switchgrass vs. Wood Pellets and Wheat Straw (Samson et al., 2005; Samson et al., 2006)

Feedstock		Energy (GJ/t)	Ash (%)	N (%)	K (%)	Cl (%)
Wood Pellets		20.3	0.6	0.30	0.05	0.01
Western Wheat Straw		18.5	8.0	0.48	1.3	0.32
Switchgrass	*Fall harvest*	18.2-18.8	4.5-5.2	0.46	0.38-0.95	n/a
Switchgrass	*Overwintered spring harvest*	19.1	2.7-3.2	0.33	0.06	n/a

Grass and biomass quality

It is not the amount of ash that is important when burning grasses but the rather the chemical components of the plant that makes them difficult to burn. A good analogy can be found with an example of making concrete, from sand, cement and water. It is not the amount of sand in the mix that causes concrete to form, but the absence or presence of cement in the mix. When grass is burned and levels of potassium, chlorine and others such as sodium are too high in the material, agglomeration in boilers occurs. Most coal, for example, does not readily form clinkers despite having high levels of ash because it has modest concentrations of chlorine and potassium.

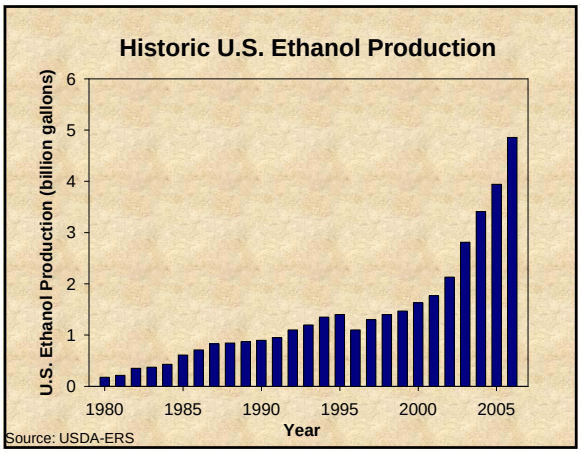
For combustion applications, warm season grasses such as switchgrass are preferred over cool season grasses such as reed canarygrass or crested wheat grass because of their superior biomass quality for combustion, with higher energy contents and lower ash and chemical contents.

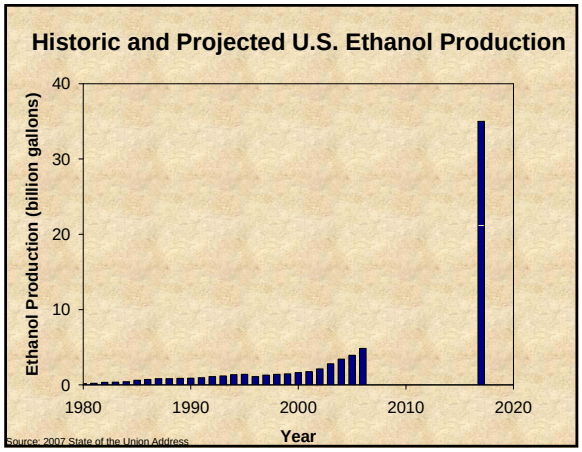
Dudley Smith Initiative

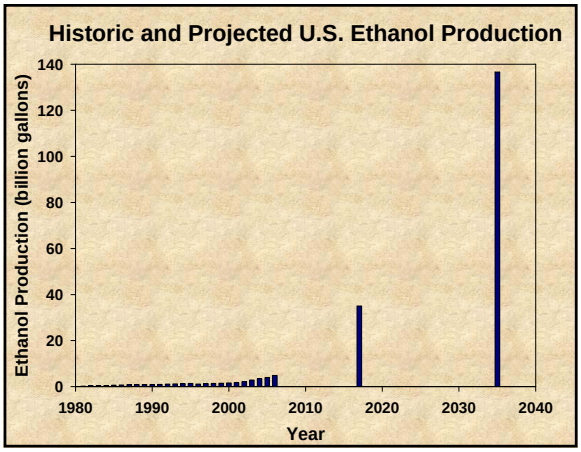
Miscanthus and Switchgrass Trials in Illinois

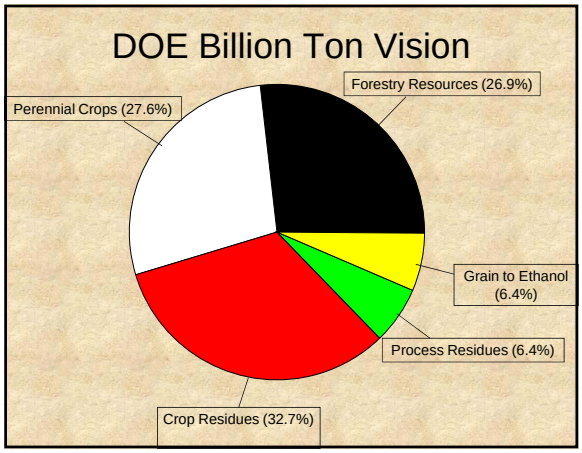
Frank G. Dohleman[1], Thomas B. Voigt[2,4], Stephen P. Long[1,3,4]
University of Illinois

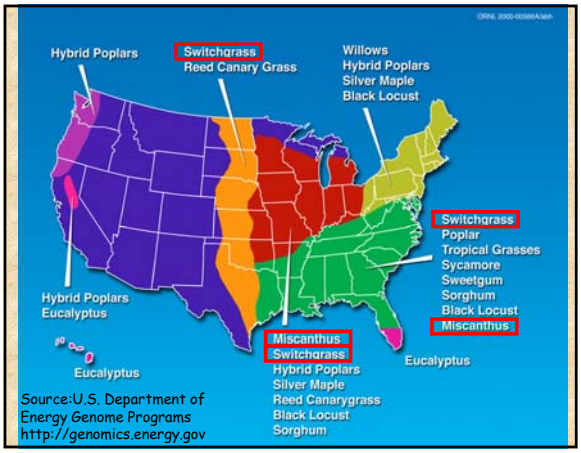
[1]Department of Plant Biology, [2]Department of Natural Resources and Environmental Sciences, [3]Department of Crop Sciences, [4]Institute for Genomic Biology







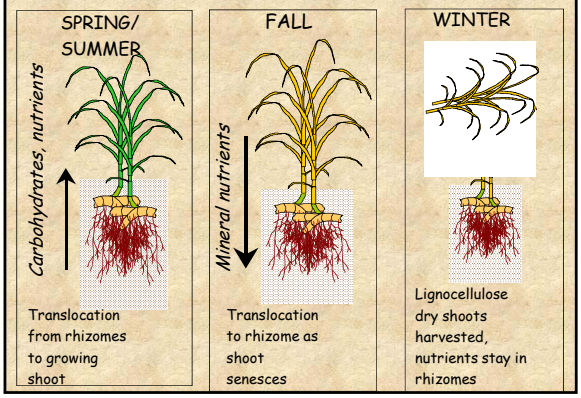




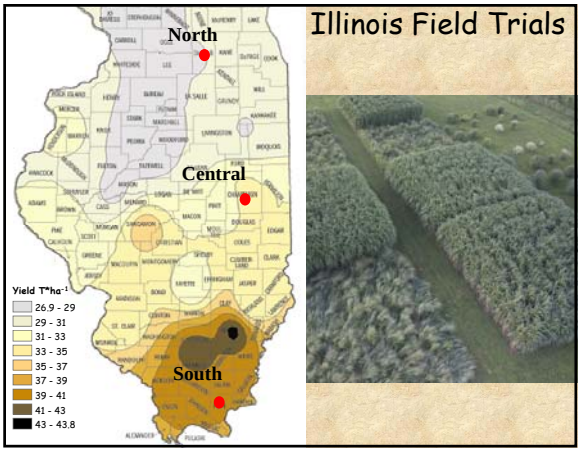
Why Miscanthus?

- No need for annual tillage or planting.
- Rapid growth in the spring out-competes weeds – No herbicide needed once established.
- Recycles nutrients in the fall – Low fertilizer requirements.
- No known pests or diseases.
- Harvest utilizing existing farm equipment.
- Dry down in field – harvest when needed.
- High Water Use Efficiency.
- Stores Carbon in soil – soil restoration and Carbon Credit tool.
- Sterile hybrid – low risk of becoming invasive.

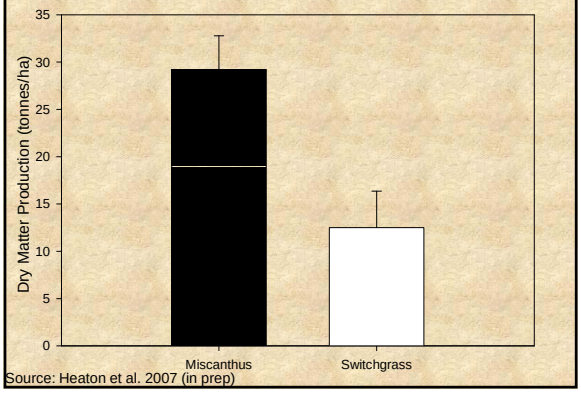
Nutrient Recycling



Illinois Field Trials



3 Year Average Miscanthus and Switchgrass Yield



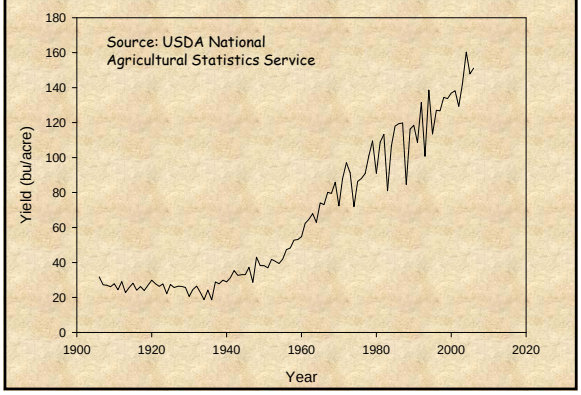
Source: Heaton et al. 2007 (in prep)

Why Does Productivity Matter?

Feedstock	Harvestable Biomass (Mg/ha)	Ethanol (L/ha)	Million Ha needed for 132 billion liters of ethanol	% 2006 harvested US cropland
Corn grain	10.2	4261.2	31.0	24.4
Corn stover	7.4	2801.0	47.2	37.2
Corn Total	**17.6**	7062.2	18.7	14.8
LIHD	**3.8**	1436.4	92.1	72.5
Switchgrass	**12.5**	4725.0	28.0	22.0
Miscanthus	**29.2**	11037.6	12.0	9.4

Source: Heaton et al. 2007 (in prep)

Avg. U.S. Corn Yields over Time



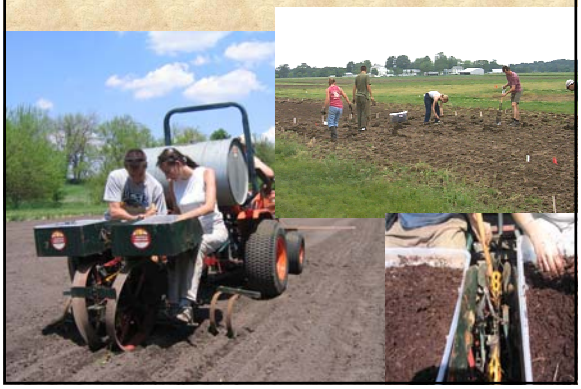
Opportunities for Improvement (Current Problems)

Crop Improvement

Weed Control

Crop Improvement

Planting Technology



Improved Germplasm

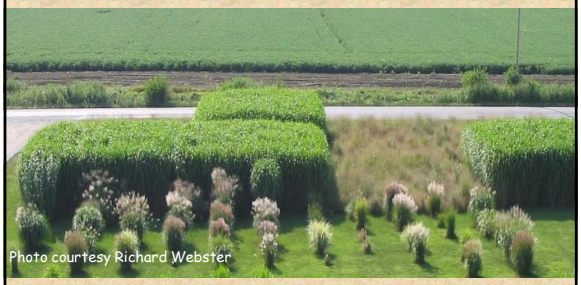
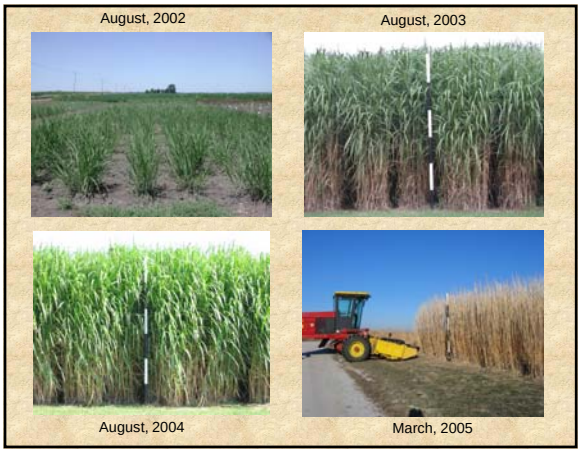


Photo courtesy Richard Webster

Scale-Up

Photo courtesy Andrew Leakey




October 25, 2007


Acknowledgements
The Illinois Council on Food and Agriculture Research (C-FAR)
The Dudley Smith Initiative
The Illinois Dept. of Agriculture
Members and Friends of the Long Lab
Emily Doherty
Pat Schmitz
Becky Arundale
Joey Crawford
Allison Luzader
Meagan Wells
C-FAR
Dudley Smith Initiative
ILLINOIS

Session #23
Energy Savings on the Farm

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Your Energy Management Team

Ron MacDonald
Agviro

Lorne Allin
Albro Farms

Agenda

1. Enercompare: William McClounie
2. The Energy Analysis Process: Ron MacDonald
3. Albro Farms Experiences: Lorne Allin
4. Energy Audits and Benchmarking: Ron MacDonald
5. Conclusions: William McClounie

Overview of Enercompare Program:

A comprehensive program to capture savings
Widespread membership participation
Competent experienced trusted contractors
Pre-arranged financing
Development of an industry-recognized standardized program
Utilization of "Enercompare" benchmarking system
Linkage to emission credits
Identification of other opportunities including those relating to power generation

Demand Side Management Energy Program - Agriculture "Lessons Learned"

This is a project focused on practical learning and extension of energy conservation and efficiency in production agriculture. The project goal is to reduce energy consumption by 10% during practical learning at "Learning Locations". "Lessons Learned" at these locations was applied as demonstration sites for a hands-on learning experience. A previous study targeted the greenhouse sector in a Demand Side Management project modeled under the same format. Results from both projects will be available under the project brand identity of "Enercompare".

Lessons Learned Demonstration Technologies
Geothermal poultry
Heat Recovery: mushroom
Solar heat and electricity: Swine
Dual Ventilation conversion; broiler, layer
EE Turkey with dual vent, dimmable photocell T8 lighting vs. on-site standard fans, incandescent lighting
Dairy conversions: VFD's on all large motor loads
Methods: Similar to greenhouses

Energy Audit and Analysis
Review of 1-2 years of all electric and gas/propane/fuel bills
On site inspection:
Inventory energy consuming components and annual operating times
Input data
Additional metering if required
Report and Implementation

On Farm Energy Audits
100 completed
Dairy: Tie & Free Stall
Swine: Farrow, Finish, Farrow-Finish, Nursery, Farrow-Nursery, Nursery-Finish
Poultry: Layer, Broiler Chicken, Turkey
Other: Cash Crop, Mink, Tobacco

Albro Farms Energy Conservation Program – Farmer Experience
- 450 Sow Farrow to finish with cash crops
- Located near Newcastle Ontario
- Began energy conservation in the early 1980's as it just made sense

Why did we do this?
- Energy is a controllable and manageable cost
- It was fun; we learned a lot
- Experienced increases in productivity
- No impact to production as a result of energy efficiency initiatives

What did we do?
1983: built a Modified Open Front finisher building; no extra capital over a fan barn
1984: Retrofitted a Wall Type Heat Exchanger on the Gestation Farrow Nursery wing; cost of about $10,000
1985: First in Ontario to install Philips IR-PAR infrared heat lamps; no extra capital to convert and lamps last longer. First in Ontario to install Philips SL-18 compact fluorescent lighting; $3000 to convert

1994: First to install infrared tube heater system in all in-all out nursery facility
Many other smaller items, some successful and others not. Retrofitted vapour proof fluorescent fixtures. Energy audit by Ontario Hydro in 1992 revealed the best thing to do was reposition the refrigerator away from the local heat source.
Dual ventilation in breed barn as a retrofit was not automated and did not work well
Motion sensor in the hallways to ensure lights only on when pigs/people in halls

Intensive Audits:
Six intensive energy audits were performed on farms representing agriculture production sectors with information needs and gaps.

Although the level of conservation and efficiencies produced varied by operation and sector many excellent opportunities and "Lessons Learned" were identified at the sites and are summarized below:

Learning Locations:
Eight pilot projects or Learning Locations were selected as a result of the audits. Data logging systems collect energy savings data and verify systems' performance. Information from data collection and practical experience is featured in these "Lessons Learned":

Swine Creep Heating
Poultry Light Harvesting
Poultry Dual Ventilation
Fruit Storage Demand Management
Geothermal Heat System
Dairy Light Harvesting
Dairy VFD
Greenhouse Boiler Reconfiguration

Benchmarking Software - Enercompare:
Enercompare has been realized through internet and software tools including:

1. Enercompare Website - completed to demonstrate "Lessons Learned" and "Learning Locations" (www.otimultimedia.com/enercompare/index.html)
2. Benchmarking or comparison software for Greenhouses (25 farms on-line) (www.enercompare.com)
3. Benchmarking or comparison software for Livestock and Poultry (over 100 farms on-line) (www.enercompare.com)

Next Steps:
The momentum of these and past efforts must continue and build on the foundation of the findings and tactics of the project – it works! Now that common conservation and efficiency systems and technologies have been identified, there is a clear opportunity to extend others. Here are next steps activities to expand application and engage agricultural production facilities in Ontario:

Train the front line contractors: Develop and launch a training program for electrical and mechanical contractors in order that they can consistently employ creditable conservation actions

Drive users to the resource tools: Promote the Enercompare website to increase awareness, access and adoption

Expand the resource tools: Further develop the Enercompare website with additional tools, links and comparison capability

Continuous improvement is critical to success: Maintain and add content to the Enercompare website, with new technologies continuously being added to the “Lessons Learned”

Motivate through marketing the ideas: Develop incentive ideas to motivate use and adoption

Energy Influencers and Champions Leader Network: Develop agriculture energy conservation and efficiency advocate network with partners such as Ag Energy Cooperative and other energy Champions

Meet the needs of agriculture: Continued development of conservation and efficiency programs that meet the needs of the agriculture sector

Some technologies have been around for years, but have not been adopted in farming applications. Geothermal heat is one such technology. Only one installation in Ontario on a farm about 20 years ago is known. Problems with that installation resulted in its being mothballed. Newer systems are in the marketplace. Farmers have been inquiring about these systems for their farms. Data on farm applications do not exist. There is a need to determine whether these systems will work on farms, identify and address problems, determine energy use and payback, and get the information to the farm community.

There also is a need to inform the farm community about new technologies such as dimmable lighting in dairy barns with the capability of daylight harvesting, dual ventilation in poultry barns, variable frequency drives on dairy vacuum pumps.

As part of the Ag Energy Cooperative long-term strategy, a program called Lessons Learned is being developed. The purpose is to showcase new, emerging and evolving technologies that farms can investigate without necessarily having to directly visit the facility. This is being done through the Enercompare Lessons Learned website and the Quality, Improvement and Control stories.

Professional Audit Advantages:
Improve energy savings impact through:
Time to analyze energy and management systems
Review opportunities with farmer
Provide a detailed report
Potential to provide follow-up design

Session #24
Fast Pyrolysis and its Potential in Agriculture

Ron Golden
President, Agri-Therm Limited

A member of the Professional Engineers Ontario, Ron was educated at the University of Windsor in Ontario and holds Bachelors Degrees in Biology and Mechanical Engineering.

His career has been focused on the design, manufacture and commissioning of heavy industrial equipment for mining, minerals processing, metal fabrication and process industries. International experience was gained in the oil and gas pipeline service industry, installing and commissioning facilities in North and South America, Australia and Asia. He is the inventor of a patented process to apply thick concrete coatings to large diameter off-shore gas pipelines as well as co-inventor of Agri-Therm's pyrolysis reactor.

Coming from a farming background in rural Ontario, he is a co-founder of Agri-Therm Limited; a venture which presents the unique opportunity to combine his accumulated skills and training in the exciting emerging field of renewable resources and environmental technology.

Agri-Therm Ltd.

Agri-Therm is a Canadian company involved in the design, manufacture and commercialization of a unique mobile fast pyrolysis technology jointly developed with the University of Western Ontario.

Fast Pyrolysis:

Pyrolysis is the process that has been used to produce charcoal for centuries. Wood is set on fire then deprived of oxygen either through specially designed kilns or simply burying it. After several hours or days the wood is reduced to a solid carbon product which has many desirable properties as a fuel over wood.

Fast pyrolysis is a thermal process which rapidly (in a matter of seconds) "cracks" biomass into its constituent components in an atmosphere of high temperature and lack of oxygen. This process is carried out in a device called a fluid bed reactor which uses fluidized heated sand as a medium to rapidly transfer heat and simultaneously abrade biomass particles.

In this environment, chemical bonds are broken and the biomass is converted into small solid particles (primarily Carbon) and a hot gas. Some components of this hot gas can be condensed into what is commonly referred to as “bio-oil.” Solid carbon char, more recently being called “bio-char” as well as incondensable and combustible gases are also products of the pyrolysis of biomass.

Bio-oil:

It is important to note the difference between bio-oil and other bio-fuels which are currently being produced and utilized around the world. Unlike bio-diesel, which is manufactured from fats and oils using a process called transesterification, bio-oil is a water-based liquid which is not a direct replacement for the diesel fuel used in combustion engines. Bio-oil can be used as a replacement for heavier oils typically used in industrial burners.

There are several potential uses of bio-oil which cannot be matched by bio-diesel or ethanol. Bio-oil can be further refined to produce specialty chemicals, pharmaceuticals and even food additives. All products are renewable ‘green’ products which reduce dependence on fossil fuels, have low or no sulphur content and are ‘greenhouse gas neutral.’

Bio-Char:

Essentially this is the element of carbon which was originally a component of the biomass. There is much research and interest in this material as a solid fuel, a fertilizer and as a means to sequester carbon from the environment.

Combustible Gases:

There are three combustible gases which are typically produced via this process; methane, ethane and hydrogen. These gases are available to re-route into the Agri-Therm process to provide some or all (depending on feed stock chemistry and production rate) of the fuel energy to heat the pyrolysis reactor.

Potential Feed Stocks:

Virtually any biomass, (plant or animal matter) can be utilized as a feed stock for pyrolysis. However it must be noted that the quality and quantity of bio-oil, bio-char and gases which can be produced from a given feed stock are highly dependent on its chemical characteristics. Some feed stocks produce large quantities of high quality oil, while others produce low quantities of bio-oil which has little commercial value.

Identifying “prime” feed stocks via extensive laboratory scale analysis must be done in order to assess the technical and economic viability of any project.

The low density of most potential feed stocks from agricultural operations generally makes it uneconomical to transport these materials for significant distances. Agri-Therm’s mobile pyrolysis equipment was specifically designed to overcome this economic barrier.

Residual materials from agricultural and food operations, straw, husks, shells, skins, pits…etc…are all candidates for pyrolysis. A crop grown specifically for pyrolysis into specialty fuels and chemicals is an area of great interest and research. This area has the potential to bring marginal farm land back into production utilizing crops which require minimal fertilization or tilling.

Pyrolysis of biomass complements the production of other bio-fuel processes. Residual biomass from both ethanol and biodiesel production can be utilized to produce bio-oil, bio-char and combustible gases.

Potential in Agriculture:

There are several potential benefits available to the agricultural economy through this technology:

- Bringing value to residual and waste biomass materials
- Specialty crops grown specifically for pyrolysis processing
- The production of eco-friendly ‘green’ fuels, chemicals and pesticides
- The potential to bring marginal farm land into production
- Production of solid fuel and/or fertilizer from bio-char
- Reduction of dependence on fossil fuels
- Reduction in greenhouse gas emissions when used as a replacement for fossil fuels and chemicals
- Mobile design to accommodate low density materials and seasonal nature of agricultural production

Session #25
Biodiesel

Dr. Rex Newkirk
Canadian International Grains Institute
Winnipeg

The promise and the reality of biodiesel for Ontario growers.

Please use the balance of this page for notes.

Session #26
Wind Power and Net Metering

Mike Oegema	Eddie Van Engelen	John Hogg
Talbotville	Forest	Free Breeze Energy Systems Ltd.

Presenter Mike Oegema

Introduction

Oegema Turkey Farms has been around since 1958. The first flock of turkeys showed up in 1959 – the bronze kind. Over the years land was acquired and new barns were built to the point where it is at today. Heiko Oegema has been there since day one and brother Tom joined the operation full time in 1973 after completing a degree in soil science at the University of Guelph. Heiko's two sons, Mike in 1987 and Wayne in 1996, have also come on board. Turkeys and cash crops were for many years the two main focuses of the business. In 1992 another focus was added – an on-farm retail outlet called The Turkey Shoppe. This business has grown substantially in its 15 years of existence due to some good products and a great location on a busy artery between St Thomas and London. As of 2004, Tom now operates the cash crop business as his own company and Heiko, Mike, and Wayne operate the turkey and retail business.

The Windmill

The Turkey and retail operation uses a lot of hydro. Always looking to cut costs, the Oegema's tossed around the idea of a wind generator after seeing a display at the Outdoor Farm Show in 2005. In December of that year a contract was signed with a contractor to put up an 80kW WES wind generator – a refurbished Dutch model of which many can be found around the world. The contractor took care of everything from getting the permit to commissioning the unit. They dealt with the township and they dealt with Hydro One. The township was no problem. Hydro one was a bit of a problem. The wind power/ net metering portfolio changed hands within Hydro One once or twice while the tower was being erected. The tower was ready to go by the end of April, 2006, but the final commissioning didn't happen until the first week of June.

The farm operates on 3-phase 208V hydro and meshing the tower's output to the grid was not a problem. Hydro One did make it a requirement to install a phone line to the new meter at the farm's expense so they could call in to read the meter. The new meter will spin backwards if the generator is producing more than the farm is using. Under the net metering contract the farm is credited these excess kilowatts and has 12 months to use them. With the high use rate on the farm these credits are used up in a matter of hours.

Performance

Shortly after construction of the tower was completed, a mistake was discovered by Tom that the contractor had made. In their calculations they had placed the farm's location as being in the middle of Lake Erie (where the wind was really good). The contractor was very apologetic and even offered to take the windmill down. That offer was declined because the windmaps still showed favourable windspeeds for the Oegema's location. The contractor took a discount on the project and is paying the $2000/year maintenance contract until the project becomes cash flow positive. The wind generator is performing very well after a few initial adjustments, but the winds have not been even close to what the windmaps indicate. They have been over 1 m/s less than indicated which means a huge drop in productivity for the turbine. The Oegema's recommend setting up a test tower for a year before deciding on putting up a tower.

Right now the're looking at a 12 – 15 year payback based on the numbers from the last 18 months. That's about twice the time they were originally anticipating. But wait – there are a few other factors they are considering at this point.

Many people are driving in and commenting on and asking questions about the turbine. Not one negative comment has been heard. People are impressed and offer the opinion that it's a great idea and good for the environment. It's become somewhat of a landmark in the area. After a couple years of small increases, sales at the retail outlet have taken quite a jump this year. While it is hard to quantify, the Oegema's feel that the turbine has played a part in that.

Conclusion

While short term numbers indicate the wind generator project wasn't such a great idea, the Oegema's aren't getting too upset. They went into this thinking long term. Next time they would put up a test tower first and not rely on the government wind maps. The tower has a 50-year life expectancy while the turbine itself has a 20 year life expectancy. The infrastructure is there to produce green power for 50 years. There have been no maintenance issues and the community seems to be really excited about the project.

Presenter Eddy Van Engelen

As you heard on the introduction I farm with my brother Mike and my son Andrew. Our farm, Van Engelen Dairy Farms Ltd. is milking 280 cows and we farm 1000 acres. I have another brother, John, his farm (Hog-tied Farms Ltd) is a 250 sow farrow to finish operation. He farms 500 acres.

We farm about 10 km from Lake Huron so we have good wind there. We started talking about a wind mill 2 years ago and thought it would be a good idea. Our thoughts were if we could pay for the wind mill in 10-12 years it would be good to have free Hydro after that.

The two farms are very close together so instead of each buying a 80 kw tower for $220 000 it was decided to buy a 250 kw for $450 000 and tie the two farms together. Putting the two farms together cost $150 000 but we got some benefit from this because we buried all the Hydro lines on both farms and put in a 300 kw auto Generator. Previously we each had our own generators. My brother John had an auto Generator set and the dairy had a P.T.O. model, so we traded both in for a bigger generator.
We bought the Wind mill from a company that handled used 'Wes' Wind mills. We did go to see some 80 Kw wind mills. We went to Oegema' s Turkey Farm as well to see theirs.

We put a down payment on the Wind mill in February for $100 000. And then another $100 000 more in April, they said it would be up in August, but after they had the next cheque they disappeared. Finally in October they put in the cement and on December 15, 2006 we started Generating power.

When we got a December 2006 Hydro bill we thought it was a little high, but it was hard to figure out. In January 2007 we had a low wind month and only generated 24000 kw but the bill come in at such an amount that it looked like we did not generate anything. We called hydro and never got a straight answer out of them. In February we generated 54 000kw and still got a bill for $800 from our normal bill of $5000 but we generated $10 000 kw more then we used. So we called Hydro once again, after much prying we finally find out that we are getting charged line charges because we were a demand billed customer. We argued with Hydro every month. Finally they said it would go to a ruling from the Ontario Energy Board. Everyone at the Wind conference in London in April 2007 said we would win the ruling but when the ruling come down, we lost. I called the Ontario Energy Board and they told me it was not a ruling it was the Law.
The Ontario Government has a law that a demand billed customer does not get his line charges back. This law states that if you go over 50 kw for more than 15 min. anytime in an entire month you will be billed as a demand billed costumer, and that means not getting your line charges back.

We had meetings with Hydro, the Ontario Energy Board, and our Local M.P.P. in the end, we had to switch to S.O.P (Standard Offer Program).

In May of 2007 when I talked to John Renello of the Ontario Energy Board, he made it very clear that the only way this wind turbine will pay for itself is on the S.O.P. I think you

should know that when dealing with Hydro One you are also dealing with the Ontario Energy Board and the O.P.A (Ontario Power Authority). And none of these people speak, or know anything about each other. They don't hold meetings together of mutual interest, don't share information or procedures and in fact they don't like each other. It was a big job to switch from Net Metering to the S.O.P.

For our farm net metering would be much better because now we are in the S.O.P. and we are tied into 20% of inflation for 20 years. With net metering if Hydro where to go up you would get all the inflation. Plus you would get carbon credits.
If the government is serious about being green then it will change the ruling. If you are a generator of power, whether its wind, bio gas or solar you should not be billed as demand billed customer. If they do not switch this law then anything over an 80 kw generator should not be on Net Metering. Net Metering will be dead.

In fact, on our farm if we new everything we know now we could have built a much bigger wind mill on a farm down the road by itself, away from the buildings, saved the money on tying the two farms together, and into the S.O.P. immediately.

As of Nov 17 we switched to S.O.P. and in the 13 days of Nov. that were left we got a cheque for $2400 for the Hydro we produced.

Session #27
Marketing Outlook 2008

Cal Whewell
FC Stone, Ohio

Please use the balance of this page for notes.

FCStone
UNDERSTAND·SIMPLIFY·SUCCEED

USDA Grain Supply/Demand Summary

December 11, 2007

December-07

U.S. Corn Supply/Demand (mb)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Planted	81.8	**78.3**	93.6	**93.6**
Harvested	75.1	**70.6**	86.1	**86.1**
Yield	148.0	**149.1**	153.0	**153.0**
Carryin	2114	**1967**	1304	**1304**
Production	11114	**10535**	13168	**13168**
Supply	13237	**12514**	14487	**14487**
Feed	6155	**5598**	5650	**5650**
Exports	2134	**2125**	2350	**2450**
Ethanol	1603	**2117**	3200	**3200**
Other Ind	1378	**1371**	1390	**1390**
Demand	11270	**11210**	12590	**12690**
Carryout	1967	**1304**	1897	**1797**
CO/Use	0.175	**0.116**	0.151	**0.142**
Price	$2.00	**$3.04**	$3.20	**$3.35**
range			$3.80	**$3.95**

World Corn Supply/Demand (mmt)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Carryin	130.70	**123.04**	104.98	**106.17**
Production	696.37	**703.85**	768.22	**769.31**
Supply	827.07	**826.89**	873.20	**875.48**
Feed	476.31	**472.19**	481.50	**484.17**
Demand	704.03	**720.71**	762.82	**766.43**
Carryout	123.04	**106.18**	110.38	**109.05**
CO/Use	0.175	**0.147**	0.145	**0.142**

China Production: 07/08 145.0; unch
Argentina Production: 07/08 22.5; unch

U.S. Soybean Supply/Demand (mb)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Planted	72.0	**75.5**	63.7	**63.7**
Harvested	71.3	**74.6**	62.8	**62.8**
Yield	43.0	**42.7**	41.3	**41.3**
Carryin	256	**449**	573	**573**
Production	3063	**3188**	2594	**2594**
Supply	3322	**3647**	3173	**3173**
Crush	1739	**1806**	1825	**1830**
Exports	940	**1118**	975	**995**
Seed	93	**78**	86	**86**
Residual	101	**71**	77	**77**
Demand	2873	**3074**	2963	**2988**
Carryout	449	**573**	210	**185**
CO/Use	0.156	**0.186**	0.071	**0.062**
Price	$5.66	**$6.43**	$8.50	**$9.25**
range			$9.50	**$10.25**

World Soybean Supply/Demand (mmt)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Carryin	47.41	**52.81**	62.08	**61.11**
Production	220.44	**235.57**	220.81	**221.59**
Supply	267.85	**288.38**	282.89	**282.70**
Crush	185.03	**195.51**	203.07	**204.74**
Demand	215.19	**225.02**	233.54	**235.20**
Carryout	52.81	**61.11**	49.35	**47.32**
CO/Use	0.245	**0.272**	0.211	**0.201**

Brazil Production: 07/08 62.0; unch
Argentina Production: 07/08 47.0; unch

USDA Grain S&D Summary

December 11, 2007

December-07

U.S. Wheat Supply/Demand (mb)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Planted	57.2	**57.3**	60.4	**60.4**
Harvested	50.1	**46.8**	51.0	**51.0**
Yield	42.0	**38.7**	40.5	**40.5**
Carryin	540	**571**	456	**456**
Production	2105	**1812**	2067	**2067**
Supply	2726	**2505**	2613	**2613**
Food	915	**933**	940	**945**
Exports	1003	**909**	1150	**1175**
Seed	78	**81**	86	**88**
Feed/Res	160	**125**	125	**125**
Demand	2156	**2048**	2301	**2333**
Carryout	571	**456**	312	**280**
CO/Use	0.265	**0.223**	0.136	**0.120**
Price	$3.42	**$4.26**	$5.90	**$6.20**
range			$6.30	**$6.60**

World Wheat Supply/Demand (mmt)

	Dec USDA 05/06	**Dec USDA 06/07**	Nov USDA 07/08	**Dec USDA 07/08**
Carryin	150.62	**147.84**	124.06	**124.30**
Production	621.65	**593.66**	603.30	**602.31**
Supply	772.27	**741.50**	727.36	**726.61**
Demand	624.43	**617.20**	617.56	**616.55**
Carryout	147.84	**124.30**	109.80	**110.06**
CO/Use	0.237	**0.201**	0.178	**0.179**

Australia Production: 07/08 13.0; unch
Argentina Production: 07/08 15.0; -0.5

Summary: Friendly all around

Corn: U.S. carryout down 100 million bushels on increased exports, much more than expected 15-25 mbu export bump. Farm price range 15 cents higher. World stocks down 1.3 MMT, on 2.7 MMT increase in world feed use.

Beans: U.S. carryout down 25 mbu on 5 mbu rise in crushings, and 20 mbu rise in exports. World stocks down 2 MMT on increased crush.

Wheat: U.S. stocks down 32 mbu on increases in exports (25 mbu), feed use (5 mbu), and seed (2 mbu). World stocks actually slighty higher on reduced global usage.

Opening Calls

Corn up 2-3 cents, beans up 4-6, wheat up 3-5. Report slightly friendly all around, but has market already accounted for demand increases?

Session #28
Bio-fuels; Corn and Soybean Market Outlook for 2008 and beyond

Victor Aideyan MBA, CAFA
Snr. Risk Management Consultant
Farms.com Risk Management
London Ontario & Ames Iowa

Increased demand for corn and vegetable oils from the corn ethanol and bio-diesel industries led to sharp increases in corn and oilseed prices during 2006-2007. Did you nevertheless find yourself having to sell your grain at a lower price after missing much better marketing opportunities?

Have you ever thought about how to improve the marketing of your products, but didn't know where to start or just don't seem to have the time to do a good job? Do you wonder what impact ethanol and bio diesel demand will have on future corn and oilseed prices and what you need to do to take advantage of any possible price increases?
Prices during the 2006 and 2007 crop years presented opportunities for producers to achieve profitability. The increase in volatility in the markets has made it more difficult to time correctly the marketing of crops. There are lessons to be learned from our experience in 2006 and 2007 that we can apply to our marketing of 2008's and future harvests.

During this presentation we will look at actual past prices, look at a real life, successful, farm marketing experience during 2006-2007 and draw conclusions that can help us develop a reasoned marketing approach for our grain selling during 2008 and beyond in an environment where price volatility is being driven by the bio-fuels industry.

Farm Credit Canada

Session #29
Grabbing Profits from a Volatile Marketplace

Heather Moffatt
Agricultural Marketing First

Are you using marketing tools and strategies to your best advantage? Applied workshop on the mechanics of using futures, options, etc.

Note: Participants in this session should have a good working knowledge of futures and options on futures.

Please use the balance of this page for notes.

Session #30
Innovative Financial Solutions

Brian Hughes ACC Farmers' Financial	Ken Filson Libro Financial Group

Please use the balance of this page for notes.

Farm Credit Canada

Southwest Agricultural Conference

Presentation by:

Brian Hughes, ACC Farmers' Financial

"Innovative Financial Solutions"

Innovative Financial Solutions

What Is Special About Financing

Farming & AgriBusiness ??

ACC was built on the Innovation and Vision Of Farmers

What is Innovative Thinking

Challenge conventional thinking

Self Assessment

Where to Start

Vision – Idea – Goal

Brainstorm – Test – Retest

Decide

What About Traditional Industry

Vs

Agriculture

Do You Have The Tools

Talent Inventory

Team

Business Plan/Roadmap

Assign Duties & Roles to Team

- Owner
- Family
- Others
  - Legal
  - Accounting
  - Financial
  - Marketing
  - Production Management

Why A Plan

Roadmap – Measure Accountability

Who Has A Business Plan

Who Cares About The Plan

What is Financial Innovation

Asset leverage
Value Chains (Value-added & Integration)
Cash flow management

Financial Tools Available

VCM relations
Cash flow management
Inventory tracking
Managing financial relationships
Commodity Loan
Advance Payments

Financial Goal Setting

Reducing financial risks through sound financial management:

- Understand financial management and planning
- As an individual business operating as part of a value chain
- Use of collateral management to track inventory and sales to leverage asset financing and loan margin.

KEY FINANCIAL RISKS

Management – Skills, Experience, balance, team	Mitigating factors:
Money (Finances) – Equity, unencumbered personal funds	Mitigating factors:
Market – saturated, fad, Competition	Mitigating factors:
Materials (Assets etc) – Equipment, resources	Mitigating factors:

Who is ACC Farmers' Financial

A farmer financial solution provider to farmers

A delivery agent for financial programs

Who is ACC Farmers' Financial?

- Administrator of the Commodity Loan Program
- Administrator of the Advance Payment Program
- 77 commodities
- Financial programs (FCC Advantage Financing)

- Project management and business development
- Farm business management culture

- Data base management exchange

Commodity Loan Objectives

Provide alternative source of funding for crop inputs – max $750,000

Co-ordinate with other government programs

Introduce a new discipline to financing

Provide funds to better match individual needs

Match collateral to loan purpose

Provide greater marketing flexibility

Advance Payment Program

Crops and Livestock

Interest-free amount = $100,000

Can borrow over $100,000 to maximum of $ 400,000 (interest rate is prime minus one quarter between $100,000 and $400,000 levels)

Field & Horticultural Crops

Greenhouse Vegetables

Livestock

Requires crop insurance or CAIS participation

Business Risk Management Tools of the Future

AgriStability (CAIS)
AgriInvest
Ontario Risk Management Program
Cost of Production
Production Insurance
Farm Forward – Benchmarking

Who is the farmer of the future – next 5 years?

Features of Farm Forward

- ✓ Pathway to Personal Performance
- ✓ Linking risk to financing
- ✓ Leverage the inventory value

Visit concurrent presentations

Opportunity–Vision–Innovation
ACC + Farmer Clients

Partnership with Farm Credit Canada
– Ginseng – Contract Financing
– Deferred Payment – Processing Vegetables
Farm Business Management Awareness
Access to Capital
Biofuels

So – What is Special About Financing Farming & AgriBusiness

. . . . . Basically Nothing

But

Opportunity

Southwest Agricultural Conference

Understanding Your Lender

About Libro

- Incorporated in 1951
- Formerly called St. Willibrord Credit Union
- Provide a full range of agriculture, business and personal banking services

The Libro Difference

There is a basic difference between Libro and the banks: a bank's primary purpose is to **extract** value from customers to **transfer** to stockholders. Libro's primary purpose is to create and **deliver value to our owners**.

Statistics - 2007

Assets Administered	$1.4 Billion
Branches	14
Profit	$8.8 Million
Staff	306
Customer Owners	49,156
Owner Satisfaction Score	4.7/5

Service Strengths

- Local decision making
- Fast turnaround time, fewer steps
- Stability in branch team, and development of relationship
- Frequent, straightforward communication and clear expectations for everyone

Keys to a good relationship

- Honesty
- Communication
- Performance

What your Lender needs to know

- What is your current situation?
- What are your short & long term plans?
- How are you going to get there?
  (What's holding you back?)

LIBRO FINANCIAL GROUP

Questions your Lender asks

- Will you pay? - Character
- Can you pay? - Cashflow
- Can we make you pay? - Collateral

LIBRO FINANCIAL GROUP

Cashflow

- Prepare a monthly cashflow
- Be realistic
- Explain assumptions esp. Price/Yield
- Shock it
- Your farm is unique

LIBRO FINANCIAL GROUP

Key Financial info

- Earned Equity
- Debt Service ratio
- Working Capital
- Return on Investment

LIBRO FINANCIAL GROUP

Session #31
Timely Tax Tips

John Dick
BDO Dunwoody

Please use the balance of this page for notes.

Timely Tax Tips
2007 Personal Income Tax Rates

Ontario & Federal

- Taxable income from:

	Regular	Ineligible Dividends
– nil to $35,488	21.05%	3.23%
– $35,488 to $37,178	24.15%	7.11%
– $37,178 to $62,487	31.15%	15.86%
– $62,487 to $70,976	32.98%	16.86%
– $70,976 to $73,622	35.39%	19.88%
– $73,622 to $74,357	39.41%	22.59%
– $74,357 to $120,887	43.41%	27.59%
– $12,887 and over	46.41%	31.34%

Timely Tax Tips
Basic Personal Amounts

Spouse/Common-law Partner/Wholly Dependent Relative Amount

- Federal amount for 2007 is $9,600
- Matches the basic personal amount
- Elimination of the threshold above which the dependant's net income must be taken into account.
- Ontario basic amount is $8,553, with spouse amount at $7,262 with reduction above threshold of $726.

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

New – Child Tax Credit

- New non-refundable tax credit available to parents with children under age 18
- Credit will be based on an amount of $2,000 for each child under the age of 18 at the end of the taxation year
- Credit will be indexed
- Either parent may claim the credit if the child resides with both parents throughout the year

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

RRSP Changes

- Under the pre-budget rules RRSPs matured by the end of the year in which the RRSP annuitant turned 69
- The budget proposed to increase for the 2007 and subsequent calendar years, the conversion age from 69 to 71

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

RRSP Changes - Who will benefit?

- Anyone turning 69 in 2007 – allowing them to defer conversion of their plans by 2 years
- Anyone 70 or 71 in 2007 or after who has contribution room available, due to unused RRSP carry forward or additional earned income

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

RRSP/RRIF – 70 or 71 in 2007

- A new RRSP could be opened to shelter contributions and provide a tax deduction
- The individual could transfer existing RRIF back into an RRSP as long as it is then reconverted back to a RRIF before the end of the year in which the individual turns 71
- Better idea – just leave money in RRIF, as no withdrawal required in year the individual turns 70 or 71

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

Lifetime Capital Gains Exemption

- Under the pre-budget rules, up to $500,000 of capital gains realized on the disposition of qualified small business corporation shares and qualified farm and fishing property qualified for the lifetime capital gains exemption (LCGE)
- The budget proposed to increase the limit to $750,000 for dispositions that occur on or after March 19, 2007

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

LCGE - 2007 Transition – 3 Step Process

1. Determine the individual's capital gains deduction for 2007 as if the limit was $250,000
2. Determine the additional amount, not exceeding $125,000, that is attributable to net taxable capital gains from dispositions after March 18, 2007 (*to the extent it exceeds Step 1*)
3. Add the amounts determined in Step 1 and Step 2

Timely Tax Tips
2007 Federal Budget – Personal Tax Changes

Registered Education Savings Plan

- The Registered Education Savings Plan (RESP) rules was amended as follows for contributions made after 2006:
  - the annual contribution limit of $4,000 will be eliminated
  - the lifetime limit will be increased to $50,000 from $42,000
  - the maximum annual RESP contribution qualifying for the 20% grant from the government (CESG) will be increased to $2,500 from $2,000
    - $7,200 cumulative limit still applies
  - many students pursuing post-secondary education on a part-time basis will now be able to draw from their RESPs

Timely Tax Tips
2007 Federal Budget – Capital Cost Allowance

Aligning CCA Rates with Useful Life

	Current Rate	Proposed Rate
Buildings used for manufacturing & processing	4%	10%
Other non-residential buildings	4%	6%
Computer equipment (hardware)	45%	55%

NB: Most non-residential farm buildings already qualify for a 10% rate – CCA class #6.

Timely Tax Tips
2007 Federal Corp. Tax Instalments

Increasing Corporate Income Tax Instalment Threshold

- The budget proposes to triple, to $3,000 from $1,000, the threshold amount above which corporations are required to pay corporate income tax by instalment.
- This threshold change will apply in respect of corporate taxation years that begin after 2007.
- The budget also proposes that the frequency of instalment payments by CCPCs be reduced from monthly to quarterly if:
  - the taxable income of the corporation for either the current or previous year does not exceed $400,000;
  - the corporation qualified for the small business deduction for either the current or previous year;
  - the taxable capital employed in Canada of the corporation does not exceed $10 million in either the current or previous year; and
  - the corporation has no tax compliance irregularities during the preceding 12 months.

Timely Tax Tips
2007 Federal Personal Tax Instalments

Increasing Personal Income Tax Instalment Threshold where farming not chief source of income

- The budget proposes to increase the personal instalment threshold amount to $3,000 ($1,800 for individuals resident in Quebec)
- These changes to the instalment threshold amounts will apply to the 2008 and subsequent taxation years
- The CRA will continue to notify individuals who are required to remit instalments of the amount of each instalment, determined on the basis of tax information that is available to the CRA

Timely Tax Tips
2007 Federal Payroll Changes

Increasing Quarterly Remittance Threshold for Source Deductions

- The 2007 budget proposes to increase the average monthly threshold amount from $1,000 to $3,000 where an employer is entitled to remit on a quarterly versus monthly basis
- These changes will apply to calendar years beginning with 2008
- Must have clean compliance history for 12 months

Timely Tax Tips
2007 GST Filing Changes

Increasing GST/HST Annual Filing and Annual Remittance Thresholds

- The budget proposes to:
  - triple the taxable supplies threshold, at or below which registrants can file a GST/HST return annually, to $1,500,000 from $500,000; and
  - double the net tax threshold, below which annual GST/HST filers can make one tax remittance, to $3,000 from $1,500.
- These measures will apply to fiscal years that begin after 2007

GST/HST UPDATE
Changes to Penalty & Interest Rules

- Changes to the GST interest and penalties, which, were originally announced in the 2006 federal budget, came into effect on April 1, 2007
- One key change is an income tax change – for taxation years beginning after April 1, 2007, you can no longer claim an income tax deduction for GST arrears interest and penalties that are payable

GST/HST UPDATE
Changes to Penalty & Interest Rules

Changes to Penalties

- The CRA will no longer charge a 6% penalty on overdue GST amounts
- Instead, as of April 1, 2007, a penalty will apply to any return that is filed late where there is an amount owing, as follows:
  - 1% of the amount owing; plus
  - 0.25% of the amount owing multiplied by the number of complete months the return is overdue, to a maximum of 12 months
- File “nil” returns to avoid flat penalty.

GST/HST UPDATE

Changes To Refunds

- Beginning on April 1, 2007, a taxpayer will only receive a refund or rebate if all overdue and outstanding returns (known to the CRA) for GST, income tax, excise tax and airport security charges have been filed
- Similarly, the CRA will apply any refund to all amounts owed by a taxpayer before any amount is paid out by them

Timely Tax Tips
Pension Income Splitting

- NEW when filing 2007 T1 returns (form T1032)
- Must have a source of pension income:
  - Annuities and RRIF withdrawals if 65 or older
  - Annuities from an RPP if under 65 plus some amounts arising due to the death of a spouse
- Split will be made when 2007 T1 is filed
- Income tax withheld can also be split
- Other pension-related amounts don’t qualify
  - CPP splitting is still possible, but is still done separately through CPP rules

Ontario/Federal Corporate Tax Harmonization

Background

- Ontario Corporate taxpayers will begin filing a harmonized T2 Corporate Tax Return with the CRA for taxation years ending after December 31, 2008
- *Bill 174 which received Royal Assent on June 4, 2007, enables the CRA to begin administering Ontario corporate taxes for taxation years ending after 2008*

Ontario/Federal Corporate Tax Harmonization

What does this mean?

- Corporate taxpayers will start making blended instalment payments to the CRA in February 2008
- Corporate taxpayers will start filing a single T2 Corporate Tax return with the CRA for taxation years ending after December 31, 2008
- Ontario has agreed to harmonize its corporate income tax base with the Federal tax base
- The CRA will administer Ontario's corporate capital tax and corporate minimum tax

Ontario/Federal Corporate Tax Harmonization

- Ontario corporations will adopt the Federal tax attributes as the tax basis for taxation years ending after December 31, 2008
- Federal tax attributes (e.g. balances in loss pool, UCC) will apply to Ontario corporate tax pools
- The adoption of the Federal tax attributes will create either:
  - A transitional debit, or a,
  - A transitional credit

Owner-Manager Remuneration Integration

- Where corporate and personal tax systems are integrated:
  - **The tax paid by a corporation and its shareholders** (i.e. earning the business income in a corporation and then paying out the after tax income as a dividend to the shareholders)

  should equal
  - **the tax paid by an individual** on the same business income earned directly
- Integration depends on corporate and personal tax rates

Owner-Manager Remuneration
Ontario – Income Eligible for SBD (Ineligible Dividends)

	2006	2007	2008	2009	2010	2011
Tax deferral:						
Tax at top personal rates	$ 46.41	$ 46.41	$ 46.41	$ 46.41	$ 46.41	$ 46.41
Tax at SBI corporation tax rates	$ 18.62	$ 18.62	$ 17.00	$ 16.50	$ 16.50	$ 16.50
Tax deferral from retaining income	**$ 27.79**	**$ 27.79**	**$ 29.41**	**$ 29.91**	**$ 29.91**	**$ 29.91**
Tax cost of flowing general business income through a corporation and paying it to a shareholder as a dividend:						
Income earned by the business	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Corporate taxes payable	$ (18.62)	$ (18.62)	$ (17.00)	$ (16.50)	$ (16.50)	$ (16.50)
Income available as an ineligible dividend	$ 81.38	$ 81.38	$ 83.00	$ 83.50	$ 83.50	$ 83.50
Personal tax payable on ineligible dividend	$ (25.51)	$ (25.51)	$ (26.01)	$ (26.17)	$ (26.17)	$ (26.17)
Net cash to shareholder	$ 55.87	$ 55.87	$ 56.99	$ 57.33	$ 57.33	$ 57.33
Total corporate and personal tax	$ 44.13	$ 44.13	$ 43.01	$ 42.67	$ 42.67	$ 42.67
Personal tax at top rates	$ 46.41	$ 46.41	$ 46.41	$ 46.41	$ 46.41	$ 46.41
Savings/(cost) of earning income in a corporation and paying it as a dividend	**$ 2.28**	**$ 2.28**	**$ 3.40**	**$ 3.74**	**$ 3.74**	**$ 3.74**

Corporate rates are nominal rates at July 1st, 2007.

TIMELY TAX TIPS

For more info, visit the following web sites:

Canada Revenue Agency:
www.cra-arc.gc.ca

BDO Dunwoody LLP
Chartered Accountants and Advisors
www.bdo.ca

Session #32
Demystifying Farm Succession

Peter Coughler
Succession Planning and Business Agreements Program Lead
Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
Brighton, Ontario

Please use the balance of this page for notes.

Demystifying Farm Succession

SOUTHWEST AGRICULTURAL CONFERENCE
Ridgetown, Ontario
Thursday, January 3, 2008 and Friday, January 4, 2008

Peter Coughler
Succession Planning and Business Agreements Program Lead
Ontario Ministry of Agriculture, Food and Rural Affairs

Ontario

Succession Planning can be thought of as:

- the long-term thinking and advanced planning for:
  - the smooth entry of the next generation (or a third party) into a profitable business and a rewarding career.

AND

  - the gracious exit of the retiring generation into a financially secure and a satisfying retirement.

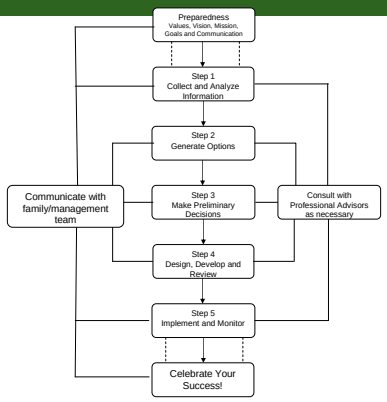
Process vs. Plan

- The succession planning **process** requires:
  - investigating and analyzing the farm business;
  - exploring and understanding the goals and aspirations of all family members;
  - and balancing these needs against the business, legal and tax considerations.
- The succession **plan** accurately documents the decisions that result from the **process**.

Uniqueness

- Each & every farm business is unique.
- Each & every farm family is unique.
- Thus, each & every succession plan will be unique.
- Therefore, there are NO cookie cutter solutions or magic pills.

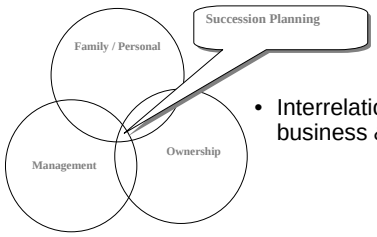
Steps of the Succession Planning Process



Preparedness

- Need to understand what's important to parties (Values).
- Based upon the values—determine Vision, Mission and Goals.
- Communication—key ingredient.
- Three key questions to consider:
  - Is there anyone on the management team (family or key employees—if applicable) capable of running the business when founder retires?
  - Any interested in taking over the business?
  - If yes, then what are some of the options to train and prepare them for leadership of business?

Preparedness—Business & Family



- Interrelationship of business & family.
- Conflicts arise because issues get blurred.
- Again, communication—key.

Tagiuri and Davis, 1982

Preparedness
Strategies to Improve Communication

- "Professionalize" the business relationship through regular "Family Business Meetings."
- Deal with conflicts.
- Consult with outside advisors.

Step 1-Collect and Analyze Information

- Assessment of business situation:
  - Current profitability
  - Future growth and profitability—Is there really a future for this business?

Step 2 - Generate Options

Generate Options regarding:

- Management transfer—successor development:
  - The late Professor Andrew Errington's analogy regarding four reins of control:
    1. first rein—"decisions related to the tactical day-to-day operations of the farm business."
    2. second rein—"control and responsibility of the strategic decisions"—the mix of enterprises on the farm and how they affect profitability.
    3. third rein is associated with the money issues—"control over buying inputs and selling production—negotiating the various contracts."
    4. final rein is the "settling of accounts"—the cheque book—most difficult to train and transfer to the next generation.

Step 2 - Generate Options (continued)

Generate Options regarding:

- Ownership transfer:
  - Tax considerations
    - Methods of Transfer
    - Capital Gains and Exemption
    - Tax Deferred Transfer or "Rollovers"
  - Business structures
  - Legal considerations

Step 2 - Generate Options (continued)
Tax considerations: Methods of Transfer

- **Sale**
- **Gift**
- **Bequest (your will)**
- Combination of all three.
- Begin with the end in mind.
- ***Tax should not be the motivating force.***

Step 2 - Generate Options (continued)
Tax considerations: Capital Gains and Exemption

- **Capital Gains –** ½ of a capital gain is tax free, the other half is added to your income.
- **Capital Gains Exemption –** currently $500,000 per person.
  - **2007 budget - increased that to $750,000**
  - **Draft legislation - dispositions on or after March 19, 2007.**
- **Qualified farm property** includes land, quota, buildings and an interest in a family farm partnership or shares of a farm family corporation.

Step 2 - Generate Options (continued)
Tax considerations: Tax Deferred Transfers to Children or Rollovers

Rollover

- Transfer price can be set at any value between the adjusted cost base and fair market value (FMV) of the asset. (Does NOT include Inventory)
- Transfer at ACB (or zero) **= no capital gain**.
- Transfer at FMV **= full capital gain.**

Step 2 - Generate Options (continued)
Tax considerations: Assets

- Land—capital gains.
- Quota—capital gains and recapture of depreciation.
- Machinery—recapture.
- Inventory—must sell / transfer at FMV or transferred tax deferred through a will.
- Shares.
- Partnership Interest.

Step 2 - Generate Options (continued)
Business Structures

Sole Proprietorship

- Simple, child can start by owning some assets and/or sharing some gross income.
- More difficult to gain gradual entry.

Partnerships

- Effective in splitting income.
- Child can enter the business gradually.
- Records important.
- Income split must be reasonable.

Step 2 - Generate Options (continued)
Business Structures (continued)

Corporations

- Tax effective for higher incomes and paying debt—income under $400,000 taxed at 16.5%.
- Can utilize capital gains exemption on transfer of assets.
- Children can enter business gradually.
- Very flexible.
- **Corporation has no capital gain exemption.**
- More complex.

Step 2 - Generate Options (continued)
Legal Considerations

- Business Agreements (i.e. buy-sell, partnership, shareholders, etc.).
- Will—one component—a back-up to the overall succession plan while alive.
- Power of Attorney for Property and for Personal Care.

Step 3 – Make Preliminary Decisions

- Make preliminary decisions about direction.
- Consider various options and their implications with help of advisors.
- Ensure decisions align with goals, objectives and expectations of team members (family and others).

Step 4 – Design, Develop and Review the Plan

- Design, develop and review the plan for the business.
  - Set direction for the business.
  - Work with advisors to ensure options are workable.
  - Involve successor-valuable learning tool.
- Set a timetable for transfer of management/leadership, control and ownership.

Step 5 - Implement and Monitor

– A plan is useless unless implemented.

– Put documents and agreements in place.

– Move forward with transfer of management/leadership, control and ownership.

An Integrated Approach

- Different issues and considerations in developing a succession plan:
  - human & family dynamics
  - viability, profitability, feasibility
  - financing, insurance, investments
  - retirement planning (both financial & lifestyle)
  - taxation
  - legal
- Due to complexity and overlap of issues:
  - Good idea to utilize a “team approach.”

Team

- #1: Business Owners and Management Team
- Accountant
- Lawyer
- Banker/Financial Institution Rep.
- Financial Planner/Investment Advisor
- Business Advisor/Facilitator
- Etc…..

Conclusion

- Many considerations—overlap and linkages of family & business.
- Step-by-step approach provides a logical approach.
- Programs to Consider:
  - Canadian Farm Business Advisory Services (CFBAS) and Specialized Business Planning Services (SBPS). Call 1-866-452-5558 (toll-free) or visit online at: www.agr.gc.ca/renewal
- It’s up to you - #1 member of the Team.

Session #33
Innovation on the Back Roads

Jason Persall
President
Persall Naturals Ltd.
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John Bryans
Munro Honey

Contemplating a shift in a traditional farm business model is not an easy decision to make. Making that decision and the proper one requires an extensive assessment of not only your operation but of your personal state as well. I will review the steps that I considered in our assessment and what decisions we faced.

History of Persall Naturals

In the year 1999 we had recently completed an expansion on our farm which included acquiring another farm and building a grain drying/storage facility. The idea of value adding was a thought I had been considering for a few years. Before embarking on any ideas, I came up with an assessment that would look strategically at our farm operation, our risk factor, our capabilities, future goals, personal and family affairs.

Assessing your Operation

- Assess your farm operation
    - Beginning with financials, is your farm profitable? A value addition will require capital and lots of it. Is there enough personnel to take care of the operation during its peak times? What is your short and long term goals for your farm?
    - Before' thinking outside of the box' think inside it first. If your farm is struggling now for what ever reason, do not rely on a value added venture to save it.

- Assess your risk factor
    - How much are you willing to risk? Any venture comes with risk, some more than others depending on markets.
    - How much capital are you willing to risk? What ratio of debt to asset are you comfortable with?
    - If this venture were to flop with your maximum risk at stake would you be able to recover?
- Assess your capabilities
    - Would your farm be able to adapt a new venture easily? Land base? Infrastructure? Municipal regulations?

- Are you capable of overseeing two businesses? Do you have a business mind set? Are you willing to invest a load of TIME,TIME and more time? New ventures do not generally turn profits for 5 to 10 years which equals TIME over income.

- Assess your future
  - What are your short term goals? What are your long term goals?
  - How do these goals mould together with a new venture?
  - Can you see yourself making a decision of choosing one over the other in time?

- Assess your personal affairs
  - Would your wife be in agreement to this risk!!!
  - Can you handle business time vs family time?
  - Are you factoring in your children caring on the businesses? Exit strategies?

In addition to this, performing a SWOT analysis is also helpful.
S. What are your strengths? Both professionally and personally. What is the strength of your farm? And how could this benefit a new venture?
W. What are your weaknesses? Both professionally and personally. What are the weaknesses of your farm? And how could this effect a new venture?
O. What are your opportunities? Partially and in whole? The farm and together with a value add?
T. What are the threats?

Knowing the answers to these will help you in your next decision and will continue down the road. Seek advice from gov't officials, they are there to help and support you. They may also be able to steer you towards organizations that can further help with little to no cost. Never for any reason feel that you need to do something value added to stay in agriculture just because it has been pushed as a saviour.
Feeling comfortable in moving ahead we were ready to start analysing some of our ideas and put them down on paper. Choosing an idea for value added was not an easy one to make. We wanted one that would fit into our assessment, was unique and would be directly related to the food industry. The food industry was always of interest to me but would pose a serious issue with me on risk down the road. Choosing to process soy was a relatively easy decision as our farm was already dedicated to growing good quality non-GMO seed. Method of further processing took a little more research but landed on cold pressing. This fitted into our strategic plan on a number of points but the main being able to market high end extra virgin oils. Buying equipment and giving a pole barn adjacent to our elevator and major make over we were ready to start. From that point on to the present has been a serious learning curve. Now we have a new retail brand that launched this fall 'Pristine Gourmet', we have a very detailed strategic plan/business

plan and a detailed sales and marketing plan. Our risk, mentioned earlier was popping up. Any venture dealing with the public and food elevates your risk to where seeking advice from lawyers, accountants and gov't is essential. Priority one, PROTECT your family and its assets. As our business prepares for the US market this year, this issue must be finalized. We are starting year 5 in 2008 and I think I can smell a profit lingering!

If you have any questions or comments please do not hesitate to call or email.

Thank-you.

Session #34
Growing Profits from People – On Farm Marketing Innovations

Ingrid & Ken Dieleman Thamesville	Trevor and Joanne Herrle-Braun Co-owners, Herrle's Country Farm Market 1264 Erb's Rd St. Agatha 519-885-8933 tandjbraun@sympatico.ca

Presenters Trevor and Joanne Herrle-Braun

Herrle's Country Farm Market, is a family owned and operated farm located just west of Waterloo, Ontario. Our farm has been in operation for nearly 150 years. We are proud to be a part of the fifth generation of Herrle's to farm the land. Certainly, over the past 150 years, our farming practices and focuses have changed so that we could remain a viable farming operation. Our retail farming business began in 1964 when our family began growing a few acres of sweet corn and selling it from our garage.

In 1988, we built our Farm Market to accommodate the growing demand for fresh sweet corn, and to enable us to carry a greater variety of fresh Ontario fruits and vegetables, preserves and baking. With the addition of squash, pumpkins, hay bales, wheat sheaves and other decorative harvest items, our market season was extended until the end of October. In 1996 we further expanded our season to include strawberries, with both a Pick your Own Patch and freshly picked berries. Our market is open daily, during our marketing season which runs from mid-June until October 31st.

By 1995 we had "outgrown" our original building, and so a beautiful post and beam addition was hand notched, pegged and constructed by a team of local Mennonite craftsmen. This was followed by our final addition in 2005, bringing our market, with its retail and storage areas, to its present size of 9400 square feet.

While we would not consider ourselves "entertainment farmers", we still offer plenty to delight youngsters. With our indoor train, and our outdoor corn maze and play area, a visit to Herrle's is always a pleasurable family experience.

We run a fall school tour program, providing an agricultural experience for children in preschool through grade 2.

Our motto at Herrle's has always been, "Where Freshness Makes the Difference!" It is our goal to provide excellent quality, fresh fruits and vegetables and friendly service for

our customers. The major crops we grow are sweet corn, strawberries, pumpkins, squash, peas, and beans, which supply the majority of our needs. We also grow a few other small crops including zucchini, cucumbers, spinach, beets and sunflowers, which partially supply the demands of our market. We focus on growing these crops well, and then source out other fresh, quality produce from local farmers, to provide a full array of seasonal Ontario produce for our customers.

We have been proud members of Foodlink since it was established in 2002. We are also avid supporters of the Elmira produce auction, a venue for local farmers to market their fresh produce, founded in 2004. We are excited to be a part of the food localism movement, and are encouraged by the effect its growth has had on our business and the community.

Presenters Ken & Ingrid Dieleman

The Business Of Agri-tainment – an aMAIZEing venture.

What we do: Our goal is to provide an Agri-tainment destination for people who want to enjoy a farm experience. We have established a 10 acre corn maze along with added farm features. where the public can come to enjoy, relax and spend a day with family and friends.

Best Management Practices:

1. Understand government regulations and laws - Federal, Provincial, and Municipal
   - -zoning/licensing regulations
   - - fire codes

2. Have a business plan
   - - keeps you on target
   - - better to offer a little and do it well than offer a lot and do it poorly
   - - allow Agri-tainment to grow

3. First impressions are lasting impressions
   - - create a WOW factor
   - - clean facilities

4. Support

- establish a network

Business Decision Making

1. Family discussions

Personal Attributes

1. To work with the public you need to like people

2. We can build/create it
   - if you build it they will come

3. We are a family

Marketing and Promotion

1. Understand your target audience
   - for educational purpose
   - for fun

2. Advertising
   - press releases
   - mailings
   - newspapers/ radio
   - word of mouth

3. Give aways

Staffing

1. Need to be willing to work
   - better to pay yourself than others
   - always provide excellent service

2. First aid

Building Effective Teamwork

1. Communication

Key Investments

1. Time
2. Buy quality goods
3. Unique/creative entertainment

Community Involvement

1. Community involvement at the Maize
2. The Maize's involvement in the community

Lessons Learned

1. Be Realistic
   - it takes time
2. Be willing to look, learn and listen

Session #35
Putting Local Food in Local Markets

Elbert van Donkersgoed
GTA Agricultural Action Committee

Concrete strategies to rebuild the food chain to support local producers.

Please use the balance of this page for notes.

Session #36
Making the Best of a Bad Situation

Steven Bicum
St. Clair Twp Fire Dept

The farm safety message is not new. Regardless of how often we hear it, despite our vigilance, accidents still occur. Are you prepared to make the best of a bad situation? This session will provide added information to the usual farm safety message. The focus will be on the role of emergency services during these accidents and what people can do to assist first responders before, during, and after farm accidents have happened.

The first question to ask yourself is what happens when a person calls 911 during an emergency? How do the emergency response vehicles get to where they need to be? How long will it take for them to get there? What will happen after they arrive, and who are these people coming to my aid? It may surprise some at how complex this process can be. Depending on the type of call, there can be three or four steps in the process before the call even reaches the fire station. Response times are not only determined by distance, but by road conditions, time of day or even staffing issues. Emergency 911 calls from home phones vary a great deal from calls from cell phones. A caller's quick, decisive action at this point can have a large effect on the outcome of the accident, but people have an uncanny ability to not know where they are during very stressful situations.

Also covered are the many ways people can assist the emergency services during a conflagration. Tips like keeping your family together, securing your dog, telling emergency personnel where the "shut offs" are, are important tips that many may not know are vital. During an emergency the single greatest resource that first responders often are missing is information. Information about the building on fire, the chemical stored inside, the location of the manure pit, or the medical history of a patient, will allow faster more effective response. Emergency response personnel have been trained to deal with high-stress situations, but time spent with hysterical bystanders is time spent not fixing the problem. Staying calm only helps emergency responders do our job.

The greatest help to any emergency responder is to not have to respond at all. Prevention is the key. A few considerations before an accident could avoid, or at least minimize, tragic outcomes. Calculating the proximity of new buildings to each other, being aware of storage issues, identifying on-farm hazards, or simply checking smoke detectors, may seem like extra work or inconveniences in an already full day, yet these small steps may help prevent a life-altering event. Farmers and their families could also sign up for basic first aid and CPR training. Taking a few minutes to replace the guards

on equipment could be a simple gesture that could help prevent injury. Marking driveways, having 911 signs installed on open farm land, carrying a cell phone while planting and harvesting: these are additional steps that will help emergency responders.

Finally, it is important to remember the following: never hesitate to call 911. Sometimes we are afraid that we are a burden to our emergency response system. However, it is far easier for responders to return to the hall than it is for them to arrive too late to be effective. Please remember that, for the most part, the people coming to your aid are your friends, family, and neighbours. Be aware of your surroundings, be safe, and do what you can to help responders if they are ever needed. The best way to protect these dedicated people from harm is by protecting yourself.

Session #37
Factors Affecting Herbicide Injury

Peter Sikkema
Associate Professor in the Department of Plant Agriculture of the University of Guelph Ridgetown Campus

Please use the balance of this page for notes.

Herbicide Performance

Why does crop injury occur?

Peter H. Sikkema
University of Guelph
Ridgetown Campus

Herbicide Injury

Due To …

- Extremes in weather
- Unique or variable soil characteristics
- Application errors
- Planting problems
- Interaction with other pesticides
- Herbicide tankmixes/sequences
- Herbicide carryover
- Sensitive crop hybrids or cultivars

Herbicide Injury

Extremes in Weather

- Too much rain
- Too cold and wet after seeding
- Too cold at application
- Too hot and humid

Herbicide Injury

Too Much Rain

- Heavy rainfall shortly after application may move the herbicide into the crop seed/root zone
- Greater than normal uptake of the herbicide may result in crop injury
  - Prowl in corn
  - Converge in corn
  - Banvel in corn

Herbicide Injury

Too Much Rain

- Heavy rainfall just as dry beans are emerging
  - Dual and Frontier injury in white and black beans

Herbicide Injury

Too Much Rain

- Heavy rainfall after crop emergence
  - Splash injury from Lorox in soybeans

Herbicide Injury

Too Cold and Wet After Seeding

- Cool, wet conditions after planting delays emergence and active plant growth
- Greater crop injury since the plant relies on metabolism to breakdown the herbicide
  - Dual, Frontier, Prowl and Banvel in corn
  - Dual, Frontier and Sencor in soybeans
  - Dual and Frontier in dry beans

Herbicide Injury

Unique or Variable Soil Characteristics

- Light soil texture low in organic matter
- High soil pH
- Soil crusting

Herbicide Injury

Light Soil Texture Low in Organic Matter

- Herbicides are more biologically available on light textured soils
  - Banvel, Converge, Dual, Frontier and Prowl injury in corn
  - Dual, Frontier, Sencor and Treflan/Rival/Bonanza injury in soybeans
  - Dual, Frontier and Treflan/Rival/Bonanza injury in dry beans

Herbicide Injury

High Soil pH

- Some herbicides form more active metabolites depending on soil pH
  - Sencor injury in soybeans on high pH soils
  - Increased atrazine carryover on high pH soils accentuates Sencor injury in soybeans

Herbicide Injury

Soil Crusting

- Soil crusting delays emergence and active plant growth
- Greater crop injury since the plant does not begin to metabolize the herbicide as soon
  - Dual, Frontier, Prowl and Banvel in corn
  - Dual, Frontier and Sencor in soybeans
  - Dual and Frontier in dry beans

Herbicide Injury

Application Errors

- Excessive herbicide rate
- Application timing
- Spray drift
- Tank contamination
- Incorrect adjuvant
- Time of day

Herbicide Injury

Excessive Herbicide Rate

- Rate too high for the soil type - Sencor in soybeans
- Rate too high for crop - Pursuit rate on soybeans compared to dry beans
- Spray overlaps
- Concentration of the spray in the whorl of corn - Ultim, Banvel & 2,4-D

Herbicide Injury

Application Timing too Late

- Banvel (5 leaf or 20cm) & 2,4-D (15cm) injury in field corn
- Pinnacle in soybeans
- Banvel and 2,4-D injury in barley (4 leaf) & oats (5 leaf)

Herbicide Injury

Application Timing too Late

- Delayed preemergence application of Pursuit in white beans
- Glyphosate after planting corn

Herbicide Injury

Spray Drift

- Banvel drift in soybeans
- Glyphosate drift in non-Roundup Ready crops
- Liberty drift in non-Liberty Link crops
- Amitrol drift

Herbicide Injury

Tank Contamination

- Banvel II and Distinct injury in soybeans
- Glyphosate injury in corn, soybeans and wheat
- Ultim injury in wheat

Herbicide Injury

Incorrect Adjuvant

- Addition of too much Sure-mix with Assure in beans under hot, humid conditions

Herbicide Injury

Time of Day

- Increased injury from Ultim in field corn when sprayed during the heat of the day

Herbicide Injury

Planting Problems

- Planting too shallow
- Planting too deep
- Poor seed furrow closure

Herbicide Injury

Interaction with Other Pesticides

- Herbicide residues
- Insecticides
- Herbicide tankmixes

Herbicide Injury

Herbicide Tankmixes/Sequences

- Increased injury with Ultim + Pardner in corn under hot conditions
- Basagran/Laddok applied before Ultim

Herbicide Injury

Herbicide Carryover

- Herbicide injury to subsequent crops in the rotation
  - Converge injury to dry beans

Herbicide Injury

Sensitive Crop Varieties

- Ultim, Accent, Option & Summit on field corn
- Banvel on field corn
- Converge on field corn
- Sencor on soybeans
- Basagran Forte & Laddok on sweet corn
- Accent on sweet corn
- Glyphosate on conventional corn or soybeans

Session #38
Weed Management of RR Corn and Soybeans

Peter Sikkema
Associate Professor in the Department of Plant Agriculture of the University of Guelph Ridgetown Campus

Roundup Ready Soybean

Topics Covered

1. Market Share
2. Label
3. Crop Safety
4. Burndown
5. Options for weed management in RR soybean
6. Application timing
7. Tankmixes
8. Manganese

Roundup Ready Soybean

Label

Application timing	Postemergence First trifoliate through flowering
Application rate	1.0 - 2.0 L/ac 0.67-1.33 L/ac (Weathermax) 1.0 L/ac fb 1.0 L/ac 0.67 L/ac fb 0.67 L/ac (Weathermax)
Tankmixes	Pursuit, FirstRate, Classic, Assure & Venture
Formulations	Roundup, R Transorb, R Weathermax Vantage, Vantage Plus, Factor, Touchdown iQ
Cultivars	Use only on Roundup Ready cultivars

Roundup Ready Soybean

Application Timing

Days After Emergence	Delay in Application	Yield Loss (bu/ac)	Value ($/acre)
23	1	1.0	10.00
24	2	2.0	20.00
25	3	3.0	30.00
26	4	4.0	40.00

Roundup Ready Soybean

Early Application Timing

1. Protect the full yield potential of the crop
2. Severe yield losses may result if application is delayed too long
3. Generally weeds are easier to control when they are young and actively growing
4. Late emerging weeds generally do not reduce crop yield
5. A second application will be required in some fields

Roundup Ready Soybean

Application Timing Depends on

1. Relative time of weed emergence
2. Weed species composition
3. Weed density
4. Environmental conditions
5. Soybean price

Roundup Ready Soybean

Manganese

1. Some formulations of manganese antagonize weed control with glyphosate
   a. This may result in reduced crop yield and net returns
2. There are differences among the various formulations of manganese

Roundup Ready Corn

Topics Covered

1. Market Share
2. Label
3. Crop Safety
4. Burndown
5. Options for weed management in RR corn
6. Application timing
7. Roundup rate
8. Single vs sequential applications
9. Tankmixes
10. Foliar fertilizer
11. Ammonium sulfate

Roundup Ready Corn

Label

Application timing	Postemergence Up to the 6 leaf stage of corn (high rate) Up to the 8 leaf stage of corn (low rate)
Application rate	1.0 - 2.0 L/ac 0.67-1.33 L/ac (Weathermax) 1.0 L/ac fb 1.0 L/ac 0.67 L/ac fb 0.67 L/ac (Weathermax)
Tankmixes	Aatrex Liquid 480 (0.6-0.8 L/ac) Marksman (1.0-1.5 L/ac)
Formulations	Roundup, R Transorb, R Weathermax, Vantage, Vantage Plus, Factor
Hybrids	Use only on Roundup Ready hybrids

Roundup Ready Corn

Value of a Burndown

1. In no-till corn there is a yield benefit from applying a burndown in most situations
2. In many fields this is the most important application timing in no-till crop production
3. Do not apply too early
4. At very cool temperatures (10 C vs 20 C), glyphosate is slower acting and final control may be reduced

Roundup Ready Corn

Glyphosate - Application Timing

Delay in Application (Days)	Yield Loss (bu/ac)	Value ($/ac)
1	0.5	2.00
3	1.5	6.00
7	3.5	14.00
10	5.0	20.00

Roundup Ready Corn

Application Rate Depends on

1. Environmental conditions
2. Species
3. Size

Roundup Ready Corn

Single vs Sequential

1. In greater than 75% of our experiments a single application of glyphosate has provided acceptable full season weed control
2. A sequential is required ….
   a. in fields with heavy weed pressure to eliminate early weed competition and associated yield loss
   b. for weed species that germinate over an extended period of time
   c. in seasons with repeated rainfall
   d. in fields with perennial broadleaf weeds

Roundup Ready Corn

Atrazine and Marksman Tankmixes

1. Use where a single application is preferred
2. Improved control of late emerging weeds such as Eastern black nightshade and velvetleaf
3. Add 0.6 to 0.8 L/acre of Aatrex 480
4. Add 1.0 to 1.5 L/acre of Marksman
5. Use the higher rate for heavy weed infestations
6. Apply up to the 5th leaf stage of corn

Roundup Ready Corn

Tankmixes

1. In greater than 75% of our experiments a single application of glyphosate has provided acceptable full season weed control
2. A tankmix should be used when a single pass weed control program is desired
3. Use the higher rate for heavier weed pressure
4. A tankmix with either atrazine or Marksman will provide residual control of annual broadleaf weeds such as Eastern black nightshade and velvetleaf (Marksman only)

Roundup Ready Corn

Foliar Fertilizer

1. Not all foliar fertilizers are the same
2. Severe antagonism and associated yield loss have been observed with some foliar fertilizers
3. No antagonism has been observed with other foliar fertilizers

Roundup Ready Corn

Ammonium Sulfate

1. The addition of ammonium sulfate …
   a. Increased the control of velvetleaf at below label rates
   b. Increased the speed of activity on velvetleaf
   c. There was no difference in weed control 56 DAA
   d. There was no difference in corn yield
2. Results may vary depending on
   a. Glyphosate formulation
   b. Water source
   c. Weed species
   d. Environmental conditions

Roundup Ready Soybean & Corn

Summary

1. Excellent broad-spectrum weed control
2. Single application is adequate in most fields
3. Sequential can be very beneficial in some fields
4. Tankmix with atrazine or Marksman provides residual control in corn
5. Tankmix with Pursuit, FirstRate or Classic provides residual control in soybeans
6. Tankmix with Assure or Venture controls volunteer RR corn

Roundup Ready Soybean & Corn

Annual Weed Control

1. Plants not fully emerged at the time of application will not be controlled
2. Improved control if sprayed when weeds are small
3. Control of weeds greater than 25 cm in height is inconsistent
4. A second application may be required to control late emerging weeds
   a. Fall panicum, proso millet, nightshade

Roundup Ready Soybean & Corn

Perennial Weed Control

1. Plants not fully emerged at the time of application will not be controlled
2. Do not delay application if heavy annual weed pressure
3. Two applications of 1.0 L/ac may be required
4. The sequential applications should be at least 2 weeks apart

Roundup Ready Soybean & Corn

Summary

1. Excellent crop tolerance
2. Wide window of application (timing can be critical)
3. Early application protects yield potential
4. Activity is not affected as much by weed size as other postemergence herbicides
5. Performance is not affected by nozzle selection, spray volume and spray pressure
6. Lower cost of weed control
7. No herbicide carryover affecting rotations

Roundup Ready Soybean & Corn

Concerns

1. No residual control (sequential & tankmixes)
2. Misapplication of herbicides to non-transformed hybrids (Use only Roundup Ready hybrids/varieties)
3. Drift injury on adjacent crops
4. Volunteer plants may become weeds in subsequent crops
5. Greater selection pressure for the development of herbicide resistant weeds (13 species globally)

Roundup Ready Soybean & Corn

Glyphosate Resistant Weeds

1. Canada fleabane (17 US states including (MI, OH, IN & IL)
2. Common ragweed (AR, MO & KS)
3. Giant ragweed (OH, IN & KS)
4. Common waterhemp (MO, IL & KS)

Roundup Ready Soybean & Corn

General Recommendations

1. Use RR technology in fields where it will have the greatest economic benefit
2. Rotate RR crops with conventional or other herbicide tolerant crops
3. Rotate/include other herbicide modes of action

Thank You

- Ridgetown College Technical Staff

  Christy Shropshire, Todd Cowan, Yvonne McLellan, Nader Soltani, Lynette Brown & Chris Kramer
- Financial Support

  Grower Groups (OCPA, OSG)

  Herbicide Manufacturers (Monsanto, Nufarm, Oligosol, Syngenta)

Peter H Sikkema
University of Guelph
Ridgetown Campus

Session #39
New Weed Management Tools for 2008

Mike Cowbrough
OMAFRA

Mike will cover the strengths and weaknesses of new herbicides for 2008 and demonstrate new tools for herbicide selection.

Please use the balance of this page for notes.

Session #40
Similar But Different

Dave Bilyea
University of Guelph, Ridgetown Campus

Please use the balance of this page for notes.

Session #41
Corn and Soybeans Fungicides

Carl Bradley University of Illinois	Albert Tenuta OMAFRA

Please use the balance of this page for notes.

Session #42
East Meets West Insect Pests

Tom Hunt
University of Nebraska

Please use the balance of this page for notes.

Session #43
Pest Alert 2008

Tom Hunt University of Nebraska	Chris DiFonzo Michigan State University	
Carl Bradley University of Illinois	Wayne Pedersen University of Illinois	Tracey Baute and Albert Tenuta OMAFRA

Please use the balance of this page for notes.

Session #44
Seed Treatment and Plant Vigour and the Future

Wayne Pedersen
University of Illinois

Please use the balance of this page for notes.

Seed Treatments, Plant Vigour and the Future

Dr. Wayne L. Pedersen
Emeritus & Research Plant Pathologist
University of Illinois

Root Health vs More Roots

- Root Health (Killers & Nibblers)
  - Disease control (Pythium, Fusarium,etc)
  - Insect Control (corn root worm, etc)
- More Roots
  - Stress Tolerance
  - Less Lodging
  - Better Nutrient Uptake
  - Higher Yields

Standard Research Protocol

- No-till or minimum tillage
- Corn – soybean rotation
- Planted early (mid-April)
- 4-row plots x 50 ft long
- 4 replications
- Count plant populations
- Determine yield

Table 1. Results of corn seed treatment study in 2003 under no-till planted on April 14.

Treatment	Plt/a	Yield (bu/a)
Control	26927	176.9
Maxim XL	30581	215.6
Maxim XL +Dynasty	30668	214.2
Cruiser Extreme 250	29972	233.3
Maxim XL + Poncho 250	29885	227.9
LSD (5%)	n.s.	11.2

Table 2. Results of corn seed treatment study in 2004 under no-till planted on April 12.

Treatment	Plt/a	Yield (bu/a)
Control	27801	226.2
Maxim XL	33131	242.1
Maxim XL +Dynasty	33310	258.9
Cruiser Extreme 250	31466	258.8
Maxim XL + Poncho 250	30646	245.1
LSD (5%)	2245	14.2

Observations on Cruiser Extreme 250

- Uniform emergence
- Darker green color
- **Increased vigour!!**
- Less Stewart's wilt
- Less insect feeding
- Didn't always increase yield
- WHY?????

Research Project.. 2006/07

- Minimum tillage – fall only
- Planted on April 16th in 2006 and April 15th in 2007
- Inoculated with *Pythium sp*. at planting
- Planted population was 36,000 seeds/acre in 2006; 33,000 seeds/acre in 2007
- Plots were 4-rows-wide and 50 feet long with four reps
- Hybrid was Golden Harvest EX58982 CB/GT/LL in 2006, H-9551 GT/CB/LL in 2007

Research Project.. (Cont)

- Determined plant populations
- Determined yield
- Scan roots with WinRHIZO 2005 © (Regent Instruments, Inc.)
  - Root length (cm)
  - Root diameter (mm)
  - Root tips (per plant)
  - Root forks (per plant)

Seed treatments and rates

- Control
- Maxim XL + Apron XL (1.0 g)
- Cruiser Extreme 250
- Experimental treatments

Table 3. Plant populations and yield from trial at South Farms in 2006

Treatment	Plant Population	Yield (bu/a)
Control	32,856 a	195.6 a
Maxim XL + Apron XL	32,556 a	220.7 b
Cruiser Extreme 250	35,788 b	234.6 c

Numbers followed by the same letters are not statistically different at the 5% level of significance.

Table 4. Plant populations and yield from trial at South Farms in 2007

Treatment	Plant Population	Yield (bu/a)
Control	27,297 a	164.3 a
Maxim XL + Apron XL	29,040 b	179.3 b
Cruiser Extreme 250	31,847 c	185.6 b

Numbers followed by the same letters are not statistically different at the 5% level of significance.

Figure 1. Root scan from non-treated control plots at UIUC South Farms.

Figure 2. Root scan from Cruiser Extreme 250 plots at UIUC South Farms.

Table 6. Root Scans (V6) from corn plots inoculated with Pythium in 2007.

Treatment	Root Length (cm)	Root Tips (no/plt)	Root Forks (no/plt)
Control	220.4 a	281.0 a	1078.3 a
Maxim XL + Apron XL	311.5 b	375.3 b	1491.7 ab
Cruiser Extreme 250	314.9 b	443.7 b	1661.3 b

Numbers followed by the same letters are not statistically different at the 10% level of significance.

Table 7. Correlation coefficients and statistical probability values for root parameters, plants/acre, and yield from corn plots in 2007

	Length	Diameter	Tips	Forks	Plants/a	Yield
Length		**-0.70** 0.01	**0.88** 0.04	**0.93** 0.01	**0.45** 0.14	**0.49** 0.10
Diameter			**-0.45** 0.14	**-0.45** 0.14	**-0.43** 0.17	**-0.18** 0.57
Tips				**0.89** 0.01	**0.55** 0.06	**0.61** 0.03
Forks					**0.41** 0.19	**0.56** 0.06
Plants/a						**0.64** 0.03

Additional trial in 2007

- Perry, Dekalb, Tolono, and three environments on Fisher Farm at UIUC (Pythium, Fusarium & Control).
- Planted under no-till, minimum tillage, or strip-tillage.
- Determined plant stand, root parameters, and yield at each environment.

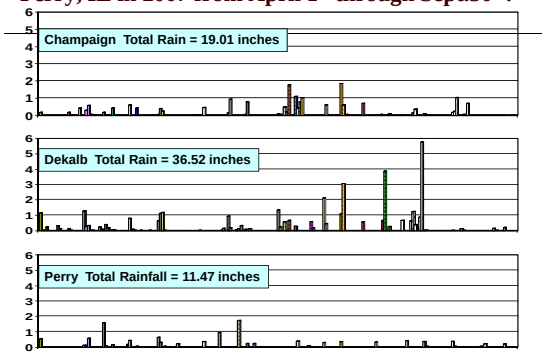
Table 9. Root length from seed treatment plots from six environments in 2007.

Treatment	Fisher Control	Fisher *Fusarium*	Fisher *Pythium*	Tolono Strip-till	Dekalb Min-till	Perry Min-till
Control	280.7	197.0	213.7	329.1	213.3	323.0
Maxim XL +Apron XL +Dynasty	296.1	238.3	290.0	383.2	243.3	353.8
Cruiser Extreme 250	374.4	304.3	399.5	499.1	316.9	410.4
LSD (P=0.1)	44.9	49.2	57.0	65.3	38.2	36.8

Table 7. Yields (bu/a) from seed treatment plots from six environments in 2007.

Treatment	Fisher Control	Fisher *Fusarium*	Fisher *Pythium*	Tolono Strip-till	Dekalb Min-till	Perry Min-till
Control	142.7	120.9	135.4	131.1	182.7	114.4
Maxim XL +Apron XL +Dynasty	147.7	140.8	144.2	143.5	183.1	137.3
Cruiser Extreme 250	152.8	149.9	151.7	156.4	182.2	152.4
LSD (P=0.1)	9.8	13.7	12.6	3.8	ns	27.9

Figure 3. Daily rainfall for Champaign, Dekalb, and Perry, IL in 2007 from April 1st through Sept.30th.



Conclusions:

- Plant vigour is related to improved root systems, especially when diseases/insects are present.
- Seed treatments are part of an Integrated Crop Management System = Preventative Medicine.

How about other products?

- 252,000 web sites = Plant growth promoters
- Growth regulators / hormones
- Many are "organic"
- Addition of a micro-organism
- May be patented

What have we tested?

- Numerous products
- Some increase yields in some years
- Most products have had limited testing in replicated trials
- Limited data on root development, especially in the field

Recommendations?

- **NONE !**

Soybeans???

- Similar research projects
- Root systems are different, but the response is similar – more fine roots
- Best treatment was CruiserMaxx® Beans
  - Type of germination for soybeans
- Watch for addition of other fungicides (e.g. Dynasty / Rhizoctonia control)

Session #45
Advanced IPM for Vegetable Production

Janice LeBoeuf
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Ridgetown ON
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Ontario.ca/crops

Introduction

Integrated Pest Management is constantly evolving. A mixture of strategies is required for every situation – often using a mixture of old and new tools. When developing a pest management system for your farm, consider all the tools available, and choose those that are most practical for your operation. For each crop and situation, there are many factors to consider. Some examples:

- What is the goal of your IPM system?
  - Reducing pest damage from current levels?
  - Reducing production costs?
  - Meeting "organic" production requirements?
  - Using only "reduced-risk" pesticides?
  - Reducing pesticide applications?
  - Meeting requirements of buyer?
  - Other?
- How much time do you have for IPM activities during each phase of the season? Do you have a crop scout or are you willing to invest in one?
- What resources do you have? Are you able to modify or add to your equipment to fit a desired IPM strategy? Are you able to adjust cropping practices (eg. extend rotation, make space for a trap crop, seed a cover crop earlier)?
- What are the key pest problems in each field? What pests will be affected (increase, decrease) if a new pest management practice is adopted or an existing practice is given up?

Designing an IPM System

Consider all the tools available. There may be some brand new techniques coming out of research programs. If they are not yet proven in your area, are you willing to try them out? Are there well-established practices that you haven't adopted yet? Maybe they require an adjustment in your production system or a modification of some equipment – or just some advance planning (like ordering monitoring supplies in the winter). If some IPM strategies, such as those requiring intensive scouting, require more time than you have available in the season, do you have the option to hire a crop scout or consultant?

In this presentation, we will cover a number of Integrated Pest Management techniques for vegetable crops, based on audience interest – covering the spectrum from “tried and true” to “strange and new”. Some topics are described below.

Building a Better Stink Bug Trap

The very latest U.S. research on monitoring and controlling stink bug has shown exciting results on intercepting these insects with a very narrow band of easy to grow trap crops around the field.

We may also be able to monitor for stink bug with pheromone traps. How?

Combining these two strategies has worked very well in other areas. Can it work here?

Biofumigation – Pie in the Sky or Ready to Fly?

There has been a lot of research over the last few years on biofumigation. Plants in the brassica family produce glucosinolates that release natural pesticides into the soil as they break down. One of these chemicals – the delicious-sounding isothiocyanate – is the soil-active compound released by several commercial fumigants – and at lower concentrations is what make horseradish and hot mustard so tasty.

How do you accomplish this biofumigation? How effective is it? Isothiocyanate – killer or condiment?

The Secrets of Spray Coverage in Onions

Onion thrips are a damaging pest of *Allium* species in Ontario. The nymphs, however, hide deep in the leaf axils of the plant, where they are well protected from insecticide applications. Can we improve insecticide penetration to the target area with the right nozzles, surfactants, water volumes, and spray angles?

Like a Moth to a Flame – Monitoring for Worm Pests

Nothing new here! This technology is ready to go. But many growers aren't using it. Using pheromone traps to monitor moth activity is relatively easy, inexpensive, and effective for vegetable pests like European corn borer, variegated cutworm, corn earworm, and swede midge. There are just a few details you need to know.

Nematode-Suppressing Cover Crops

Do they really work? How do you fit them into your cropping system?

Barrier Traps for Carrot Weevil

Can you fence out a pest? Promising research results – hot off the presses!

More IPM Techniques

Biographies

Aideyan, Victor

Victor has fourteen years experience in commodity trading and marketing. He received a Masters Degree in Business Administration from the Richard Ivey School of Business, at The University of Western Ontario, London Ontario Canada and is also a Derivative Specialist. Victor leads Farms.com Risk Management, serving as Senior Risk Management Consultant.

Apart from the in-house marketing risk managed by Victor's unit, Farms.com Risk Management also works with a wide range of clients across North America in cattle, swine and grain marketing. During 2007 Victor's Division provided hands-on marketing advice to external clients for corn, soybeans, wheat and swine marketing with a value in excess of $300 million. Victor's unit has also been involved in pricing energy price risk management products using derivatives for agricultural clients such as green house operators.

Victor's area of expertise encompasses management of grain and livestock marketing and price risk. In addition, Farms.com Risk Management has developed a research competency in the area of grain ethanol and bio-diesel and the on-going impact of demand from this sector on commodity prices. Victor has made numerous presentations to groups across the USA and Canada and is a sought-after speaker who possesses considerable experience when it comes to explaining and sharing his knowledge of marketing price risk and strategies for addressing this problem.

BDO

"The staff of the Ridgetown office of BDO Dunwoody have a broad understanding of the tax issues affecting farmers. Rick Elliott (partner), John Dick (tax manager) and Dean Titus (manager) have been providing service to family farm and other agri-business clients throughout their careers as Chartered Accountants. In addition to accounting and tax preparation, they provide farm transfer, estate, incorporation, and other business planning services."

Baute, Tracey

Ontario Ministry of Agriculture, Food and Rural Affairs
Field Crop Entomologist – Program Lead

Tracey is the Field Crop Entomologist -Program Lead with OMAFRA. She grew up on a cash crop farm just outside of Tilbury, Ontario. She obtained her M.Sc. in Entomology from the University of Guelph, focusing on the assessment of European corn borer and Bt corn in Ontario and has been working for the Ministry since 2000. Tracey's responsibilities include research validation and delivery of proper management strategies for field crop insect pests in Ontario. She is Chair of the Field Crop Protection Subcommittee within the Ontario Agricultural Services Coordinating Committee (OASCC), Chair of the Canadian Soybean Aphid Working Group, member of the North American expert committee on Soybean Pest Management (S1010), member of the Canadian Corn Pest Coalition and Chair of the Program Committee for the Southwest Agricultural Conference. She is also the editor and contributing author of four publications; The Canadian "Soybean Aphid Scouting Cards" and "Soybean Aphid Threshold Postcards", "Agronomy Guide for Field Crops", OMAFRA Publication 811, "Field Crop Protection Guide", OMAFRA Publication 812, and "A Grower's Handbook, Controlling Corn Insect Pests with Bt Technology".

Bedggood, Robert

Mr. Robert Bedggood was appointed by the Ontario Ministry of the Environment to serve as Chair of the Thames-Sydenham and Region Source Protection Committee on August 20, 2007. Mr. Bedggood has been involved in water quality issues for over 20 years at the local, provincial and national levels. He serves on the local Clean Water Program Committee, reviewing implementation plans for best management practices designed to improve and protect water quality on farms; was an integral member helping to deliver the provincial Clean Up Rural Beaches (CURB) program and served on the environmental committee of the Agriculture Policy Framework. Mr. Bedggood is a past President of the Christian Farmers Federation of Ontario, Chaired the Agricultural Adaptation Council and Co-Chaired the Ontario Farm Environmental Coalition. He also served as a member of the Agriculture Advisory Team providing input to the province's Greenbelt Plan. Mr. Bedggood continues to farm in the Upper Thames area of the Thames-Sydenham and Region.

Beuerlein, Dr. James E.
Professor, Department of Horticulture & Crop Science, 2021 Coffey Rd.
The Ohio State University, Columbus, Ohio 43210-1086
Bachelor of Science, Agriculture, June 1965, University of Tennessee
Master of Science, Agronomy, June1967, University of Tennessee
Doctor of Philosophy, Crop Production, June1970, University of Illinois
Professor, 1991-Present, Department of Horticulture & Crop Science, OSU
Associate Professor, 1977-1990, Department of Horticulture & Crop Science, OSU
Assistant Professor, 1970 1976, Department of Horticulture & Crop Science, OSU
Graduate Research Assistant, 1967-1970, Department of Agronomy, Univ. of Illinois

Bicum, Steve

Steven Bicum has been a volunteer firefighter for the past eleven years with the St. Clair Township Fire Department. The department provides coverage for 1200 square kilometres utilising six fire stations and one hundred seventy firefighters. Mr. Bicum currently holds the rank of Training Officer in the department.

Mr. Bicum is a graduate of Carleton University (BA), and holds certifications from Fanshawe College and the Ontario Fire Marshal's Office. He is a Professor of Fire Science at Lambton College School of Applied Arts and Technology. He is also a Seconded Instructor for the Ontario Fire College, and an Associate Instructor for the Ontario Fire Marshal's Office.

Steven's family is currently the fifth generation on the family farm located in the south west corner of Lambton County. He and his family continue to operate a three hundred acre cash crop farm.

Bilyea, Dave

Currently involved in Horticultural Weed Science and other related weed science projects Conducted weed science studies with most field crop and horticultural crops grown in the province for the past 28 years. Conducted or participated in several weed identification seminars and classes for over 20 years such as Southwest Agricultural Conference, Diagnostic Days, Ridgetown College Farmer's week, Farm smart, and several company and O.M.A.F sponsored events.

Brown, Christine

Christine is a Nutrient Management Field Crop Lead with OMAFRA, working out of the Woodstock office. For over 15 years she has focused on valuing the nutrients in manure, and maximizing nutrient utilization for crop production while minimizing environmental impact from manure. Chris lives near Belmont on a small cash crop farm.

Bruulsema, Tom

Tom is a native of Ancaster, Ontario, covers the Northeast region for the North American program of IPNI. His research program focuses on the benefits of plant nutrition for the crops of the region, and his educational activities feature responsible, science-based use of fertilizer nutrients. Before joining the Institute as Regional Director in 1994, Dr. Bruulsema held a research associate position at the University of Minnesota. He holds a PhD in Soil Science from Cornell University. He also has experience in international agriculture, having served four years with the Mennonite Central Committee as research agronomist in Bangladesh. He currently serves as president of the Canadian Society of Agronomy. He served as president of the Northeast Branch of the American Society of Agronomy and Soil Science Society of America from 1999 to 2002. He has also been active in the Certified Crop Adviser (CCA) Program, having served as chair of the International (2001-2004) and Ontario (1999-2000) Boards, and currently represents CCA on the Board of Directors of the American Society of Agronomy.

The International Plant Nutrition Institute (IPNI) is a not-for-profit, scientific organization dedicated to responsible management of plant nutrients – N, P, K, S, and others – for the benefit of the human family. IPNI, which officially began operating January 1, 2007, is funded by fertilizer industry member companies and affiliates from around the world. With headquarters in Norcross, Georgia, U.S.A., IPNI has established effective programs led by scientific staff in many important global regions. The purpose is to help provide a coordinated scientific foundation for fertilizer nutrient use and to scientifically address associated environmental issues.

Bryans, John

John is a fourth generation beekeeper. Along with his brother Davis, they operate Munro Honey in Alvinston, Ontario. Their company has grown to be one of the largest producer packers of honey in the province. In 2000, John and Davis established the first commercial Meadery (honeywine) in the province in addition to their specialty honeys which is proving to be a good draw for their new agri-tourism venture.

Campbell, Deb

Field Agronomist, NK Syngenta Seeds

Work in Mid-Central Ontario, offering agronomic support . This includes product inquiries, strip trial management and new product updates. Delivery of product training, field recommendations and agronomic updates to distribution points and Customers.

Previous Positions Held

Farm Marketing Representative, Cargill Ltd 2004-2006

Consulting Agronomist, Cargill Ltd 1998-2004

Educational Background

Bachelor of Science(Agr), University of Guelph 1996

Collins, Dorene

Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, Ontario

- employeed with OMAFRA for the past 26 years
- current position involves working with farmers and related associations, particularly those involved in direct farm marketing, to develop effective and sustainable marketing and customer service initiatives
- Dorene represents the province of Ontario on the newly established Canadian Agritourism Working Group and is the OMAF representative on the Board of Directors for the Ontario Farm Fresh Marketing Association and Farmers' Markets Ontario.
- Being raised on a farm and currently living in the country, she has a keen interest in the agri/food industry and sustainable rural communities.

Coughler, Peter

Succession Planning and Business Agreements Program Lead with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) based in Brighton.

Peter obtained a Diploma in Agriculture (Dip. Agr.) from Kemptville College, a Bachelor of Science in Agriculture (B.Sc.(Agr.)) majoring in agricultural economics from Macdonald Campus-McGill University and a Master of Science (M.Sc.) in agricultural economics & business from the University of Guelph. He also has his Professional Agrologist (P.Ag.) designation.

Peter has had a variety of work experiences, including teaching farm management courses at Macdonald Campus—McGill University, manager within government and operating a dairy farm.

He is involved with the Canadian Farm Business Management Council's Beginning Farmers Team and the International Farm Transition Network (IFTN).

Deen, Bill

Dr. Bill Deen -

- Since 2000, an Associate professor in the Plant Agriculture Department, University of Guelph
- From 1997-2000 an instructor at Ridgetown College
- Focus of research - cropping systems (tillage, rotations, cover crops, and nitrogen and manure management)
- Teaches courses on Plant Agriculture, Grain Crop Production, and Cropping Systems

Denotter, Henry

Henry is a cash crop farmer from Kingsville, He has a Photographic Arts Degree from Connestoga College. Henry has 15 years experience in a farm dealership and is the Provincial Director with the Ontario Soils & Crops Association.

Dieleman, Ken and Ingrid

Ken and Ingrid Dieleman are owners and operators of The Thamesville Maize since 2001. They have completed 7 successful maze seasons. Their maize is affiliated with The Maize Company located in Utah, U.S.A. They operate the Maize along with their four children just outside of Thamesville, Ontario. Along with Maizing they also hold jobs off the farm.

DiFonzo, Christina

Education:

- I received a B.S. in biology in from Mercyhurst College in Erie, Pennsylvania.
- Got an M.S. and Ph.D. in Entomology from the University of Minnesota, specializing in aphids and viral diseases of potatoes, working in the Red river Valley of Minnesota and North Dakota
- From 1995-1996, did postdoctoral work at the Volcani Center, an agricultural research institute near Tel Aviv, Israel. My work in the Volcani plant virology department focused on aphid transmission of plant viruses.
- Returned to the U.S. in 1996 to take a position with Michigan State University in East Lansing.

Current position at MSU:

- Field Crops Extension Entomologist – responsible for research, extension, and teaching in entomology related to all field crops in Michigan, including alfalfa, corn, soybean, dry beans, small grains, stored grain, and sugarbeets.

I also teach the introductory Entomology course at MSU and a course on pesticides, and I am an undergraduate advisor for Entomology students.

Dohleman, Frank

Frank received a B.S in General Biology with a minor in Chemistry from the University of Illinois at Urbana-Champaign in 2001, and from there worked as a technician on the SoyFACE project which tests the effects of future climates on crops until the Fall of 2003. That experience allowed him to explore many different aspects of global climate change and its impacts on the plant world. He then worked as a technician on the Miscanthus project beginning in 2004 beginning a graduate program in August of 2005. Frank is currently a Ph.D. student in the Department of Plant Biology at UIUC and Coordinator of the C-FAR Special Research Initiative for Biomass Energy in Illinois. Frank is recently married, and in his free time, he enjoys bowling, homebrewing, and listening to his wife.

Filson, Ken

Married to Karen (Toohey), Four daughters 13,12, 9 & 8. Live in Ilderton. Grew up on Family Farm - cattle and cash crop.
2001-present - Senior Account Manager Agriculture & Commercial @ Libro Financial Group
Responsible for underwriting and approvals of Ag & Commercial Loan applications from the branches.
1999-2001, Account Manager @ Libro Financial Group in the Arkona branch.
1989-1999, Worked in the field of Farm accounting and tax preparation
2006-present,Councillor for Municipality of Middlesex Centre.
Have served as Director and Past President of Ilderton Agricultural Society - 14 yrs in total.
Have served as Director and Past President of Middlesex Mutual Insurance Co. - 9 yrs in total
Graduate of Advanced Agricultural Leadership Program Class 10 - 2005
Bachelor of Commerce Degree from University of Windsor - 1989

Fletcher, Carl

OMAFRA

Carl Fletcher is a Strategic Business Planning Program Lead with OMAFRA providing resources in farm business planning and entrepreneurship.

Golden, Ron
P.Eng. President Agri-Therm Limited

A member of the Professional Engineers Ontario, Ron Golden was educated at the University of Windsor in Ontario and holds Bachelors Degrees in Biology and Mechanical Engineering.

His career has been focused on the design, manufacture and commissioning of heavy industrial equipment for mining, minerals processing, metal fabrication and process industries. International experience was gained in the oil and gas pipeline service industry, installing and commissioning facilities in North and South America, Australia and Asia. He is the inventor of a patented process to apply thick concrete coatings to large diameter off-shore gas pipelines as well as co-inventor of Agri-Therm's pyrolysis reactor.

Coming from a farming background in rural Ontario, he is a co-founder of Agri-Therm Limited; a venture which presents the unique opportunity to combine his accumulated skills and training in the exciting emerging field of renewable resources and environmental technology.

Harrison, Percy

- 5th Generation farmer from Grey County
- Eldest son has joined the operation
- 1200 acre cash crop operation
- No-tilled crops of soybeans, fall and spring wheat since 1996
- Recently shifted from cow/calf to new crop lamp production

Hendrick, David

David received his Honours B.SC. and MBA degrees from Carleton University and Ottawa University respectively. From 1976 through 1993 he assumed the responsibilities of a public servant with Agriculture Canada; completing a distinguished career as Director General, Management Strategies and Priorities with the Canadian Food Inspection Agency. For a few years after that, David conducted several consulting assignments for public and private interests in the areas of program restructuring. In 1999, David returned to his farm fulltime and began the design and development of his foodgrade soybean export business with Japan. Today, his company manages a value chain enterprise that involves over 100 soybean growers from Eastern Ontario. The vision for the future is food as medicine.

Herrle-Braun, Trevor and Joanne
Co-owners, Herrle's Country Farm Market

Trevor and Joanne are partners in life and work. They reside near St. Agatha, a small community on the outskirts of the rapidly growing city of Waterloo, with their two young daughters. Together, they farm with Joanne's family, managing the operations of Herrle's Country Farm Market. The Herrle family has been market-gardening for over 40 years. The Herrle's grow 210 acres of fruits and vegetables which they retail from their farm, along with other local produce. They are committed to building an awareness of local agriculture in their consumers and community. They are proud to be members of Foodlink, a local, non-profit organization that promotes healthy, local food systems, that sustains both producers and consumers in the community. Trevor is a board member of Foodlink and is encouraged by the growing food localism movement and the impact it has had on their farm business.

Hogg, John
Free Breeze Energy Systems Ltd.

Free Breeze was established in 2001 when John Hogg recognized the need for farmers and communities to protect themselves against rising energy costs. Its mission is to provide landowners passive revenue opportunities and offer protection against rising energy costs by providing custom wind energy solutions with m minimal time, cost and confusion.
With over 65 wind turbine and solar installations, Free Breeze offers the largest line of wind turbines in Ontario ranging from 10kW up to 3MW. Free Breeze is a full-service wind/solar generator provider, offering a range of services:

- Standard Offer Program Counseling
- Net Metering Applications
- Wind Studies
- Large Revenue Producing Turbines
- General Wind Energy Consulting
- Matching landowners in good wind areas with investors

Hughes, Brian M.

Brian Hughes has been with ACC Farmers' Financial since its inception in 1992 and is currently the Chief Executive Officer and General Manager for this not-for-profit organization. He has had a distinguished career within the agri-business and financial services industries.

Visionary and innovative by nature, Brian helped build ACC Farmers' Financial, into Ontario's premiere not-for-profit farm financial and business services organization which includes three other operating subsidiaries offering financial services, management consulting, and technology solutions to the industry. This highly successful business enterprise administers an annual loan portfolio of $200 million.

Johnson, Peter

Cereals Specialist, Ontario Ministry of Agriculture and Food

- The Provincial Cereals Specialist with the Ontario Ministry of Agriculture and Food, based in the Stratford Resource Centre.
- Worked with the Ministry of Agriculture and Food as a Soil & Crop Specialist for 20 years.
- The voice of the ***CROPLINE***, a extension tool developed to answer grower questions and deliver crop alert concerns on a timely and regular basis.
- Works closely with local and regional Soil & Crop Improvement Associations. This work is focused on improving agricultural productivity, reducing costs, and minimizing environmental impact.
- Provincial specialties are cereal crops, production systems, site specific management and conservation tillage.
- A University of Guelph graduate with an Honours Bachelor of Science degree in Agriculture. He was the 1997 recipient of the T R Hilliard Agricultural Extension Award.
- Peter operates a farm near Lucan along with his family.

LeBoeuf, Janice

Vegetable Crop Specialist, Ontario Minsitry of Agriculture, Food and Rural Affairs

I was raised on a farm in south Lambton and graduated from the University of Guelph with an ag degree in crop science. I got into the vegetable industry initially through summer jobs with the Heinz Canada and Nabisco Canada research departments and the Ministry of Agriculture and Food in Ridgetown. I was the agronomist and tomato operations manager for a large farming operation in Chatham-Kent for several years and also worked a bit in research, extension and ag input sales prior to my current job. Since 2001, I have been a Vegetalbe Crop Specialist with OMAFRA in Ridgetown, where most of my work is with tomatoes, peppers, and sugarbeets.

Lynch, Patrick J.

35 years working with Ontario growers, some with OMAFRA, rest with Cyanamid and more recently with Cargill. Started a Crop Consulting venture on a fee for service basis and have finished 23 years in that capacity. Publish a weekly newsletter for Cargill customers on Crop Sense Write in Better Farming. Have enjoyed working and visiting with 100's of Ontario's finest, namely Ontario farmers.

MacDonald, Ron

P.Eng., Agricultural Engineering

Ron MacDonald is president and owner of Agviro, Inc., a consulting agricultural engineering company based in Guelph. Agviro specializes in environmental engineering, specifically indoor air quality, energy use efficiency and manure management. Agviro also conducts R and D, develops custom software programs, provides training and engineering systems designs.

Before establishing Agviro, Inc, Ron was employed with Ontario Hydro for 3 years, the Ontario Ministry of Agriculture and Food for 3 years and the University of Guelph for 5 years as a researcher in energy efficient technologies and alternative fuels/energy sources for agriculture.

Agviro received two Energy Efficiency Awards last March from Natural Resources Canada for energy savings achievements on two farms in Alberta.

McCallum, Dave

Dave is a cash crop and beef farmer from Iona Station, Ontario.

McCallum , Alan

Alan has been an independent crop consultant in Elgin County since 1998. He has also worked in agribusiness and as a Soils and Crops Advisor for the Ontario Ministry of Agriculture, Food and Rural Affairs.

McClary, Pete

Owner-manager of Arva Heghts Limited, growing corn, soybeans and wheat on 3500 acres near London, Ontario. He has been farming for thirty-seven years. With his wife, Lynn and son, Brian, he also manages Arva Grain Corp., a family owned agri-business. Arva Grain has locations near Arva, Seaforth and Kintore, with a total storage capacity of two million bushels. Arva Grain also sells fertilizer and chemicals at its Arva location and Dixie Chopper lawnmowers out of its Seaforth location. Its fleet of twenty-two trucks hauls agricultural commodities and co-products within Ontario, New York State and Michigan.

McClounie, William

ACC Farmers' Financial

As Manager of Special Projects at ACC Farmers' Financial the role is to initiate innovative strategic alliances and then to design loan products for farmers. Recent projects involve the investigation of biofuels projects in Ontario, PEI and BC, renewable energy business planning and risk management tools in forward contracting.

Additional areas of work involve Ag Energy Co-operative in the delivery of demand side management and energy conservation programs for Ontario farmers. Over 30 years experience in the grain industry includes being co-founder and Project Manager/Business Manager of Eleview (Agri-eBusiness Group Inc.) in 2000. Completed in 2006 a Six Sigma Black Belt certification, which is a rigorous and disciplined methodology that uses data, statistical analysis and project management techniques to measure and improve an organization's operational performance by identifying and eliminating "defects. As former

Moore, Carl

Canadian Farm Business Advisory Service Consultant

Carl is a farm business and agri-financial consultant specializing in leading edge and unique enterprises. He is also a mediator who has been involved in assisting families and businesses to develop solutions to a wide range of family and business issues. He has over thirty years experience in assisting farm businesses to plan, finance and strengthen their operations.

Carl has experience in marketing, college teaching and research, agricultural finance, beef, dairy, hog and cash crop farming. He has been chairman of Ontario Pork, vice-president of Canadian Pork Council, board member of Canada Pork International and chairman of Canadian Animal Health Coalition.

Oegema, Mike

B.A. Business, Redeemer University College, 1987, Ancaster, Ontario.

I've been on the farm full time since graduating, but I did grow up on the farm. I was responsible for starting up our on-farm retail store called The Turkey Shoppe in 1992 and life hasn't been the same since. I've spent a number of years on the Southwold Township fire department and I've been active in a number of school and church committees over the last 20 years. My wife of 19+ years is Annie, who now manages the store, and I have three wonderful sons aged 16, 14, and 11 who keep me really busy.

Orson, Jim

- Son of a farmer in Leicestershire
- B Sc (Hons) agriculture University of Reading in 1969
- Local technical adviser for ADAS, part of Ministry of Agriculture Fisheries and Food, 1969-1979
- Liaison Adviser for Weed Research Organisation 1979-1984
- Regional Agronomist for ADAS 1984-1988
- Head of Cereals for ADAS 1988-1991
- Director of Boxworth Experimental Farm for ADAS 1991-1994
- Head of Development for ADAS 1994-1997

- Director of Morley Research Centre - a farmer funded research station in Norfolk, 1998-2003
- Now Technical and Research Director for The Arable Group (formed after a merger between four different organisations).
- Married with three daughters, hobbies golf and gardening
- I now work from home 6 Rayleigh Close, Cambridge, CB2 8AZ but if you want a more official address use Morley Research Centre, Morley, Wymondham, Norfolk, NR18 9DB. Morley's phone is 0044 1953 713200, home business line is 0044 1223 502027, mobile is 0044 7771 572983.

Pedersen, Wayne L

Wayne is currently an Emeritus Plant Pathologist in the Crop Sciences Department at the University of Illinois, after retiring in 2004. A native of North Dakota, Pedersen graduated from NSDU and did post-doctoral research at the University of Nebraska and Penn State before moving to the University of Illinois in 1980.

In addition to teaching six different graduate/undergraduate courses, Pedersen has worked extensively in Integrated Crop Management with an emphasis on managing both foliar and soil-borne disease in reduced tillage systems. He also has worked on fungicide seed treatments on corn, soybeans, and wheat for over 35 years. He still maintains a smaller research program and also works closely with several growers on the application of GPS based technology to large scale field experiments.

Jason Persall

Jason was born and raised on a 4th generation family farm near Waterford Ontario. His farm, owned with father Clarence cultivates approximately 1000 acres of corn, soybeans, and wheat. In early 2000 Jason was looking to diversify his operation and better utilize his on farm storage. Fascinated with the food industry, and with much research, landed on cold pressing soybeans and canola for high end gourmet oil. Today Jason is the President and CEO of Persall Naturals Ltd. which manages the plant operations and as well owns the brand Pristine Gourmet. Pristine Gourmet has landed some serious press over the past two years with articles in Toronto Star, Globe and Mail, MacLean's, The Spec, and most recently selected as one of the 100 Tastes of Toronto with Toronto Life Magazine. Jason is married to wife Linda and they have two children together Benton and Emma.

Pfeffer, Mary

ASS Participant

Mary and John Pfeffer operate a 600 acre grain and oilseed farm, provide a custom combining and planting service and raise rheas. Mary, John and their children John, Adam and Jennifer reside at 45180 Fruitridge Line, RR#5 St. Thomas.

"I am really enjoying that the CASS program has afforded me the opportunity to realize a dream of attending post secondary school. I am a part-time student at the University of Western Ontario. I'm also presently taking an online course to become a Health and Wellness Coach. My husband John will be using his program to attend the IFAO meetings and attend a marketing course at the George Morris Centre."

Quesnel, Gilles

Field Crop Integrated Pest Management Program Lead, OMAFRA

- Field Crop Integrated Pest Management Management Program Lead, OMAFRA, Kemptville
- Previously worked as a Soil and Crop Specialist and Farm Management Specialist with OMAFRA

Graduated with a B.Sc.(Agr) from the University of Guelph majoring in Plant Protection

Reid, Keith

Keith has been with the Ontario Ministry of Agriculture, Food and Rural Affairs since 1989, and has held the position of soil fertility specialist since 1996. He has also farmed, and spent six years in agribusiness. His education was at the University of Guelph, graduating with a B.Sc.(Agr.) in 1980, and then returning to complete a Masters degree in soil science in 1995. A regular contributor to several newsletters and magazines, his latest achievement has been leading the team that revised and updated the Soil Fertility Handbook (OMAFRA Publication 611).

Ryan, Tracey

Grand River Conservation Authority

Tracey is the Supervisor of Conservation Services at the Grand River Conservation Authority. She received a Bachelor in Environmental Studies at the University of Waterloo and a Masters of Science in Rural Extension from the University of Guelph. She resides in Guelph with her husband and two children and a variety of pets. When not working to help landowners improve the environment Tracey can be found in a hockey arena or sports field.

Tracey has been providing assistance to farm families and rural landowners to help them protect and improve water quality on their properties for more than 20 years. She is firmly committed to helping landowners manage water on a watershed basis. Tracey has been coordinating the development and delivery of the Rural Water Quality Program since its inception in 1998. The Rural Water Quality Program has helped rural landowners implement over 2000 water quality improvement projects.

Sikkema, Dr. Peter H.

Peter Sikkema is an Associate Professor in the Department of Plant Agriculture of the University of Guelph Ridgetown Campus. He conducts research on weed management in field corn, soybeans, cereals and edible beans. Peter teaches courses in Applied Weed Science and Crop Diagnostics and Recommendations at the diploma level. Prior to his employment at the University of Guelph, Peter worked for Rhone Poulenc Canada from 1986-1988 as Product Development Manager for Canada and for Union Carbide Agricultural Products Company from 1983-1986 as a Product Development Representative. Peter received his B.Sc.(Agr) in 1981 and M.Sc. (Weed Physiology) in 1983 from the University of Guelph. In 2002, Peter received his Ph.D from the University of Western Ontario (Environmental Sciences). In 2006, Peter received the “Excellence in Weed Science” award from the Canadian Weed Science Society and in 2007 he received the “Teaching Award of Merit Certificate’ from the North American Colleges and Teachers of Agriculture. Peter and his wife, Angela, have three children. They reside in Ridgetown.

Tracey-Cowan, Karon

- Owner of AgTech GIS Sales & Leasing Inc. together with GIS specialist Rob Parkhill
- Served as the Director of the Agri-Food Laboratories GIS Mapping Centre for 14 years providing quality mapping and data management services since 1993.
- Operates nine different GIS and satellite imagery processing software packages to service the Canadian market place.
- Experience comes first hand as a user of agricultural GIS software and as a reseller for Ag Leader Technology, Raven, Farm Works, and other high profile Precision Ag software, hardware and data products.

Van Eerd, Laura

Laura grew up on a hog and cash crop farm in Southwestern Ontario and holds a triple crown (B.Sc. 1996, M.Sc. 1999, and Ph.D. 2004) from the University of Guelph. She is an Assistant Professor in the department of Land Resource Science at Ridgetown Campus – a satellite campus of the University of Guelph. Her research focuses on quantifying and minimizing the risk of environmental contamination within the agricultural sector. Primary area of research is in the area of nitrogen cycling and availability as influenced by soil/site characteristics and management practices. She is member of the Canadian Society for Horticultural Science and Canadian Society of Agronomy, as well as a member of the Great Lakes vegetable and cover crop working groups. Laura is an accomplished speaker who has given presentations all over Canada and internationally.

Van Engelen, Eddy

Eddy is married to Zulma, they have 3 boys. Eddy farms with his brother Mike and son Andrew. They milk 280 cows and farm 1000 acres near Thedford Ontario.

van Donkersgoed, Elbert

Elbert van Donkersgoed P. Ag. (Hon.) is the Executive Director for the Greater Toronto Area Agricultural Action Committee with a mandate to make local food a corner stone of a viable and sustainable GTA farm sector for generations to come.

The GTA Agricultural Action Committee is a distinctive partnership involving the four GTA Federations of Agriculture and the Regional Municipalities of Halton, Peel, York and Durham, plus the City of Toronto, Ministry of Municipal Affairs and Housing, Ministry of Agriculture, Food and Rural Affairs, Agriculture and Agri-Food Canada, Toronto Food Policy Council and the food sector.

Elbert was the Strategic Policy Advisor of the Christian Farmers Federation of Ontario and its 4,300 member family farm entrepreneurs for 35 years. During that period he helped found the Ontario Farm Environmental Coalition and the Ontario Rural Council. He is a member of a wide range of working groups such as, Ontario Farmland Trust, Toronto Food Policy Council and the Business Advisory Network of the Environmental Commissioner of Ontario.

For eight years he wrote a weekly farm, food and countryside commentary, Corner Post, heard on Southwestern Ontario radio stations and widely distributed on the Internet.

In March of 1986, he received an honourary life membership in the Ontario Institute of Agrologists “in recognition of leadership, contribution and Christian commitment to agriculture and of his service to his community”.

Elbert and his wife Nellie live in Guelph where they are refurbishing an 1847 home built from local limestone.

Walpole, Mark

Vinifera For Life is the brainchild of Certified Chef de Cuisine Mark Walpole.

His natural instincts as a chef combined with Walpole's proximity to Niagara Wine Country, led to the development of a grape flour/powder. Vinifera For Life takes grape seeds and skins - which are disposed or used as fertilizer by wineries following crush - turning them into a premium ingredient in gourmet bread, pasta and other products.

Wine grapes have commonly been shown to have health-promoting effects and Walpole's product is no exception possessing components which help to fight off a multitude of illnesses including cancer.

As the driving force of Vinifera For Life, Walpole has put his more than 30 years of experience as an internationally-recognized chef to good use.

The possibilities seem endless as Walpole continues to seek out new uses for his product including the possibility of using the flour or powder to produce crackers, snack foods, cheese, energy bars or drinks.

Ward, Dave

Dave is a farmer from Strathroy. He graduated from Centralia College of Agricultural Technology in 1979.

Watson, Paul

Paul is a returning speaker from last year where he brought the Organic perspective of Nitrogen on an Organic Farm. Paul and his wife, Patti, have 3 grown children. Two are married with another away at school. They have been blessed with two grandchildren and just recently the proud owners of a riding horse, Patti’s passion. They live on the 100-acre family farm, which has been in the Watson name since 1867. Paul has been managing the farm as organic since 1997, through some challenging years.

Whewell, Cal
Risk Management Consultant

- Born and raised on a grain and livestock farm in west central Illinois
- Graduated in 1979 from Quincy College with a Bachelor of Science degree in Accounting
- Over the last twenty-six years has been involved in many different aspects of the Grain industry:
    - Operated his own commodity brokerage office
    - Grain merchandiser for a large multi-national grain company
    - Warehouse examiner for the State of Iowa
    - Grain department manager for a large Co-op in Northeast Iowa

For the last 15 years Cal has been a Risk Management Consultant for FCStone. Cal has worked with companies in Ohio, Indiana, Michigan, New York, Pennsylvania, and Ontario. These companies include end-users, producers, and country grain elevators. Through a very disciplined approach he has helped these companies use the many tools available through the futures market to reduce risk and increase margins.

Willemse, Rick
Rick is a cash crop farmer from Park Hill.

Winnicki, Jerry
Jerry was raised on a mixed farm in the Niagara Peninsula. After graduation from the University of Guelph in 1978. He spent two years at Kemptville College in Eastern Ontario working and teaching in the Agronomy Department. In 1980, he joined the Ontario Ministry of Agriculture and Food and served as a Soils and Crops Specialist for several Eastern Ontario counties for a period of 5 years. In 1985, he transferred to the Niagara Peninsula and worked the counties of Niagara and Haldimand till 1997. He then joined the staff at Clark Agri Service in Wellandport as a Sales Agronomist and is currently responsible for a customer base from Dunnville to the Niagara River. His biggest challenge in his present role is combating the challenges that the heavy silty clay loam soils offer to successful and profitable crop production.

Zobel, Richard W. (Rich)
B.S. in Chemistry, Sacramento State University, M.S. in Vegetable Crops, University of California, Davis, PhD in Genetics, University of California, Davis. Career has been focused on roots ; first at Davis with Tomato genetics and breeding, next at Harvard for two years working with peas and nitrogen fixation. Next step was two years with Monsanto Chemical Co. working with wheat, then on to USDA-ARS at Cornell University to work on Soybean and Corn roots for 20 years. Last step was a move to West Virginia to work on pastures and turf grass roots (10 years). Along the way he invented and patented modern research aeroponics for growing plants in nutrient fogs, and developed Aeroponic Scanning Meso-Rhizotrons for automatic digital recording of root growth patterns.

Thursday, January 3, 2008

Buffet Lunch Sponsored By: **John Deere Ltd.** Box Lunch Sponsored By: **Libro Financial Group**

LOCATION	9:00 - 9:50	10:00 - 10:50	HOT BUFFET LUNCH	11:00 - 11:50	12:00 - 12:50	1:00 - 1:50	2:10 - 3:00	3:10 - 4:00	4:10 - 5:00
Agronomy Ag Theatre* (Farm Credit Canada)	**3** Unlocking Wheat's Yield Potential	**1** Corn: Research Meets Realism		**2** Profitable $oybean$ for 2008	**27** Market Outlook 2008		**3** Unlocking Wheat's Yield Potential	**27** Market Outlook 2008	**4** Production Pundits
Agronomy 126	**44** Seed Treatments and Plant Vigour	**42** East Meets West Insect Pests		**43** Pest Alert 2008	**37** Factors Affecting Herbicide Injury		**43** Pest Alert 2008	**39** Weed Management Tools for 2008	**42** East Meets West Insect Pests
Agronomy 127 Agri-Food Innovation Forum	**20** Reach Your Business Potential	**21** Commercializing Agri-Food and Health		**20** Reach Your Business Potential	**35** Putting Local Food in Local Markets		**8** Getting Down to the Grass Roots		**30** Innovative Financial Solutions
RDC Don J. Pestell '62 Auditorium	*INDUSTRY TRADE SHOW / REFRESHMENTS*		*Served at 11:00 or 12:00 in Willson Hall*	*INDUSTRY TRADE SHOW / REFRESHMENTS*		**Alex A. Avery** *Feature Speaker*	*INDUSTRY TRADE SHOW / REFRESHMENTS*		
RDC Pioneer Hi-Bred Lecture Theatre	**38** Weed Management of RR Corn & Soybeans	**19** Cover Crops - Red Clover and more!		**16** Fertilizer vs. Manure - A Nutrient Showdown	**18** Rhizobotany: The Root of Agriculture		**5** Early Planting Pays, Right?	**19** Cover Crops - Red Clover and more!	**41** Corn and Soybean Fungicides
RDC 102 - Ridgetown Community Classroom	**5** Early Planting Pays, Right?	**9** The Challenges of Growing Organic Corn		**13** Which Inputs Really Pay?	**12** Getting More Out of the Technology			**44** Seed Treatments and Plant Vigour	**2** Profitable $oybean$ for 2008
RDC 110 - Syngenta Classroom	**31** Timely Tax Tips	**32** Demystifying Farm Succession		**36** Making the Best of a Bad Situation	**10** Manure Application BMPs	***Modern Agriculture: An Environmental Solution***	**33** Innovation on the Back Roads	**34** Growing Profits from People	**A Taste of Southwestern Ontario** Reception in RDC Auditorium 4:00 - 6:00 pm
RDC 111 - Sun-Brite Classroom	**7** Pasture Strategies in Dry Years	**14** Clean Water Act - Agony or Opportunity		**26** Wind Power and Net Metering	**6** Dry Bean Fertility		**15** Impact of Soil Disruption	**26** Wind Power and Net Metering	
Willson Hall Conference Room	**6** Dry Bean Fertility	**39** Weed Management Tools for 2008					**30** Innovative Financial Solutions	**45** Advanced IPM for Vegetable Management	
Livestock Pavillion Agri-Food Innovation Forum	**25** Biodiesel	**23** Energy Savings on the Farm		**24** Pyrolysis Potential in Agriculture	**25** Biodiesel		**24** Pyrolysis Potential in Agriculture	**22** Energy Crops	
Engineering Shop				**11** Fine Tuning Combines for Food Grade and IP Workshop			**11** Fine Tuning Combines for Food Grade and IP Workshop		
Workshops	**17** Soil Test Workshop *HELD IN AGRONOMY B34*	**40** Similar but Different *HELD IN AGRONOMY B35*		**29** Grabbing Profits *HELD IN AGRONOMY B29*	**40** Similar but Different *HELD IN AGRONOMY B35*		**29** Grabbing Profits *HELD IN AGRONOMY B29*	**17** Soil Test Workshop *HELD IN AGRONOMY B34*	

8:00 - 9:00 REGISTRATION Rudy H. Brown Rural Development Center (RDC) Don J. Pestell, '62 Auditorium

Sponsored By: John Deere

Ridgetown High School Gymnasium

Sponsored By: Maizex, Bayer CropScience

Friday, January 4, 2008

Buffet Lunch Sponsored By: **Pioneer Hi-Bred Limited** Box Lunch Sponsored By: **Libro Financial Group**

LOCATION	9:00 - 9:50	10:00 - 10:50	HOT BUFFET LUNCH	11:00 - 11:50	12:00 - 12:50	1:00 - 1:50	2:10 - 3:00	3:10 - 4:00	4:10 - 5:00
Agronomy Ag Theatre* (Farm Credit Canada)	**Growing Forward** Discussion & Question Period INVITED: *Federal Agriculture Minister OMAFRA Minister* RDC AUDITORIUM W.G. THOMPSON STAGE	**28** Biofuels: Corn & Soybean Marketing Outlook		**1** Corn: Research Meets Realism	**2** Profitable $oybean$ for 2008		**3** Unlocking Wheat's Yield Potential	**28** Biofuels: Corn & Soybean Marketing Outlook	**4** Production Pundits
Agronomy 126		**42** East Meets West Insect Pests		**43** Pest Alert 2008	**12** Getting More Out of the Technology		**37** Factors Affecting Herbicide Injury	**39** Weed Management Tools for 2008	**38** Weed Management of RR Corn & Soybeans
Agronomy 127 Agri-Food Innovation Forum		**21** Commercializing Agri-Food and Health		**20** Reach Your Business Potential	**21** Commercializing Agri-Food and Health		**14** Clean Water Act - Agony or Opportunity	**41** Corn and Soybean Fungicides	**30** Innovative Financial Solutions
RDC Don J. Pestell '62 Auditorium	*INDUSTRY TRADE SHOW / REFRESHMENTS*		*Served at 11:00 or 12:00 in Willson Hall*	*INDUSTRY TRADE SHOW / REFRESHMENTS*		**Dr. Donna Houghton** *Feature Speaker*	*INDUSTRY TRADE SHOW / REFRESHMENTS*		
RDC Pioneer Hi-Bred Lecture Theatre	**5** Early Planting Pays, Right?	**18** Rhizobotany: The Root of Agriculture		**10** Manure Application BMPs	**13** Which Inputs Really Pay?		**1** Corn: Research Meets Realism	**43** Pest Alert 2008	**16** Fertilizer vs. Manure - A Nutrient Showdown
RDC 102 - Ridgetown Community Classroom	**19** Cover Crops - Red Clover and more!	**41** Corn and Soybean Fungicides		**7** Pasture Strategies in Dry Years	**8** Getting Down to the Grass Roots		**35** Putting Local Food in Local Markets	**12** Getting More Out of the Technology	**Alumni Reception** CASH BAR / SNACKS PROVIDED *All Participants Welcome!* **Campus Centre** (in Willson Hall) 4:00 - 6:00 pm
RDC 110 - Syngenta Classroom	**33** Innovation on the Back Roads	**34** Growing Profits from People		**32** Demystifying Farm Succession	**16** Fertilizer vs. Manure - A Nutrient Showdown		**44** Seed Treatments and Plant Vigour	**10** Manure Application BMPs	
RDC 111 - Sun-Brite Classroom	**31** Timely Tax Tips	**26** Wind Power and Net Metering		**15** Impact of Soil Disruption	**6** Dry Bean Fertility			**36** Making the Best of a Bad Situation	
Willson Hall Conference Room	**45** Advanced IPM for Vegetable Management	**13** Which Inputs Really Pay?					**45** Advanced IPM for Vegetable Management	**9** The Challenges of Growing Organic Corn	
Livestock Pavillion Agri-Food Innovation Forum	**23** Energy Savings on the Farm	**22** Energy Crops		**25** Biodiesel	**22** Energy Crops		**24** Pyrolysis Potential in Agriculture	**23** Energy Savings on the Farm	
Engineering Shop	**11** Fine Tuning Combines for Food Grade and IP Workshop						**11** Fine Tuning Combines for Food Grade and IP Workshop		
Workshops	**29** Grabbing Profits *HELD IN AGRONOMY B29*	**17** Soil Test Workshop *HELD IN AGRONOMY B34*		**40** Similar but Different *HELD IN AGRONOMY B35*	**29** Grabbing Profits *HELD IN AGRONOMY B29*		**17** Soil Test Workshop *HELD IN AGRONOMY B34*		

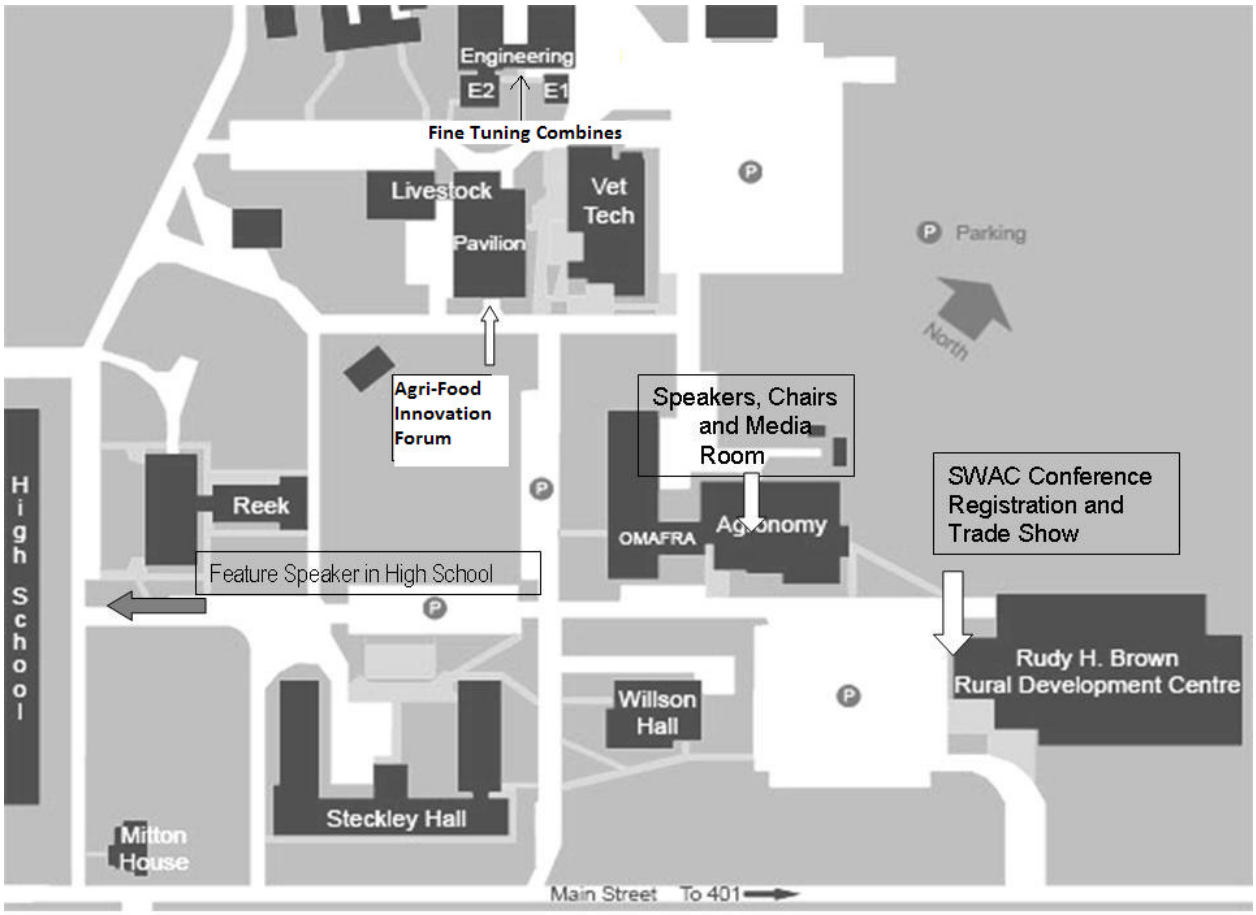
8:00 - 9:00 REGISTRATION Rudy H. Brown Rural Development Center (RDC) Don J. Pestell, '62 Auditorium

Sponsored By: Pioneer A DuPont Company

Ridgetown High School Gymnasium

Sponsored By: Ridgetown and OAC Alumni

*All sessions held in the Ag Theatre are sponsored by Farm Credit Canada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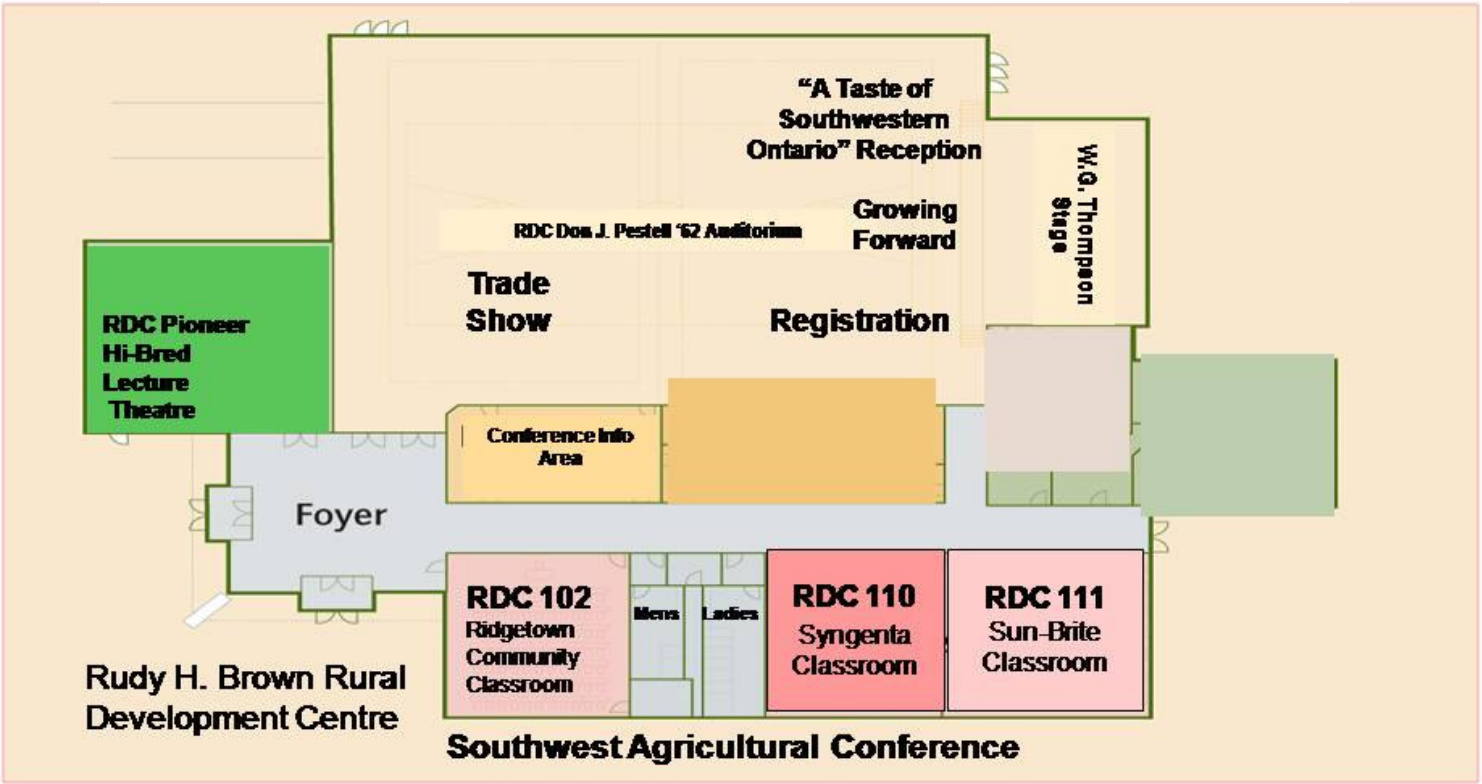
"A Taste of Southwestern Ontario" Reception
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RDC Don J. Pestell '62 Auditorium
Growing Forward
Trade Show
Registration
RDC Pioneer Hi-Bred Lecture Theatre
Conference Info Area
Foyer
RDC 102 Ridgetown Community Classroom
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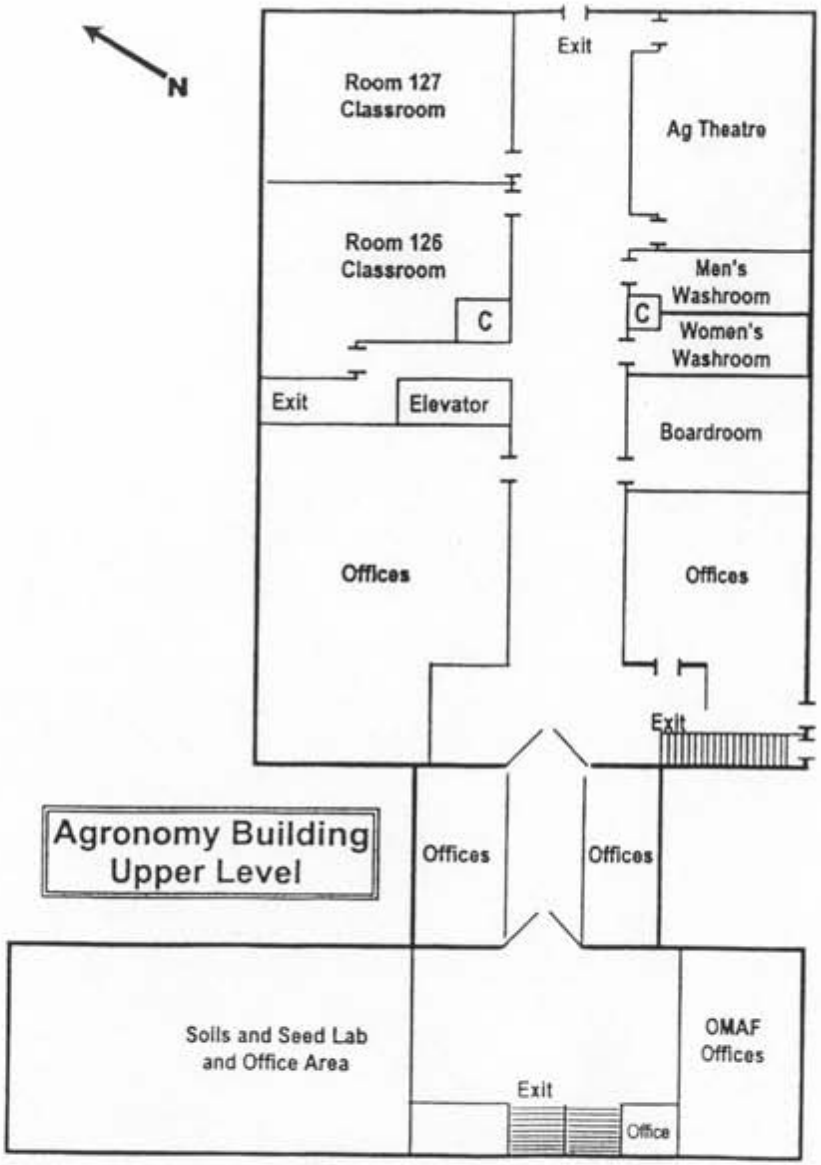
RDC 110 Syngenta Classroom
RDC 111 Sun-Brite Classroom
Rudy H. Brown Rural Development Centre
Southwest Agricultural Conference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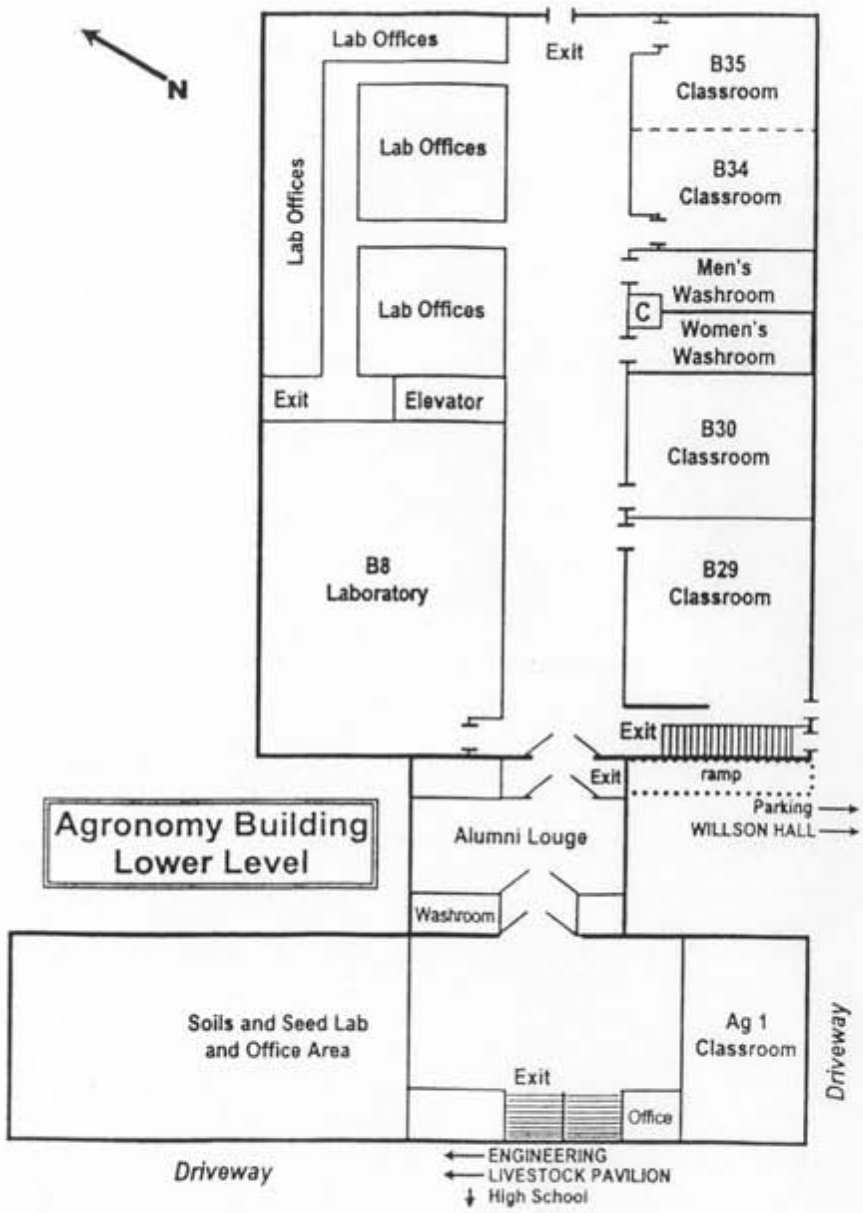
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Soils and Seed Lab
and Office Area
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Classroom
Driveway
Driveway
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