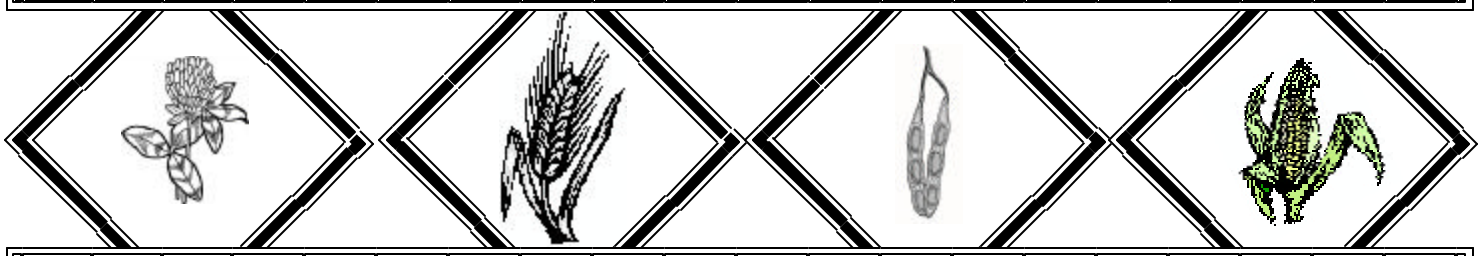
Volume 2, Issue 6 November, 2002

CROP TALK



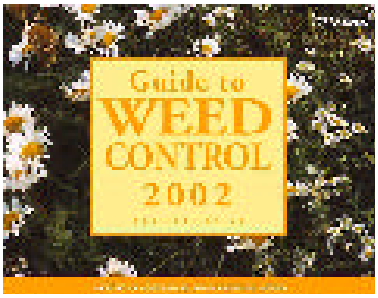
OMAF Field Crop Specialists—Your Crop Info Source

Table of Contents

Brought to You by the Following OMAF Crop Specialists

Mike Cowbrough Weed Management Program Lead
Hugh Martin, Organic Crop Production Program Lead
Anne Verhallen, Soil Management Specialist (Hort.)
Horst Bohner, Soybean Specialist
Ian McDonald, Applied Research Co-ordinator
Albert Tenuta, Field Crop Pathologist
Michael Payne, Biosolids Specialist
Keith Reid, Soil Fertility Specialist
Jack Kyle, Grazier Specialist
Brian Hall, Alternative Production Systems Specialist
Peter Johnson, Cereals Specialist
Scott Banks, Emerging Crops Specialist
Gilles Quesnel, Field Crops, IPM Program Lead
Christine Brown, Nutrient Management Program Lead
Adam Hayes, Soil Management Specialist - Field Crops
Greg Stewart, Corn Industry Program Lead
Tracey Baute, Entomology, Field Crops Program Lead
Heather Griffith, IPM Modelling Specialist

Editor: *Joel Bagg, Forage Specialist*



"Publication 75 - Guide to Weed Control" will now be available on a biennial basis and a supplement to the 2002 publication will be available for distribution to clients early in 2003.

The "Guide to Weed Control" will follow the same publication schedule as Publications 360, "Fruit Production Recommendations" and 363, "Vegetable Production Recommendations". The next new addition of "Publication 75" will be made available for distribution in the spring of 2004.

Green Soybeans

by Horst Bohner, Soybean Specialist

An extremely dry summer resulted in lower yields and introduced a new problem for many Ontario soybean growers. At harvest, some producers were shocked to discover that up to 70% of their harvested soybeans were green, even though seed moisture was only 12%. Worse, some elevators either would not accept these soybeans or imposed large discounts. IP soybeans were also affected

and some ended up going to the crusher since they could not meet quality standards. Various percentages of green beans could be found in fields throughout most of southwestern Ontario. The majority of fields had less than 15% green, but some fields in Elgin, Lambton, Chatham-Kent, Essex, and Middlesex had much larger percentages. The problem was most severe in those regions that were extremely dry during July and August.

Caused By Hot Dry Weather

These green beans are not the large unripe green beans that can often be found most years, when parts of the field that are not ripe are harvested along with ripe beans. Instead, a large percentage of *dry* green beans were harvested along with the mature yellow beans. Although this was a new dilemma for the Ontario soybean industry, some of the dryer US soybean growing areas, like Kansas have experienced this problem before. Under normal conditions, as the plant matures, an enzyme called chlorophyllase degrades the chlorophyll in the bean to result in a normal soybean colour. This summer, extremely dry hot weather during the latter stages of seed maturation this summer influenced this activity. It is believed that bean drying and maturation occurred so quickly that the enzyme activity stopped before all of the chlorophyll could be metabolized.

2 Types

There are two types of dry green soybeans. The first category involves a green tinge on the outside of the bean, while the inside remains yellow. These beans are generally classified by the Grain Commission as 'not of good natural colour'. They are designated as Grade 2 and are not discounted. In the second category however, a green discolouration can be found right through the entire soybean. The Grain Commission grades these green beans as 'damaged kernels'. Depending on the percentage of green beans and other damage present in the sample, these beans are downgraded. The reason green soybeans are discounted by the crusher is that the chlorophyll has a direct effect on oil quality and content. The extra bleaching required during processing to remove the chlorophyll increases processing costs and reduces oil yield.

Degrade Over Time?

Will this green colour degrade over time if the beans are left in the field or put into storage? Since the beans are dry the "activity" inside the bean is minimal. The enzyme that normally breaks down the chlorophyll cannot function at such low moistures therefore the green colour will not disappear over time. However, field experience has shown that there is some improvement to the green tinge on the outside of the bean over time as well as a slight improvement to the green discolouration inside the bean. Although there may be some improvement the green will not disappear over time.

Some food-grade soybeans are also being harvested with a large number of green beans. Although an electronic eye can pick out a certain percentage of these undesirable beans there are limits to the number of green beans that can be removed. Since appearance and processing quality standards for food-grade beans are high some intended IP soybeans will not make food grade due to these green beans.

The green seed issue is not uncommon to canola growers in Western Canada. Researchers have been working on the problem in canola for a number of years. Strategies involving plant breeding as well as transgenic approaches have been attempted to minimize the impact of green seeds on oilseed canola.

Lab analysis of various green bean samples from across the province showed no significant protein or fat differences in these green beans. In fact, except for the extra chlorophyll, no significant differences could be found in any of the 19 components tested. It's also believed that germination and vigour are not affected by this green colour.

There is little producers can do to avoid having green beans in the future since no one can control the weather. Variety and planting date differences do exist but these differences are not consistent across regions. A good crop rotation along with choosing the best varieties suited for your area is the best defense. Remember that the likelihood of having similar extremely dry conditions again next year is small.

No-Till Soybean Yields

by Horst Bohner, Soybean Specialist

The shift in Ontario to no-till and reduced tillage soybeans has been rapid. More than 60% of Ontario soybeans are now grown under some form of reduced tillage. One of the reasons for the speed of this change can be attributed to the use of glyphosate tolerant varieties. In 2001 approximately 30% of soybeans grown in Ontario were herbicide tolerant. That number increased to approximately 45% this year and may reach 60+% by next year.

Equal Yields

One of the main production fears of those who are considering adopting a no-till system is of having lower yields. This is especially true after years like 2002 when yields varied a tremendous amount. Nevertheless, field experience and research trials have demonstrated almost identical yields on average between tillage systems. From 1997 to 2000 the University of Guelph conducted tillage research, and found that yields for no-till soybeans equaled the fall moldboard plow in row widths of 56 cm (22.5 in.) or less and in twin rows (Table 1).

Soil Types

Heavy textured soil types (clay, silty clay loam or silty clay) are some of the most challenging for no-till systems. Producers have reported reduced no-till soybean yields on these heavier soils during difficult growing seasons. But long-term tillage system research on Brookston clay soil at the University of Guelph's Ridgetown College, showed equal soybean yields for no-till and fall moldboard tillage (see Table 2).

Varieties

Not all varieties are suited for a no-till system, however. Soils stay cooler and wetter in the spring, which may result in slower emergence and more soil-borne diseases. This means that varieties selected for no-till need to have excellent vigour and a good tolerance to phytophthora root rot.

Dry & Warm Soil

Also, before planting begins, the soil should have reached an adequate temperature. Planting before the soil reaches 10°C (50°F) should be avoided. Reduced germination and lower vigour may result if the newly planted seed absorbs cold water. Planting into wet soils also results in seed slot smearing which may cause reduced lateral root growth and slower nodulation. Or the seed slot may open up again as the ground dries, resulting in poor seed to soil contact. One of the most important factors in successful no-till planting is to wait until the soil is sufficiently dry and warm. Depending on how well drained the field is, this could mean as little as 3 to 4 days longer than conventional fields.

Table 1. Soybean yield response under various tillage systems. Average of 9 sites per year

	Row Width cm (in.)				
	76 (30)	**Twin 76 (30)**	**56 (22.5)**	**38 (15)**	**19 (7.5)**
Tillage	**Soybean Yields t/ha (bu/ac)**				
No-till	2.72 (40.4)	3.04 (45.3)	2.93 (43.6)	3.06 (45.5)	3.06 (45.5)
Fall Moldboard	2.94 (43.8)	3.02 (44.9)	2.93 (43.6)	3.12 (46.4)	3.21 (47.7)
Fall Zone-till	2.78 (41.3)	2.93 (43.6)	-	-	-
Spring Zone-till	2.71 (40.3)	3.02 (45.0)	-	-	-

Least Significant Difference $_{(P=0.05)}$ = 2.4

Where the difference between 2 treatments exceeds 2.4, there is a less than 1 in 20 chance that it is due to random variation

1. University of Guelph (1998-2000). Trials were conducted on clay loam, silty-clay loam, silt loam, and Guelph loam soil types.
2. Spring zone-tillage conducted approximately 1 day prior to planting.

Table 2 Soybean Yield at Ridgetown College 1992-2000

Tillage Treatment	Average Yield (excluding 1996)	
	t/ha	bu/ac
Fall moldboard plow	3.21 a	47.7 a
Fall chisel plow	3.05 b	45.4 b
Ridge tillage	2.96 b	44.1 b
Zone tillage	3.06 b	45.5 b
No-till	3.21 b	47.8 a
LSD (0.05)	2.2	2.2

Values followed by the same letter are not significantly different at the 5% level.

Take An Accurate Hay Sample

by Joel Bagg, Forage Specialist, OMAF, Lindsay

Hay sampling should be a very simple, basic task, but this is often a weak link in forage quality evaluation. Think about what we are trying to accomplish when we take a hay sample. We are trying to obtain a small sample (200 grams) that accurately represents many tonnes of hay in a mow. It is very important to fairly represent the leaf/stem ratio, as well as the legume/grass/weed mixture of the hay.

We are taking samples for analysis so that we can balance rations, achieve livestock performance and determine market value. Small sampling errors can lead to costly mistakes. Research and practical experience indicate that the following practices can minimize hay sampling error.

Sample Probes

It is impossible to get an accurate sample using bale slices, so a sample probe is essential. There are many different types of acceptable commercially available sample probes. "Push" types must be kept extremely sharp, while "drill" types that use either a hand brace or electric drill are more common. Many newer probes utilize a canister collection chamber that holds the core samples.

Make sure the sample probe tip is sharp. Tips may be serrated or straight, as long as they cut cleanly and do not push aside stems particles. Dull probes will push material out of the core. Many probes can be manually resharpened. The cutting edge should be a right angles to the probe.

The inside diameter should be between ? and ¾ inch. A smaller diameter may not cut the leaf/stem properly. A too large diameter probe may result in a sample that is too large for the lab. Avoid open augers that loose leaf particles when withdrawn from the bale.

Sample probes should allow penetration 12 to 22 inches into the bales. Research has shown that an extra long probe is probably not required for large round and large square bales.

Minimum of 20 Cores

There is considerable variation in a hay lot. Take a separate sample from each field and cutting. Sample bales at random at various heights. Research has shown that it is very important that a minimum of 20 bales (1 core per bale) should be sampled. Because small square bales have a pattern of leaf and stem packing within a bale, sample at right angles near the centre of the butt of the bale. Large square bales don't have the same pattern of leaf and stem packing, so sample probes do not necessarily need to be from the centre of these bales. Large round bales should be sampled at right angles to the outside circumference of the bales.

Handle Samples Carefully

It is important to collect all of the sample for

submission to the lab. Samples tend to separate into leaf and stem particles, so do not subsample or divide this composite sample. Combine the whole core samples into a single sample and store in a polyethylene freezer bag. Protect from heat or direct sunlight. The sample should be about 200 grams. Avoid samples that are too large and difficult for the lab to grind without subsampling. Subsampling defeats the purpose of careful sampling. Avoid samples that are too small to be representative of the hay. Label samples clearly.

There is no accreditation program for forage analysis in Ontario, so be sure to use a reputable laboratory. You may also want to consider requesting fibre digestibility (dNDF) analysis. For more information on dNDF refer to the November 2001 issue of Crop Talk. http://www.gov.on.ca/OMAFRA/english/crops/field/news/croptalk/2001/ct1101.htm#Fibre. Extra care while taking a hay sample can ensure a more representative sample and more accurate results.

How Much Are Herbicide Resistant Weeds Costing You?

by Mike Cowbrough, Weed Management Lead, OMAF, Guelph

You've tried a herbicide for the first time and it works extremely well. You can't even begin to wonder how much yield loss those weeds would have cost you if you weren't able to control them. It makes sense to keep using that product, why wouldn't you? But what if repeated use of that product year after year and on the same field caused it to become less effective. Is it resistance or is it a weed shift? It doesn't really matter, you have weeds that you cannot control as effectively and it is costing money, but how much? Lets look at two different scenarios.

Scenario 1:
Field "A" has been planted to soybeans and has both common ragweed and redroot pigweed at a density of roughly 2 plants/m^2 (2 per square yard). Both species were recently confirmed resistant to group II broadleaf herbicides. The following table outlines the amount of dollars lost per acre if the two weed species could not be controlled.

Table 1: Damage estimate for uncontrolled weeds in soybean (HADSS 2002)[1]

Weed	Weed/m^2	Bu/acre lost	Yield loss	$/acre lost
Redroot pigweed	2	7.5	15.56%	$52.16
Common ragweed	2	6.2	13.67%	$43.12
TOTAL	**4**	**13.6**	**30.25%**	**$95.28**

*Prices based on a weed-free yield of 45 bushels and a selling price of $7.00/bushel.

Fortunately, there are other products that do a good job of controlling those resistant species. However, lets assume the alternative products are more expensive, or do not provide as good of control as the product that you had been using. The losses won't be as substantial as shown in Table 1, but they would be more than previous.

Glyphosate (Round-up Transorb, Vantage Plus) applied on glyphosate tolerant crops would be an effective option to control group II resistance weeds. However, if overuse of that effective technology resulted in weed resistance or shifts, what would it cost you?

Scenario 2:
You've been growing glyphosate tolerant corn and soybeans and applying straight glyphosate in both crops. You notice some volunteer corn that you suspect is also glyphosate tolerant. Table 2 outlines the amount of dollars lost per acre if volunteer corn is not controlled.

Table 2: Damage estimate for uncontrolled volunteer corn in soybean (HADSS 2002)[1]

Weed	Weed/m^2	Bu/acre lost	Yield loss	$/acre lost
Volunteer Corn	4	5.6	12.36	$38.94
TOTAL	**4**	**5.6**	**12.36**	**$38.94**

*Prices based on a weed-free yield of 45 bushels and a selling price of $7.00/bushel.

Certainly volunteer corn, even if glyphosate tolerant, can be controlled using any one of the group "1" grass herbicides (Assure II, Excel, Poast Ultra, Select and Venture L). However, this will

add to your overall herbicide costs. The stakes are higher if weed resistance or weed shifts develop. It would either increase herbicide costs as a result of having to tank-mix another product for control of the problem weed, or yield loss from lack of weed control.

Some may have the attitude that weed resistance isn't much of a concern because ultimately a new herbicide will come along that will control the resistant weed problem. Although historically this has been the case, currently there are very few herbicides, particularly in soybeans, that will be registered in the foreseeable future.

Take the time to scribble down what products you are using in each field every year. This will allow you to spot and correct any trends of repeated use with a particular herbicide group. This simple task can help keep that effective working herbicide in your bag of tricks for years to come.

[1]HADSS 2002 is a web based weed control decision support program available for use in Ontario. To use this program go to www.cropsci.ncsu.edu/webhadss/

Crop Rotation – The Key to Organic Farming

by Hugh Martin, Organic Crop Production Program Lead, OMAF, Guelph

One of the keys to success on any farm will be to have a good crop rotation. Organic farmers depend on their crop rotation to boost yields and to manage pests. Crop rotations can be as simple as having 2 different crops that alternate, or a multi-year plan of several crops and cover crops in a planned sequence to complement each crop in the rotation.

There are many considerations when planning the crop rotation.

1. What are the needs on the farm – feed, straw, and pasture.
2. What are the market opportunities in the next couple years.
3. What are the insect, disease, weed management opportunities.
4. What are the soil quality needs?

Farm Needs

The first need is always to be able to meet the needs of the whole farm system. For example if the farm has a dairy herd there needs to be enough hay or silage each year to feed the herd. Similarly for grain unless there are opportunities to buy feed for less than the cost to grow it. Straw for bedding or pasture requirements and other similar needs always need to be addressed.

Market Opportunities

We always need to look at the anticipated markets for crops and how prices of various crops compare, in order to capture market opportunities. The price this year is irrelevant. The trick is to predict the price for next year. But price is only half of the revenue equation….

Boosting yield consistently over a number of years is the key to a good rotation. Conventional farmers can use fertilizers or pesticides to reduce fertility and pest problems, but organic farmers chose not to use many of these options.

Insects, Disease & Weeds

Crop rotation has long been known to be the best solution to insects, such as corn rootworm. Diseases such as root rots, white mold, or nematodes can been reduced with a good crop rotation – or made worse with poor rotations. Barley, wheat and spelt are closely related and get similar diseases. They are poor choices to follow each other in rotation, but oats get very few of the same diseases so make a better rotation choice with these crops. Organic farmers who have grown several crops of soybeans in a row will experience heavy weed pressure from annual weeds. A summer-harvested crop such as cereal grains can reduce some perennial weeds by cutting them prior to seed set. It also gives an opportunity for summer tillage and cover crops to interfere with the life cycle of weeds and other pests. Crops with a dense crop canopy can out compete small annual weeds.

Soil Quality

Soil quality covers many aspects. Legume crops and cover crops can add nitrogen to soil to benefit succeeding crops. Some crops such as rye or canola can have detrimental effects on following crops of corn unless properly managed due to allelopathy or the effects on microorganisms such as mycorrhyzae. To improve soil structure chose

a crop with a large volume of fine roots, such as a grass crop. Incorporating crop residues into the soil can be most valuable to building soil organic matter to feed soil microorganisms. Most bean crops have small root systems and low volume of crops residue. In general it is best to follow a grass crop with a broadleaf crop and vice versa.

There is no recipe to choosing the right crop rotation sequence for your situation, but make sure you consider the long term (5 year +) benefits to the whole farm system rather than just the costs and revenues over the next 12 months.

Precision Agriculture For You

by Adam Hayes, Soil Management Specialist – Field Crops

Precision farming has been in Ontario for close to 10 years now. A large number of farmers are using some form of precision farming and a small number are big users of the technology. In the last 5 years the accuracy and ease of use of the equipment has improved. Also, the software to analyze the information is now faster and easier to use. The challenge has been and still remains – how to use the information to determine where to specifically apply inputs in a field. Progress is being made in this area.

Precision farming is not just for large farm operations. Sure, a small operation may not be able to afford all the technology, but can still benefit from the technology. One opportunity to use the technology is to have fields soil sampled. Smart soil sampling of fields can help determine the variability in a field and can help identify specific requirements, especially lime. Another way of utilizing the technology without directly purchasing it is through yield monitoring. If you have someone do your combining and they have a yield monitor there is the opportunity to have yield maps for your fields.

Yield monitor data can provide a lot of useful information. Yield maps can be used to improve crop yields and the bottom line. Yield maps have helped many determine where drainage would pay, how bad the yields are in a poor area and have helped to quantify the benefits of management changes. There is also the potential with protein sensors to separate crops, such as wheat, on the go for different markets.

Regardless of whether precision farming is currently being used, or if it is being considered for use, the cost/ benefit must be analyzed. The costs for the technology and services can be significant. Computers, yield monitors, variable rate applicators, global positioning systems (GPS), grid sampling, data analysis all have a cost. There are also learning costs to working with something new.

On the benefit/returns side, variable rate application of inputs has the potential to reduce input costs. It also may pay some big dividends down the road as environmental concerns continue to move to the forefront. Variable rate equipment has the potential to apply environmentally sensitive inputs, like nitrogen and manure, in the amount needed by the crop in specific areas of the field. It can also provide a record of what input was applied where in the field. Precision farming can also contribute to risk reduction on the farm.

Getting the Most Out of Yield Maps

by Adam Hayes, Soil Management Specialist – Field Crops

It is important to get the most out of yield maps. There are many that work with yield maps on their own computers and others that use a service to generate the maps. Regardless of how the maps are generated, it is critical that the maps are produced in such a way that they tell you what you need to know. Take a hard look at your maps to see if they meet this criterion. Colour schemes, breaks in yield levels, filtering out bad data and using standard deviation can all be used to improve the usefulness of a yield map.

Many growers look at maps that others provide them and then complain that they don't tell them anything. Take the time to express your needs and possibly your frustrations to the person providing the service. They are working for you, but they won't know what you require if you don't tell them. If they can't provide you with what you want, find someone who will.

Electric Fence - The Foundation of a Workable Grazing System.

by Jack Kyle, Grazier Specialist, OMAF, Lindsay

Electric fence simplifies the management of an effective and productive grazing system. To be effective your grazing system relies on you controlling where the livestock will be, not the livestock determining where they will be grazing. Electric fence is easy to erect and very effective at controlling livestock. There are a number of important principals that will make your electric fence effective in managing livestock.

Electric fence provides a psychological barrier to the animals. They need to know that it is there and that it hurts. The first step is to train the livestock to the electric fence. This is most effectively done by putting the animals in a relatively small area with electric fence on the inside of a barrier type fence, such as a board or page wire fence. Animals in close proximity to an electric fence that has a good "bite" will quickly learn to respect the electrified wire. After a couple of days in this environment, most, if not all, the animals will realize that touching the wire is not a pleasant experience.

To provide an effective bite the fence must be properly grounded. The shock from the fence is actually the completion of an electrical circuit running from the power unit through the wire, through the animal into the ground and back to the ground rod of the power unit. If the power unit does not have proper grounding this circuit will not be completed. If soil conditions are very dry there is also the risk that the circuit will not be completed. The fencer unit should have three ground rods at least six to eight feet long and made of galvanized steel. These ground rods need to be in moist soil and located at least ten feet apart. The ground wire from the charger unit should be attached with good clamps to make a tight connection. If dry soils are a potential problem consider running at least one ground wire in the fence so that when the animal touches the two wires (live and ground) the circuit is completed and a shock is received.

Avoid electrical shorts along the fence that will reduce the charge. Shorts can be due to a number of different things: poor insulators that don't give full electrical protection, grass or branches on the live wires, or poor connections at any join in the wire.

Electric fence is a psychological barrier so the wire does not need to be tight as a fiddle sting. Barrier type fences rely on the physical barrier of the fence to stop the animals. Electric fence relies on the mental aspect of "don't go there". If the animal does try to challenge the fence it is better to have some give in the wire that allows the animal to get through without breaking the wire. Repair will be much easier. One or two wires won't provide enough physical barrier in any situation.

Keeping your electric fence in good repair and animals trained to respect its nasty bite will make pasture management much easier and effective. Livestock trained to electric fence can be rotationally grazed with a single hot wire to divide paddocks, and will respect temporary fences that are easy and quick to build. An easily managed paddock system will make rotational grazing an easy management tool to increase the productivity of your pastureland.