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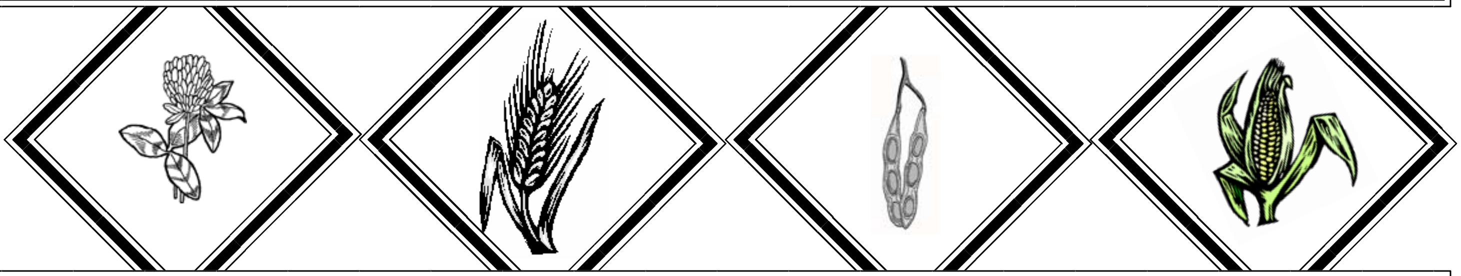
CROP TALK



OMAF Field Crop Specialists—Your Crop Info Source

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Christine Brown, Nutrient Management Program Lead
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Greg Stewart, Corn Industry Program Lead
Tracey Baute, Entomology, Field Crops Program Lead

***Editor:** Joel Bagg, Forage Specialist*

Baleage Tips

by Joel Bagg, Forage Specialist, OMAF, Lindsay

Making large bale haylage, also known as "baleage", reduces weather risk and can result in very high quality forage. However, the risk of spoilage can be frustrating. "Baleage disasters" can sometimes result in a total loss. Extra care is required when making baleage to avoid mouldy feed.

Baleage does not reach as low a pH as chopped haylage, so there will always be an increased risk of spoilage. There are many management factors that contribute to a consistently good fermentation of wrapped baleage and the subsequent "keeping ability". The consequences of making mistakes are additive and interactive, so it is sometimes difficult to pinpoint why some baleage spoils while other baleage does not. Here are a few points to consider:

Wrap High Quality Forage

Avoid trying to make baleage out of mature hay with a low sugar content. Sugars are required for a good fermentation with adequate lactic acid production and a low pH. Also, stiff coarse stems can more easily puncture the plastic. Wrapping mature, coarse, stemmy baleage is often disappointing. It won't turn poor quality forage into high quality baleage, and this makes the added cost of wrapping more difficult to justify.

Ontario Ministry of Agriculture and Food, Crop Technology Branch

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Avoid using haylage that was rained-on. Sugars are leached out and are not available for fermentation. Rained-on windrows also become contaminated by soil borne clostridia bacteria which is splashed up by the rain, resulting in a poor fermentation. For the same reason, if possible, avoid raking to minimize contamination by clostridia bacteria. Do not use fields contaminated by manure, and avoid cutting too close to the ground.

Early-cut grasses often ferment more easily than alfalfa or red clover because they have more available sugars, and have less buffering capacity which makes it easier to lower the pH. This helps to explain why second-cuts, which are usually mostly alfalfa, are sometimes more difficult to ferment successfully and have a higher risk of spoilage.

Make Dense Bales

Make uniform, firm, tight, dense bales. These bales have less oxygen in them and allow less oxygen penetration. Large square bales are typically more dense than large round bales. Size bales so that they are not too heavy for the available loader tractors to handle, or too big for the wrappers. Heavier bales are more difficult to handle without tearing plastic. Plastic twine is preferred over sisal twine to reduce plastic wrap degradation. With continuous wrappers, bale uniformity is important in order to avoid air gaps between bales. Use windrow and baling techniques to maximize bale density and uniformity. These include wide uniform windrows (no barrel-shaped bales), slower baler ground speeds, and using large square, hard core and round-silage balers with precutters.

Bale At The Correct Moisture

The recommended moisture for wrapped baleage is generally 40–55%. Moistures greater than this result in bales that are too heavy. Excessively wet bales increase the risk of clostridia spoilage with butyric acid production, resulting in sour, foul smelling, unpalatable baleage. Wet bales are also more prone to freezing.

Some producers have had success when wrapping large bales as “low moisture baleage”. This is sometimes the result when the original intention is to make dry hay, but due to impending rain it gets baled at moistures in the 25 to 35% range instead. Although low moisture baleage can be high quality, it has a higher risk of spoilage because it usually doesn’t ferment as well and ends up with a higher pH. It can be very unforgiving if everything isn’t done right. This includes making dense bales (large squares work better), avoiding rained-on forage, wrapping quickly, repairing holes, and all the other management factors mentioned in this article. It is critical that low moisture baleage be covered with plenty of plastic. Moisture should come from the plant, not dew or rain.

Use Enough Plastic

Bales should be wrapped air tight with at least 6 mils of plastic film (6 wraps of 1 mil). To ensure against tears and punctures, 8 mils or more is preferable. Because of their large area of contact with the ground, large square bales sometimes require more plastic to protect them from punctures.

Wrap Soon After Baling

Round bales should be wrapped within 2 hours of baling at high temperatures and within 4-12 hours at cooler temperatures. Large square bales have a higher density, and don’t “squat” and stretch the plastic wrap, so they are more forgiving of delayed wrapping up to 24 hours. Plastic wrap is often easier to work with in the cooler temperatures and higher humidity of night or early morning, as opposed to a hot afternoon.

Location, Location, Location

Wrapping should be done on an area free of sharp projections that can tear the plastic, such as rocks and hay stubble. Select a well drained, clean storage site that reduces the risk of rodent damage. Stacking individually wrapped round bales on their flat side (ends) prevents squatting and provides more plastic between the bale and the ground.

Moisture Migration

Some spoilage is the result of moisture migration within the bales. During hot summer days the moisture vapourizes, and then during the cooler nights the moisture condenses on the cooler north sides and bottoms of the bales. The wet portions of the bales get a slimy, butyric acid fermentation, while the dry parts of the bale don’t always ferment enough and can mould. Setting up baleage rows in a **north-south direction**, or selecting a shady area in a tree line out of direct sunlight can help minimize this.

Plastic Repairs

Rodent, bird, raccoon and other wildlife damage is a constant threat. Cats, dogs and kids should also be kept off the bales. Continually monitor stored baleage and be prepared to repair tears and holes. Be sure to use the appropriate tape, available from the plastic suppliers, that sticks more permanently to the wrap. Bad things can happen to baleage when you're not looking. The bales should be located where regular inspections are more likely to happen. Carefully stack individually wrapped bales if possible to provide some protection and easier inspection.

For more information refer to "Maintaining Quality in Large Bale Silage" on the OMAF Forage Website at http://www.gov.on.ca/OMAFRA/english/crops/field/forages.html, or the OMAF Agricultural Information Contact Centre at 1-877–424-1300.

Soybean Crop Staging and Herbicide Application Timing

by Mike Cowbrough, Weed Specialist, OMAF, Guelph

Cool temperatures, experienced by much of the province this spring, can often result in the soybean crop developing at a slower pace than many annual grass and broadleaf weeds. You may be faced with a scenario where there is an abundance of weeds at or near the maximum leafstage for effective control, yet the soybean crop is not at the growth stage specified on the product label. As a producer you are now faced with the ultimate risk/benefit analysis. Do I sacrifice the level of weed control, or risk possible crop injury?

Is there any risk in applying an herbicide before its specified label stage? In general, yes. The application stage specified on the label is there because:

1. There is an increased chance of crop injury when the product is applied outside the application window, or
2. Research on the product was conducted at the stages specified on the label. Therefore crop tolerance to applications outside those stages are unknown.

Table 1. Soybean application stages for a number of post-emergent herbicides.

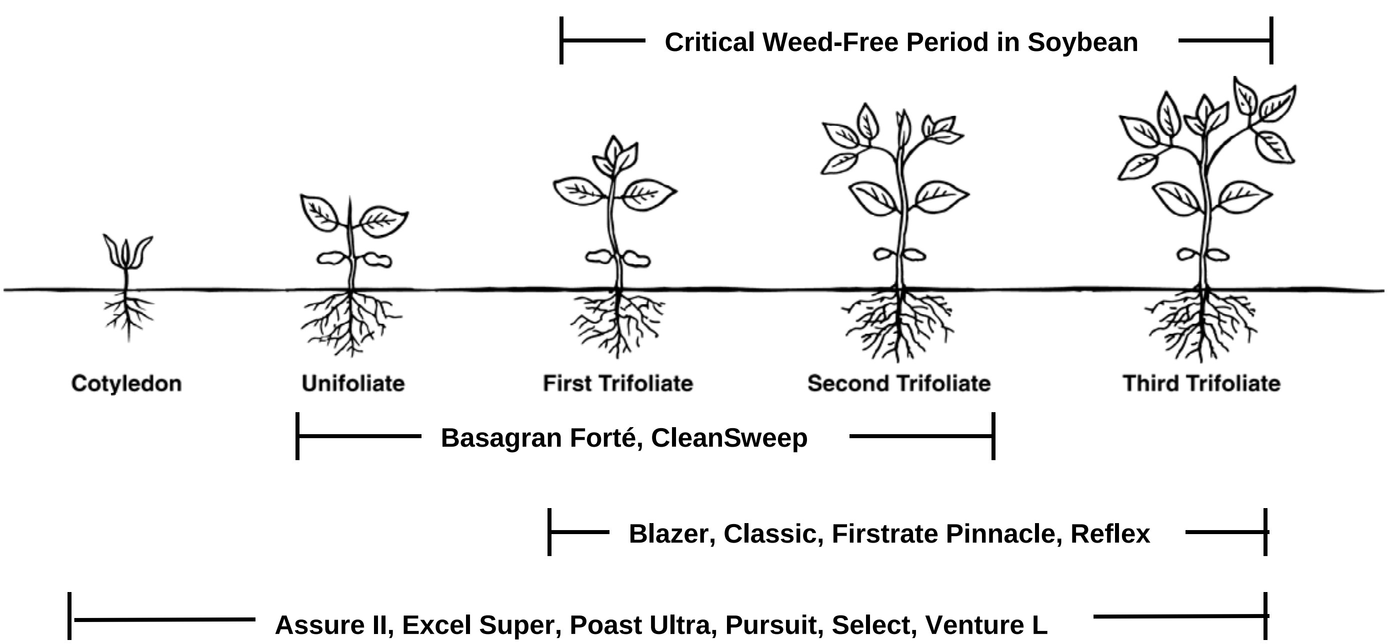


Table 2. Maximum weed leaf stage whereby the herbicide application is still effective according to the product label.

Product	Maximum Weed Leaf Stage	Weeds Controlled
Broadleaf Herbicides		
Basagran Forté (0.9 L/ac)	4 leaf	giant ragweed, velvetleaf
	6 leaf	common ragweed, hairy galinsoga, hairy nightshade, purslane, shephard's-purse, stinkweed
	8 leaf	lamb's-quarters
	10 leaf	cocklebur, flower-of-an-hour, lady's-thumb, wild mustard
Blazer (1 L/ac)	2 leaf	lamb's-quarters
	4 leaf	cocklebur
	6 leaf	eastern black nightshade, redroot pigweed
	8 leaf	common ragweed, lady's-thumb
	10 leaf	jimsonweed, wild mustard
Classic (14 g/ac)	4 leaf	velvetleaf
	6 leaf	common ragweed
	8 leaf	dandelion, redroot pigweed, yellow nutsedge
	bud stage	annual and perennial sowthistle
Firstrate (8.5 g/ac)	4 leaf	jimsonweed, velvetleaf
	6 leaf	giant ragweed
	8 leaf	cocklebur, common ragweed
Pinnacle (2.2 g/ac)	8 leaf	redroot pigweed, lady's thumb, wild mustard
Pinnacle (3.2 g/ac)	4 leaf	velvetleaf
	6 leaf	lamb's-quarters
Grass and Broadleaf Herbicides		
Pursuit (125 mL/ac)	2 leaf	cocklebur*, eastern black nightshade, ragweed*, old witchgrass, wild buckwheat, wild mustard
	4 leaf	green foxtail, yellow foxtail
	6 leaf	barnyardgrass*
	8 leaf	velvetleaf
	12 leaf	redroot pigweed

Grass Herbicides		
Product	**Maximum Weed Leaf Stage**	**Weeds Controlled**
Assure II (150 ml/ac)	6 leaf	volunteer corn
	to early tillering	green foxtail, volunteer cereals
Assure II (2000 ml/ac)	**to early tillering**	barnyard grass, fall panicum, old witchgrass, proso millet, yellow foxtail
Assure II (300 ml/ac)	6 leaf	quackgrass
Excel Super (268 ml/ac)	6 leaf	barnyard grass, crabgrass, fall panicum, green foxtail, yellow foxtail, witchgrass, proso millet, volunteer corn
Poast Ultra (130 ml/ac)	6 leaf	barnyard grass, crabgrass, fall panicum, green foxtail, yellow foxtail, witchgrass, proso millet
Poast Ultra (190 ml/ac)	6 leaf	volunteer cereals
Poast Ultra (450 ml/ac)	3 leaf	quackgrass (supression)
Select (50 ml/ac)	4 Leaf	green foxtail, yellow foxtail, volunteer cereals
Select (50 ml/ac)	6 Leaf	barnyard grass, fall panicum, witchgrass, proso millet, volunteer corn
Select (75 ml/ac)	6 Leaf	volunteer cereals, quackgrass (supression)
Select (150 ml/ac)	6 leaf	quackgrass
Venture L (320 ml/ac)	4 leaf	barnyard grass, volunteer corn (only needs 240 ml/ac rate for control of volunteer corn)
Venture L (400 ml/ac)	4 leaf	crabgrass, green foxtail, yellow foxtail, fall panicum[1], old witch grass[1], proso millet[1] quackgrass (supression)
Venture L (800 ml/ac)	5 leaf	quackgrass, wirestem muhly

*Use the 168 ml/ac rate when targeting this species.
[1]Can be controlled up to the 5 leaf stage.

In any case. There is a level of risk to applying a herbicide before the recommended crop stages. Refer to Table 1 for a breakdown of ideal crop application stages. The decision to "pull the trigger" will ultimately come down to what growth stage the weeds are at. For example, let's assume you scout your field and the soybean crop is at the cotyledon stage, yet common lamb's-quarters is at the 4-6 leaf stage and at extremely high densities. In this situation, it is probably more advantageous to spray a suitable herbicide as soon as possible versus waiting until the specified crop stage.

Refer to Table 2 for a list of maximum weed leaf stages where a specific herbicide will still be effective.

Bottom Line: Don't make the decision on your own.

If you are in a situation where there are advanced weeds in a soybean crop not yet at the labelled application stage, have your agronomist and territory sales representative scout the field with you so that you can make the best decision together.

Recipe for Keeping Clean Water When Applying Liquid Manure

by Christine Brown, Nutrient Management Specialist, OMAF, Woodstock

At forty-two cents per pound of actual N, nitrogen from manure is looking pretty good. Liquid manure is especially valuable from a nitrogen perspective. However, with the application of liquid manure also comes the increased risk of "preferential flow". Preferential flow is commonly referred to as macro-pore movement.

Preferential flow is the direct movement of liquid materials through large cracks or pores (earthworm or old root channels) in the soil. In Ontario, movement is most often to tile drains. From 1988 to 2001, 44% of the MOE reported spills impacted field tile. However, preferential flow can also occur to groundwater - either through natural cracks in the bedrock in shallow soils, or through "shallow to the water table" soils. The end result with preferential flow is contaminated water. Contaminants could include nitrates, ammonia and pathogens.

Preventing preferential flow

The conditions that favour preferential flow include:

- tiles that are flowing, but soils are not saturated above the tiles,
- application of high volumes of liquids, and
- application to soils with excellent tilth, and many macropores.

There are some guidelines that will help prevent preferential flow occurring at the time of application.

Options for application on tile-drained soils

- **Pre-tillage**, done up to a week prior to application, is the best option because it will break the macropores in the soil and increase soil surface area for infiltration.
- An **application rate of less than 3,600 gal/ac** (40 m^3/ha) will be low enough to reduce the risk of movement to tile drains, even if pretillage has not occurred. This option is often the preference for fields where no-till is practiced. Two applications up to this rate could be applied several days apart if one low application doesn't provide all the required crop nutrients.
- **Tile drains are monitored** and appropriate action is taken if contamination occurs. Appropriate action includes stopping application, blocking outlets (for at least 72 hours) and removing contaminated water (e.g. by using a vacuum tanker)
  - A suggested monitoring schedule that observes colour (compared to preapplication) of the water discharging from the tile drainage system:
    - Once 10-20 minutes following the start of manure application, and
    - Once each hour when application rate is greater than 90 m^3 or 20,000 gallons per hour, or once for each 20,000 gallons applied up to one hour after completing application.
    - Stop application immediately if discolouration is observed and implement the contingency plan.
  - An alternative to manual monitoring could include continuous monitoring using an automated system capable of detecting contamination in tile flow, and of signalling the operator when contaminates are detected
- Apply liquid manure/organic material over a "representative" tile and observe the tile outlet for manure.
- Treat tile effluent to remove contaminant (e.g. biofilter, dispersion sandwich, retention/irrigation pond)

Options for application on shallow to bedrock soils (without tile drainage)

- No manure should be applied on or within 10 ft (3 m) of exposed bedrock. The risk of contamination in these areas is the highest.
- On soils with less than 6 inches (15 cm) of soil over bedrock, liquid manure application is not recommended. Solid manure should be applied at less than 10 ton/ac (22 t/ha) between June and September.
- On soils with 6 - 12 inches (15 to 30 cm) of soil over bedrock, liquid manure should be applied to pre-tilled soils or at low rates (<3,600 gal/ac) between June and September. Solid manure should be applied to pre-tilled soils or at rates under 20 ton/ac (45 t/ha).
- On soils with 1 - 3 feet (30 – 90 cm) of soil over bedrock, liquid manure should be applied to pre-

tilled soils or at low rates (<3,600 gal/ ac).

Options for application on shallow to groundwater soils (without tile drainage)

The most difficult aspect of liquid manure application to soils with a high water table is knowing the depth of the groundwater at the time of application. Water table depths can fluctuate significantly, depending on the season. In Ontario, the water table is usually highest in the spring or fall. Depth to water table can be assessed by:

- digging a hole in June or September and observing the depth to free water in the hole
- using soil colour features (rust spots and bluegrey colours in soil layers) and the soil drainage method to assess drainage class
- referring to a local soil map to assess drainage class (e.g. imperfect drainage would tend to indicate groundwater between 60-90 cm while poor drainage could indicate groundwater between 30-60 cm.)

Options to prevent preferential flow to groundwater include:

- No manure application should occur on soils less than 30 cm from groundwater. Generally, manure application in these conditions would leave ruts in the field.
- On sandy soils 1-2 feet (30-60 cm) from the water table, liquid manure should not be applied. Solid manure should be applied to pre-tilled soil, or at less than 20 ton/ac.
- On all other soils shallow to groundwater, liquid manure should be applied to pre-tilled soils and/ or at reduced rates. Heavy clay soils have no suggested restrictions when groundwater is greater than 30 cm from the surface.

Avoid the application of liquid manure onto wet soils or during wet weather. For example, avoid application when water is flowing from tiles and when heavy rains are forecast within 12-24 hours of spreading. Where possible, incorporate manure as quickly as possible when applying under the threat of thunderstorms. Contaminants from solid manure can reach tiles or groundwater when rainfall occurs shortly after application.

Time for Field Detective Work

by Gilles Quesnel, Field Crop Integrated Pest Management Specialist, OMAF, Kemptville

Start scouting your crops early in the season to evaluate stands and check for potential problems. Otherwise, over time the “evidence” often disappears as seeds or plants rot away, or when weeds take over. A simple windshield observation or drive-by will not do. Walk each field individually. Keep your scouting simple. Basic field scouting equipment should include a clipboard to record information, a pocket knife, plastic bags to collect specimens, a hand lens, a measuring tape, and a hula-hoop for population counts. While scouting, look for things that will affect yields, such as plant population, emergence, soil compaction, crusting, diseases, insects, weed escapes, herbicide injury etc.

Your scouting pattern must be representative of the whole field!

- Include changes in variety/hybrid, soil type, past cropping history, fertilizer/manure application and any other factors that can affect plant growth.
- Avoid scouting outside rows and headlands unless there are specific reasons for sampling these areas.
- For uniform pests, or problems for which the distribution pattern is not known (e.g. corn rootworm, stalk rots, weeds), the sampling locations should be evenly distributed across the field.
- For problems expected to occur on headlands or in outside rows (e.g. armyworm, spidermites or soil compaction), the sampling locations should be evenly distributed around the edges of the field.
- For problems expected in particular parts of a field (Phytophthora Root Rot in damp clay soils or black cutworms in weedy patches), sampling locations should be concentrated in areas where the problem or pests are most likely to be found.

To calculate plant population in row crops, count the number of plants in 1/1000 of an acre and then multiplying the count by 1000 to obtain the number of plants per acre. Table 1 below lists the row length equal to 1/1000 of an acre at various row widths.

Table 1

What's 1/1000 of an acre	
Row Width in Centimetres (inches)	**Length of Row Equal to 1/1000 Acre**
33.0 cm (15")	10.62 m (34 ft., 10 in.)
50.8 cm (20")	7.97 m (26 ft., 2 in.)
76.2 cm (30")	5.33 m (17 ft., 5 in.)
81.3 cm (32")	4.98 m (16 ft., 3 in)
91.4 cm (36")	4.42 m (14 ft., 6 in.)

To determine plant population and pest infestation levels in narrow row crops, a sampling frame with a known area can be placed on the ground for the counts. This is done using a square frame (e.g. 50 cm x 50 cm equal 0.25 m^2) or a circular frame (e.g. a Hula-hoop). The Hula-hoop method is displayed in Table 2. Using the Hula-hoop, determine the number of plants per acre by counting the number of plants found inside the hoop and multiplying that number by the predetermined factor for the diameter of your hoop, which is listed in Table 2.

Table 2

Diameter of Hoop in Centimetres (inches)	Factor by Which to Multiply the Number of Plants Within the Hoop to Equal the Number of Plants per Acre
91 cm (36")	6,221
84 cm (33")	7,301
76 cm (30")	8,925
69 cm (27")	10,820
61 cm (24")	13,852

Regardless of the method used to determine plant population and pest infestation levels, at least 10 random counts should be taken in each field to determine an average.

The starting point for diagnosing problems is to look for patterns. Look for areas where the problem occurs and where it is absent.

- Crop problems that are consistent with the topography or the soil type of the field are more likely to be soil related than caused by pests or field operations.
- Problems which are worse on one side or edge of the field are likely to be related to spray drift or to the movement of insects into the field from one side.
- Problems, which occur on isolated plants throughout a field, may relate to diseases such as root rots.
- Problem areas within a field, which have sharply defined boundaries or appear in strips, are often related to field operations. Nematodes, however, are immobile enough that the edge of a nematode-infested spot may also be very distinct.
- Problems that are concentrated in one row but do not appear in an adjacent row are usually equipment or starter fertilizer related. The distance between affected rows will provide some insight into the width of the piece of equipment involved. At times, crop patterns may also relate to old field boundaries which could be up to ten years old or more.

Still Looking For A Way To Make Cover Crops Pay

by Greg Stewart, Corn Lead, OMAF & Ken Janovicek, University of Guelph

Fall seeded cover crops can increase soil cover and perhaps add some organic matter to the soil. In some cases, they can also reduce nitrogen (N) losses from the soil profile, either by reducing leaching or gaseous losses. However, for a cover crop to be cost effective, there must be an efficient transfer of cover crop nitrogen to the succeeding corn crop.

Corn response to cover crops and manure applications was evaluated in 2004 on three sites within the OSCIA sponsored Greenhouse Gas Mitigations project. The plots were split so that multiple rates of fertilizer N could be applied. This allowed better evaluation of the N contribution of the various cover crops and manure treatments to the following corn crop.

Table 1 outlines some of the findings from one of these sites near Embro. The farm co-operator applied 0, 4,000, and 8,000 gallons of liquid dairy manure to the fall seeded cover crops of oats, oilseed radish and peas. Cover crop growth was reasonable but not outstanding during the fall of 2003.

Table 1. Summary of previous fall cover crop biomass and cover crop nitrogen content, subsequent corn yields and the estimate of fertilizer N required to economically optimize corn yield (Embro Site).

Manure Amount (gal/acre)	**Cover Crop**	**2003 Cover Crop Biomass** (lbs/acre)	**2003 Cover Crop Nitrogen** (lbs/acre)	**2004 Corn Yield (No N Fertilizer Added)** (bu/ac)	**2004 Corn Yield (N Fertilizer Added)** (bu/ac)	**Additional Fertilizer N Required to Optimize Corn Yield** (lbs N/acre)
0	**No Cover**	**-**	**-**	**119**	**145**	**106**
0	Oats	2131	42	125	150	91
0	Oilseed Radish	1723	47	105	133	74
0	Peas	1122	41	110	159	113
4000	**No Cover**	**-**	**-**	**142**	**170**	**88**
4000	Oats	2387	55	152	159	54
4000	Oilseed Radish	2182	63	147	157	75
4000	Peas	1220	47	160	165	43
8000	**No Cover**	**-**	**-**	**145**	**172**	**87**
8000	Oats	2696	72	171	171	0
8000	Oilseed Radish	2821	90	166	166	0
8000	Peas	1389	59	175	175	0

Generally, higher corn yields were observed where manure was applied during the previous year, even when relatively high rates of fertilizer (150 lbs N/ac) were applied. Corn planted following a cover crop generally responded much less to adding fertilizer N compared to the plots that had no cover crops.

At this site, there was a need for 87 to 106 lbs per acre of fertilizer N to optimize yields where a cover crop had not been established. However, cover crops reduced fertilizer N requirements to optimize corn yields by 50 to 100%, provided that the cover crop was established in conjunction with manure application.

The 2004 results showed that establishment of a cover crop can result in improved manure N use efficiency of corn planted the next year. This study also clearly demonstrates the need to make the appropriate reductions in fertilizer nitrogen application following manure application/cover crop combinations.

Did the cover crops pay?

If you look at the 4,000 gallon data, it appears you are able to give about a 30 lb/acre N credit to the role of cover crops. At $0.42/lb that is $12.60/ac. This pays for the cost of the cover crop seed, but not the pass of the no-till drill to plant them. In the 8,000 gallon data it appears that the N credit is 87 lbs/acre which would represent $36/acre. This would cover most costs and maybe leave you some net returns for your effort.

Further data will be forthcoming from this project over the coming months. However, it appears that the use of cover crops either planted prior to or immediately after manure applications may improve manure N use efficiency enough to pay their own way!

Purple Corn … Should I Worry?

by Keith Reid, Soil Fertility Specialist, OMAF

During the late 1980's, one of the seed corn dealers stated that, "The first week of June should be declared 'National Purple Corn Week!'" Purple corn seedlings do not seem to be as large a problem today. But that leads us to ask "what was happening then, what has changed now, and are we likely to see it again?"

There can be numerous triggers for purpling of corn tissue, but the process in the plant is simply an accumulation of sugars with no-where to go. Some of these sugars are converted to anthocyanin, which has a purple colour. In normal growth, the sugars are incorporated into amino acids and complex carbohydrates as the plant grows. When some stress on the plant removes or reduces this sink while photosynthesis continues, the sugars build up.

Purpling is often associated with phosphorus (P) deficiency, and it is true that this is one symptom of a severe shortage of P. It was never completely clear how much, or whether, P deficiency contributed to purple corn seedlings. We do know that root growth, and P transport through the soil to the roots, are both greatly slowed by cool conditions. Purple corn was almost always associated with a change to cool weather while the corn was in the 3-6 leaf stage. The timing also corresponded to the change-over in the plant from the primary roots, which came out of the seed, to the nodal roots that formed closer to the soil surface. If the corn growth was slowed for any reason, there was a lag in the growth of the nodal roots while the primary roots continued to die off, leaving the plant with fewer resources to absorb nutrients from the soil.

Other conditions that contributed to purpling were genetics (some hybrids that were very popular at the time showed purpling at the least stress), soil compaction that reduced root growth, insect damage, or temperature shock as a sudden change to cold weather stalled the corn growth.

The one common factor was that the purpling itself did not seem to hurt the corn yields. A few days of good growing conditions, and the crop grew out of the symptoms and never looked back from there. The exceptions, of course, were the fields where the underlying cause of the discolouration was more serious than simply backwards weather.

So what has changed that we don't see as much purpling today? The biggest change has been in the genetics used, with a move away from the lines that were most susceptible to purpling, and also breeding for improved stress tolerance in the plants. It is much more common today to hear complaints about poor colour or unthrifty corn, than about purpling. There has also been an increase in the amount of seed-placed starter fertilizer, which improves the early growth of the corn plant. So while the cause of the purpling may not have been phosphorus deficiency, the enhanced vigour of the plant helps it to out-grow the lag period. Finally, it has been a few years since we have had ideal conditions in May for early growth, followed by an extended cool spell in early June. We may see purple corn again, if the weather conditions favour it!

Target Maximum Economic Corn Production And Get Environmental Sustainability As A Bonus!

by Ian McDonald, Brian Hall and Greg Stewart, OMAF

OMAF and the University of Guelph staff, in partnership with OSCIA members, have been involved in a series of projects sponsored by the Ontario Greenhouse Gas Mitigation in Agriculture Program, funded by Agriculture and Agri-Food Canada.

The results of this research are encouraging, both agronomically and environmentally.

Maximum Economic Rate of Nitrogen (MERN)

First we must understand the concept of MERN. Targeting maximum crop yield does not maximize economic return since the cost of achieving maximum yield is often greater then the value gained. MERN takes into account the cost of nitrogen (N) and the price of corn in relation to the yield potential of a field. MERN is a single target nitrogen rate. Determining MERN requires rate response trials in corn fields. Estimating MERN requires research, on-farm trials and experience over several seasons. In any given season, the true MERN can not be determined until the end of the season when N rate strips are harvested and the MERN is calculated. But we can do a pretty good job of predicting MERN. Tools to assist with this include N-rate trials, historical yields, and the Ontario Nitrogen Calculator (www.gocorn.net).

We need to understand that not fertilizing to MERN is costing us money. Over-fertilizing increases costs without an economical increase in yield. Conversely, under-fertilizing prevents maximizing the economic yield potential of the field. Both under- and over-fertilizing has an economic cost.

Research Trials

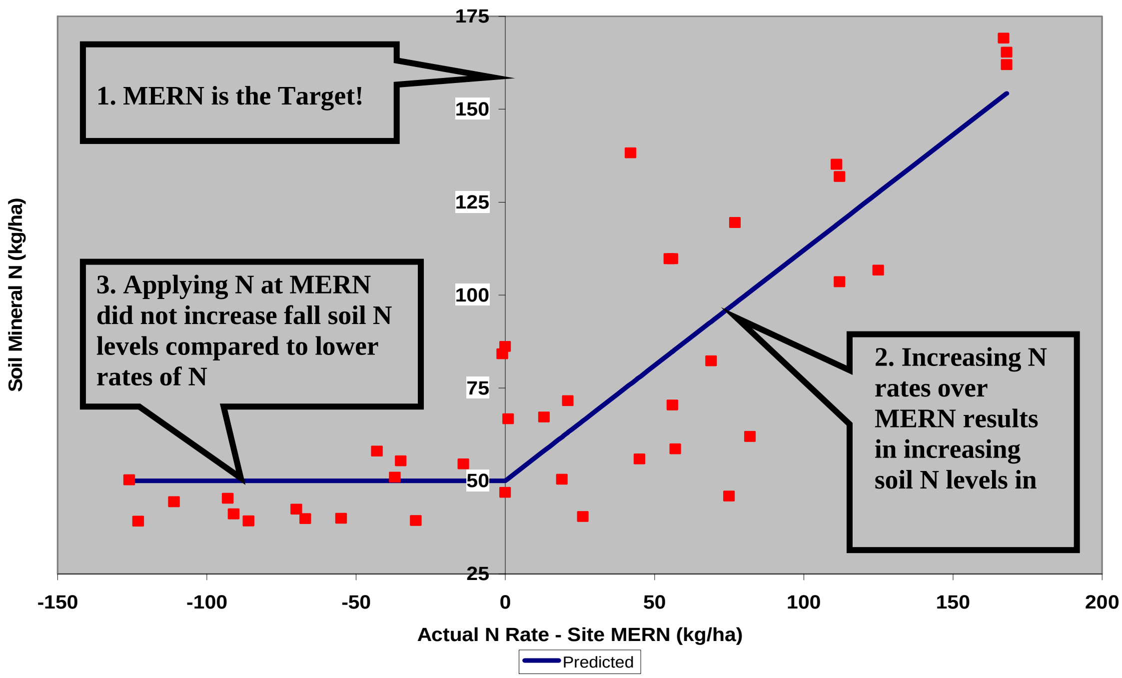
In these research trials, manure was applied as uniformly as possible. Cooperators were free to manage the application as they normally would in terms of application timing, rate and methods of application and incorporation. In the spring, 4 rates of commercial fertilizer were applied at side-dress time, at rates of 0, 50, 100 and 150 lbs of actual N per acre. Soil nitrate levels in the plots were sampled in early spring, at pre-sidedress nitrogen test time in June, and at physiological maturity. We also assessed stalk nitrate levels at harvest, and recorded crop yields and standability. Yields from the commercial rates of nitrogen were used to calculate individual field MERN's.

Figure 1 plots the fall soil nitrate levels from all the fields against the N rates above and below MERN. The dots to the left of the vertical axis were where N rates applied were below the MERN. To the right, rates of N applied were greater then the MERN.

No Environmental Advantage to Under-Fertilizing

When the N application rate was above the MERN, the fall soil nitrate levels increased with increasing N application rates above MERN. However, the soil N levels were constant at all N application rates that were at or below MERN. Although applying nitrogen levels below MERN have an economic cost, under-fertilizing the corn crop did not reduce the level of soil N concentration in the fall. This suggests that there is no environmental advantage to under-fertilizing a corn crop, even though this has been proposed as a method to reduce nitrogen losses to the environment. The data indicates that applying

Figure 1. End of season soil mineral N in the surface 30cm in relation to the amount of fertilizer nitrogen applied. A negative value indicates that fertilizer N rate applied was less than the fertilizer N rate required to economically optimize yield, and visa versa.



nitrogen to MERN has the same impact on soil N levels in fall as does applying rates of up to 150 kg/ha below MERN.

Other Advantages of MERN

Applying N to MERN has other advantages above and beyond straight economics. Since economic yield is maximized at MERN, more stover per unit N is returned for building soil structure and holding moisture. More carbon is returned to the soil, which helps to reduce greenhouse gas emissions, and less fuel and time is used per unit of yield.

Therefore we need to determine how to consistently target MERN and capture all the advantages associated with correctly predicting the MERN consistently from year to year.

Harvesting Cereals For Quality

by Scott Banks, Emerging Crop Specialist, OMAF, Kemptville

Cereal harvest is not that far away. The winter wheat crop is well into pollination in the south-western part of the province. Current high temperatures and dry weather stress have greatly increased the speed of crop development, and it is ahead of normal this year. Spring cereals were seeded 1 to 2 weeks earlier than normal in many areas. This means that cereals will be ready to harvest 1 to 2 weeks earlier than normal. Grower experience and research shows that cereal quality can drop as harvest is delayed past 13-14% grain moisture. The micro-organisms that cause weathering and quality decline flourish under cool, moist conditions. Timely harvest is important to maintain a food grade quality product.

Quality Factors & Downgrading

Mildew can be a problem in spring wheat if harvest is delayed due to rain, and can result in discounting due to downgrading. There are several other quality factors that can be negatively affected by delayed harvest. “Falling number” is a quality factor measured by the millers when they receive wheat from elevators or directly from growers. Research done by the University of Guelph and C&M Seeds showed that a decline in falling number can happen as harvest is delayed. The rate of decline varies depending on variety. Sprouting (chitting) or fusarium can result in downgrading of both wheat and malting barley. Sprouting is the result of moisture and delayed harvesting. Fusarium and DON levels can also continue to increase with delayed harvest.

Premium Oat Markets

For the premium quality oat horse and milling markets, weathering or discolouration prior to harvest is a major issue. The horse market demands a white, bright oat, with no discolouration. The milling market requires an oat with no discolouration of the groat (the core of the grain beneath the hulls). Oats that have dark tips on the hulls are not acceptable for the horse markets, but may be acceptable for milling if the groats are not discoloured. Research by John Rowsell at the New Liskeard Agriculture Research Station found that colour, whiteness and brightness begins to deteriorate with delayed oat harvest. The rate of weathering and discolouration is greater when swathed than with direct harvest. Using a fungicide did not affect the amount of weathering.

If the harvest weather looks to be unfavourable, you are better to harvest grain when it reaches 16% moisture and artificially dry it down to 13-14%, than to wait for it to dry in the field and risk weathering damage. Grain at 13-14% moisture will maintain its food quality and make it safe for storage. The $5 to $10 per tonne drying charge can be easily lost if harvest is delayed and this results in lower grades.

Integrated Weed Management - The Book

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

<u>Integrated Weed Management: “One Year’s Seeding…</u>” is the name of a new publication from Michigan State University Extension. Written by Dale Mutch and Karen Renner, this 112 page book is available for $10US. IWM has been around for the past 20 years as a name for many of the management tools of how to manage weeds effectively. A good understanding of weeds can save you money on herbicides and increase your yields.

Some ideas from the book:

- "Successful weed management is achieved by managing weeds at each stage in their life"
- Chart showing the number of weeds seeds per plant for 20 species of broadleaf weeds. Pigweed and lamb's-quarters are among the top annuals.
- Chart showing how long weed seeds last in soil. Lamb's-quarters and velvetleaf last the longest.
- Using Growing Degree Days to predict emergence of some weed species.
- Injecting manure will increase the ability of crops to compete with weeds.
- Ensiling will kill most weed seeds within 4 weeks. Digestion (in a cow) and storage in manure can reduce weed seed viability but many weed seeds survive. Composting manure for 3 days at 130°F kills most weed seeds.
- Factors influencing a crop's critical weed free period
- Information on mechanical weed control and various implements
- Biological weed management.
- "Prevention is a critical component of weed management in all cropping systems"
- The "dirty dozen" profiles of common weeds.

This book is a must for farmers who want to be in control of their weeds. There are many ideas for organic and conventional farmers alike. It is part of a series from MSUE – Michigan Field Crop Ecology and Management and Michigan Field Crop Pest Ecology and Management. All are excellent books and available from MSUE at www.emdc.msue.msu.edu