Prairie Steward

Farming For Your Future Environment

The Newsletter of the Saskatchewan Soil Conservation Association Inc. Winter Issue No. 40, 2004

Seeding Rates Revisited

By Eric Oliver, PAg
Conservation Agrologist

A few issues ago I wrote an article on pesticide free production (PFP), that is, not using pesticides on the crop during the growing season. Fertilizer and a pre-seeding application of Roundup may be applied, but no in-crop herbicide or residual herbicides can be used. There is hope that a market will develop for this product that, although it is not organic, does offer the consumer another option and provide the producer more flexibility. Weed control is attained with higher seeding rates and crop canopy. Even though a premium price would make pesticide free production much more attractive, let's look at this option, even without a premium price. Can this still save the producer money at the end of the day?

60 lbs/ac seeding rate with wheat, Shaunavon, 2003.

Wheatland Conservation Area continued the Pesticide Free Production Study this past year at Swift Current. I conducted a similar study at Shaunavon and Garry Noble established a field scale test at his farm near Mossbank. The Swift Current study looked at wheat, flax and field peas with two seeding rates, with one rate being 20% higher than the standard seeding rate. The high seeding rate treatments had no in-crop herbicides applied, but the regular seeding rate had an in-crop herbicide treatment as normal. At Shaunavon, only wheat and peas were used. The wheat received four seeding rates with the wheat (60, 90, 120 and 150 lbs / ac) while the peas received five (120, 150, 180, 210, and 240 lbs / ac). In addition, the wheat treatments were seeded with both a sideband opener and a three inch spread tip opener. As at the Swift Current site, only the 60 and 90 lb / ac seeding rates for wheat and the 120, 150 and 180 lb / ac seeding rates for peas had in-crop herbicide treatments. At Mossbank, the seeding rates for the wheat were the same as at Shaunavon. These treatments were seeded with 2.75 inch spoons and all treat-

120 lbs/ac seeding rate with wheat, Shaunavon, 2003.

CONTINUED PAGE 14

A brief look at 2003

By Blair McClinton, PAg
SSCA Executive Manager

2003 is finally over and it certainly was an eventful year both in the agriculture industry and for SSCA. Certainly the BSE problem was the story of the year and its impacts will be felt for sometime to come. Fortunately, with the strong fall calf prices, the impact this fall was not as bad many feared. However, there are still many concerns to address before we can put this issue behind us.

This was also a year of change for SSCA. Our three-year funding agreement with the Saskatchewan government ended in March. While we had high hopes that a new funding agreement could be reached, between the fallout of BSE and the provincial election, nothing concrete was reached. While the province has indicated that they do value SSCA's services and efforts to promote more sustainable farming in Saskatchewan, it is still not clear if this will translate into new funding. We are still hoping that something can be worked out now the new provincial administration is in place.

2003 was the final year of our funding agreement with Monsanto Canada. At the time of writing, no new arrangement is in place. For the past ten years, Monsanto has been a major supporter of SSCA's programs to increase direct seeding adoption. It is not clear if this relationship will continue and to what level. Monsanto has recently restructured again to refocus its efforts on its seed technology.

2003 was the first year of the Greenhouse Gas Mitigation Program for Canadian Agriculture. SSCA is coordinating the soil and nutrient management component in Saskatchewan. Over the past year, SSCA staff setup 31 demonstration sites throughout the province showing a variety of best management practices to sequester carbon or reduce GHG emissions. We are currently developing a series of factsheets on various BMPs.

"Over the past year, SSCA staff setup 31 demonstration sites throughout the province showing a variety of best management practices to sequester carbon or reduce GHG emissions."

On the policy side, SSCA has continued to play a lead role in developing new policy to maximize the benefits of agriculture soil sinks. During the national offset trading consultations, SSCA made a concerted effort to ensure there was consensus in the agriculture industry on this issue. Our efforts to build consensus were successful and we avoided the divisions that often take place in our sector. We have also traveled to Ottawa to make our case directly to several cabinet ministers and civil servants working on this issue.

The Canadian Food Inspection Agency has also consulted SSCA on the potential impact of Roundup-Ready Wheat on direct seeding and other soil conservation practices. That SSCA was the only farm organization asked to present at an internal CFIA workshop on herbicide tolerant crops speaks to our credibility, not only with producers, but with policy-makers and the agriculture industry as a whole.

And finally, one of the biggest highlights for me personally was when the Saskatchewan Institute of Agrologists honoured SSCA with the AGEX award for our contributions to Saskatchewan agriculture through our extension efforts.

Best wishes in 2004.

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President's Message: SSCA Continues its Work on the Carbon Issue

By John Clair
SSCA President

This is a very interesting time to be involved in the SSCA. On behalf of our membership we continue on the offensive on the Soil Carbon issue. Again, thanks to John Bennett, a past President of SSCA and producer from Biggar, we are the farm voice on carbon sink policy. John continues in the role of Carbon Policy Advisor to the Board. In my last report I mentioned turning our focus to the Ottawa scene. SSCA believes that the Kyoto Accord will be ratified or Canada will adopt equivalent rules. In June, we worked with the Soil Conservation Council of Canada and APAS to put our policy on Carbon Sinks in front of policy makers in Ottawa. We were successful in meeting with the Minister of Agriculture and Agrifood, Hon. Lyle Vanclief as well as one other Cabinet Minister and two senior policy advisers for two Ministers directly linked to forming our future carbon sink policy. We also held additional meetings with people working on the policy details. The opportunity to meet face to face with these policy makers gave us a chance to put the farmer point of view directly in their hands and answer any questions or concerns they might have if they were to take direction from us. All parties showed keen interest in our proposal.

Timing isn't always perfect and sometimes good luck looks like good management but when we were in Ottawa, the Federal Government released an Offset Discussion Paper. We were able to directly ask questions of the authors of this document . This helped us understand how Ottawa views agriculture's role in cleaning up the environment.

SSCA is very straight forward in its guiding principles for carbon sink policy. Those principles include

· Ownership – the landowner must own the carbon credits and the maintenance of these credits is the key component.

> "Treat agriculture fairly and it will be a huge part of the solution."

· Simple, Fair and Equitable

· Return value to the farmgate

· Single Pool – All carbon credits are treated the same regardless of when they were created (1990 forward)

· Temporary Emission Reduction Credit (TERC) – We are recommending leasing credits for a specified time period rather than selling credits.

· Minimum Liability – TERC reduces the farmer's liability especially when the lease contract is for something the farmer has already done in the past.

· Atmospheric Integrity- we want large industrial emitters to clean up their act and on the farm side if something forces us to change our farming operation and carbon is released, then our payments would end as well.

One of the key points in Canada meeting its commitment under the Kyoto Accord is very simplily put: **treat agriculture fairly and it will be a huge part of the solution**. We expect further developments from Ottawa in the form of another discussion paper early in the new year. We will be analyzing and responding to it.

Looking forward, our plans for this winter season include continued discussions at farmer meetings and working with farm organizations to continue to represent the farmer point of view as policy is written. We will do our best to get fair treatment for farmers by meeting and discussing our suggestions and concerns with both Federal and Provincial governments.. From a farmer perspective, we want to have a positive impact on the final policy adopted by the Federal Government. We respectfully request your continued support as SSCA works on your behalf. ●

REQUEST FOR SUBMISSIONS

Do you have ideas or comments on the conservation of our land resource? We would like to print them in future issues of the Prairie Steward. Pertinant photographs would be appreciated. Please forward to:

The Prairie Steward

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Nitrogen Split Application – A Producer Profile

By Richard Szwydky, PAg
Conservation Agrologist

Ron and Judy Leonard of Harris, Saskatchewan have been split applying all their crops' nitrogen requirements since 2000. They farm 7000 acres with Ron's brother Blair and sister-in-law Rhonda in the dry, dark brown soil zone, and consider nitrogen split application as a risk management tool in their dryland operation.

Prior to splitting their crops' nitrogen needs, Ron and his brother felt uneasy about spending all their fertilizer dollars before or at the time of seeding. Rainfall was becoming more unpredictable, and they were not seeing consistent yields applying all their fertilizer in the early spring. They direct seed with a Bourgault 5710 air drill on a 7 inch row spacing, and were limited in how much nitrogen they could place with the seed. They use two sets of openers – a 3/4 inch knife opener for cereals and pulses, and a 2-1/2 inch spoon for canola. Although the wider spoon allowed them to get more seed placed fertilizer down, banding operations in the late fall or early spring were required to get adequate nitrogen requirements in the soil. They decided that banding prior to seeding was not the answer. It was an extra operation that dried out the soil to the point it crusted and inhibited germination, especially with canola.

The Leonards needed another technique to address their crops' nitrogen requirements. They wanted to reduce the risk of placing all their fertilizer dollars into sometimes drier spring soil, and utilize nitrogen fertilizer more efficiently. At this point, they decided to investigate split applying the crops' remaining nitrogen needs post emergent. The Leonards soon learned that the success of this system depends on two critical factors – early application of the nitrogen and post application precipitation soon after. While split applying nitrogen is a risk management tool, particularly in drier areas, it carries with it a high degree of risk.

To date on the Leonard farm, approximately 5000 acres (all the cereal and canola acres) receive the second application of nitrogen within a couple of weeks after emergence. They try to time the second application when o the cereals are at the three leaf stage, while the canola receives the second application prior to bolting. Ron bases the amount of nitrogen he split applies on a soil test. Generally, he places 15 to 20 lbs of actual starter nitrogen, as well as the other required nutrients, with the seed. The amount of nitrogen applied post emergent is based on an evaluation of the current crop and moisture conditions. If yield potential is high, then greater amounts of nitrogen are applied - and vice versa. Ron says since beginning split application, he has improved yields up to 20% and increased protein concentrations by as much as a (full? From 11.5 to 12.5 percentage point. He also feels more confident that his fertilizer dollars are being utilized more efficiently.

Ron Leonard standing in front of his Case IH SPX 3150 high clearance sprayer.

The system developed by the Leonards to apply liquid UAN to their crops is relatively simple. A Case IH high clearance sprayer with an 800 US gallon tank is used to apply both liquid fertilizer and post emergent pesticides in a tight season. For spraying the post emergent pesticides, they use the factory built booms that came with the sprayer. To apply the UAN(28-0-0), they designed a home-built boom system with single orifice nozzles spaced on 12 inch centres. To change the boom systems, it takes Ron and his brother approximately 10 minutes to remove a couple of pins, replace the booms and tighten connections. The total cost of the materials to build the complete boom was approximately $850 . The single orifice nozzles were included in this price, however Ron states that each individual nozzle cost approximately $5.

To deliver UAN to the field, the Leonards have a truck with a 1300 imperial gallon poly tank that nurses the liquid fertilizer from a 14,000 gallon hopper bin inthe yard. Because the plumbing from the bin to the truck into the high clearance sprayer is comprised of two inch stainless steel, the liquid transfer is relatively quick and limits downtime from filling. Depending on the rate of UAN application, Ron says it usually takes 30 minutes to empty the sprayer tank. On a good day, it is not uncommon for the Leonards to apply nitrogen to1000 acres. Having a GPS system in the sprayer cab allows them to spray at night, which results in coverage of extra acres per day.

The nozzles are designed to apply a single stream of UAN on 12 inch spacing. Leaf burn is not an issue for two reasons. First, by applying the

Green House Gas Mitigation and Soil Health

By Travis Goebel, PAg
Conservation Agrologist

Scientists around the world have reached the consensus that human activities are having a direct impact on the global climate. Estimations are that our agricultural industry contributes 10% of Canada's greenhouse gas (GHG) emissions. It is because of this, and other forces driving environmentally sound stewardship, that federal funding was put into place to launch the Greenhouse Gas Mitigation Project. Conservation groups such as the Saskatchewan Soil Conservation Association (SSCA), AAFC and other partners will deliver the program. The program has identified a number of Best Management Practices (BMPs) in the areas of soil, nutrient, and livestock management that will help decrease GHG emissions.

The GHG Mitigation Project goals are to inform producers of the environmental benefits of using these BMPs. These BMPs will decrease atmospheric CH_4, CO_2, N_2 and N_2O gas through improved fertilizer formulations, improved fertilizer application methods and timing, improved livestock feeding and manure handling systems, and soil management practices.

Plants capture carbon dioxide from the atmosphere through photosynthesis and return oxygen and a portion of the CO_2 back into the air. Through photosynthetic activity, the carbon is

chemically bound in organic molecules in the plant. Plant matter is basically carbon chains of protein, amino acids, and carbohydrates. There is stable organic matter and active organic matter. Stable organic matter is well-decomposed plant material that forms humus; it is a dark brown porous, spongy material with a pleasant earthy smell. The active fraction of organic matter is

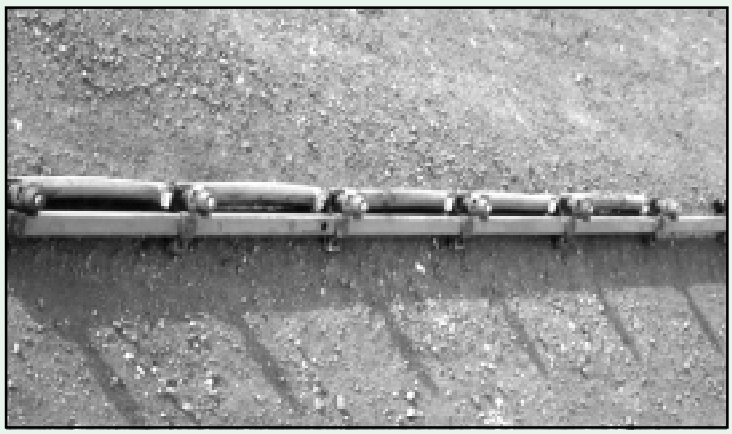
CONTINUED PAGE 9

NITROGEN SPLIT APPLICATION ... CONTINUED

UAN early enough (i.e. before the crop canopy fills in), the product hits the ground rather than the plants. Second, if the UAN stream does hit the plant, the product is heavy enough and usually rolls off the leaf surface and onto the ground. The sprayer usually applies the product at a pressure of 60 to 70 pounds. Ron says he is more concerned about the high-pressure stream cutting off plant foliage than leaf burn. With regards to the12-inch nozzle spacing, Ron has not noticed any crop variability from nozzle row to nozzle row. He says one of the keys to success of this system is to get rainfall shortly afterwards - to help move the nitrogen from the surface into the rooting zone for plant uptake.

The Leonards usually apply 50,000 gallons of UAN post emergent in a season. Their local ag retailer has no problem supplying the product at this time of year. The product is usually loaded at the manufacturing plant onto B-trains and delivered directly to the hopper bin on the yard. The Leonards reduce downtime by maintaining good communication with the dealer to ensure the hopper bin is always full of product.

Along with regularly spraying the 7000 acres of in-crop herbicides and applying insecticides when needed, the Leonards high clearance sprayer is the most utilized piece of equipment on their farm. They hire an employee to help with the daily operations, and use post emergent herbicides with wider windows of application to help spread out the workload. Timing is critical to the success of this system. To stay on top of things, they scout fields to determine leaf staging and decide when application is necessary.



Ron's home built booms featuring single orifice nozzles on 12 inch spacing.

The Leonards plan to continue their practice of split application in their LDS operation. "Spring seeding is usually facilitated because we do not have to handle as much fertilizer nitrogen when filling the drills," explained Ron. This allows the Leonards to reduce their downtime during this busy season allowing them to seed more acres in a day. Ron also states that they can better manage their crops' nitrogen requirements, thereby reducing the impact of escalating nitrogen costs. He says the success of this system is enhanced by a proper setup and a producer's commitment to stay on top of things. "Early application is critical to maximizing yields, and any significant downtime could mean missing the window of opportunity", said Ron. ●

Cereal Response to Nitrogen on Pulse and Cereal Stubbles in the Brown Soil Zone

By Brian Nybo PAg
Farm Manager
Wheatlands Conservation Area

Background and objectives of study

With the move towards direct seeding on the prairies, producers have been diversifying into many different crops for additional rotational options. Since cereal crops have dominated acres on the prairies, it is important to know how they interact when grown in rotation with a variety of other crops. Disease, weed, and pest cycle along with nutrient management, soil conservation, equipment capabilities and other logistics must be considered. The objective of this study is to evaluate cereal response to increasing rates of nitrogen on various stubble types to maximize yield, quality, and profit.

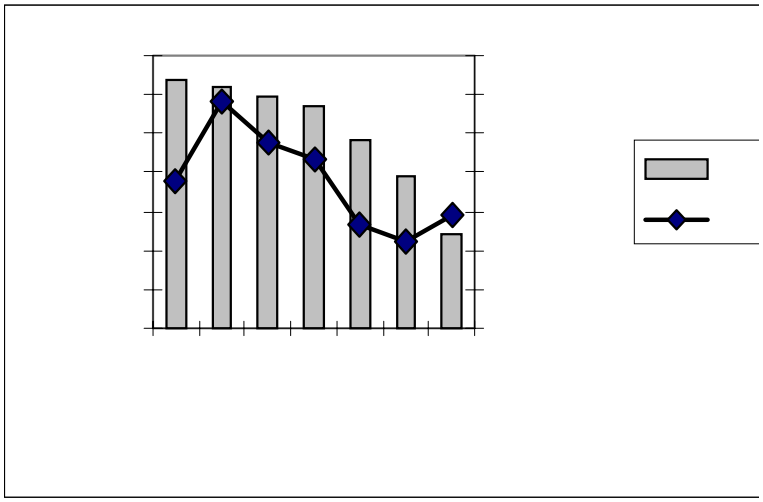


Figure 1: Durum Yields and Protein on Various Stubbles, Wheatland Conservation Area, Swift Current, SK, 1998-2002.

Study description

The study was conducted at Swift Current, Saskatchewan from1998 - 2002 . The trial consisted of seven stubbles (chickpea, pea, lentil, fenugreek, durum, oriental mustard, coriander) and replicated three times. Kyle durum was seeded at 80 lbs / ac, and Harrington barley was seeded at 80 lbs / ac into the seven different stubbles with three different rates of nitrogen. The three different rates of actual nitrogen are, high rate 70 lbs / ac, medium rate 45 lbs / ac, low rate 30 lbs / ac. The 45 lbs / ac rate is an average soil test recommended level. The crop was seeded using a Flexi-Coil 5000 air drill with double shoot stealth openers. The fertilizer was placed down the point of the openers. The main study parameters were grain yield and protein.

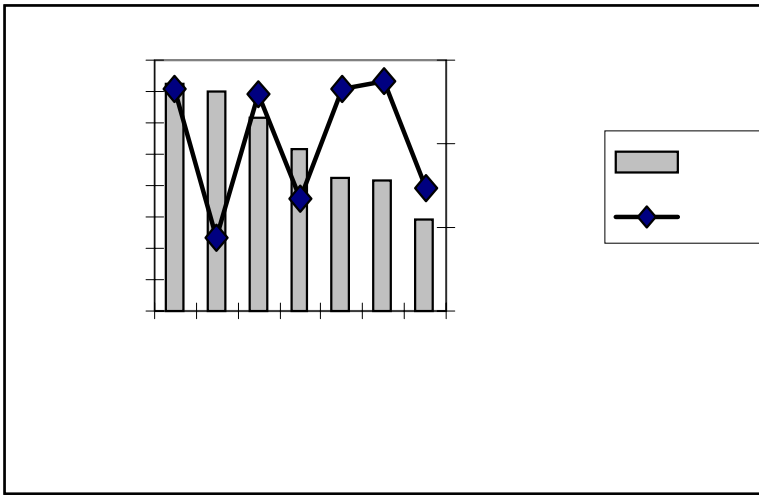


Figure 2: Barley Yields and Protein on Various Stubbles, Wheatland Conservation Area, Swift Current, SK, 1998-2002.

Results and conclusions

Moisture conditions were generally adequate for all five years of the study, with the exception of 2001. In all stubbles, both durum and barley showed a significant yield advantage to increasing rates of nitrogen. In addition, using higher levels of nitrogen on pulse stubbles seems to have greater benefit than using extra fertilizer on cereal stubbles. This may be an indirect result of a break in disease, weed, and pest cycles along with additional moisture in the pulse stubbles. Both the durum and barley crops responded best to chickpea stubble. In general, durum responded favourably to pulse stubbles when compared to cereal stubbles, as they were able to take advantage of extra moisture and nitrogen fixing benefits of the previous year's pulse (Figure 1). When observing yield and protein, durum on lentil stubble proved to have the most consistent advantage. The barley was included in the test for the last two years only, one better than average precipitation years and one dry year. In the two years of the study looking at barley, we were unable to see a yield response to pulse stubbles verses cereal stubble. We did, however, see a protein response, with cereal stubbles showing evidence of lower proteins compared to pulse stubbles (Figure 2). Lower proteins would be beneficial to growers interested in malting barley. ●

Foxtail Barley Spreads Northward

By Garry Mayerle, PAg
Conservation Agrologist

Another troublesome pest advances northward in the wake of the drier weather conditions of the last few years. It is foxtail barley, a plant which "likes" low disturbance production systems. Low disturbance seeders keep this weed at bay by dealing with it before it becomes an infestation.

Foxtail barley, sometimes known as wild barley, should not be mixed up with green and yellow foxtail which are different weeds altogether. Foxtail barley is a short-lived perennial plant with a shallow fiborous root system. It is a bunch grass with a very tufted appearance and usually grows 1 to 2 feet tall. The plant has greyish green slender leaves and as the head emerges, it is green and densely-awned with a slight pinkish tinge some photographers find appealing. It is a prolific seed producer. Each seed is produced in a segment with 7 awns with upward pointing barbs which are easily blown about by wind or become embedded in the hide of passing animals. For the livestock producer, it is a dangerous weed because these awns can become embedded in an animal's face and mouth causing irritation and abscesses.

Foxtail barley seedling. Photo courtesy of Alberta Agriculture, Food and Rural Development

The seeds can germinate in the cooler temperatures of fall or early spring. They maintain their viability for about 3 years and tend to germinate near or on the soil surface. Foxtail barley is a very opportunistic and competitive plant and has taken advantage of less crop competition in the drier conditions of the north part of the province the last few years. It can also tolerate some salinity. Winter cereal growers need to be aware that foxtail barley has an especially good fit with the growth cycle of winter cereals. All producers must be diligent to keep plants and small patches from becoming major infestations or they may have to revert to some tillage for control.

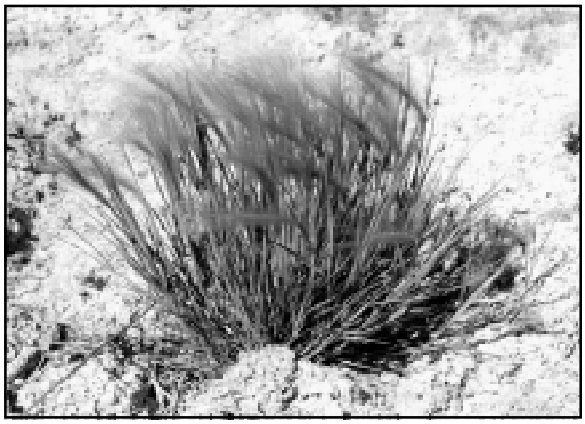
Under conventional tillage systems of the past, this weed was not a concern because it is very susceptible to tillage. Even direct seeders may find the judicious use of tillage the best way to control major infestations. Researchers at Swift Current have suggested that tillage every 2 to 3 years may be an economical way to control foxtail barley.

Fortunately, when there is sufficient moisture to grow competitive crops, there are several options for controlling foxtail barley that with due diligence should be good enough to keep from having to drag out the cultivator. One way to decrease the competitive advantage of foxtail barley is to precision place N fertilizer. Dr. R. Blackshaw, an Agriculture Canada weed scientist at Lethbridge, and his research team have carried out some good research on foxtail barley. They found that 3 out of 5 years, they reduced foxtail barley production when mid row banding N as compared to broadcasting. He and other scientists also suggest that increasing seeding rate can increase the competitive advantage of the crop.

When it comes to using herbicides against foxtail barley, be sure to control the seedlings. A 0.5 L / ac of Round-up, spring burn-off should take care of all those early germinating seedlings and most that start in the fall if they are shorter than about 3 inches. For any that start after this burn-off, Blackshaw's team has shown that Assure has very good activity on foxtail barley even up to the 2–3 tiller stage. Poast is ok at the 3–4 leaf stage. Select gave suppression at this stage. In cereal crops options are more limited with only Sundance giving quite good control in spring wheat.

The spring burn-off rate will kill very few established plants. Fall will be the best time to attack this growth stage. Blackshaw did not find any scientifically significant difference between pre and post harvest applications although the trend was for better control with post harvest applications. Practical experience for many has shown that the actual time of application is not as important as whether or not the plant is stressed. Plants need to be growing actively enough to take in the Round-up and get it down into the roots. There must be green growth there for this to happen and it must be above 10°C. If fall moisture conditions are dry, the leaves of foxtail barley become very dry and will not take in much Round-up.

Blackshaw summarizes his work by saying that the way to manage foxtail barley without tillage is over 2 growing seasons. Start off with 1L / ac of Round-up during active plant growth in the fall. He adds that they found that using ammonium sulfate at 2% may increase control when conditions are not quite ideal as is often the case in fall. Control the seedlings the following spring as discussed earlier in this article. If there are some mature plants that have still survived to the next fall, use another 1 L / ac of Round-up under good growing conditions to complete the job. ●



Mature foxtail barley plant. Photo courtesy of Alberta Agriculture, Food and Rural Development.

Farming with Cattle

By David Larsen, PAg
Conservation Agrologist

"Sustainable agriculture" is a phrase with many meanings to many people. In its most rudimentary form, it can mean having enough money to continue farming. Other conservation minded producers expand this definition to include farming in a manner that will maintain or improve the productivity of the soil. However, not many farming systems are internally sustainable. Most farms rely on large amounts of energy and power to make them sustainable.

Blain Hjertaas, a farmer in the Wauchope area (southwest of Redvers), can be described as a minimalist in his approach to farming. He has adapted a sustainable agricultural system that minimizes the need for inputs, mechanization and physical labour. Blain operates an intensive rotational grazing system. To manage 176 head on his 320 acres he has a skid steel loader, a good pair of walking boots and an understanding of how an ecosystem works.

In the late 90's, Blain was facing the challenge of establishing a viable farming operation while adhering to his conservation principles. Despite getting into direct seeding in the late 70's, Blain was not happy with the organic matter content after 90 years of mechanized agriculture. He wanted a sustainable way to restore the condition of his soil to conditions prior to cultivation.

As an avid naturalist, Blain also had an interest in improving the ecosystem of his farm. The rolling landscape and potholes on his farm had benefits for wildlife, but was not conducive to grain farming. For every obstacle the equipment has to go around, the cost of grain production increases. Removing and landscaping of sloughs was an expensive option that did not sit well with Blain's ecological approach to land management. Cattle, like any other animal, require food and shelter. Sloughs provide a cheap and effective shelter. Blain also sees the sloughs as a cheap food source. He sees the foraging potential of sloughs as equivalent to other areas.

Since his conversion to forage crops, Blain has seen an increased diversity in wildlife. For the first time since he was a child, Blain has seen a Bobolink. This jay-like bird seems to indicate an improved ecosystem.

Establishing a sustainable system had an economic, as well as an environmental, appeal. The fall of the Crow Benefit hit the southeast corner particularly hard. Low commodity prices were further depressed by high freight rates while input prices remained high. Energy costs were expected to increase while commodity prices were not. Exporting low value commodities from his land while importing expensive nutrients did not make economic sense.

Blain beside part of the 53 miles of electric fence.

Blain's objective is to produce protein at the lowest cost possible while maintaining herd quality and increasing the health of his soil and the ecosystem. He accomplishes this by utilizing the ecosystem in a manner closest to its naturally adapted state. Mimicking grazing and land use patterns of the bison reproduces an ecosystem similar to pre-agricultural times. Bison were nomadic animals. They came in to an area, grazed hard and moved on. Cattle can replicate this grazing system with managed intensive grazing.

The half section is divided into 26 paddocks ranging in size from 8-15 acres. Blain uses electric fence to separate the paddocks and create the pathways to the watering area. The paddocks are a combination of a forage grass species (crested wheatgrass, meadow bromegrass or tall fescue) along with a legume (alfalfa or cicer milkvetch). Blain found the inclusion of legumes was an integral part of a forage stand. He attempts to get 30%+ of his stand in alfalfa or another legume. The reduced uniformity of the stand as a result of the mixed composition is irrelevant because the grazing time of the animals is controlled. Utilization will be uniform, regardless of the stand uniformity.

Blain's grazing plan is predetermined. He grazes the paddocks based on forage composition, previous grazing histories, and rest periods. Precipitation and other factors allowing, Blain grazes from May to December. Extenuating circumstances such as a dry fall and grasshoppers will create a need to implement other strategies.

In early spring, once things start to green up, the animals are released onto the paddocks. The cattle are rotated onto new paddocks based on plant growth. Early in the spring, while the growth rate is still low, the animals are rotated frequently. Graz-

FARMING WITH CATTLE ... CONTINUED

ing too heavily at this time of the year will decrease production later in the season. Blain must ensure that enough residue is left to maintain the viability of his stand. Residual material is the lifeblood of his system. If the above ground biomass is reduced too much, regeneration of the stand will come from the root carbohydrates. Insufficient plant residue will not return sufficient nutrients to the roots. Nutrients from the plant residue are needed to create proper nutrient cycling. While short-term production may not be affected, stand health will diminish in the long term. This means monitoring the paddock daily or even twice a day to determine if the residue remaining is sufficient.

Managing the system to create natural nutrient cycling eliminates the need for fertilizers. Nutrient cycling is achieved through forage crop selection, controlled grazing and the feces and urine of the cattle. Blain has a rough formula of take half, leave half. Even when the paddocks are in peak production, cattle will be rotated off a stand with a lot of material remaining. At this time of the year, animals cannot keep up to the production. Most paddocks get grazed twice a year, however some paddocks are grazed a third time if precipitation is adequate. Some paddocks are rested for the whole season.

Rest is the other key variable to maintaining the health of his stand. What happens below ground is as important as what happens above ground. Resting the stand allows for root development and carbohydrate buildup. These reserves will extend the viability of a stand.

Grasshoppers and drought created a need to adopt alternate plans to feed his animals without overgrazing his farm. Blain rented a nearby stubble field to stubble graze his animals this fall. There were grazing days left on his pasture, but he felt the residue was more important and valuable than a few weeks of grazing. He estimates half of this year's production went to grasshoppers.

Grazing strategies for soil improvement is not restricted to rotational grazing. Blain implements swath grazing and bale grazing to feed his cattle throughout the winter. Cattle are fed on swaths for the first part of the winter. A cereal crop is often used for this purpose. Later in the winter, when the snow gets deeper and swath grazing is less effective, Blain moves the cattle onto bales. Access to both the swaths and bales are controlled by electric fence.

The bales are stacked on a portion of the field with low organic matter. The residue left from the bales greatly increases the organic matter in the area where they are stacked. At first Blain rented some heavy harrows to disperse the residue piles. While effective, he thought that this was an unnecessary expense and experimented with leaving the residue untouched. The residue suppressed early growth the following year, but later in the season growth was visibly higher where the bales were stacked. The residue piles were decomposed and inconspicuous by the end of the first year.

By implementing an intensive grazing system with proper utilization and rest periods the Hjertaas farm is building the soil and improving the ecosystem with a minimal amount of mechanization, physical labour or capital. With a closely managed system, Blain can create a sustainable system maximizing the inherent benefits of the region and environment. ●

GREENHOUSE GASS MITIGATION AND SOIL HEALTH ... CONTINUED FROM PAGE 5

readily decomposed plant litter, roots, and dead organisms. Soil organic matter typically contains 50% carbon, 40% oxygen, and 5% hydrogen. This transformation of carbon dioxide to stable carbon in the soil is termed carbon sequestration or carbon sinks. A soil management BMP is a practice that will enhance carbon sequestration and reduce other GHG emissions. Decreasing or eliminating tillage is an example of a BMP that enhances the soil's ability to retain carbon.

The GHG mitigation project is designed to show the benefits of proper manure, fertilizer, and soil management that lead to increased nutrient use efficiency, lower production costs, improved soil quality, and increased soil organic carbon. Improved soil quality will lead toward more productive soil with higher returns.

The SSCA is mainly concerned with actions involving fertilizer use efficiency (FUE) and soil management. The main fertilizer concern is nitrogen, as it is at the most risk to loss, used in the highest quantity, and the losses are very harmful GHGs. Currently research is being conducted on different formulations of polymer-coated urea. The polymer coating increases FUE by making the urea available, as the plant needs it. Polymer coated urea or addition of urease inhibitors such as Agrotain helps reduce losses from volatilization, leaching and denitrification. Polymer coated urea is basically urea with a polymer coat that allows slow release of urea through the coating. The thicker the coat, the longer the urea is "stored" in the capsule. The release is also partly dependent on the soil moisture conditions. As long as fertilizer is in the urea form and not exposed to the soil, it is not transformed into nitrate, ammonium, or ammonia which is more susceptible to loss than urea. The high price for polymer-coated urea is the main barrier to the use of this product.

The use of nitrification inhibitors is a novel alternative approach to the problem of reducing nitrate losses and increasing the efficiency with which nitrogen fertilizers can be utilized by crops. Agrotain is a nitrification inhibitor that shows great potential for decreasing fertilizer nitrogen losses. It is a urease inhibitor that can be used to treat urea or UAN (urea ammonium nitrate). Urease is a natural enzyme in

CONTINUED PAGE 11

How Do Shelterbelts Fit with Direct Seeding?

By Juanita Polegi, PAg
Assistant Manager

For people who wish to visit the Jedburgh Branch Office of the SSCA, there are a number of ways to get there but choosing the roads from either the south or the north will offer the most interesting drive. It's along those roads that you will see some direct seeded fields with shelterbelts. This is not a common site in the Yorkton area as there are still many farmers who hold to the belief that "there ain't no such thing as a good tree". So why, I wonder, do these farmers continue to "put up" with trees now that they are direct seeders.

John & Debbie Makowetski live south-east of Jedburgh and north of Hwy #52. They planted their first field shelterbelt in 1993, through the Save Our Soils program. At that time, they were hoping to control wind erosion. The shelterbelt runs east-west. "The field those trees went into is rolling and has a gravel and sand surface", explained John. "When the road was built, the prevailing NW wind was blowing the soil off the knolls so erosion was becoming a real problem". They planted a second shelterbelt, running north-south, on their own in 1995.

In 1997, John & Debbie first tried direct seeding on a few acres. In '98 half the farm was conventionally seeded while the other half was direct seeded. In '99, the entire farm was direct seeded. The standing stubble now protects the soil from the forces of the wind so why keep the shelterbelts?

John & Debbie have several reasons for keeping the trees. Snow trap is the first. The Makowetskis benefit from the extra moisture from the snow in 2 ways. "Firstly, we see that the crop is always heavier for a good 100m out into the field", said John. "And the snow melt runs into a slough on the east end of the field, helping to keep up the water table".

Both John & Debbie like the shelterbelt for its eye appeal. The Makowetskis selected a number of tree species for their belt including ash, spruce, choke cherry, saskatoon and lilac. Debbie said "The trees look so nice all year long".

John & Debbie both enjoy watching the wildlife that visit the trees. John has been a member of the Sask. Wildlife Federation for over 30 years so he is very knowledgeable about the many species of birds and animals that use the belt. "All kinds of birds are in those trees", said John. "We have morning doves, ruffled grouse, sharp tail grouse, Hungarian partridges, humming birds and all kinds of black birds nesting in the trees". Does and fawns are welcome visitors but the bucks can wreak some real havoc when they start rubbing their antlers on the trunks.

While establishing the trees took a lot of hand labour in the first few years, with much hoeing to be done, the Makowetskis feel it was well worth the effort. "I'd recommend field shelterbelts for everyone", said John. "They create such a pretty picture as you drive down the road and of course, the trees really protect against strong winds".

To the north east of Jedburgh and south of Hwy #16, is the farm of Clark & Delores Anderson. Like the Makowetskis, the Andersons planted their shelterbelt in 1993. They had 2 purposes in mind when they decided to plant their trees. The first was to control wind erosion along Grid #651. The second was to give some students from the Theodore school some appreciation for Mother Nature. While the trees came through the Save Our Soils program, the Grades 5 – 8 classes planted and cared for the trees for the Andersons as part of a science project. The Andersons hoped they could demonstrate to the students what trees could do to buffer the effect of wind when planted in an organized manner.

A mixture of chokecherry, ash, sea buckthorn and lilac keep the snow off the Grid Road #651 between Jedburgh and Theodore. Photo taken March 2003.

The field on which the Andersons' trees are located runs east and west along the grid following the curve to the north. There aren't many fence lines with trees between Jedburgh and the grid road as it curves northward, so the westerly winds, especially in the winter, had a lot of force behind them once they blew across the Anderson's field. "That used to be a wild mile", said Clark. "The wind blew the soil all spring and the snow all winter. We needed to do something".

So the Andersons planted a belt containing sea buckthorn, choke cherry, ash and lilac. They moved to minimum till in 1997 and had their first direct seeded crop in 2000. The soil erosion

HOW DO SHELTERBELTS FIT WITH DIRECT SEEDING ... CONTINUED

has been eliminated and the trees are doing a tremendous job of keeping the snow in the field and off of the grid road.

When asked why he and Delores leave the trees in the field, Clark chuckled and said he sometimes asks himself the same question. "The odd time I wonder why I bother, especially when I have to swath the strip between the field and the road. But then I think about how nice the trees look and the number of birds the trees attract. The birds are working on the berries all the time!"

Because the shelterbelt is doing its job of keeping the snow in the field, the Andersons realize a benefit and so does the municipality. "We benefit from the extra moisture and resulting heavier crop on the lee side of the trees while the municipality doesn't have to deal with trying to keep that curve in the road from blocking all the time", explained Clark. The Andersons also like to think that in 20 years from now, when the kids from that science project drive by the field, they will feel a tie to the land, remembering they planted those trees.

The PFRA Shelterbelt Centre at Indian Head is a very busy place every April as it bundles and ships little trees to farms across the Prairies.

John W and Debbie Makowetski inspect their field shelterbelt near Jedburgh.

Tricia Pollock, the Centre's Agri-Forestry Specialist said that while the deadline for ordering trees is February 15, farmers should not be discouraged if they miss the deadline. "As long as we have stocks available, we can take tree orders right up to the time we ship the trees". Tricia indicated that there is another deadline farmers should keep in mind if they wish to take advantage of the Canada Action Plan 2000's Shelterbelt Enhancement Program. "In this program, farmers must plant a minimum of 800m of shelterbelt. The Centre will then provide, free of charge, plastic weed barrier and the equipment to install it". The plastic weed barrier serves to conserve moisture, increase the trees' survival rate, enhance their growth and reduce competition from weeds. The deadline for applying for trees to be planted in 2005 under this program is September 30, 2004. For more information on shelterbelt planning and planting, call the Shelterbelt Centre at (306)695-2284.

The Makowetskis and the Andersons prove that field shelterbelts and direct seeding can co-exist. Together the two activities protect the environment, provide food and cover for a wide assortment of wildlife and are esthetically pleasing. That explains why these two farms "put up" with the trees. ●

GREENHOUSE GASS MITIGATION AND SOIL HEALTH ... CONTINUED FROM PAGE 9

the soil and is responsible for the rapid hydrolysis of urea to ammonium. Agrotain temporarily halts the conversion of urea to nitrate. It allows up to14 days protection from volatilization if nitrogen fertilizer is surface spread or dribble banded. Agrotain also allows up to 50% more nitrogen fertilizer to be seed placed at seeding time.

Another method of decreasing fertilizer loss is timing of nitrogen application. Applying nitrogen only when the crop requires it most can be very beneficial. A major loss of nitrogen in dryland agriculture is from denitrification. This occurs after heavy rains and / or in wet spring conditions in water logged areas. One pass seeding systems partially address this problem by fertilizing at time of seeding so the fertilizer is not exposed to spring floods. When the soil is saturated with water, the micro-organisms have no available oxygen so they strip oxygen from nitrate (NO_3) molecules, consequently reducing it to N_2O (nitrous oxide) and N_2 gas, gases that are toxic GHG and not available to crop plants. It is also interesting to know, from a global warming perspective, that N_2O is 310 times more toxic than CO_2 making nitrogen management even more important.

Fertilizer split application is another tool in crop production that is gaining popularity among producers. This is where a percentage of the targeted fertilizer, usually nitrogen, is delivered at time of seeding while the remaining fertilizer is applied post emergent. Nitrogen fertilizer is usually the main nutrient focused on because it is the most costly fertilizer input. Split application is the process of matching nitrogen supply with crop demand and weather conditions. Split application is also a way to minimize risk. For example, if the moisture conditions do not seem favorable enough to utilize all the targeted fertilizer, a producer can opt not to apply the remaining percentage of the fertilizer later in the season. If the conditions look favorable, the fertilizer can then be added. Split application attempts to mimic slow release fertilizer, which is to supply the nutrients as the crop demands. The split application will also reduce fertilizer exposure to the soil elements thereby reducing losses from leaching and denitrification. Reducing these losses will reduce N_2O and N_2 gas emissions. Most studies show that dryland crops accumulate 75 – 80% of the nitrogen within five weeks of emergence. This is a task that requires

CONTINUED PAGE 13

2003 Seeding Conference:
"The Key to Sustainable Management"

February 11 & 12, 2004

Regina Exhibition Park, Regina, Saskatchewan

WEDNESDAY, FEBRUARY 11

8:00 a.m. Registration and Coffee in Trade Show

9:45 a.m. Opening Remarks

9:55 a.m. Keynote Address:
"Agriculture in a Changing World" - Michele Payn-Knoper, Agriculturist and Marketing Consultan, Indiana, USA

SESSION #1 DIRECT SEEDING: IMPACTS ON THE ENVIRONMENT

10:45 a.m. "Soil Quality" - Dr. Marie Boehm, Agriculture and Agri-Food Canada, Saskatoon, SK

11:05 a.m. "Water Quality" Dr. Jane Elliot, National Hydrology Research Centre, Saskatoon, SK

11:25 a.m. "Air Quality (CO_2 & N_2O)" - Dr. Brian McConkey, PAg, Agriculture and Agri-Food Canada, Swift Current, SK

12:00 p.m. Lunch

1:15 p.m. SSCA Annual Business Meeting

SESSION #2 CONCURRENT SESSIONS

A: Advanced Direct Seeding

2:30 p.m. "Residue Management?: Tall Stubble"
Dr. Herb Cutforth, Agriculture and Agri-Food Canada, Swift Current, SK

2:50 p.m. "Spray Volumes" - Brian Storozynsky, Alberta Tech Centre, Lethbridge, AB

3:10 p.m. "The IHARF Precision Farming Experience"
Yann Pelcat, IHARF Precision Farm Manager, Indian Head, SK

3:30 p.m. "GPS & Yield Mapping: A Producer's Experience" - Stuart Lawrence, Producer, Rosetown, SK

B: Beginning Direct Seeding

2:30 p.m. "Selecting Openers & Packers" - Travis Goebel, PAg, Saskatchewan Soil Conservation Association, Yorkton, SK

2:50 p.m. "How I Direct Seed on My Farm" - Edgar Hammermeister, PAg, Producer, Alameda, SK

3:10 p.m. "Direct Seeding on My Farm" - Tom Mathieson, PAg, Producer, Watson, SK

3:30 p.m. "Fertilizer Placement" - Gord Hultgreen, PAg, PAMI, Humbolt, SK

3:45 p.m. Coffee in the Trade Show

5:00 p.m. Youth Vision for Agriculture: A Secondary School Environment Challenge. Agriculture in the Classroom (AITC)

6:00 p.m. Awards Banquet & Bearpit Sessions

THURSDAY, FEBRUARY 12

SESSION #3 NUTRIENT DYNAMICS

9:00 a.m. "In-Season Fertility Management: IS it For You?" - Dr. Adrian Johnston, PAg, PPIC, Saskatoon, SK

9:20 a.m. "Potential Use for Agrotain and Polymer Coated Products" - Dr. Cynthia Grant, PAg, Agriculture and Agri-Food Canada, Brandon, MB

9:40 a.m. "Micronutrient Management for Prairie Farmers" - Pat Flaten, PAg, SIAST, Regina, SK

10:00 a.m. Coffee in Trade Show

SESSION #4 CONCURRENT SESSIONS

A: Forages and Livestock

10:45 a.m. "Grazing Systems" - Dr. Paul McCaughey, Agriculture and Agri-Food Canada, Brandon, MB

11:05 a.m. "Manure Management" - Dr. Jeff Schoenau, PAg, University of Saskatchewan, Saskatoon, SK

11:25 a.m. "Integration of Livestock & Direct Seeding"
Liam Craig, Producer, Biggar, SK

11:45 a.m. "Chaff & Weed Spread" - Mark Sumborg, Agriculture and Agri-Food Canada, Swift Current, SK

A: Forages and Livestock

10:45 a.m. "Herbicide Tolerant Crops" - Keith Topinka, PAg, Alberta Agriculture, Food and Rural Development, Edmonton, AB

11:05 a.m. "Identity Preservation (IP) Programs" - Bill Farley, Producer, Regina, SK

11:25 a.m. "Pesticide Free Production (PFP)" - Kendall Heise, PAg, Producer, Isabella, MB

11:45 a.m. "Herbicide Soil Residues" - Eric Johnson, PAg, Agriculture and Agri-Food Canada, Scott, SK

12:15 p.m. Lunch

SESSION #5 HOT ISSUES

1:45 p.m. "Environmental Farm Plans (EFP) Saved the Farm" - Dr. David Biesenthal, Producer, Walkerton, ON

2:15 p.m. "Environmental Farm Plans (EFP) and the Alberta Experience" - Jack Swainson, Producer, Red Deer, AB

2:35 p.m. "Insect Update" - Scott Hartley, PAG, Saskatchewan Agriculture, Food and Rural Revitalization, Regina, SK

2:55 p.m. "Agro-Forestry in Saskatchewan" - Deb Weedon, Saskatchewan Forest Centre, Prince Albert, SK

3:05 p.m. Closing Speaker: "The Good Ol' Days are Gone - Thank Goodness!" - Kevin Hursh, PAg, Agriculture Columnist, Saskatoon, SK

3:45 p.m. Draw for Conference Prizes

You Must Be There To Win!

2004 DIRECT SEEDING CONFERENCE REGISTRATION INFORMATION

To Register Call 1-800-213-4287
(SK or MB) or (306) 695-4233

Name: _____

Address: _____

City: _____

Prov: _____

Postal Code: _____

Telephone: _____

Fax: _____

RM# _____

Representing: _____

Producer: Yes ☐ No ☐

SSCA Member: Yes ☐ No ☐

SSCA Members

	(GST Included)	
Before January 30, 2004		
Includes: all meals & conference proceedings.	$80.25	☐
Additional Farm Unit Members Includes: all meals & no conference proceedings.	$69.55	☐
After January 30, 2004		
Includes: all meals & conference proceedings.	$101.65	☐
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Non-Members		
Before January 30, 2004		
Includes: all meals & conference proceedings.	$101.65	☐
After January 30, 2004		
Includes: all meals & conference proceedings.	$123.05	☐
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SSCA Members		
Includes: lunch & conference proceedings.	$58.85	☐
Additional Farm Unit Members Includes: lunch & no conference proceedings.	$48.15	☐
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Includes: lunch & conference proceedings.	$69.55	☐
Extras		
Extra Banquet Tickets	$26.75	☐
Extra Conference Proceedings	$10.00	☐

I would like to support the SSCA by becoming a member:
(*no GST on Membership Fees)

3 year membership*	$100.00	☐
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Total Amount Enclosed $ _____

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GREENHOUSE GASS MITIGATION AND SOIL HEALTH ... CONTINUED FROM PAGE 11

good time management skills as a split application needs to be implemented around the same time as post-emergent herbicide spraying. There are many different technologies available for the application of post-emergent fertilizer such as: dribble banding and coulter banding liquid fertilizer, broadcast and coulter banding dry fertilizer and spoke application.

Another focus of the GHG mitigation project and the SSCA is soil management including, but not limited to, direct seeding. Direct seeding / zero tillage and minimum tillage over the years have proven to be superior in most locations compared to conventional seeding practices. Producers are realizing the benefits from increased returns and more efficient time management. Direct seeding results in less fuel consumption, which decreases GHG emissions and decreases farm fuel bills. Another attraction to direct seeders and potential direct seeders is the potential eligibility for carbon credits.

The SSCA has played a leadership role in developing policy with the federal government to give credit to farmers for carbon sinks. The challenge that the SSCA and other farmers have is getting credit for the farmers who use BMP's and are sequestering carbon. Farmers may be able to use increases in soil carbon as credits to sell or lease to others that wish to offset their emissions. The international recognition of carbon sinks was needed to realize this opportunity. We also need to develop systems for measuring, monitoring, verifying and trading carbon.

Carbon sinks, soil carbon or soil organic carbon all mean basically the same thing. An increase in any of these means there is an increase in soil organic matter (SOM). The primary importance of SOM is not the potential for carbon credit value nor should the switch to direct seeding be undertaken based on any idea of making money through selling or leasing carbon storage. The importance of SOM in production is certainly not to be under-estimated. It is necessary to maintain good soil structure, especially in fine-textured soils. SOM increases CEC (Cation Exchange Capacity), thereby reducing the loss by leaching of elements such as potassium, calcium, and magnesium. It serves as a reservoir for soil nitrogen, it improves water relations and its mineralization provides a continuous, though limited, supply of nitrogen, phosphorous and sulfur to the crop. It is recognized that BMP's are both economically and environmentally sustainable. In a day of narrowing margins and high-risk agriculture, we should be striving to become more efficient and profitable. Canadian farmers have already made real progress in decreasing greenhouse gas emissions in efforts to become more efficient in farming operations by reduced tillage systems and longer crop rotations. We want to increase or at least maintain SOM to achieve better soil health, fertility, and moisture-holding capacity. ●

ments had an in-crop herbicide treatment.

Fertilizer treatments at Swift Current for both wheat and flax were 36 lbs / ac actual N, 18 lbs / ac P_2O_5, and 7 lbs / ac of S sideband ed. At Shaunavon, the fertilizer applied to the wheat was 44 lbs / ac actual N, 18 lbs / ac P_2O_5, and 11 lbs / ac K_2O. The fertilizer was applied with a sideband er and also a 3 inch spread tip so single shoot treatments could be compared with double shoot treatments. No fertilizer was applied to the peas at Shaunavon, they were only inoculated. At Mossbank, the wheat received 41 lbs / ac of actual N and 20 lbs / ac of P_2O_5 applied with the seed . In all cases, the seeding implement was on nine inch row spacing.

Table 1: Yields (bu/ac) and crop density (plants/m2) of Pesticide Free Production Study. Wheatland Conservation Area, Swift Current, SK, 2002-2003.

Crop & Seeding Rate	Yield (bu / ac)		Crop Density (plants / m2)
	2003	2002-2003 Ave	2003
Wheat 113	17.3	27.5	149
Wheat 90	17.8	26.2	143
Flax 56	15.6	21.7	282
Flax 45	17.6	20.4	244
Peas 220	24.5	39.5	86
Peas 180	26.8	41.2	70

Results were somewhat variable this year. At Swift Current, the traditional seeding rates had higher yields than the higher seeding rates with flax and peas (Table 1). There was no difference in wheat yields. However, the two year average of yields show the higher seeding rate still providing slightly higher yields for wheat and flax over the traditional seeding rates. For peas, however, the traditional seeding rate resulted in a higher average yield.

Not unlike a lot of areas in the southwest, the peas at Shaunavon did not establish well at all. Establishment of the peas only ranged from 28-59 plants / m^2, even though the seeding rate ranged from 120-240 lbs / ac. The traditional rate for peas is 180 lbs / ac with an ideal crop establishment of about 80 plants / m^2.

There was good crop establishment of the wheat at both Shaunavon and Mossbank with plant counts increasing as the seeding rates increased (Table 2). As expected, the 3 inch spreader tip treatments had higher crop establishment than the sideband ed treatments. This is likely a result of the wider seed row and less in-row competition for the crop as compared to the narrow seed row with the sideband treatment. However, this increase in crop establishment did not translate into higher yields (Table 3).

Table 2: Seeding rate (plants/m2) of wheat in Seeding Rate Study, SSCA, Shaunavon, SK, 2003.

Seeding Rate (lbs / ac)		60	90	120	150
		Crop Establishment (plants / m2)			
Shaunavon	Sideband	72.03	102.48	147.99	189.56
	3" Spreader Tip	82.06	124.70	161.97	190.99
Mossbank	2.75" Spoon	107.16	135.11	163.40	199.61

Even though conditions were very dry at Mossbank throughout the growing season, wheat yields showed a definite increase in yield with increasing seeding rates, although there is no significant difference between the 120 and 150 lb / ac seeding rate (Table 3). At Shaunavon, there was little difference in yields between seeding rates for both sideband and single shoot treatments, except at the highest rate for the sideband treatment and at the 120 lb / ac seeding rate for the single shoot treatment. However, there was a trend that the single shoot treatments did not yield as high as the sideband ed treatments. This may well be a result of the crop being able to more efficiently utilize the fertilizer when it is sideband ed.

The two high seeding rates provided excellent canopy and weed competition. There were very few weeds in these treatments. Another observation was that the two higher rates of wheat did not tiller, as in the low seeding rate (60 lb / ac). Having no tillers tends to have an advantage in that all the plant's energy goes into the head and not producing tillers. Some producers swear by low seeding rates and rely on tillering to produce acceptable yields. However, tillering can delay maturity and in years with an early frost, that means lower grades. As the wheat was maturing, it became quite evident that the 120 and 150 lb / ac seeding rates were maturing much sooner than the 60 or 90 rates, with the 60 lb / ac seeding rate being the latest to mature.

Even without the premium price for pesticide free production, the practice can be attractive to the producer. Without the cost of the in-crop herbicide treatment, there can be substantial savings for the producer (Table 4). These savings are most pronounced when bin run seed is used. However, even if certified seed is used, the higher seeding rate treatments can still result in higher net returns.

Table 3: Yields (bu/ac) of wheat in Seeding Rate Study, Shaunavon and Mossbank, SK, 2003.

Seeding Rate (lbs / ac)		60	90	120	150
		Yield (bu / ac)			
Shaunavon	Sideband	29.99	29.00	28.95	31.98
	3" Spreader Tip	27.97	27.97	29.00	27.28
Mossbank	2.75" Spoon	15.57	18.40	19.93	20.37

The 60 lb / ac seeding rate in 2003 seemed to have some advantage over

Carbon Offset Trading Policy Development

By John Bennett
Advisor to the SSCA Board

Last spring the federal government held a cross-Canada series of consultations on how carbon offset markets could be structured. The SSCA circulated a proposal to the Soil Conservation Council of Canada (SCC) and many leading organizations. This proposal is available on the SSCA web site at http://www.ssca.ca or you can request a copy from the SSCA office. SSCA was present at the Calgary and Regina rounds of offset market discussions. SCC members attended at most of the other venues across Canada.

Emission markets have the potential to add value or risk to the agricultural sector. Producers have the ability to reduce emissions: first on the livestock side with feeding strategies and manure management and secondly on the cropping side with fertilizer placement, application timing and fertilizer rates. These management strategies generate reductions or ERUs that should be tradable in an emission offset market.

SSCA's recommendation is that Agriculture ERUs (reductions) should be treated like any other emission reduction and be tradable.

Producers growing crops have the ability as well of removing CO_2 from the atmosphere and sequestering (storing) it in the soil as organic carbon. BMPs (best management practices) such as zero till, reducing summer fallow, planting forages, legumes and permanent cover all sequester carbon. These biological removals (RMUs) also have value in offset markets.

Agricultural RMUs (removals) need to be treated differently. Since sinks can be reversed and the CO_2 returned to the atmosphere, issues like permanence and liability were addressed in our presentation.

It would be prudent for agriculture to view sink offsets (RMUs) as a service to capture and remove CO_2 emissions for a fixed period of time. RMUs should be considered as a storage contract rather than a commodity. TERCs (Temporary Emission Reduction Credits) would work in an offset market.

Rather than replace emission reductions, TERCs act as a substitute or a "bridge" for emitters until effective and less expensive reductions are available. The SSCA offset market proposal addresses these issues and offers a path forward.

Politics and policy proposals at these discussions are adding confusion to how agriculture will participate in offset trading. There are some disturbing indications that government may want to appropriate a significant portion of the offsets that agriculture will generate.

The issue of ownership has not been resolved. My understanding is that the Government of Canada has a legal opinion that the sequestered Carbon is the property of the landowner but the offset that results from the sequestered carbon may not be owned by the farmer. In other words, the carbon offset may be *decoupled* from the carbon. There was some early debate in Alberta that sequestered carbon could be a mineral right and be owned by the province. Later the Alberta government passed legislation stating that offsets would be the property of the landowner. Although Saskatchewan has no legisla-

CONTINUED PAGE 20

SEEDING RATES REVISITED ... CONTINUED

higher seeding rates likely because there was more moisture and fertilizer available to the crop and there was no early frost. Protein contents were unavailable at time of writing this article. However, for the seeding rate study at Shaunavon, more fertilizer should be applied to the higher rates to reflect the higher demand. There was very good weed control with the higher rates, but the producer should use the cleanest fields for this practice.

However, if there becomes a serious weed problem, the producer can certainly apply an in-crop herbicide treatment.

Table 4: Net returns ($/ac) of treatments of wheat in Seeding Rate Study, SSCA, Shaunavon, SK, 2003.

Seeding Rate (lbs / ac)		60	90	120	150
Sideband 3" Spreader Tip	Gross 107.96 Return ($ / ac)	104.40 100.69	104.22 100.69	115.13 104.40	115.13 100.37
Sideband 3" Spreader Tip	Certified Seed Costs ($ / ac)	7.00	10.50	14.00	17.50
Sideband 3" Spreader Tip	In-crop Herbicide Costs ($ / ac)	21.00	21.00	0	0
Sideband 3" Spreader Tip	Net Returns) ($ / ac)	79.96 72.69	72.90 69.19	90.22 90.40	97.63 82.87
Sideband 3" Spreader Tip	Net Returns using bin run seed ($ / ac)	86.96 79.69	83.40 79.69	104.22 104.40	115.13 100.37

Estimated price of wheat at $3.60 / bu.

Producers using this practice on part of their land can provide flexibility and lower input costs. However, producers need to monitor fields carefully so a serious weed problem doesn't develop. It is also evident that not all crops will improve yields over the long term with higher seeding rates. However, even without a premium price for the production, something as simple as increasing seeding rates for some crops can result in more dollars in the pockets of producers. ●

Soil Fertility – Finding the Balance

By Tim Nerbas, PAg
Conservation Agrologist

To apply or not to apply is not the question. The question is: what should I apply? Just as a physician examines a patient's overall health to uncover all the symptoms before recommending a remedy, so too producers need a complete analysis of their soil conditions before making a fertility plan.

As input costs continue to soar, it is imperative to make informed decisions regarding what those costs need to be. Soil tests are an important diagnostic tool to help the producer plan accordingly and are therefore a wise input expenditure. No two fields are the same. Different cropping histories, changes in soil texture, rainfall or the lack there of, past crop yields, and a number of other factors all impact the amount of fertility remaining for the upcoming crop.

Once a soil test has been completed we need to ask ourselves some important questions. First, what is the present moisture situation? Is there any stored moisture? It is also a good idea to examine estimates on how much moisture is predicted for next year's growing season. To do this, the producer can either error on the side of caution and low-ball next year's precipitation or use long-term averages from local weather stations.

Next, the producer should determine how many dollars per acre are available for investment (Table 1). What is invested in plant fertility will impact significantly the overall yield potential of the next crop. If a producer is not satisfied with the business's present yield goals, perhaps more dollars should be targeted for fertilizer (assuming those dollars are available). In Table 1 if $25 is spent on fertilizer, crop yields peek for both canola and barley at 26 and 56 bushels per acre respectively. Both crops produce their maximum yield with this level of fertility at approximately 7 to 8 inches of total water. Having any additional water does not improve yields. Soil fertility limits any further yield increases.

This same field's sulphur deficiencies are limiting both canola and barley yields. A custom blend provides a yield benefit for both crops. As well, to target barley yields greater than 65 bushels per acre requires a potash consideration.

When making next year's plans, remember that a soil test is an important tool. By looking at the soil's overall health, a more efficient remedy can be developed - a remedy to meet your business's goals. ●

Table 1: Target yields of canola and barley based on various moisture regimes and fertility options.

Canola

Total Moisture (Inches)	Fertilizer Blend						
	15-9-0-7	26-10-0-9	37-12-0-11	46-15-0-14	57-19-0-15	72-30-0-17	60-25-0-0
	Cost of Fertilizer Blend						
	$10.00 / ac	$15.00 / ac	$20.00 / ac	$25.00 / ac	$30.00 / ac	$40.00 / ac	$29.75 / ac
		Crop Yield (bu / ac)					
3	8	9.5	9.5	9.5	9.5	9.5	4.5
4	9	12	13	13	13	13	6
5	9	15	17	18	18	18	9
6	9	15	20	22	23	23	11
7	8.5	14	21	25	29	31	14
8	8	13.5	20	26	31	35	15
9	8	12	18	25	31	40	17
10	7.5	12	17	24	30	41	17

Barley

Total Moisture (Inches)	Fertilizer Blend						
	14-12-0-3	27-13-0-4	39-15-0-4	50-17-0-9	56-23-0-9	72-28-23-9	60-25-0-0
	Cost of Fertilizer Blend						
	$10.00 / ac	$15.00 / ac	$20.00 / ac	$25.00 / ac	$30.00 / ac	$40.00 / ac	$29.75 / ac
		Crop Yield (bu / ac)					
3	16	18	18	18	18	18	12
4	18	24	26	26	26	26	18
5	19	32	38	40	42	43	29
6	20	33	44	49	52	56	37
7	20	32	45	56	64	73	47
8	19	30	43	55	66	80	50
9	19	28	39	53	66	85	51
10	19	27	37	50	66	85	51

Edgar Hammermseister Joins SSCA Board

The staff and board would like to welcome Edgar Hammermeister as the new director for the South East. Edgar is a keen observer and participant of all events relating to agriculture. His insight and understanding of farming issues will greatly benefit the South East and the SSCA.

Please allow me to introduce myself, I am Edgar Hammermeister, and I am your SE Director for the SSCA.

Home for me is Alameda, SK located approximately 35 miles east of Estevan and 30 miles south of Carlyle. I am the oldest of three sons belonging to Harold and Gisela Hammermeister.

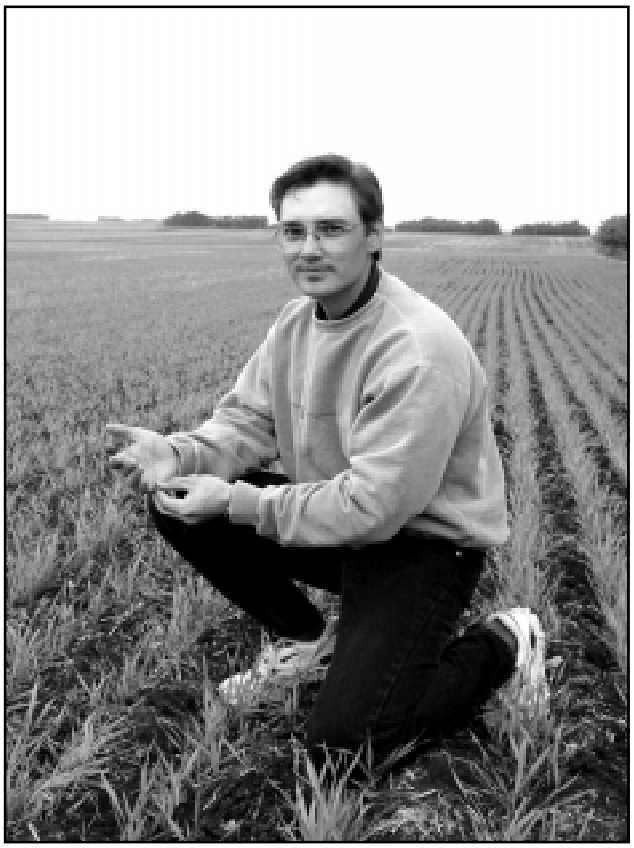
After completing a Degree in Agriculture at the University of Saskatchewan ('89), I worked for four years at a private ag research station, Ag-Quest, located at Minto, MB. There, I conducted and coordinated environmental field research necessary for the registration of new pesticides in Canada.

I started farming part-time in 1992 and moved home in late 1993. I continued farming part-time working in the local oil industry as a battery operator. I currently farm relatively full time and provide crop advising services, working closely with Western Ag Labs based in Saskatoon.

The family farm shares equipment and labour between my Dad, my youngest brother, Jason, and me. The middle son, Andy is an Agriculture Research Scientist at the College of Agriculture at Truro, Nova Scotia. Andy is researching organic farming techniques and loves to "discuss" farming practices with us.

The crops grown on the farm include the traditional wheat, durum, barley, oats, canola and flax but since my return, has also included at various times, brown and yellow mustard, yellow and green peas, canary seed, and even experiments in coriander, caraway, and desi chickpeas. This year some millet and corn is being tried in small acreages. A number of things are considered in our crop selection each year but the primary driver is what is the opportunity vs the risk for each crop. I try to get ahead of the pendulum swings on crop demand, gaining insight from a number of market information sources.

We currently run a mixed farm with approximately 2300 acres and 70 cows. The operation will hopefully grow over time. We have been direct seeding for only two years, though I had been studying the practice for some time. My original piece of seeding equipment was a single shoot air seeder with sweep openers with no on row packing. The land had to be "prepared" prior to seeding and often needed a separate fertilizer banding operation prior to seeding and harrow-packing. Typically we tried to get the nitrogen on in the fall but this was not always the case. The system did all right as long as we had spring moisture. After a couple of near misses with dry springs and dry seedbeds, we finally made the change. We currently seed with a Morris Maxim air drill with paired rows on ten inch spacing. We are anticipating a change in opener for next year, as the current opener seems to have too much variability in where the seed finally ends up. We have also noticed significant soil movement by the openers where the lead seed rows have extra soil thrown on top of them. Fusarium can be very significant in our area and timing fungicide applications is tough enough with out the variability in crop emergence.



Edgar Hammermeister, SSCA Director for Southeast Region

It is too soon to say how the conversion to direct seeding has changed the land. Each year will be different and things do take time (about five years I am told). But I have observed that my customers' land that has been direct seeded for a few years, appears to have better soil tilth, the earthworm populations are increasing, soil moisture and young crops are protected by the standing stubble and soil fertility is increasing if good fertility management is practiced. To take advantage of the extra moisture direct seeding can provide, the crop must have the nutrients to best utilize that moisture. ●

Roundup Ready Wheat – Are You Ready?

By Tim Nerbas, PAg
Conservation Agrologist

The debate over Roundup Ready wheat is heating up. Consumers have yet to identify any benefits to introducing this new product. Of the 70 countries to which the Canadian Wheat Board exports wheat, 82% say they don't want herbicide tolerant wheat. Can there be a segregation system of sufficient rigour to assure customers that require the absence of GMO wheat in a shipment? Who will pay the costs of segregation? Monsanto says it will not commercialize its Roundup Ready wheat (RRW) unless six concerns are met including buyer and consumer acceptance. If Monsanto feels these conditions are met, they stand to make a lot of money selling not only the RRW and technology use agreement, but also the Roundup itself.

But what about the producers, the people who would actually use this latest technology? What does the potential of RRW mean to their operation? Will the producer receive benefit both in the short term as well as the long term? What about farm saved seed particularly after a drought? Or are we simply increasing the risk to the producer?

Let's begin with what we know about: direct seeding and reduced tillage operations.

Direct seeding has truly been a success story in Saskatchewan. Over 40% of seeded acres are now seeded in a one-pass low disturbance seeding system. Another 30% uses high disturbance one-pass direct seeding. We have seen summerfallow acres drop from 24 million acres in 1970 to 14.5 million in 1990 to only 7.8 million in 2001. And many of the summerfallow acres today receive at least one application of glyphosate in a reduced tillage fallow period.

As direct seeders we rely on Roundup to provide cost-effective weed management. So what does past experience tell us? Producers have been seeding herbicide tolerant (HT) canolas since the mid-1990's and today less than 10% of seeded acres are conventional varieties. Producers adopted the technology very quickly. The HT canolas have allowed earlier seeding, and in some cases fall seeding. The broad-spectrum weed control has allowed producers to seed land that would have either been summerfallowed or seeded to another crop due to weed concerns. For both Liberty Link and Roundup Ready canolas, it has meant controlling weeds with different modes of action. From research, we know weed resistance to groups 1 and 2 modes of action is a growing concern.

One of the unique characteristics of Roundup Ready technology is the ability of sequential treatments. A somewhat unique feature of glyphosate is that its biological activity against most weeds remains constant, or in some cases increases with increased weed age and size.

Thus Roundup Ready wheat would allow control of off-types of wheat, barley, or winter cereals. Growth-regulating herbicides such as dicamba and 2-4D, AIS-inhibiting herbicides such as Ally, Assert and AC-Case-inhibiting herbicides such as Puma or Champion have all caused crop injury and yield loss. Crop injury is always worse when the crop is under stress. Roundup Ready wheat should exhibit little crop injury or result in little yield loss.

Despite these benefits there are still concerns for the producer. In chem-fallow, producers typically use glyphosate for weed control. If some of the volunteers are Roundup Ready wheat, a tank mix with glyphosate will be required. Although spring wheat is easier to manage than volunteer winter wheat with AC-Case-inhibiting herbicides, the timing is important. An additional concern with AC-Case-inhibitors is that they can select for resistant biotypes within a few generations. This could lead to multiple resistance in Roundup Ready wheat volunteers and eliminate this alternative as a volunteer wheat control strategy. Unless growers can find cost-effective control measures to control this volunteer wheat, they may have to revert back to tillage to control the volunteer wheat.

Most of us know the many benefits of reduced tillage: less fuel usage, improved fertilizer and moisture-use efficiencies and the ability to rebuild soil organic matter. However, if tillage is required, many of the gains could be quickly lost. This is of particular concern if these increases in soil organic matter are used to help meet Canada's commitment to the Kyoto agreement. **Reverting back to tillage could put a tremendous hardship on producers who may sign agreements for carbon storage**.

Another concern with Roundup Ready wheat technology is that weeds will adapt to take advantage of the altered environments. For several decades, herbicides have effectively reduced or eliminated the impact of weeds on crop yield. Yet weeds that were problems when herbicides were first used are still prevalent in many fields today. As herbicides and new crop production systems are adopted, weeds continue to invade and occupy niches that are available. For instance, as direct seeding has increased, several perennial weeds such as dandelion and Canada thistle have become more prevalent.

Weeds could persist in Roundup Ready wheat production systems because of tolerance to glyphosate or because of growth types or because of life cycles that allow them to avoid being treated. As well, weeds vary in their susceptibility to glyphosate and weeds that are adapted to a system will potentially invade and spread.

Herbicide resistance is strongly linked to monoculture systems with an over reliance on one or multiple herbicides with the same site of action. Planting Roundup Ready wheat will increase the reliance on glyphosate in the system. In western Canada we already have Roundup

Ready canola. Thus there is potential to have two or more Roundup Ready crops in a four-year rotation. **The combination of repeated use and high efficacy could increase the selection pressure for glyphosate-resistant biotypes**. This is of tremendous concern to direct seeding.

So far there has been weed-resistance to glyphosate reported for three species; rigid ryegrass in Australia and northern California, goosegrass in Malaysia, and horseweed in Delaware. In western Canada, horseweed is referred to as Canada fleabane. This is a wind-dispersed winter annual considered common in direct seeded fields.

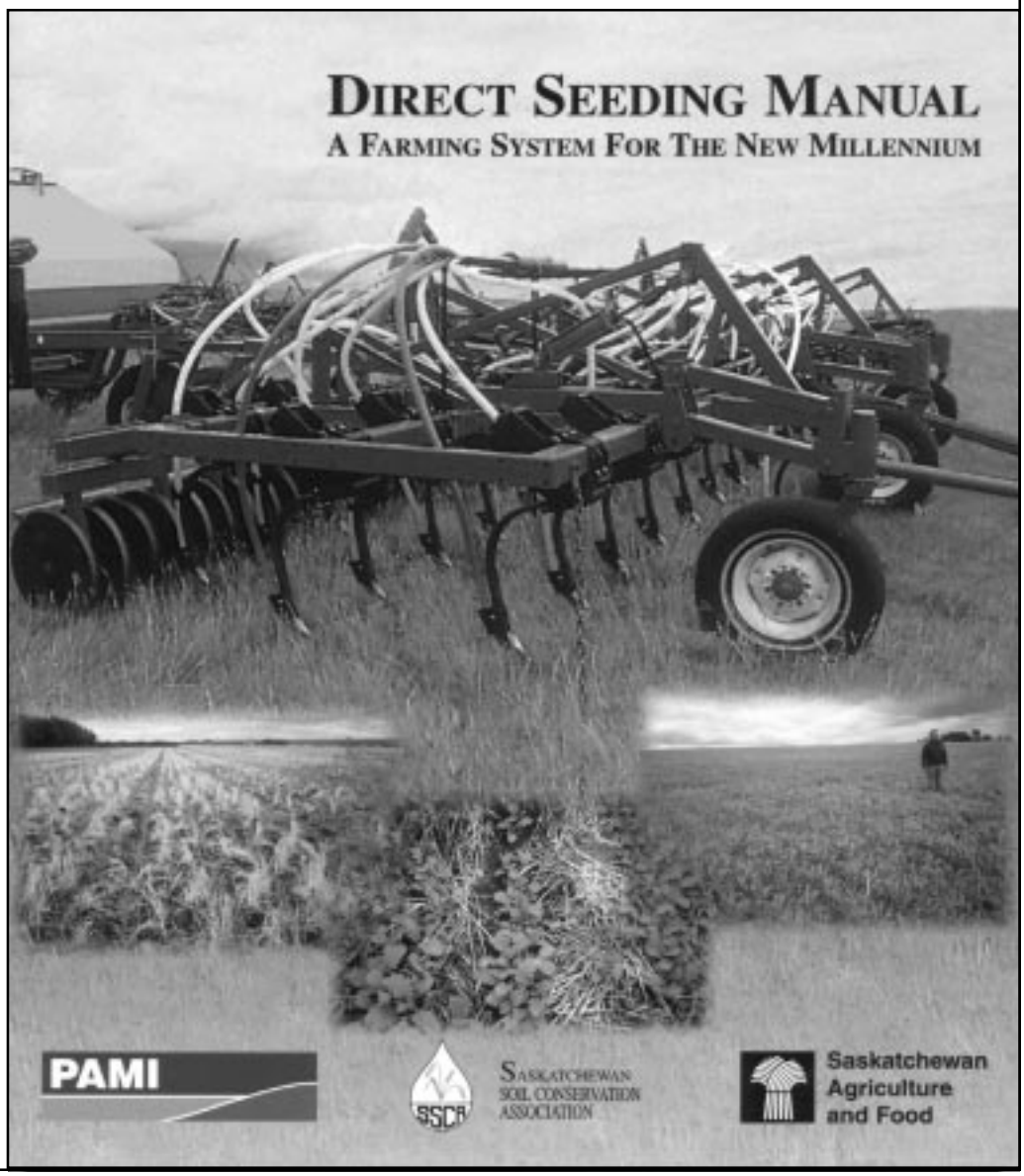
Ogg and Isakson (2001) predict that jointed goatgrass, downy brome, kochia, field pennycress, and Italian ryegrass are the most likely candidates to develop resistance to glyphosate. Lyon et al. (2002) state: "We can predict that glyphosate-resistant biotypes will occur, but we cannot necessarily predict the species or the time frame". They go on to say: "It is important to limit glyphosate use in the system by rotating glyphosate-resistant wheat with non-glyphosate-resistant crops and to use herbicides with different sites of action in the system." "**The identification of glyphosate-resistant grass and broadleaf weeds with more than one mechanism of resistance should be a warning that glyphosate resistance is likely to occur in glyphosate-resistant wheat production systems**".

It was with these concerns in mind that in 2001 the SSCA developed a position paper on Roundup Ready Wheat. Here are some of the questions the board of directors felt must be addressed:

1. How will seed dormancy affect volunteer management? Will volunteers need to be controlled for just the first year or two? Or will they pose a longer problem?
2. What will happen to seeds from in-crop volunteers? Will they contribute more seeds to the seed bank? In other words will escapes continue to supply a source of resistant plants that need to be controlled?
3. Will selection pressure increase the proportion of glyphosate resistant plants?
4. How will volunteer crop dynamics affect weed control costs? Will Roundup Ready wheat provide both short as well long-term benefits to the producer?
5. What is the potential for Roundup Ready wheat to cross-pollinate with related weedy species?

Presently the Canadian Food Inspection Agency is reviewing Monsanto's application for an environmental safety assessment of RRW. The Canadian Wheat Board has called on the federal government to close the regulatory gap on genetically modified wheat by adding a cost benefit analysis to the food, feed and environmental assessments currently being undertaken on RRW. In a letter dated May 22, 2003 the CWB asked Monsanto to withdraw its present application on RRW. To date this has not occurred. If approved under this current system, RRW could be approved for unconfined release as early as 2004.

Have we missed anything? We invite you to share your comments and concerns regarding how Roundup Ready Wheat could affect or benefit producers. Please get in touch with us at 1-800-213-4287. ●



tion, the government has had a legal opinion that sink offsets are the property of the landowner. Both the NDP and the Saskatchewan Party are on record as stating that offsets are the property of the landowner.

As a personal rant, I take the stand that," I sequester the carbon, the sequestered carbon is contained in land that I own, and the sink maintenance is my responsibility, does this not constitute ownership?"

Early on, sinks were referred to as "National Treasures" and the government of Canada proposed to use them to meet the nation's targets. Later terms like BAU (business as usual) or baseline determinations were used to divide sink offsets into two different pools. The government would use the BAU pool to meet the Nation's target. This BAU pool would return no value to the producer. The second pool or "tradable" pool would be owned by the producer and return value in an offset market place.

Federal policy proposals have suggested that offsets created by the early adopters of BMPs would be used to meet the national objectives. The producer who delayed adopting BMPs would own the offsets and could capture their value in the offset market.

There are differing approaches as to how BAU offsets would be determined. The term "baseline"' could be used. For example if 2008 was used, offsets created before that date would be a BAU offset while those created after that date would be tradable. Canada has an international agreement using 1990 as a baseline as part of their Kyoto process. Our proposal recommends using the same baseline.

Even more troublesome is the concept put forward federally that the date of adoption of best management practices would determine whether the offsets created would be tradable. Under this scenario, offsets created after a specified baseline would all be BAU and none would be tradable.

It is conceivable that two neighbors could make the same contribution to reducing emissions and in sequestering carbon but only one would have tradeable offsets that would add value at the farm gate. The only difference would have been the date that the management was adopted.

The government of Canada with Action Plan 2000 and budget 2001 are claiming that supporting soil conservation and by implementing programs such as Green Cover they are incenting the adoption of BMPs. The federal government says that since financial support for these programs provides the incentive, the offsets created have been paid for and owned by the government of Canada.

These two pools of offsets will be very contentious and likely litigious. At the very least it will be a disincentive for a producer to take action early. The outcome will be "gaming", as producers attempt to move offsets from the valueless BAU pool to the tradable pool.

The SSCA's offset market proposal would be simpler and much more acceptable. Our proposal would be to treat all sink offsets as a single pool of tradable TERCs that represent sink maintenance. We points out that a loss of CO_2 from a carbon sink is an emission so maintaining an existing sink has value. The value of TERCs in a market place would incent both sink creation and maintenance.

"Producers have the ability to reduce emissions: first on the livestock side with feeding strategies and manure management and secondly on the cropping side with fertilizer placement, application timing and fertilizer rates. "

To help explain I would like to quote an analogy from a paper by Greg Marland:

" A car driver (emitter) leases a garage (TERC) to park his car (emission). At the end of the lease or contract, the car driver must either renew the lease or find another place to park his car. The car driver might have used the lease term to find a better lease agreement elsewhere, built his own garage (reduce emissions in-house) or chosen to park his car on the street and suffer the (regulatory) damages. The car driver would be looking for a new place to park his car but the garage would be available for another driver. If the garage owner (producer) had become wealthy enough to purchase his own car (his own emission problem) he could decline to renew the lease and use the garage for his own car. The garage (TERC) would be available as long as it was maintained".

Our proposal recommends that sequestered carbon would qualify for a TERC after a five-year delay. This TERC would be valued for a five-year period. If the sink were reversed and the carbon lost, the TERC would expire. If the sink was maintained, the TERC would be reissued. The delay of five years before the TERC is issued would limit the risk both for the farmer and the offset buyer.

Our proposal was used as part of the submissions put forth by SCC and Grain Growers of Canada. Parts of it were used in the APAS, SARM, DUC and many other Ag group submissions.

There has been no direct feedback from the Federal side on the Ag side of the Offset Market discussion but the feed-back on the forestry side has a very similar opinion to what the SSCA has been advocating. My understanding is that Ag Canada is currently studying the Transaction costs of an Offset market.

In summary, GHG concentrations in the atmosphere present a problem. Kyoto addresses this problem with ERU and RMU offsets. It also sets the rules for international offset trading. Offset markets have the potential to add value to agriculture. Sink offsets have the potential to transfer liability and add unacceptable risk to producers. Treating sink offsets as a service rather than a commodity would limit risk.

There is an offset ownership issue and a jurisdictional debate surrounding sinks. The current Government of Canada Action Plan has two pools of offsets: the Business As Usual pool, which has no value for producers, and a tradable pool. The two-pool systems will likely result in delayed action and gaming, which could limit the contribution agriculture could make. The SSCA offset market proposal would eliminate the two pool system and reduce risk with renewable TERC's that would represent sink maintenance.

Producers can make a positive impact on greenhouse gas concentrations in the atmosphere. The question is whether this contribution will be recognized and rewarded in the market place.

The SSCA will continue its efforts to see that our membership is treated fairly in offset markets. There will be an update at our Direct Seeding Conference (February 11 & 12, 2004 in Regina) and you can ask questions at the Carbon Bearpit session. ●

Challenges and Opportunities at CLC

By Laurie Hayes, MSc PAg
Manager, CLC

It's been another dry year at the Conservation Learning Centre – less than 6 inches of moisture from May 1 through to the end of October. We got half of that (3") in the first two weeks of July so it did have an impact on some crops.

Some crops were a success and others not. We rented new land this year and there were many agronomic challenges that adversely affected the establishment and production of the 2733 InVigor and 6045 Clearfield canola. The combination of a poor seedbed, heavy weed pressure and lack of moisture limited the yield to ~10 bu / ac. The CDC Stratus malt barley on that field averaged 40 bu / ac while on the home site it ran 69 bu / ac. The crude protein content of all the barley was over 14% thereby eliminating it for malting. The barley weighed in at was 51 pounds.

All crops, with the exception of canola (thanks to Farm World for the use of a swather), were straight cut. Harvesting started in August but was delayed many times by small showers, continuously cloudy skies that did not allow any drying and constant equipment breakdowns (the combine officially died on October 8). We finally finished combining October 23 (thanks to the Saskatchewan Canola Development Commission for the use of a combine and Brent Serviss for moving the GPS / yield monitoring gadgetry from the old to the borrowed combine). Preliminary yields (bu / ac) are: Osprey winter wheat 22; Snowbird hard white spring wheat 30; AC Superb hard red spring wheat 50 and CDC Bethune flax 16. We closed down the farm on November 7 and have not had time to get the other harvest data pulled together yet.

The yield monitor was used on all fields and it will be interesting to study the yield maps, particularly in the flax (precision farming) and the copper trials in the spring wheats.

We are very pleased to at last have been able to seed our riparian area – on November 5, 2003. For the past two years, we have either run out of time or it was too dry to seed. Due to the cold temperature, we did not try to apply liquid fertilizer. We put a 1:1 ratio of granular fertilizer with the forage seed (a mix of alfalfa, smooth brome and intermediate wheatgrass) and will dribble on more fertilizer in the spring.

Supporters who have been with the CLC since its inception. Back row, left to right: John Clair, SSCA; Keith LePoudtre, Ducks Unlimited; Barry Swanson, SAFRR; Sid Zdrill, District 32 ADD Board; Ian Pickering, PFRA. Front row: Randy Kutcher, AAFC; Diane Knight, U of S, Carly Fortin, BASF; and Lyall Smith, Simplot. Missing; Sean Isberg, Monsanto. Photo Courtesy of Prince Albert Daily Herald

We had some difficulties with establishment of the strawberry crowns and, together with Karen Tanino, are trying to identify the problem. The hybrid poplar cuttings were planted but we experienced problems with survival. Another puzzle to figure out over the winter.

Our annual field day, this year celebrating "Ten Years of Progress," was very successful. About 120 producers, partners, sponsors, members and past board members were welcomed. After lunch (sponsored by Gates Fertilizers), recognition was given to long-term (10-year) supporters of the CLC:

Ducks Unlimited Canada; Agriculture and Agri-Food Canada (Research Branch and PFRA); Saskatchewan Agriculture, Food and Rural Revitalization; the University of Saskatchewan; District 32 ADD Board; Simplot Canada Limited; BASF Canada Inc.; Monsanto Canada Inc; and the Saskatchewan Soil Conservation Association. Over the past ten years, over 80 other groups and agencies have contributed to the success of the CLC – both the agronomic and school components.

There was a decline in student participation (1,508) in the school program this year, mostly due to cancellations (217). Following the trend over the past two years, there was again an increase in participation from students at the junior (36%) and senior (33%) high level. (Of note, in the cancelled groups, 67% of the students were Grade 7 to 10; this would have been a 50% increase in those grades.) On a positive note, this year, schools from Saskatoon, North Battleford, Sucker River, Lake Lenore and Dalmeny visited the CLC and we feel that once the quality of our program (not to mention our substantial sponsorships) gets more word-of-mouth exposure, we will see increased participation from schools in those areas.

The year has certainly been a mixed bag and we look forward to new projects in 2004. If you have any suggestions, just give us a call. Again, we thank our many supporters for their contributions. ●

Saskatchewan Farmers Doing their Part

By David Larsen, PAg
Conservation Agrologist

Saskatchewan farmers know the importance of climate. The very existence of farming is dependent on stable and relatively predictable weather patterns. Visit any coffee shop in rural Saskatchewan and within 10 minutes you are guaranteed to hear about the Roughriders and the weather.

Stable and predictable weather is an oxymoron. To the disappointment of every farmer, at best rains cannot be forecasted more than a few days in advance. The weather is always the biggest risk associated with farming. That is accepted and considered part of the business. What is not acceptable is the disruptive and unpredictable impact of global warming on the weather patterns across the prairies.

Farmers are on the front line when it comes to climate change. Not only are they among the first to suffer the effects of weather changes, they are also (amongst) the most effective fighters in reducing greenhouse gas levels. Farmers are contributing to the battle against global warming by reducing the amount of greenhouse gases they are emitting and by removing carbon dioxide from the atmosphere. By reducing and removing greenhouse gases, farmers contribute to long-term environmental benefits and to their own short and long-term economic welfare.

Agriculture is responsible for 10% of greenhouse gas emissions in Canada, primarily from nitrous oxide and methane. Like other industries, these gases are a natural byproduct of production. However levels can be reduced. Reducing GHG emissions simply means growing crops more efficiently. Increased efficiencies are beneficial economically as well as environmentally through the reduction of wasteful losses of nitrogen (nitrous oxide) and energy (methane). Increased efficiencies happen through the adaptation of Best Management Practices (BMP's).

Identification of BMP's and the methods of promoting and creating awareness about BMP's is the responsibility of a group of Saskatchewan farmers, agricultural researchers and some Saskatchewan Soil Conservation Association staff. These interested individuals and organizations formed a Taking Charge on Climate Change Team to address soil and nutrient management practices that are considered Best Management Practices. The Saskatchewan Soil Conservation Association staff carries out the initiatives set by this group. These activities include the establishment of demonstration plots, hosting producer meetings and writing articles for farm publications. The efforts by the Committee on Climate Change has led to increased adoption of BMP's by Saskatchewan farmers.

"Farmers are on the front line when it comes to climate change. Not only are they among the first to suffer the effects of weather changes, they are also (amongst) the most effective fighters in reducing greenhouse gas levels. "

Soil and crop management BMP's contribute to the reduction of nitrous oxide (N_2O) and carbon dioxide (CO_2) emissions. Soil and crop management BMP's include widely practiced techniques such as direct seeding, utilization of forage crops, and the proper placement and quantity of fertilizer.

"An average farm size of 1500 acres alone will offset the equivalent amount of carbon emitted by burning 400,000 litres of fuel."

Soil stewardship is widely embraced by Saskatchewan farmers. A PFRA survey found that Saskatchewan farmers are increasingly utilizing conservation seeding systems (such as direct seeding or min-tillage). Adoption of this soil conservation technique rose from 55% in 1996 to 67% in 2001. The actual rate of adoption of conservation seeding is probably somewhere between these two data sources.

Agriculture is unique in that it both emits GHG and removes GHG such as CO_2. Many of the same BMP's that reduce emissions also remove emissions. Plant growth naturally utilizes CO_2 through photosynthesis. If degradation of the soil is minimized, plant carbon will be converted to soil carbon upon plant degradation. In this way CO_2 is sequestered from the atmosphere into the soil... This soil carbon is a stable and extremely beneficial component of organic matter. Storing of the carbon in these "ag sinks" is a recognized method for removing greenhouse gases.

The capability of agricultural soils in Saskatchewan to remove the carbon from the atmosphere is huge. The Prairie Soil Carbon Balance Project data suggests that direct seeding on average will sequester 0.7 tonnes of carbon per acre per year. In only one year, assuming half of the farm land in Saskatchewan is being direct seeded, 12.4 million tonnes of carbon is taken from the atmosphere and stored in the soil. An average farm size of 1500 acres alone will offset the equivalent amount of carbon emitted by burning 400,000 litres of fuel. This capability has been recognized and agriculture and forestry are expected to offset 20% of Canada's required emission reductions. With close to half of Canada's agricultural land, Saskatchewan is an important player in helping Canada meet its emission reduction targets.

The net benefit to the environment from agriculture is monumental. Increasingly, sustainable farming practices are being adopted to the benefit of all. Farmers adopting BMP's deserve credit for taking the risk and making these changes happen. ●

Summerfallow: Pros & Cons

By Thom Weir, PAg
SAFRR

As I travel the back roads of east central Saskatchewan this summer, I am again taken aback by the fields of summerfallow one encounters. This summer, I have talked to a number of producers and asked the question "Why are you summerfallowing?" The four answers that came up repeatedly were for weed control, nutrients for next year, to store water for next year's crop and to reduce disease. Briefly I have discussed these four factors below – giving both sides of the discussion.

1. Weed control

Weeds will be reduced the year following summerfallow but seldom to the level where in crop spraying is not required. As for perennial weed control such as quack grass or Canada thistle, control can be adequate- but only when conditions are optimal and you are lucky to not have rain after you have worked the fields. Often, however, spreading these weeds with tillage can make the problem even worse.

On the other hand, a timely burn off or in crop alternatives can do a very acceptable job of controlling these weeds and pre harvest or post harvest applications offer excellent control at a cost below the cost of summerfallowing.

2. Increased release of nutrients

Summerfallowing will release nutrients into the soil. This is especially true for nitrogen. This nitrogen is coming from the break down of organic matter. On average, we see soil tests showing from 20 to 35 lbs. more nitrogen in summerfallow fields than stubble. Thirty-five lbs. of N at $.30 / lb. is about $10.00 worth of nutrients. As well, it must be noted that this nitrogen will only be 50% available to the next year's crop. The remainder will be used by weeds, used by soil microbes to break down other organic matter or lost through various loss mechanisms.

3. Soil moisture storage for a subsequent crop – a reduced risk of crop failure due to drought:

In areas where moisture is limiting, summerfallow will add to the soil moisture stored. However, studies done in Swift Current showed that the majority of the soil moisture stored in a field comes from the first year's snow melt. In this area, the added moisture stored is minimal as in most years, we are near capacity in the spring and in years like this year, waiting for soil to dry out is more of a concern.

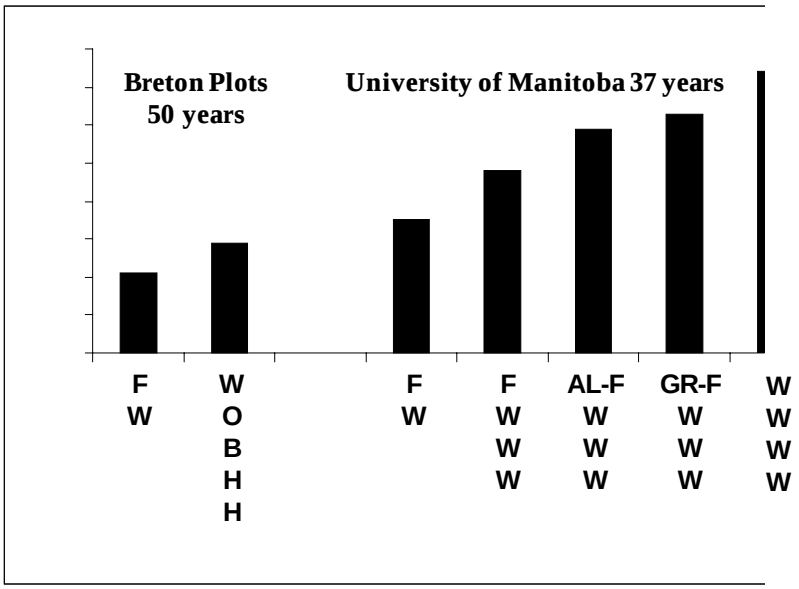


Figure 1: Effect of rotation on soil organic matter

4. A lower incidence of crop diseases

In wheat – wheat rotation, a break for summerfallow will reduce disease. However, the same effect can be observed by proper rotations such as a cereal – oilseed – cereal – pulse rotation.

Having looked at the "positive" aspects of summerfallow, let's take time to look at the negative side.

Potential for Erosion

In black fallow fields, tillage operations stir the soil and bury crop and weed residues. Lack of plant residues on the surface leave the soil vulnerable to wind and water erosion. Plant residues anchor the soil, reduce wind and water speeds at the solid surface and protect the soil from raindrop impact. Raindrop impact and frequent tillage can pulverize the soil resulting in crusting and poor soil moisture infiltration. Low infiltration rates result in higher runoff and more water erosion.

Decline of Soil Organic Matter

Tillage raises soil temperatures and increases aeration and mixing of the soil. These conditions lead to faster decomposition of both the soil's organic matter and crop residues, as compared to a soil with a growing crop. During the fallow period, certain plant nutrients that become available through decomposition are lost through leaching or gaseous emissions. Normally these nutrients would have been used by plants and retained in the plant-soil system.

A decline in the organic matter content of a soil results in less plant nutrients being stored in the soil and degrades the physical structure or tilth of the soil. Poorer soil structure results in less infiltration of precipi-

CONTINUED PAGE 24

SUMMERFALLOW: PROS & CONS ... CONTINUED FROM PAGE 23

tation into the soil resulting in increased runoff. Consequently, it becomes more difficult to prepare a suitable seedbed for crops. The ease of seedling emergence also declines because of increased resistance from crusting of the soil surface.

Figure 1 shows the effects of different crop rotations on soil organic matter following 37 and 50 years for each treatment in Manitoba.

Groundwater Recharge and Salinity

During a fallow season, precipitation percolates down through the subsoil and enters the groundwater. Water-soluble crop nutrients (e.g. nitrates) aretransported with the water. Excessive levels of crop nutrients can reduce the quality of the water in underground aquifers. In addition, the excess water can move salts to groundwater discharge areas. This will cause groundwater levels to rise in these discharge areas and increase the size of areas adversely affected by excess salinity. If a crop had used the water, the nutrients would have been used by the plants, and fewer salts would have been moved to discharge areas.

What does it cost to summerfallow?

From SAFRR's Crop Production Costs – variable costs average $16.68. This does not include costs such as taxes (approx. $5.00) machinery depreciation ($8.00) and land payments.

Crop insurance yields

Looking at the "yield credit" given by SCIC for two risk areas in east-central Saskatchewan reveals that from their data, there is little benefit arrived at by summerfallowing (Table 1). In fact, in risk area 14, there is no yield credit given for fallowing. In risk area 11, there is less than 1 bushel credit given per acre for wheat and 1.6 bushels for canola.

Conclusions

In summary, let's look at the four reasons people say they summerfallow.

Firstly for weed control, in all but organic production, herbicide alternatives exist that will provide control of troublesome perennial weeds – usually with superior results to fallowing and often cheaper.

Secondly – while fallowing does release nutrients from organic matter, this is actually mining organic matter resulting in a reduction in total organic matter from our soils. In addition, the actual value of the nitrogen released may not cover the cost of fallowing.

Thirdly, the majority of water stored in the soils in east-central Saskatchewan comes from the winter immediately preceding a crop. SCIC gives little if any yield bonus to crops grown on summerfallow vs. stubble.

Fourthly – with the practice of alternating broad leaf and cereal crops, there is little benefit from summerfallowing as a method of reducing crop diseases.

Table 1: "Yield credit" given by SCIC for two risk areas in east-central Saskatchewan.

	Soil Class F	
	Risk area 11	Risk area 14
Wheat	+0.8 bushels	-
Barley	-	-
Canola	+1.6 bushels	-

Considering these facts and looking at the negatives, there is little benefit and many negatives to summerfallowing. The practice of summerfallowing – especially with traditional tillage should be closely examined and alternate practices adopted. ●

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