The Newsletter of the Saskatchewan Soil Conservation Association

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Prestigious Awards presented at the SSCA Conference

By Tim Nerbas, P Ag

Conservation Agrologist

Two awards recognizing outstanding achievement in soil conservation were presented at the SSCA's Annual Meeting and Banquet on February 14th in Saskatoon.

The Saskatchewan Soil Conservation Association annually recognizes achievements in the development of innovative approaches to soil conservation, and in that light, presents an Award of Merit to an individual who has made an outstanding contribution.

This year, Dr. Guy Lafond, a research agrologist with Agriculture and Agrifood Canada since 1985, was recognized for his dedication to promoting conservation tillage systems in the prairie region.

As an avid promoter of direct seeding, even before it was fashionable to be so, Dr. Lafond has been a leader in changing prairie farming into a soil conserving, reduced tillage system. His research and technology transfer efforts attest to his personal commitment to finding practical ways to help producers conserve soil, increase production efficiency, and improve net returns.

He was instrumental in establishing the AFIF spoke sites throughout the province to promote the established principle of conservation tillage including sound crop rotations and new crop technologies.

With 53 scientific publications to his credit and more than 200 proceedings papers and releases, Dr. Lafond is a recognized researcher and one of the first to insist that low disturbance seeding systems form the basis for long-term agronomy studies in Western Canada.

The Royal Bank, in conjunction with the Saskatchewan Soil Conservation Association, annually recognizes a farm family that has made an outstanding contribution toward promoting production systems that reduce soil degradation yet maintain economic viability.

Edward and Marguerite Beauchesne are this year's recipients of the Royal Bank - SSCA 2001 Farm Family Award.

For over 30 years, the Beauchesne's have farmed northeast of Prince Albert, near Albertville. They recognized their need for reduced tillage in the late 70's. Years of summerfallow had allowed wind erosion to pile 3-foot dirt banks in the tree lines. Some years the spring run-off left gullies three feet deep. It was time for a change.

In 1989, the Beauchesnes ran side by side trials with the Save Our Soils program, comparing direct seeding and conventional production practices. They were sold on the results and the whole farm was converted to direct seeding by 1991.

Ed and Marguerite have actively promoted direct seeding in their community and throughout the province. They have hosted many crop tours, and in 1995, they gave presentation on their direct seeding system at the SSCA Annual Conference. Ed has participated in direct seeding meetings as a panelist. He served as a director on the SSCA Board from 1994 to 1997, which led him to serve on the Conservation Learning Centre steering committee until 1998.

Mr. and Mrs. Beauchesne have served as direct seeding role models for the Prince Albert community and soil conservation leaders in Saskatchewan.

Congratulations are extended to Guy and Ed and Marguerite.

What's Your Carbon Sink Worth?

By John Bennett

Incoming SSCA President

What's your carbon sink worth? That is the big question. There exists a great deal of uncertainty about this issue. What I hope to give you in this article is some possible scenarios as to its value and to wave a few cautionary flags.

When Canada's International Negotiators got on the plane last November at the Hague to return to Canada, they thought they had reached an agreement to ratify Kyoto and that the agreement included soil sinks. Unfortunately, this agreement unraveled at the last moment. What it does mean, however, is that agreement is close and that the ag community should take ag soil sinks seriously.

Farmers need to be aware of the contribution they can make to the National Plan to reduce greenhouse gases. Instead of using big numbers let's use an average sized 10 quarter Saskatchewan direct seeded farm and show the relationship between the CO_2 removal potential of soil and litres of fuel burned that releases CO_2 into the atmosphere.

The Prairie Soil Carbon Balance Project in which 137 Saskatchewan farmers participated, and many of these being SSCA members, has shown that the average direct seeded farm sequesters 0.5 tonnes of carbon per acre over three years. If we multiply this by 3.7 this converts to removing and storing 1.85 tonnes or 1850 kg of CO_2 removal. Tickle your calculator and this translates into 770 litres per acre over 3 years or 256 litres per acre per year. This means a single acre farmed under Best Management Practices, such as direct seeding, can remove the CO_2 released from burning 256 litres of gasoline. Tickle your calculator again and you'll find that a quarter section can absorb the CO_2 released by burning 40,000 litres of gasoline per year. On the 10 quarter section of land from our example, this means offsets for 400,000 litres of gasoline burned. Stated a slightly different way, the 10 quarter direct seeded farm removes the CO_2 emissions released by burning 400 thousand litres of fuel and sequesters or stores it in the soil.

What's it worth? The Federal Government has spent millions of dollars in formulating a national strategy. The results are summarized in a report entitled **Implications for Canada of the Kyoto Protocol (** Page 30). This is a very comprehensive study that outlines 5 paths or groups of options needed to reach emission reduction targets. In Paths One and Three, they suggest " a motive fuel tax of 12 cents per litre (CIMS) and 16 cents to 19 cents (Markal). To put this in perspective, the combined Federal and Provincial level of taxes is on average 32 cents per litre". Presumably the higher cost of fuel would encourage more efficient use of fuel. (Note: CIMS and Markal are modelling systems).

If farmers were bold enough to suggest that the incentive for the removal of CO_2 with sinks should equal the penalty for emission, the results would be interesting. Our 10 quarter direct

seeded farm would see a range of $48,000-$76,000 or $30.00 to 47.50 per acre as value added income.

However, before farmers breathe a sigh of relief thinking that they can finally make a living, we need to look at **Canada's First National Business Plan** Page 97:

"Carbon sinks offer a unique opportunity for Canada to offset its rising GHG emissions with a low cost (possible range: < $1-2 /tonne CO_2 equivalent), high quantity (10-40 megatonnes) abatement mechanism. Therefore, sinks have considerable strategic value for Canada in context of both its national and international climate change discussions. To realize this opportunity, clear and favourable rules are required internationally, while at the national level, governments must develop a sound scientific underpinning coupled with actions that encourage sinks investments."

Again if you go back to your calculator and the 10 quarter direct seeded farm you get $266.00 0r 16 cents per seeded acre incentive. As a grumpy farmer, I suspect this figure was inserted by the sector that wants to buy cheap offsets. These two scenarios should illustrate the uncertainties surrounding the value of soil sinks.

Let's take a look at it from a different perspective and consider the cost of emission reduction and its effects on the farm input side. Consider the dramatic recent increase in the cost of natural gas. Many people share the opinion that the price rise is a result of the U.S. electrical companies switching from coal to natural gas to generate power with reduced emissions. This could change the price of a pound of nitrogen from 20 cents to 40 cents. If you use 100 lb. of N per acre, your fertilizer costs go up $20.00 per acre or $32,000 on our 10 quarter direct seeded farm.

Will sequestering carbon reward soil stewardship or only add risk and cost to our farms? The verdict is still out and will remain unclear until public opinion and the policy makers decide on a course of action.

The "take home" message to the prudent farm manager is be cautious! Think very carefully. A deal signed on the hood of a half-ton could come back to haunt you. As farmers we should take pride in the contribution we can make in addressing Canada's emission problems, but let's be sure our contribution is recognized and rewarded.

2001 Direct Seeding Conference a Success

850 farmers from across western Canada and northern U.S., met at the Saskatoon Prairieland Park, February 14 and 15, to attend the Saskatchewan Soil Conservation Association's annual Direct Seeding Conference. The success of this year's conference reflects that even in light of the poor farm economy, farmers recognize the value of attending our conference in helping them gain an edge with their crop production system.

"The purpose of the conference was to bring farmers together to get the latest information on direct seeding and how to implement these practices on our farms," says SSCA president Don Kelsey. "Farmers had the opportunity to have their questions answered by researchers, industry experts and other farmers," says Kelsey.

This year's conference featured keynote speakers David Irvine and Brent Van Koughnet. Mr. Irvine's presentation focused on the three cornerstones of sustainable family businesses: Connection, Contribution and Character. Brent VanKoughnet challenged producers to think of themselves as CEOs. He added that we should be asking ourselves if we have the skills to manage our farm businesses and how can we develop these new management skills.

The conference had six sessions, which offered a mixture of farmers and researchers to provide both experience and first-hand information. The one concurrent session enabled experienced direct seeders to listen to information different from that offered to those farmers just beginning to implement a direct seeding system. This remaining session covered topics on farm decision-making, weed management, farming for the future and emerging issues in direct seeding. Speakers talked about how to integrate all this information into a successful direct seeding system.

Once again, the four concurrent informal evening "bearpit" sessions were well attended. These were": How to Start Direct Seeding, Cropping Options, Soil Carbon and Conserving the Family with David Irvine. The sessions provided farmers with the opportunity to have their questions answered by experts in less formal, smaller groups.

The trade show had 85 exhibitors showing the latest in-crop production technology and information related to direct seeding. The trade show continues to be a major attraction of the conference.

Extra copies of the conference proceedings are available for $10 through any SSCA staff member. Plans are already under way for the 2002 annual meeting and conference in Regina, February 13 & 14.

Tradition, Low Disturbance Direct Seeding and Oat Production

Bill May, IHARF and AAFC

Traditionally the mind set surrounding oats was that you could seed them late and still harvest a crop or if you needed extra forage you could cut it for green feed. In a tillage cropping system, the tillage created a big spike in the emergence pattern of wild oats and more often than not, the tame oats emerged after the wild oats. Late seeding took away some of the risk for the farmer but the trade off was that they gave up yield and test weight.

So what has changed about oat production? A much larger percentage of the oat crop is now sold off the farm and yield and test weights have become much more important. At Indian Head, yields in oats have been reduced by 60 bushels an acre by delaying seeding from May 15 to June 15. The reduction is not always this large but the trend has been observed at Melfort, Canora, Saskatoon, Indian Head, Brandon and Winnipeg (Table 1 and Figure 1). The reduction in test weight with delayed seeding is even more pronounced than the yield reduction (Figure 2). If you are in a rust area, the risk of a loss in yield and test weight is even higher.

Low disturbance direct seeding has two effects on wild oats. The first is that the reduction in tillage removes the spike in wild oat emergence. Instead, wild oat emergence occurs over the whole growing season. In fact, you can wait a long time in the spring until most of the wild oats have emerged. The ability to control wild oat emergence has been lost and therefore the risk reduction gained by delayed seeding is also lost. However, low disturbance seeding offers less stimulation for wild oats, which is a benefit. Concurrently, our mind set for fertilizer application has also changed. Research has proven that broadcast fertilizer can give wild oats a competitive advantage over the crop compared to when the fertilizer is banded.

Spreading out the emergence of the wild oats combined with the reduction in the competitiveness of the wild oats, opens the door to plant oats earlier and still have higher yield and test weight and while managing wild oats. If you primarily use oats as on farm feed and your cropping system still uses a moderate amount of tillage, delayed seeding may be a good crop production practice for your farm operation

In a direct seeding system wild oats still must be managed. The use of high seeding rates, over 300 plants per metre is important. Much more research is needed in Western Canada to provide the farmer with information on the importance of row width, cultivars, crop rotation, fertilizer placement and fertilizer timing on the management of wild oats in oats. We're working on it.

Table 1 The Effect of Seeding Date on the Yield of Oats in 1998

	Indian Head	Saskatoon	Brandon

Planting Date	Bushels/acre		
May 1	127 *a*	-	60.0*a*
May 15	126 *a*	103 *a*	58.2*a*
June 1	91 *b*	94 *b*	48.4*a*
June 15	65 *b*	67 *c*	
SE	3.4	1.7	5.7
a-c Values for planting date or cultivar within a column followed by the same letter are not different at P#0.05 by protected LSD.			

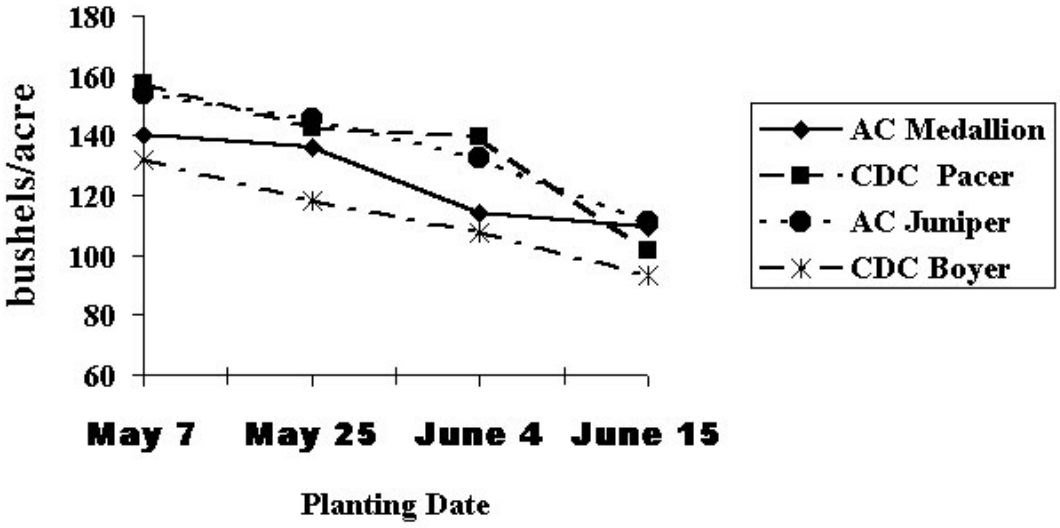


Figure 1. The effect of planting date on the yield of four oat cultivars at Melfort in 1999

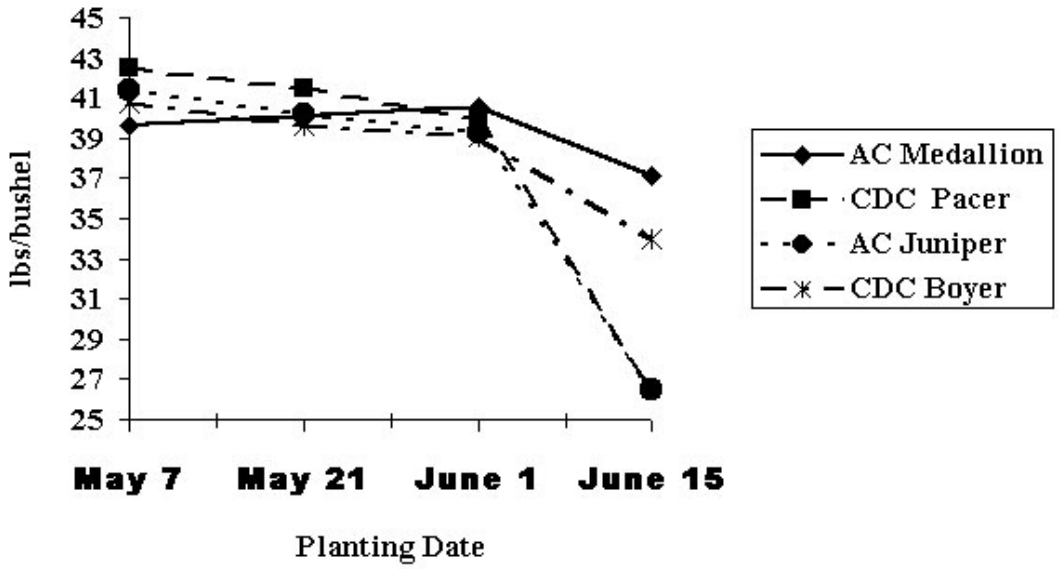


Figure 2. The effect of seeding date and cultivars on test weigh at Indian Head in 1998

Conservation Learning Centre Gearing Up for Spring 2001

By Laurie Hayes, M.Sc. P Ag

CLC Manager

This winter has been extremely hectic with trade shows and conferences, not to mention meetings to plan for the upcoming year. The CLC participated in the Crop Production Show, SSCA Annual Conference, Soils and Crops Workshop and Showcase 2001 (Saskatchewan teachers' convention). In addition, a summary of the CLC's results for 2000 was presented at Crop Talk in Prince Albert.

Preliminary plans for 2001 have been discussed. The CLC's "big" project is going to be a precision farming project (thanks to partial funding from CARDS). The southeast quarter, currently four small fields, will be converted back to one large field and the project will be implemented across the 100 acres. The crop this year will be canola, with plans to continue the project for three additional years following standard crop rotations (canola-barley-peas-wheat). The goal is to vary the rates of nitrogen and sulphur fertilizer, herbicides and fungicides. We have purchased a weather station to aid with accumulation of pertinent data and timing of applications, especially fungicides. As well, we have ordered a yield monitor that will enable us to complete the final, crucial step of precision agriculture - generating the yield map. Both pieces of equipment were purchased through AFIF funding.

Fifty acres will be seeded to peas. In response to many queries over the last two years and in light of increased fertilizer costs, this field will be divided into three plots demonstrating the effect of level of fertilization. Treatments, based on soil samples, are:

1. Recommended rates of nitrogen and phosphorus fertilizer (17 acres)
2. Half recommended rates of nitrogen and phosphorus fertilizer (17 acres)
3. No nitrogen and no phosphorus fertilizer (17 acres).

Hard red spring wheat will be seeded to 70 acres. We will be using seed left over from last year (AC Elsa and AC Barrie) as well as showcasing some new varieties such as (hopefully) Clearfield wheat. Both the AC Elsa and AC Barrie seed were treated (Dividend and Raxil, respectively) last spring so we will be assessing the efficacy of these seed treatments after one year.

We will be showcasing Bethune flax on 30 acres. Establishment will be evaluated as the flax will be seeded into wheat stubble that was sprayed in-crop last year with Everest + DyVel DS and Sundance + Buctril-M. We are extremely pleased to welcome the Saskatchewan Flax Development Commission as a sponsor of this project.

Plans are to expand the school program yet again this year. The target is to host 100 groups at the CLC, bringing a total of ~2,200 students to the farm in 2001. Participation in Showcase 2001 will increase our visibility. As well, we have been discussing the possibility of collaborative efforts with Agriculture in the Classroom (Saskatchewan). Over the past couple of years, such an alliance has been sought and now is much anticipated.

The past few months have also been busy on the organizational front. Significant time is spent at all the extension events "looking after business" - securing sponsors for the upcoming year. The patience of sponsors is sincerely appreciated as I conduct what I call "sponsor stalking." We are pleased that past, current and new partners and sponsors continue to support the CLC and we sincerely thank all for their commitment.

Is this the Year For Barley

By Bob Linnell,

Soil Conservationist

With all the talk and action around livestock feedlots, hog mega-barns and diversification, the average farmer is asking himself, "What crop can I grow to take advantage of the current marketing opportunity? Is there something that we can do that will overcome the "secret" to achieving malting quality for our barley?" Like any rotational crop, we need to find ways to make it pay. Sometimes malt varieties yield less than feed varieties; so we must try to ensure it goes malt. There are a number of things we can do to increase our chances. We may have thought that the only way to get acceptance in the past was to either know the grader or just keep submitting samples until we got malt. We now know different.

There is a lot more to growing malt barley than just sticking the seed in the ground and hoping for the best. In fact, good seeding practices will get you started right to produce a crop acceptable for malting. Malt barley is a "special crop"- special in that achieving success takes special attention right from field selection to harvest and storage. Maltsters are fussy and farmers should be just as particular.

What can we do?

Firstly, we can select the right field, the right variety, the right seeding method, the right fertility program, the right weed control and the right harvest and storage treatment. A lot of "rights" can be ruined by just one "wrong".

The right field is a uniform field that allows early seeding, doesn't have wheat or durum stubble, or barley stubble of another variety, and probably is not a pulse stubble because of the chance of having unacceptably high protein in the sample. Some farmers prefer to go to these pulse fields, however, watch out for herbicide residue challenges, so check your field records form the past few years. A good field also has the past residue evenly spread across the field to avoid poor emergence.

The chaff row is often the forgotten factor, as it can prevent good seed-to-soil contact. Poorly spread chaff rows are usually thinner stands with more disease, later in maturity and will cheat you out of about a third of your potential yield. In addition, that is where you will more likely find thin kernels in enough quantity to reject the sample from malting grade. Variety is the million dollar question in many parts of this country, and it pays to do your homework to find out if a variety has a good acceptance record for your area, particularly where you intend to deliver it. Seed quality is of high importance, and certified seed is pretty much considered a must especially when it comes to guaranteed purity of that variety. Pedigreed seed also ensures good, even germination and minimum weed content.

Seeding date is very important, and early seeding is recommended, mainly to take advantage of your available moisture to maximize yield. You have more tillering under good moisture, and heads will fill prior to the August heat. That heat can increase the chance of thin kernels and higher protein levels. In any case, aim to seed your barley at least in the first third of your seeding period.

Seeding rate is important to ensure an even stand and further achieve even maturity. Seed treatments are usually a good investment, since you will be seeding early.

Fertility is also a very important consideration in the successful production of acceptable malting quality barley. Start with a soil sample to help determine what level of nutrient additions you may be looking at. You want yield, but not protein, so it is a bit of a balancing act, especially since moisture during the growing season can play such a big role. A good balanced fertility program should provide adequate amounts of nitrogen, phosphorous, sulfur and potassium. Nitrogen is necessary for yield; phosphorous aids maturity; sulphur and potassium prevent disease to an extent.

Weed control is always an important factor in the production of any prairie crop and malting barley is no exception. The guideline here is to control the weeds with the gentlest herbicide necessary to still get the job done. It is also a good idea to control the weeds early, as they are easiest to kill at that stage, and barley is more tolerant. Barley is pretty competitive once it gets going, but wild oats will be a big downgrading factor in malt acceptance. Broadleaf weed control is up to the operator and the area, but try to avoid spraying crops when they are under stress to avoid the chance of injury or hinder tillering.

Diseases are very important in producing malting quality. Most years the weather doesn't favour the production of a lot of disease, but fields should be scouted and treated accordingly. Good rotations help, as do certified seed and fungicidal seed treatments. Foliar fungicides have been developed to a greater extent in the last few years and can maintain yield against disease, and have also shown an increase in the percentage of plump kernels. The timing of foliars is usually at early flag leaf to protect the top leaves and full flag to protect and fill the head.

Harvest is the truly critical time of the production year, and extra efforts taken at this time will usually pay big rewards. Mistakes in harvesting can be that one "wrong" that wipes out all the other "rights" that have taken place over the growing season.

Swathing is usually the right thing to do especially with 6-row, because of the shatter loss potential. It is also easier to control the moisture content of the finished product if it is swathed, although some producers insist they can straight cut "everything." A 30% moisture content at the swath day is good, and combining right at the 14.5% is highly desirable. A treatment in an air flow storage is a valuable tool for malting quality barley. Dessication is not recommended, nor is heat drying, because of the potential damage to the germination process required for malt production.

Combine operation is also critical, and great care must be taken not or crack or peel the seed coat. Cylinder or rotor speed must be low to ensure an undamaged kernel with a short awn left

on. Grain augers should not be run at a high rate of speed, especially if they are not full. Every time through an auger causes damage to the quality, and the maltsters buy "quality" not always quantity. A vacuum is not a recommended tool if you expect to assure malting quality barley leaving the farm.

In summary, it pays to plan your strategy. Select the field, use certified seed, fertilize properly, employ good weed control measures, and watch carefully for disease. Harvesting is the critical time for successful completion of the malting barley production season, so take extra care at that time. Storage is important and marketing is always one of the key elements to a profitable picture.

If you had less than desirable results from chickpea challenges last year, want a crop that is not subject to midge, has potential for rewarding careful production techniques, then maybe, have a close look at malt barley for 2001.

Bob will send you a slide of a chaff row to accompany this article.

Slash Herbicide Costs with Second Boom

By Garry Mayerle, P Ag

Conservation Agrologist

Two farmers who make it work in their operations say herbicide costs can be cut with a double boom spraying system.

Saskatchewan grain farmers continue to be in an economic squeeze. Market analysts are holding a flashlight at the end of the tunnel now and the hope is that it will soon be a spotlight and then the sunlight. But, producers have to get to the end of the tunnel, which is a least another growing season away. Part of everyone's solution is cutting corners. One of the heavy draws on operating funds is weed control. For all non-organic producers, weed control involves herbicides. Numerous means of reducing the herbicide bill have been tried. Two northeast Sask. farmers have developed spot spraying add-on systems for their crop sprayers that save dollars.

Allan Hurd is a grain producer farming just a few miles south of Melfort. He crops 4300 acres growing peas, wheat, barley, canola, and flax. He has been direct seeding for 20 years. He currently seeds with a Bourgault 5710. He puts down NH_3 with mid row coulter banders and runs 2^2 spoon openers on the seed shanks. Over the years he says his direct seeding system reduces wild oat pressure and spot spraying works for him because he does not have "wall to wall" wild oats.

Al says he first started reaping the benefits of spot spraying by re-spraying spots with his single boom sprayer. Of course he got tired of sitting on the sprayer as has everyone else who has tried spot spraying this way. When Al started working on a home built high clearance sprayer, the project just naturally lead to making a system that would spot spray on the go.

Al's system started off as an old army truck. He got 26 inches of clearance at the lowest point with rims made to take 9.5 X 42 tires. When pre-harvesting, he fastens puck board underneath and in cereals, he says he is knocking very little grain out of the heads. He took a 540-gal tank off his pull type Bourgault sprayer. The boom is a 70-foot Wilmar Air ride boom. He used a Gleaner combine cab for an operator station. The transmission is a 540 Allison and he powers it with a 350 Chev.

A direct injection system is what makes spot spraying possible. When spraying, the main tank contains the one herbicide already in suspension. In Al's case, this is normally the less expensive broadleaf herbicide. It feeds to the first of two sets of booms and nozzles. A second set of booms will spray both the broadleaf herbicide and an in-line injected and agitated second emulsifiable herbicide. This is usually the more expensive wild oat herbicide. The second boom is already charged with this injected mixture of herbicides. A very rapid electric 3-way ball valve switches between the booms without a miss even at 13.5 mph. It is located just before the point of injection into the boom. Agitation takes place in an in-line swirl chamber.

There certainly was some cost to setting up a system like this but it doesn't compare to what you would have to spend on a commercial system. Al says the electronics to make his first boom work cost about $5000. He is using a Raven automatic rate controller with 3-boom section shut off. The cost of the injection system which is an add-on to the Raven rate controller was another $5000.

This is certainly a significant capital investment but there are some big savings to be made, too. Al says that on many of his fields last year, he only sprayed 20 acres out of the quarter section for wild oats. In fact, he says that in the last growing season, the greatest portion of any of his quarter sections he had to treat with wild oat herbicide was 40 acres. These kinds of savings amount to some serious dollars saved to help offset the cost of rigging. At $15/ac saved, it only takes a little over 330 acres to pay for the injection system.

Al has had 2 years of experience spot spraying with this sprayer now. He says the first season he was completely satisfied with the results. Last year he thought he was seeing some misses on the edges of wild oat patches during his 2-3 day after spraying check. However, Al says that by the time he was back in the field at pre-harvesting, he was totally satisfied with the control.

Al points to several techniques that make this spot spraying system work on his farm. One of these is that he sprays at 13.5 mph not 18 mph like the "real" high clearance sprayers. Because he seeds on a 10-inch row spacing with narrow knives, he is assured that low disturbance seeding will not stimulate wild oat growth. It also means that at in-crop spraying time, the wide row spacing makes wild oat patches fairly visible and the booms can be switched rapidly enough for satisfactory control.

One of Al's concerns is that only spraying patches will leave enough seed to start a real mess that will get out of hand in following crops. Al has been spot spraying for 5 years and has not yet seen this fear realized so it seems we can safely conclude that in his low disturbance seeding system, spot spraying is a viable alternative.

One of the difficulties of transferring this concept to your farm is that it is not likely you are going to build your own high clearance sprayer. In fact, Al would not recommend starting a high clearance project like his to anyone. He is already concerned about where he might find truck parts for what is left of the old army truck. However, the injection system part of his project would fit for a number of different types of sprayers. Al sees real value in trying to incorporate that into the spraying system on your farm.

An alternative option that can make this on-the-go spot spraying work is a 2-tank sprayer. In fact, Flexicoil has a large pull-type commercial unit available that lists at about $46,700. With cash in hand, you could probably find one for less than $40,000.

If this is still beyond the range of your capital budget for the coming growing season, there is the option of putting a second tank on your current pull-type sprayer. Philip Mansiere of Meskanaw added a separate tank and booms on his Centurion III 100 foot Bourgault sprayer. He put a lot of time into this conversion but his actual cash out-of-pocket was less than a $1000. He did have an

old sprayer he took a lot of parts from and various sales where he picked up used parts and pieces to make this system work.

The extra tank holds 200 gallons and he uses a hydraulically driven centrifugal pump in the second spray circuit. The pump on the main system is pto driven. The main tank is 830 imperial gallons. The main set of booms has nozzle bodies with 2 nozzles per body. The second boom is a 1² boom with old style nozzle bodies and 5 gal/ac tips. Philip sprays at 9 mph. so he can still cover a lot of ground in a hurry.

The advantages he sites with a 2-tank system are, of course, spot spraying for wild oats. He particularly mentions the use of extra Poast on heavy patches of wild oats when he is spraying Pursuit on peas. He also used extra Liberty in the small tank to hit heavier patches of weed infestations in Liberty Link Canola. They have a lot of horsetail, which has become a problem with reduced tillage. During Round-up burn-off, Philip will hit the patches of horsetail with some MCPA from the second tank.

Philip has had one year's experience with his 2 boom sprayer and he also sites significant herbicide savings saying he cut dollars spent on wild oat chemical by at least 50% last year. He is also especially pleased with much better control with Liberty.

As is always the case when making a change to any part of your grain farm, you must consider your production system as a whole. These producers make a 2 boom spraying unit sound pretty easy to come up with. Probably the bigger challenge is, do you have a seeding system that will make it work? For those who do, there are some significant savings to be captured!

Midrow Shank Bander Retrofits

By Garry Mayerle, P Ag

Conservation Agrologist

Midrow shank bander retrofits make low disturbance one pass seeding with anhydrous ammonia economical for two northeast Sask. producers.

Wayne Gronvold and his father Rollice have been direct seeding since 1992. They farm northeast of Tisdale on degraded black to gray clays. The seeding tool that got them into direct seeding was a Concord 12-inch spaced 4012. The packing tires were 6.5-inch bias-ply implement tires. They outfitted it with 6-inch Penetrator openers and ran seed and fertilizer down the same tube. Because of the heavy soils they farm and the adequate to more than adequate moisture usually found in this moist black soil climatic zone, they were getting away with single shooting. They were pushing the safe rates of seed placed fertilizer by applying 60 lb of actual N with oilseeds and 70 lbs with cereals.

However, they knew they were always over the limits of safe seed placed rates and not always getting on the amounts of N they wanted. It is important to emphasize that the only way these high seed placed rates worked for them is because of high seedbed utilization, soil with a heavy texture, and good moisture.

They had been researching and pricing different options for several years. They wanted NH_3 nitrogen but were uneasy about placing it on 24-inch centres. After talking to enough people with experience, they became convinced that these wide centres would be no problem. The next step was the right shank and they ended up with Jim Sowa's Valley Packing midrow bander. These shanks are 1.25-inch spring steel with a "pig tail coil" at the top. They have a long 1/2-inch wide knife bolted on the bottom. The knife has a steep angle of entry into the soil. The Gronvold's set these up to cut 3/4 to 1-inch deeper than the seed opener.

Their Concord is a 4-row machine but all the seeding shanks were already set up on the back three rows. Wayne thought since the banders would be 24 inches apart, they should be able to set them all up on the front row. But he says they experienced a steep learning curve. They found plugging problems in some of their tall cereal straw. The Gronvold's straight cut a lot of their cereals and they were leaving some of their heavy stubble at 16 to 18-inches high. This heavy, tall stubble was causing problems and where it was lodged, it was even worse. It was quite obvious what they had to do. But it is still tough to shut down a seeding drill in seeding time and move half of the midrow bander shanks forward 18-inches by adding extensions on the frame. Configuring them worked except for two in the centre around the hitch. Here they used some pig tail shanks from an old John Deere cultivator. These are a little lighter and shorter but otherwise don't look a lot different than the Valley Packing shanks.

After getting past this hurdle, the Gonvold's seem to be very happy with their system. Ammonia losses are nil Wayne says. Good moisture conditions with direct seeding and moist soil being thrown around by all of the shanks has virtually eliminated any losses. There was some freezing around the knife but the build-up was never wider than 1.5 to 2-inches. The knives are narrow and don't seem to pull heavy or do a lot of soil disturbance. Wayne likes the simplicity of a knife with no moving parts and a very reasonable cost compared to the coulter systems. Their air tank is about 200 bu. When they were using all dry fertilizer they were filling every 30 acres, now they are averaging 60.

This fall the Gronvold's decided to keep stubble height at a maximum of 14-inches. Wayne suggests fine tuning residue handling at the combine, possibly even making chopper adjustments for different residue conditions throughout the harvest season. They will aggressively heavy harrow all lodged stubble from now on. They are looking at other means to trap snow. Wayne says next year they plan to cut their Penetrators down to 4-inches wide, as they don't need all that spread and draft should be reduced.

Philip Mansiere is the main manager in a multi-generational mixed farm operating in the Meskanaw area west of Melfort. This last spring he converted a model 34-38 solid hitch Bourgault Commander single shoot cultivator airseeder with mounted gang packers into a one pass seeding tool. These tillage units were manufactured as 8-inch spaced four row cultivators. Philip converted his to a 10-inch spaced seeding machine with the seed shanks at the back. He then added midrow bander shanks on 20-inch centres (side-to-side) in front of the seed shanks. Some of these he put on the old front row. The rest he placed on frame extensions ahead of the original first row. He was aiming for two rows of bander shanks that would be a reasonable distance apart (front to back). With wheels and wing bracing, the ideal configuration was not always possible. Philip used Bourgault's narrow knock-on knife as the opener for all the shanks. He shimmed the banders down with 1inch steel plate between the frame and the shank.

To make a conversion like this work, you have to be very handy and ready to spend some time in the shop. Philip even had to reposition some of the cross members in the cultivator frame to make his spacing work. A good suggestion he has is to use a laser level to check for even shank depth. Besides the shop time and supplies, expenses to this retrofit were very low. All Philip had to purchase was the knock-on knife openers, and 9 shanks and he found a dealership who sold used shanks for $50 apiece.

Residue management is going to be crucial with mid row shank banders at 10-inch spacings. The Mansiere's heavy harrowed almost everything before seeding this spring. Philip says the one field they didn't harrow was a canola field cut two feet high and they had some plugging problems. They again harrowed everything aggressively last fall. Their harvesting system does not have the best residue management equipment. They run Versatile combines with no chopper but the rotary does chew up the straw a lot. Philip says that with a good residue management system like a Redekop system, he is sure they would not be harrowing everything. They also tine harrowed behind the drill this spring to give a better field finish. They used to do this harrowing after seeding with spoons to fill in seed rows. Now with the knives Philip feels that the seed rows are filled in and they are looking at cutting out the extra harrowing to save fuel expenses.

In the past, the Mansiere's have been seeding with 2-inch spoons and mounted packers on this single shoot Bourgault air seeder. If it was a dry year they would put as much dry fertilizer with the seed as they dared and then top dress. For the wetter years they would band fertilizer in an extra pass. The move to mid row shank banding was to get down to one pass seeding and put on N without concern for seedling damage. Philip says they are very happy with the way the system worked and with the crop they produced. Draft did not seem to increase and the gang packers with narrow poly wheels do a better job in combination with the knives than with the spoon openers. The one thing he wishes he had done differently is purchase carbide tipped openers.

Dollars for large capital expenditures no longer need to be a major obstacle to keep you from getting into one pass direct seeding. Take time to look around at what you have or is available cheaply. If you have time to spend in the shop, there is probably a retrofit idea that you can put to work on your farm!

Prairie Soil Carbon Balance Project

By Garry Mayerle, P Ag

Conservation Agrologist

The Prairie Soil Carbon Balance Project was initiated to provide scientific verification that Saskatchewan farmers who have adopted direct seeding are storing carbon (C) in their soil. After 3 years the project has shown conclusively that direct seeding does build soil C and therefore can significantly reduce greenhouse gases.

Soil carbon is directly related to soil organic matter, the stuff that gives our soil its colour, quality, tilth, ability to resist erosion, and nutrient supplying characteristics. An important conversion to remember is that soil organic matter is 58% carbon. Once this relationship is understood, it is easy to follow the progression from building this organic matter to increasing soil carbon. Scientifically acceptable results are important as we seek to get international powers to accept our soils as a recognized sink in the greenhouse gas issue.

The most prolific greenhouse gas is carbon dioxide (CO_2). A simple "chemical conversion" that shows this progression is that 1 tonne of C can produce 3.67 tonnes of CO_2. Plants take CO_2 out of the atmosphere and break it down into carbon and oxygen through the process of photosynthesis. The carbon is built into plant structures. In our annual cropping system, much of this plant structure is returned to the soil every year. Conservation practices, such as direct seeding, maintain more of this carbon in our soil than traditional production systems. The net effect is that carbon has effectively been taken out of the atmosphere and stored or sunk into our soils.

The Prairie Soil Carbon Balance Project involved 4 different levels of trials. The first level was evaluating the changes in soil carbon content as fields were converted to direct seeding. The goal was to establish enough sites to give good statistical data from every combination of soil type, texture, and regional climate in the agricultural area of the province. A second level of trials was designed similarly but also included a 2 to 10 acre strip of tilled field for comparison. The purpose was to reduce other variables that go along with low disturbance seeding. The third level was carbon measurements at different landscape positions on fields that had recently been converted to direct seeding. The 4^{th} level of trials compared carbon stored in land that had already been directed seeded for a number of years to across-the-fence-line conventionally farmed land. Another component of the project established later evaluated carbon storage on native and tame forages.

Four groups of people were involved in making this project happen. The first important group was the 150 cooperating farmers who had fields that fit the criteria for establishing carbon monitoring sites. This next group is the SSCA staff who found the producer cooperators, collected cropping histories and background information and the annual biomass samples at the level 2 sites. The more technical side of the project was carried out by theAgriculture and Agri-

Food Canada and University of Saskatchewan research scientists and technicians. Dr. Brian McConkey of Swift Current Research Station headed up a great deal of this section of the project. His crew did the research, soil testing, biomass determinations, and data manipulation. GEMCo, a consortium of Canadian energy producing companies, provided the part of the funding that got the project going.

SSCA was involved in 3 levels of the project. In the first 2 levels, 137 sites were established. The level 1 & 2 fields were chosen because they were being converted to direct seeding as the project was starting. Each level 1 site was a benchmark sampling site where 3^2 soil cores were taken to a 16^2 depth and divided into 4^2 segments, which were then analyzed to determine carbon content. The actual changes in soil carbon in each 4^2 x3^2 core would be very small. Think about a ½ tonne of C added to 26 tonnes already in the soil spread out over 43,560 sq.ft and the difference in C content in 6 3^2 soil cores looks pretty small.

The coring procedure was set up to eliminate as much as possible variables other than the effects of direct seeding that might change soil carbon content. The sites were 2m x 5m in size and were located in a level spot to minimize any effects of erosion. 6 soil cores were taken each time a coring was done. The initial cores were taken in the fall of 1996. They established the initial soil carbon content. After 3 years of direct seeding, they were sampled again in the fall of 99. Each site was located within 5 meters using a compass. The exact location of the microsite was determined with a buried electromagnetic marker. Measurements were also adjusted to account for soil density differences. The importance of these procedures is that any measured change in carbon in the core is based on direct seeding and not on natural variability due to a change in location.

The purpose of the 22 level 2 trials was to track and recognize soil carbon changes that come along with production changes associated with direct seeding such as reduced fallow, increased use of fertilizer, or rotation adaptations. There was more in depth analysis on these sites. 3 micro sites were established in each of the tilled and directed seeded treatments with approximately 40 plus meters between them. Within a week of swathing each year, square meter yield samples were taken at each of these sites. 3 samples were taken from each microsite. The samples were dried, weighed and threshed. Both yield and biomass comparisons could then be made between the tilled and direct seeded sites.

The 4th level of trials was completed near the beginning of the project. There were 9 paired farm comparisons in this level of the project. SSCA was involved in lining up these cooperators. Dr. McConkey reported on these comparisons at the last annual conference.

RESULTS:

One of the significant results is the yield comparison on the level 2 trials. See fig. 2. Direct seeding increased total biomass production as compared to the tilled site production. A significant amount of this increase was in above ground residue. The importance of this in terms of stored C is that direct seeded crops take more CO_2 out of the atmosphere and so have more C to store. As far as yield goes the trend was to a slight increase in yield although the figure was not statistically significant. McConkey states, "On these fields the farmers had crop rotations

involving a mix of grain legumes, oilseed, and cereal crops. Direct seeding provided a general productivity advantage to all these crops."

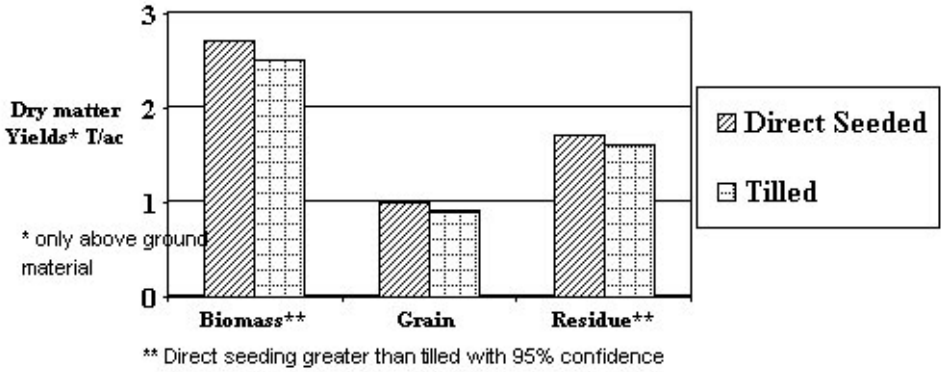
Gains in soil C may not be profitable for producers yet but the likelihood of a day when they will be rewarded for stored carbon seems imminent. On averag,e across the province, soil to a depth of 12² gained ½ tonne of C per ac during the first 3 years of direct seeding.

Regional differences in stored carbon were most obvious between the drier and the wetter areas of the province. The drier area can be characterized as semiarid. This is open prairie area where grasses predominated in the past. In these areas an average of 1/3 of a tonne of C /ac was stored in the top 12² of soil during 3 years of direct seeding. In comparison in the subhumid area of the parkland where trees flourished in the past almost 2/3s of a tonne of C /ac was stored. See table 1. The expectation is that as soil clay content increases more C should be stored. In this project soil texture did not play any clear role in the amount of soil C stored. It is important to remember that this data is just from the first three years of a new management practice.

TABLE 1Average soil C change during first 3 years of direct seeding for all level 1 & 2 sites dividing province into wet and dry soil climatic zones.

Climate	Number of sites	Mean Soil C Change Tonnes/ac
Semiarid	61	0.33
Subhumid	69	0.63
All	130	0.49

One of the most significant results of the project is the demonstration of a method for confirming soil C changes with the introduction of new management practices that is not cost prohibitive. Setting up this quantification and verification project has strengthened support for including soil sinks on agricultural land as a method of reducing the concentration of CO_2 in the atmosphere.



** Direct seeding greater than tilled with 95% confidence

Figure 1 Average 97-99 Level 2 Project Yields

McConkey et. al.

Executive Manager's Report

By Blair McClinton, PAg

SSCA Executive Manager

As I mentioned in the last Prairie Steward, there is reason for optimism within SSCA. It became apparent that future-funding arrangements will be geared towards specific projects. Over the past few months, SSCA has been working with potential industry partners to develop new programs to continue to increase direct seeding cropping systems within Saskatchewan.

The SSCA finalized a new partnership agreement with Monsanto. The announcement for funding from Monsanto at the direct seeding conference allows SSCA to build on its existing programs, jointly funded by SSCA and Saskatchewan Agriculture and Food. The new agreement with Monsanto is to develop a targeted extension program to focus on areas of low adoption and to promote low cost direct seeding strategies. The objective of this work is to continue to increase the adoption of direct seeding in Saskatchewan.

Have you seen Monsanto's new reduced tillage marketing strategy? Over the past couple of months they have been running a low-key campaign promoting reduced tillage. Part of this marketing campaign is also their new web site www.reduceyourtillage.com . The focus of these ads looks at the many economic benefits producers find when they switch to direct seeding.

Monsanto is also working with producer groups like SSCA to promote the positive short-term benefits of direct seeding practices. Things like reduced fuel use, increased yields, producer's ability to manage time, labour and equipment more efficiently are all highlighted. Both farmers and researchers have proven these economic benefits of adopting a direct seeding system.

Good luck with your 2001 crop.

Monsanto Renews Partnership Commitment to the SSCA

The Saskatchewan Soil Conservation Association (SSCA) has entered into a new three-year partnership with Winnipeg-based Monsanto Canada. This partnership will provide the SSCA with $150,000 annually to encourage the adoption of sustainable reduced tillage cropping systems aimed at providing farmers short-term economic gains and rebuilding soil quality through Saskatchewan.

"The farmers we've worked with across Saskatchewan have found that reduced tillage initiatives help them save time and money, and improve productivity on their farms," said Howard Heinrichs, Reduced Tillage Marketing Associate of Monsanto Canada."If we can find a way to support the efforts of SSCA, help farmers, help the environment and also meet our business goals at the same time, then we have a win-win project."

In addition to the focus on farm management practices, Heinrichs added that the partnership will allow SSCA to maintain their staff of field agrologists and give improved focus and resources to SSCA's efforts to share information with farmers throughout the province. "For us, the opportunity to support local community initiatives and the farm sector in Saskatchewan is a big plus".

Blair McClinton, Executive Manager of SSCA agreed. "The program we have jointly developed is a good opportunity to improve our outreach to farmers and really show them they can practice soil conservation techniques on their farm, without increasing costs or investing in new, expensive technologies," he said. "The additional resources and focus will also allow us to improve our communication with farmers, which in turn, should increase adoption of soil conservation techniques among farmers."

The three-year program's three major focus areas include:

- targeted technology transfer of sustainable farming systems into areas of the province with low levels of adoption;
- the development of strategies for low disturbance seeding under constrained farm economics;
- the development of an integrated communication strategy on immediate benefits of reduced tillage to improve awareness and increase adoption in all regions of the province.

Reduced tillage practices provide farmers, the environment and society in general with significant and long-term benefits such as reduced soil erosion, improved water, air and soil quality, increased farm profitability, and improved wildlife habitats. Since 1987, SSCA has been a major player in promoting sustainable farming practices, including reduced tillage. Adoption of reduced tillage throughout the province, however, has not been uniform. This is generally due to a lack of resources dedicated to creating awareness and understanding of the tangible benefits of

reduced tillage practices and difficult farm economics in recent years. The goal of the SSCA-Monsanto venture is to provide the resources to increase the adoption of reduced tillage.

To Fertilize or Not To Fertilize - Is That the Question?

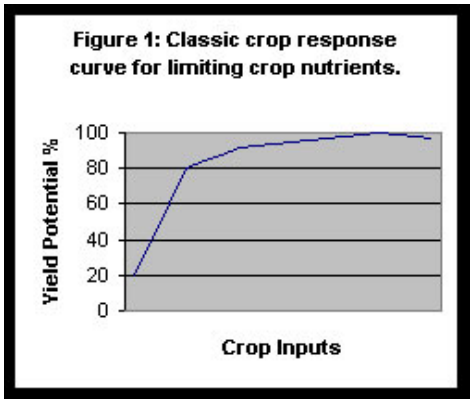
By Tim Nerbas, P.Ag.

Conservation Agrologist

With a depressed farm economy, an increase in the cost of nitrogen fertilizer was the last thing that producers needed. Once again tight economics are forcing tough decisions. But before you decide to take drastic fertilizer measures, you should know what the cost of a hasty decision could mean to your bottom line.

This winter as I visit dealers and producers, I have been amazed at the number of producers considering zero fertilizer inputs for 2001. What concerns me is this decision is based merely on the rise in the cost of nitrogen fertilizer. Yes, the price of N is up. Some predictions made in late February put the cost of N this spring at 42 cents to 49 cents per pound. Those prices are scary. But let's consider a few options.

First of all, a **soil test** will go a long way toward uncovering the base level of nutrients in any given field. I know, I know - this is when most producers tune out and decide they know what is best for their fields. But without some base line data (and a **soil test** is the best way to get this information), it is impossible to know where your field lies on the response curve (figure 1).



By knowing a field's position on this curve you can estimate its response to a given combination of inputs. For every dollar invested, you want at least an equal dollar returned. But generally, "a return of $1.50 for the last dollar invested allows for the risk of less than optimum conditions in the use of fertilizer." (Fertilizer Economics, Sask Ag and Food).

The lower the level of residual nutrients in the soil, the greater the crop's response to an increase in a deficient nutrient. In order to meet 100% yield potential, all essential nutrients must be available in optimum quantities. As shown in the classic response curve (figure 1), the bottom

axis represents increasing levels of required nutrients. If any single input (for example nutrients, water, heat) is less than optimum, the curve will peak at a yield level far below 100%.

So what does this mean? If you have high levels of residual soil nutrients, in particular N, you may not require as much fertilizer N to attain a target yield. The key is to know what those residual soil levels are so you can determine what inputs are required to attain yield targets.

When you know the level of fertilizer required, you can determine the cost (the bad news). At this point you can reset your target yields lower (if the news is really bad). By doing these calculations you can modify your input dollars and know what yield to realistically expect from those given inputs.

So as you grapple with these tough decisions, it may be beneficial to do your homework first (get a **soil test**) and see how far those stretched fertilizer dollars can take you in 2001. Good Farming.

Swine Manure Injection Demo

by Bryan Nybo P Ag and Darren Steinley

Wheatland Conservation Area Inc.

Over the past few years, the Wheatland Conservation Area has been working with the Prairie Agriculture Machinery Institute (PAMI) on a Swine Manure Injection project north of Swift Current. With a rapid increase in hog production in the area the need for environmentally sustainable manure management is required. This has led to producer and public demand that swine manure be applied to the soil with the least possible nutrient escape and odour. PAMI has worked to develop technology, which addresses these concerns and, along with the Wheatland Conservation Area, realized the need to further examine the agronomic issues that still exist with the use of swine manure as a fertilizer.

PAMI has determined that the most efficient use of swine manure is achieved when it is injected into the soil on as narrow a row spacing as possible. This conflicts with the philosophy and cultural practices in direct seeding and zero tillage systems. The farmers involved with these tillage systems require a low disturbance method of manure injection. Some low disturbance opener systems are already available but farmers are generally unaware of them. In this study, Wheatland will determine the proper amount of manure to applied, and if enough manure can be supplied in one year to fulfill the nitrogen requirements for a number of years without significant losses. The public is still unaware as to how little odour is produced in a properly configured manure injection operation and this information is equally as important to dissimilate as the agronomic information.

The swine manure treatments included a low disturbance disk at rates of 3000 gpa, 6000 gpa, 9000 gpa, and a high disturbance sweep at 3000 gpa, 6000 gpa, 9000 gpa. The urea treatments were applied at 50 lbs/ac, 100 lbs/ac, 150 lbs/ac of actual N. Urea was applied with a Flexi-Coil 5000 with the stealth opener on 9 inch rows. Two checks were also used, a high disturbance and a no disturbance check. No fertilizer was applied to the checks. These treatments were applied in the fall of 1998. Kyle durum was seeded on May 3rd 1999 and again on May 9th, 2000 at 80 lbs/ac with an Ezee-On air drill with stealth openers on 10-inch spacing. No additional fertilizer or manure was applied to the plots in either year, in order that we could determine the amount of nutrient carried over to the second year of production. The three main study parameters were yield, protein, and 1000 seed weights.

Major Findings

Year 1 (1999)

Protein was increased by using higher levels of hog manure, as was the case with the urea. In all cases, the protein levels in the low, medium, and high rates of swine manure met or exceeded the protein levels in the low, medium, and high rates of urea, respectively. In regards to 1000 seed

weights, only small differences could be found between the treatments. The most dramatic results showed up in yields, where in all cases the hog manure treatments out yielded the urea-based fertilizer. Higher levels of hog manure or different types of disturbances did not necessarily translate into a higher yielding crop.

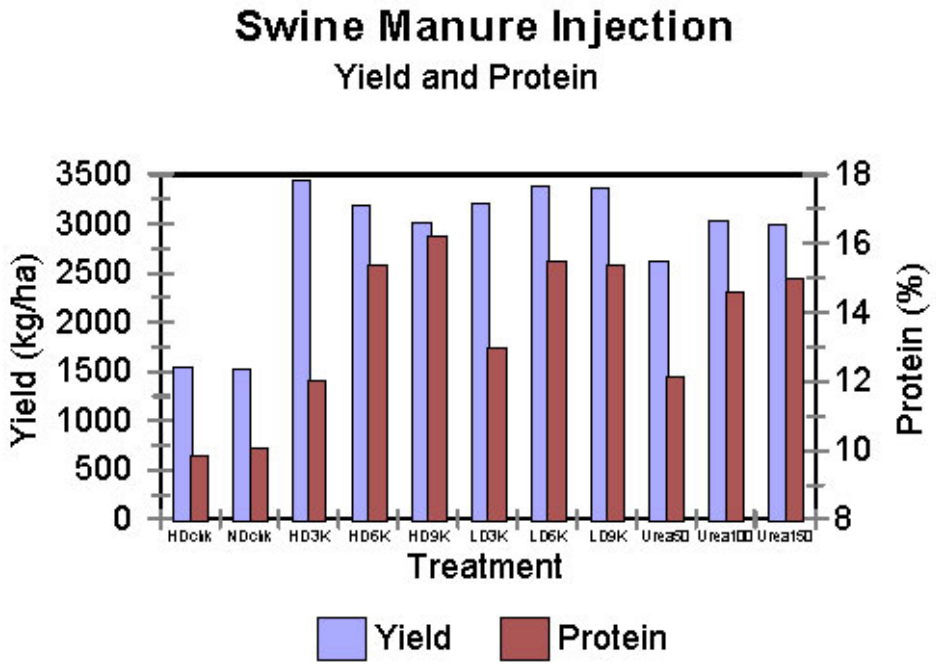


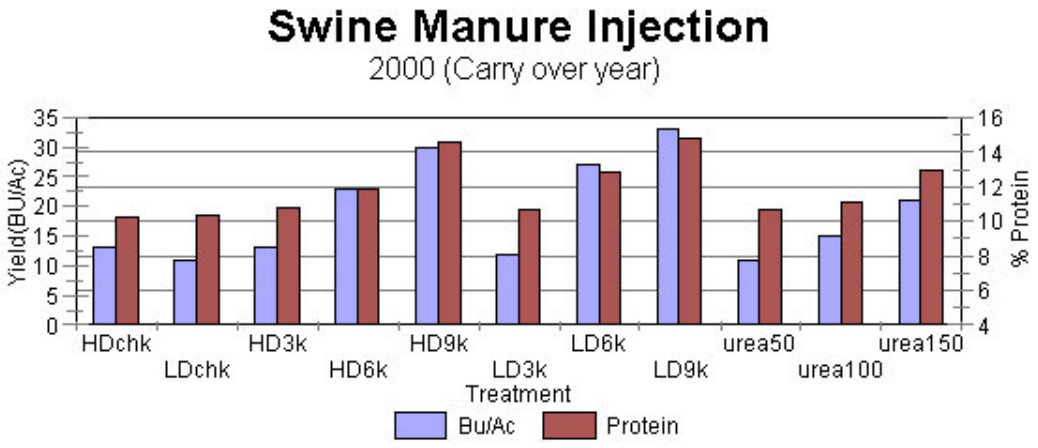
Table 1. Yield

Treatment	Yield (bus/ac)	
Low Disturbance 9000 gpa	33.3 a	
High Disturbance 9000 gpa	29.7 b	
Low Disturbance 6000 gpa	26.5 c	
High Disturbance 6000 gpa	23.1 d	
Urea 150 lbs/ac	20.5 e	
Urea 100 lbs/ac	15.1 f	

Table 2. Protein

Treatment	Protein (%)
Low Disturbance 9000 gpa	14.8 a
High Disturbance 9000 gpa	14.5 b

Urea 150 lbs/ac	12.9 c
Low Disturbance 6000 gpa	12.8 c
High Disturbance 6000 gpa	11.9 d
Urea 100 lbs/ac	11.1 e



Conclusion

It appears there is a great nutrient potential for swine manure when injected directly into the soil. Overall, the best yields and protein were observed when manure was injected using the low disturbance type opener. The crop grown in the manure-injected plots were observed to have wider, greener leaves with less disease than plants grown on the check. This enables the plant to achieve greater yield potential. As well as the agronomic advantages to injecting manure, there are environmental benefits, specifically concerning odor management. If not injected, the strong, foul smell of swine manure can affect the lives of neighbors for miles. However, as shown at our field day, one can comfortably stand next to the implement while the injection process is taking place. This has significant implications on issue of manure management and disposal.

2000 Opener-Rotation Study Update

Eric Oliver, P Ag

Conservation Agrologist

2000 was the third in a four-year study looking at varying levels of soil disturbance of four single shoot openers (angle disc, knife, spoon and sweep) on four different crops and the effect of the level of soil disturbance on weed densities. The site is located at Aneroid, one hour southeast of Swift Current, in the Dry Brown Soil Zone. One of the unique features of this study is that each opener seeds a particular plot throughout the study. Although the crops on that plot rotate in a cereal/broadleaf rotation, a plot seeded with a particular opener is seeded with that opener through the four years of the study. In this way, we are able to observe changes in weed densities over this study period. In addition, there are glyphosate pre-seeding burnoff treatments and non-burnoff treatments to see if there are any advantages to this practice, especially on high disturbance openers.

There wasn't a lot of difference in crop establishment between the four openers with chickpeas (Figure 1). However, with the peas, barley and durum, the sweep generally resulted in the lowest crop establishment.

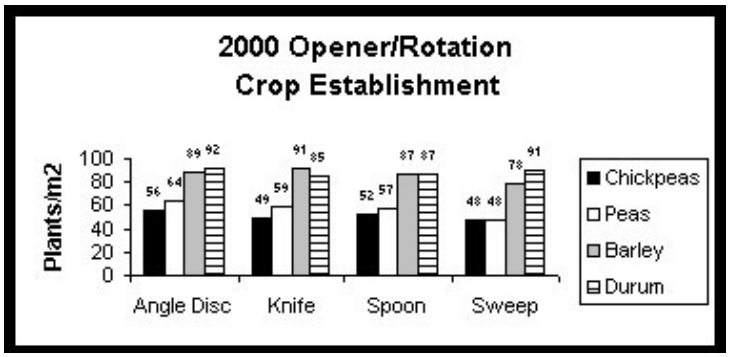


Figure 1. Crop establishments 2000, Aneroid.

The trend continued in 2000 as it has over the previous two years in that the angle disc resulted in the lowest weed density compared to the other three openers (Figure 2).

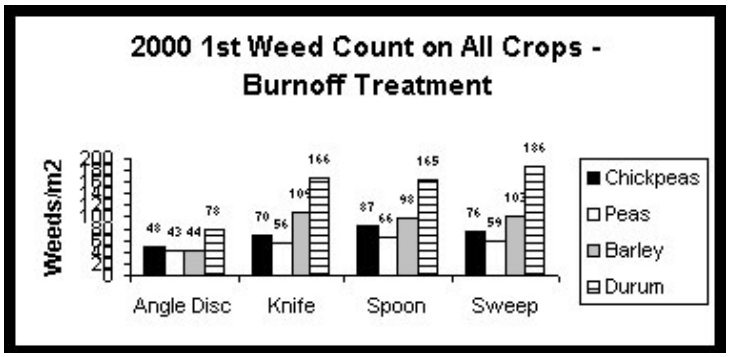


Figure 2. Weed density of first weed count, Aneroid 2000.

The knife appears to be starting to have lower weed densities compared to the first two years when compared to the densities with the spoon and sweep. Another trend developing is that the sweep and spoon tend to have the highest weed populations in most of the crops in this study. Another trend in 2000 was the higher the disturbance the opener is, the higher the broadleaf weed population (data not shown) in barley and durum. An interesting development occurred on the barley with all openers. There were very few broadleaf weeds, particularly kochia and wild buckwheat, in the barley plots. This was a bit of a surprise except when I looked back at the records and realized that the barley was seeded on field pea stubble. In 1999, the field pea plots had an in-crop application of Odyssey. It was quite apparent that there was some residual effect of that application on broadleaf weeds in 2000.

With respect to yield, for all crops except durum, the yield decreased with increased soil disturbance caused by the opener (Figure 3). There seemed to be much more variability with the durum yield between the openers.

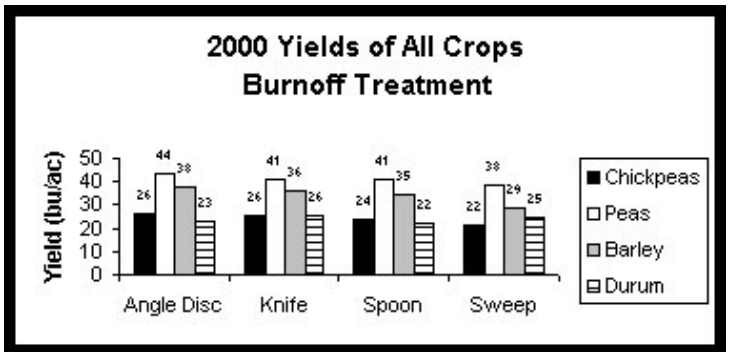


Figure 3. Yields of all crops using the four openers, Aneroid, 2000.

In summary, it appears that the angle disc results in significantly lower weed densities and is generally at the top end of the yield compared to the other three openers. However, the knife is now starting a trend of lower weed densities as compared to the previous two years. It appears that it takes the knife a few years before weed densities are lowered and yields are close to those of the angle disc. I suspect that this trend will continue in 2001. The sweep is showing a trend of

higher weed densities and lower yields. The advantages of the high disturbance opener tend to be in the very short term and are not sustained over several years. I would like to emphasize again that the angle disc is like any other opener and is not appropriate for all regions of the province or soil zones. It does appear to present some major advantages in the Brown and Dry Brown Soil Zones.

Narrow Seed Rows, High Rates of Urea: A Recipe for Disaster?

By Juanita Polegi, P Ag

Conservation Agrologist

Here's the situation: A farmer wants to move into a low disturbance direct seeding system. He's using knives on his air seeder. He wants to put high rates of 46-0-0 down with the seed. He knows that the germinating seedlings can be damaged by "fertilizer burn." If the soil conditions aren't perfect, that burn could seriously affect the establishment of the stand. What to do?

Until recently, the farmer had a few options available. He could either band the nitrogen prior to seeding, dribble band it post-seeding or cut the amount of nitrogen applied at seeding and then run the risk of not having sufficient N available throughout the growing season. Now there is another option, Agrotain, produced by IMC. The cost is 10 cents per pound over the cost of the N (as of spring 2000).

Agrotain is a urease inhibitor. That means that it slows the activity of the enzyme urease, which is what converts urea into ammonia. It's the ammonia that causes seedling burn so as the urease activity slows, the conversion of urea to ammonia slows. That in turn, allows more time for the moisture and leaching to move the urea away from the seed row. As the urea moves away from the seeds and is converted to ammonia, the ammonia will be less concentrated near the seeds. The lower concentration of ammonia in the seed row will ultimately reduce the fertilizer burn on the seedlings.

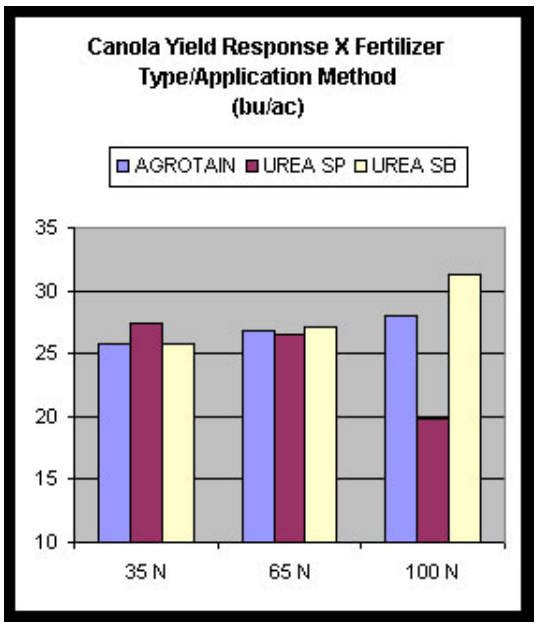
When the white urea granules are sprayed with Agrotain, they turn a pale green. They are handled in the same manner as the 46-0-0 and flow pretty much as the plain white granules.

Last spring, Ernie Patrick of SA&F and I seeded some canola plots at ECRF on May 11. Using the farm's Seed Hawk, its 2-knife system enabled us to sideband the fertilizer or put the fertilizer with the seed down one knife. We applied 3 rates of urea based (46-0-0) fertilizer: 35, 65 and 100 lbs/ac actual N. Each rate was seed placed, sidebanded or had been coated with Agrotain. The soil moisture was more than adequate and a snowstorm rolled in at the end of the day.

Plant counts were taken June 16. As the table below shows, at the 30 lb rate, there was no real effect on the # of plants per metre^2 row or their development. All treatments fell within the target of 80 - 180 plants per m^2. At the 65 lb rate, we start to see some effect of the higher N rates on the seed placed N and seed placed N coated with Agrotain. The two treatments were below the target populations, while the side banded N met the target. (We're not sure why the # of plants dropped between the 35 and 65 lb N side banded treatments. We didn't expect that, especially when the number of plants rebounded at the 100 lb N side band treatment). The high rate of seed placed N seriously affected plant numbers and development. The number of plants per metre^2 in

the 100 lb N seed placed treatment was one third of the sidebanded treatment. The Agrotain helped the numbers somewhat in that the number of plants per metre^2 in the seed placed Agrotain treatment increased from one third to one half the number of plants in the side banded treatment.

Treatment	# plants per metre^2 row	Plant development
30 lbs N seed place	84	4 leaf
30 lbs N with Agrotain seed place	106	2 - 3 leaf
30 lbs N side band	106	3 - 4 leaf
65 lbs N seed place	65	2 leaf
65 lbs N with Agrotain seed place	68	cotyledon - 1 leaf
65 lbs N side band	84	2 leaf
100 lbs N seed place	29	Cotyledon - 3 leaf
100 lbs N with Agrotain seed place	52	1 - 2 leaf
100 lbs N side band	100	3 - 4 leaf



The damage caused by the high rates of seed placed fertilizer carried through to harvest. As the graph below illustrates, significant drops in yield occurred at the 100 lb N rate. The side banded N treatment yielded 31.2 bu/ac while the seed placed fertilizer with Agrotain yielded 28 bu/ac and the seed placed N dropped to 19.8 bu/ac.

At high rates of seed placed N, we expect to see fertilizer damage, especially when the seed and fertilizer are in such a narrow band as created by the knife. What was surprising from this trial was that it took excessive rates of N before that damage was significant. The excellent soil moisture most likely explains this at the time of seeding and the naturally high fertility of the soil in the Canora area. If moisture had been limited, especially during seeding, or the trial had taken place at a location where the organic matter content of the soil hadn't been so high, we would most likely see damage at lower rates of N and ultimately, lower yields. And at sites where the soil fertility was low, the 30 lb N/ac rate didn't yield anywhere near the higher rates, as there just wasn't enough N available to push it through to harvest.

Eric Oliver, Conservation Agrologist with SSCA, observed that if the Agrotain sits in very dry soil for a week or two, it will volatalize leaving the pure urea behind. This condition occurred at both Kindersley and Clavet. For this reason, Agrotain hasn't yet been recommended for use on canola, as the canola isn't nearly as forgiving as wheat.

For single pass seeding operations, double shooting is the ideal. If the seeding equipment you have won't enable you to do that, you must decide if you're going to move to two passes, one for banding the fertilizer, the other for seeding, or if you're going to single shoot. If you're single shooting, the narrower the seed row, the higher the risk of fertilizer damage to germinating seedlings. As seed placed fertilizer rates increase, so does the risk of damage. An option may be to obtain urea fertilizer coated with Agrotain. The Agrotain won't completely prevent seedling damage but it appears that it will help to minimize the damage.

Some of the information for this article was provided by Dr. Cynthia Grant of the AAFC Brandon Research Centre.

So, Whatever Happened to that Alfalfa - Canola Project at ECRF?

By Juanita Polegi, P Ag Conservation Agrologist, SSCA

and Ernie Patrick, P Ag Extension Agrologist, SA&F

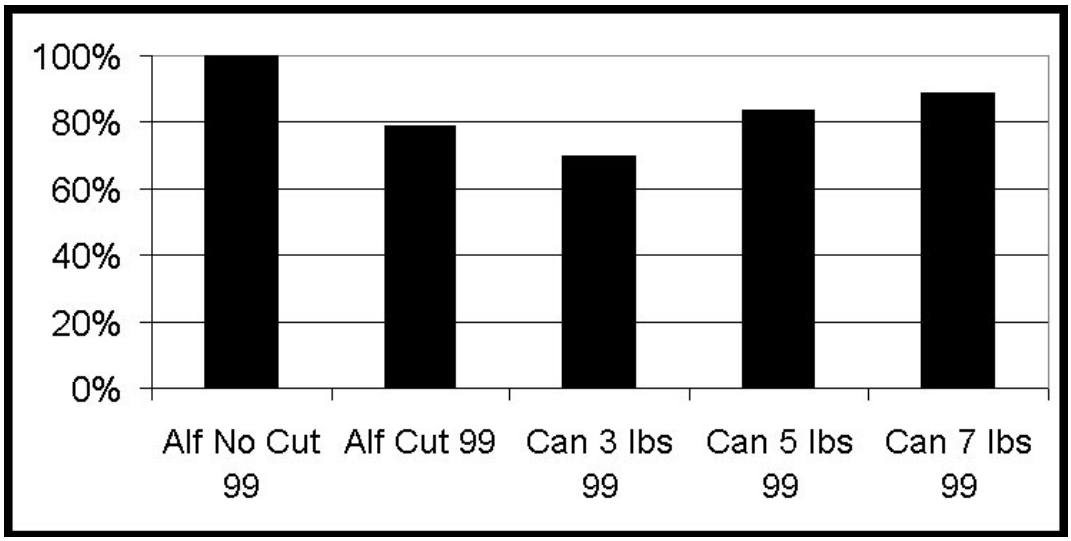
Alfalfa was underseeded to Smart canola in the spring of 1999. All the alfalfa was seeded at 8 lbs/ac while the seeding rate of the canola was 3 lbs, 5 lbs and 7 lbs. Three alfalfa treatments were seeded without any canola. Roundup was applied to all treatments pre-seeding at a rate of 1.0 l/ac and Pursuit was applied in-crop at a rate of 0.085 l/ac. The first pure alfalfa treatment was allowed to grow the entire season. The second treatment had one cut taken in the summer of 1999 and the third treatment was left to grow and then a dormant cut was taken. The **canola yield** averaged **50 bu/ac regardless of canola seeding rate**.

The alfalfa in all the treatments survived the winter well. Growth began early and the alfalfa in the treatments that had been cut either through mowing or the harvesting of the canola, soon caught up to the treatment that had been allowed to grow without any cutting or mowing in 1999. The first cutting of alfalfa occurred July 31 and the second cut was taken August 22. The average of the 2 cuttings from each treatment appears in the graph below. The difference in yield is not significant.

Yield of alfalfa in 2000 cut in year of establishment vs. that not cut

In this test, the alfalfa proved not to inhibit the yield of the canola. Cutting in the year of establishment did not appear to affect alfalfa yields the following year. It should be noted, however, that the moisture levels in both years were adequate for crop and hay production. It is unclear if, in years of insufficient moisture, the establishment of the alfalfa would be adversely affected by the canola or if the mowing and cutting in the year of establishment would affect alfalfa production in the second year.

This project was made possible by funding from BASF and the assistance of staff from the ECRF, SA&F and SSCA.


100%
80%
60%
40%
20%
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Alf No Cut 99
Alf Cut 99
Can 3 lbs 99
Can 5 lbs 99
Can 7 lbs 99

President's Message

Don Kelsey.

SSCA President

As this is my last report to members of SSCA as president, I would like to take this opportunity to thank all of you for the support you have given over the past year. It has been a privilege to have the time to serve on the executive of your board. Most of the time spent on SSCA has been more of a learning experience than what I as an individual bring, but together, your board has a great diversity of experience.

Though the past year was one of looking back at our strengths and refocusing on our purpose, the issue of greenhouse gas emissions, as you know, has been one the SSCA board has been prepared to spend both time and funding on. The importance of this issue and how we as agriculture producers influence the structures of compliance, will have a major bearing on whether we benefit or not from the efforts we have made as stewards of the land.

The funding commitment received from our provincial government last year has been the key in SSCA's ability to carry forward til this February's conference announcement of a new agreement with Monsanto and hopefully a further announcement of a project with Ducks Unlimited in April. I would like to thank all our partners for the confidence shown in our organization. As outgoing president, I would be remiss not to mention on of the main pillars of your SSCA, our staff. As I have mentioned before, their knowledge and list of contacts is unsurpassed by anyone and I would like to thank them for their support this past year.

Good luck this spring and may economic fortune smile as we already work in the best industry a person could hope for.

Fertilizer Response of Wheat on Different Stubble

By Brian McConkey, Bryan Nybo, and Darren Steinley

Wheatland Conservation Area Inc.

The results from the last three years at the AFIF Swift Current spoke site have shown that the yield of AC Barrie hard red spring wheat on pea, lentil, or Kabuli chickpea stubble has averaged 5 to 8 bushels per acre more than AC Barrie on durum stubble (see Figure 1). This yield benefit after a pulse crop occurred across a range of N fertilizer rates -- when applying less fertilizer than soil-test recommended (25 to 30 lb/ac of actual N), applying soil-test recommended fertilizer N (40 to 45 lb/ac of actual N) or applying more fertilizer than recommended (65 to 70 lab/ac N actual). Wheat grain protein has also averaged 0.5 to 1 percentage points higher on pea or lentil stubble than on durum stubble (see Figure 2). Again, the protein benefit after a pea or lentil was about the same across a range of rates of N fertilizer. Wheat grain protein after Kabuli chickpea was about the same as after durum except at highest N rate when protein after chickpea was about a percentage point higher than after durum. At the lowest N fertilizer rate, the AC Barrie yield and protein was about the same on oriental mustard stubble as on durum stubble. However, at soil-test recommended or higher N rate, AC Barrie yielded 2 to 5 bu/ac more and had 0.2 to 0.5 percentage points higher protein on mustard stubble than on durum stubble. However, the AC Barrie did not always do better on the stubble of a broadleaf crop than on cereal stubble. When planted on coriander stubble, the wheat often did worse than on durum stubble, particularly at high N fertilizer rates.

Durum (Kyle) and Canadian Prairie Spring wheat (AC Karma) were very similar to hard red spring wheat with regard to their relative yield and protein performance for the different stubble types and for different N fertilizer rates. Yield and protein were highest on pea and lentil stubble and lowest on coriander and durum stubble. If the yield was higher on mustard and chickpea stubble than the protein was usually similar to that on durum stubble. However, if the yield was the same on mustard and chickpea stubble as on durum stubble, then the protein was higher.

The yield and protein increase for each additional amount of N fertilizer applied was similar among stubble types for durum and both wheats. Hence, there is no reason to reduce N fertilizer to below soil-test recommendations for pulse stubble. In fact, considering protein premiums, under fertilizing wheat on pulse stubble can be a poorer decision than under fertilizing wheat on other stubble. For example, in 1999 and 2000, we did not capture the protein premium for durum on durum stubble even with 70 lb/ac of actual N. We only attained high-protein durum when it was grown on pea or lentil stubble and fertilized to soil-test recommendations or better.

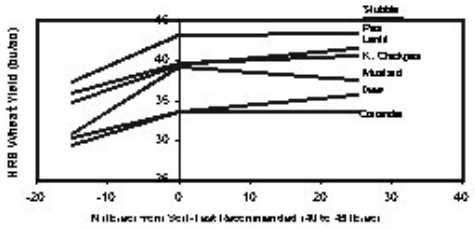

Figure 1. Average yield of AC Barrie for 1998 to 2000 at the AFIF Swift Current spoke site as affected by previous stubble and nitrogen fertilizer rate.

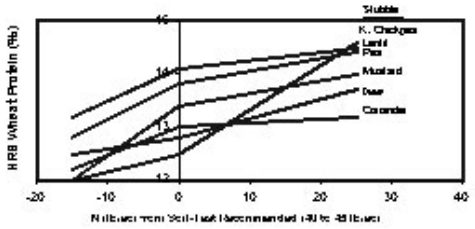

Figure 2. Average protein of AC Barrie for 1998 to 2000 at the AFIF Swift Current spoke site as affected by previous stubble and nitrogen fertilizer rate.

The SSCA Staff Want to Know....

Did you hear about the SSCA Staff member that walked into a farmer's quonset and asked the air seeder, "Hey! What's a nice retrofitted air seeder like you doing in a place like this? I could make you a star!"

If you haven't heard that one before, not to worry, no one else has, either, but it caught your attention, didn't it?

Seriously, the Staff are always on the look-out for examples of machinery that you have changed to make work for you. We know that farmers are always interested in what other farmers are doing or have done and we'd like to be able to show them what you've been doing. If you have retrofitted an air seeder or modified a sprayer or combine chopper and spreader, we would like to know so we can pass that information on to others.

If you call us, one of us will come out and take some photos of your retrofits or modifications. Ideally, we'd like to visit you at a time when the implement is working in the field so we can observe such things as field finish and spread pattern. We'll ask you a lot of questions and try to do an article for a future edition of the Prairie Steward. The photos will likely be made into slides and featured in our many presentations we give throughout the winter. And if the timing is right and you agree to it, we'd like to be able to stop at your farm with a group of farmers on a tailgate tour so they can talk to you directly.

But we can't tell the world about your ingenuity and resourcefulness if we don't know about it. So give us a call and get your machinery out of the quonset and into the pictures!