The Newsletter of the Saskatchewan Soil Conservation Association

Issue 33 -- Summer, 2001

Low Budget Residue Management for Direct Seeding

By Garry Mayerle, P.Ag.

Conservation Agrologist

Do you want to get into direct seeding but are having a hard time seeing over the mountain of dollars needed to make a system work? Following are some low budget ideas that, along with some shop time, would help set up residue management in your seeding system.

Ed Beauchesne and his wife Marguerite are veterans at direct seeding. They farm at Albertville northeast of P.A. Of course they grow pretty big straw crops some years. When Ed started direct seeding he was threshing with a John Deere 7721. He beefed up the straw chopper on this combine by bolting 2 swather knife sections on the end of each hammer. He says they don't cut his straw up too fine. He likes to see short pieces if straw that flow easily through his seeding tool, and insulate his ground but don't form such a thick mat of chaff that they seal out the heat of the sun. He also says this retrofit gave him more consistent spread whether the straw was tough or dry. The hammers have a little more weight so they have more momentum in tougher conditions and don't pull back. In fact Ed says he seeded canola and flax into his heaviest cereal straw this spring with great success. The area north of P.A. had very high rainfall last growing season so there was certainly plenty of residue for them to manage!

The Beauchesnes have out grown their 7721 by one or two models and tried some of the newest and best straws chopper options the manufacture had to offer but have come back to this simple retrofit chopper. They have the standard chopper on a 9610 John Deere. They also straight cut and swath only 25¢ wide. Ed has removed the hammers and cut them off so that they are just long enough to bolt on a standard swather knife section on either side of the hammer. The unit will end up with the same clearance from the chopper housing as the original hammer. He bolts the sections on with 2 of the same bolts and locking nuts the sections would use on the swather knife. The bolts are in a line at right angles to the long direction of the hammer.

One of the big considerations in this procedure is to keep the chopper balanced. Ed keeps the hammers in triplets as each set of 3 comes off in its line around the rotor. After Ed cuts the hammers and adds the knives, he uses his grain moisture meter weigh scale to weigh each set of 3 retrofitted hammer units. He wants each set of 3 to match the weight of the other sets. He spot welds washers to the hammers to adjust the weight. Ed says his chopper comes out balanced after this procedure. A professional balancer who has checked out Ed's chopper says that the idea is to work from the outsides of your rotor to the center keeping each pair of sets equal in weight. The idea is you take the 2 outside sets of 3 hammers and get each set weighing the same. Then move in to the next set and do the same till you are at the center. Of course it is still a good idea to get your chopper balanced. Plan ahead as there are companies that have on-site balancing to check out your workmanship.

Ed says that he should be able to get about 3000 acres out of each side of the knife sections. One of the things Ed does is to retract the stationary knives when combining peas. Usually if you are combining peas the straw is dry enough to shatter quite well without the stationary knives and your chopper will stand up much better to the odd little stone or lifter you might put through the combine.

Ed originally retrofitted his chopper after seeing what his neighbour Roger Godin of Henribourg had done with his TR 86. Roger started out with a similar set up on his hammers as Ed has. He found that he could only get about 700 acres before he needed to turn the knives around so he has now removed the stationary knives and put 4 knife sections on the end of each hammer with a 3/16² spacer between the outside and inside knife. He says this certainly gives him more acres before he needs to flip the knives although straw chopping is not quite as good. He also recommends using L9 bolts to fasten the sections to the hammer as they stand up better to rocks he puts through the combine. There certainly is some danger that one of these knives will fly off. No one should ever be behind or in the spreading pattern of the chopper.

Many direct seeders in the northeast region of the province have included a heavy harrow as part of their residue management. The Beauchesnes have found that they have gotten away with a set of diamond harrows. Ed says he pulls his diamond harrows at 10 mph and they do quite an adequate job of spreading straw. He stresses that they have a good enough system on the combine that they do not harrow every field but if they see that the straw is not spread to their satisfaction they will run over the field with the diamond harrows right behind the combine. They will even shut the combine down if necessary to do this harrowing.

It is hard to imagine that there is a set of diamond harrows heavy enough to stand up to 10 mph but Ed says he does have a good bar with the supporting brace on top. He is prepared to fix up broken chains and whatever else is necessary after every field. And he is very happy with this low budget straw spreader.

The only other major consideration in your residue handling system is a chaff spreader. If something new is out of your budget there are a number of options for some type of spinner to spread that chaff to either side of the combine. These ideas should keep anyone from using the excuse that "residue management costs too much to CONSERVE MY SOIL".

Don't Fix What Ain't Broke

By Juanita Polegi, P Ag

Conservation Agrologist

In this the era when products are constantly being touted as "new and improved," some products don't need to change. Take for instance, the theme song from Hockey Night in Canada; the colour of the paint on John Deere equipment; Crown Royal in a velvet bag; and 2,4-D.

Like the others on the list, 2,4-D has been around a long time. In fact, in a weed control book published in 1961, it's stated that 2,4-D first appeared in the literature in 1941 and that by 1944, the USDA was reporting that 2,4-D applied to lawns did a good job of controlling dandelion, plantain and other weeds. For nearly 60 years 2,4-D has been whacking weeds.

If you thumbed through the Weed Control Guide this spring while filling the sprayer, you may have noticed the list of available herbicides continues to grow. In fact, there are over 100 products listed in the index. That makes for a lot of herbicide choices. For many reasons, having a variety of chemistries to choose from for weed control is good. But it's important to keep 2,4-D in your arsenal against weeds, especially for controlling seedlings of winter annuals and weeds such as dandelion.

During the long weekend in May, I left a couple of casseroles in the fridge and hubby on the tractor and then loaded the kids into the car and headed northwest along the Yellowhead. The further along #16 you went, the drier it got but that didn't seem to deter the dandelions. The ditches were pretty yellow the entire route. The dandelions seem to be thriving everywhere - in ditches, lawns, stands of forage and annual crops.

While there are a few in-crop herbicides that will provide control of dandelion, most achieve only suppression or top-growth control. To get the big old granddaddy dandelions, an application of pre-harvest Roundup is pretty effective. But even that treatment can be beefed up by an application of 2,4-D late in the fall, just prior to freeze-up. In the years 1992- 94, Dr. Doug Derksen applied 1.0 l/ac pre-harvest Roundup to lentils. Half the lentils each year received an additional application of 2,4-D late in the fall. In the spring of 1995, dandelion control was rated visually on all treatments from each of the 3 years. The fields that had received both pre-harvest Roundup and a post-harvest application of 2,4-D in each of the 3 years, had greater dandelion control than those that had received only the pre-harvest treatment of Roundup, even up to 3 years after applying the 2,4-D (See Table 1).

2,4-D does have some residue and that must be taken into consideration, especially if the succeeding crop is a broad leaf. Dr. Rick Holm assessed the effect of 2,4-D applied to broadleaf crops. Both soil type and soil zone play a role in the sensitivity of broad leaf crops to 2,4-D. As Table 2 illustrates, canola is not affected by high rates of 2,4-D applied in the fall or low rates in

the spring. But at a high rate in the spring, the canola was damaged in the Dark Brown Soil Zone. Lentils are more sensitive to both fall and spring applications of 2,4-D than either canola or peas.

Table 3 illustrates how soil type influences the sensitivity of broad leaf crops to 2,4-D. Crops on Black soils and clay soils are generally less susceptible to the herbicide than those on sandy loam.

With the threat of weed resistance ever looming, it's not likely anyone will apply 2,4-D to the same field year-after-year. However, a study was conducted at Indian Head several years ago to see what would happen in the soil after repeated long term use (35 years) of the herbicide on one field. Although 2,4-D has a short-term soil residual, it is quickly broken down and the study found no build-up of 2,4-D residues over the course of the study. It was also concluded that 2,4-D did not interfere with nutrient cycling or have any adverse effects on the soil microbiological populations.

In the weed control "tool box," there are many tools available to hold the weeds in check. Although 2,4-D is an old product, it still has a place in the top tray of the box. While spraying in the very cool conditions typical of late fall is no one's idea of fun, an application of 2,4-D at that time of year may very well save the need for spending precious dollars on more expensive in-crop herbicides the following spring.

Table 1. Effect of Harvest Treatment in Lentil on Control of Dandelion (Visual Rating), 1995

Year	Pre-harvest Glyphosate Only % Control	Pre-harvest Glyphosate and 2,4-D Post-harvest % Control
1992	47	73
1993	58	80
1994	96	100

Dr. Doug Derksen, AAFC, Brandon

Table 2. Fall vs. Spring 2,4-D Effect on Canola

Rate(based on LV 600 formulation) **l/ac**	Timing	Effect
0.56	Fall	None
0.28	Spring	None

0.56	Spring	Damage in Dk. Brown Soils

Dr. Rick Holm, University of Saskatchewan

Table 3. Number of Years Yield Reduced by Spring 2,4-D @ 0.28 l/ac (Saskatoon)

	Sandy Loam	Clay Loam
Lentils	2/3	1/3
Canola	2/3	0/3
Sunola	1/2	0/2
Flax	2/3	0/3
Pea	1/1	1/2

Dr. Rick Holm, University of Saskatchewan

Winter Wheat Core Grower Program

By Blair McClinton, PAg

SSCA Executive Manager

Over the past year, SSCA has been working with industry groups to develop to projects to promote conservation tillage and other sustainable agriculture practices. In addition to the project with Monsanto, SSCA has also been working with Ducks Unlimited to develop a "Core Grower" program to increase winter wheat acres in Saskatchewan.

For several years, Ducks Unlimited (DU) has been advocating planting winter cereals in annual crop rotations to improve nesting habitat for migratory birds like ducks. DU would like to see winter wheat become the dominant wheat grown on the Prairies within the next 25 years. To realize this goal, they will be investing in research, plant breeding and extension. Part of the extension component is the development of "Core Growers." Ducks Unlimited approached SSCA to lead this project due to our success with operating similar projects and because winter wheat production is only practical in direct seeding systems.

"Core Growers" are winter wheat growers who will be used as success stories in extension events. These growers will also host kitchen-table meetings and half-ton tours to help promote winter wheat to local producers. SSCA's involvement will be to work with and develop "Core Growers" to help ensure their success growing winter wheat. SSCA staff will utilize these producers in extension meetings, tours and field demonstrations to promote winter wheat production.

This program is being phased-in over the next three years and is being targeted in Ducks Unlimited "Target" areas, which are mainly located in the Black Soil Zone and the Missouri Coteau.

Seeding Trends- Management: Put Your Money Where Your Mouth Is!

By Bob Linnell, P.Ag.

Conservation Agrologist

Some people just like to talk, or maybe just to hear themselves speak. And… it isn't just restricted to farmers, retired farmers, the "senate" table at the local Co-op, or even the church wise men and women. I have even seen scientists and researchers get into the act. The part that bugs me is when they don't have all the facts and still insist on giving their opinion to anyone that will listen.

The true and genuine person that has experienced the situation is really the only one qualified to make the statement, and even they would be the first ones to admit they still don't know everything, and never have any intention of actually publishing. Mostly, we are talking about the "serious" people who truly get involved and buy into a regime. That, naturally, involves a lot of farmers and agriculture service people.

I recently read an article by a researcher who decided to publish an expose on some work done, and after only one year, came to a conclusion that seems not to agree with a significant segment of the farming population. Most researchers will usually wait a period of about 3-5 years, to assure their findings are statistically significant, before they publish. I can only say to that researcher, "good luck in your studies" and hope crow is not too difficult to eat in the future, should the end result of those studies prove something different.

Farmers will buy into an area on interest, only if they can afford it or perceive a chance of surviving a few more years in tough times, or if circumstances force the issue. Think about the issue of direct seeding that SSCA has been championing for the past number of years, and you will undoubtedly come to the conclusion that the concept works, and works very well for some of the people. I say some, because there have been wrecks and failures, but there have also been magnificent successes.

Many of the progressive farmers still in operation today will tell you they are here only because they went with the growing trend of increasing their efficiency on the farm, or have taken the time to study crop rotations and put one into practice that works for them. They always have something to sell, and are confident they are building, or re-building their soil to a level they could not hope to achieve under their old system of land management. Yes, there are "good" farmers who don't direct seed, and there always will be, but they have learned something from the direct seeders, whether they like to admit it or not.

The "secret", if you haven't guessed it by now, is "management". Any successful operator will tell you they need to make use of every available tool at their disposal, to survive in the

marketplace as it exists today. This includes more efficient methods of seeding, access to reliable research data that has practical application, practical G.M.O.s, a healthy marketplace, a secure financial plan, a bunch of empathetic neighbors who are not too proud to share their own information, and time.

I have been noted to evoke a head scratching look from a farmer who calls me out to attempt to diagnose an impending disaster. When I go to the outside or the starting point in the field and begin to look at the ground, they ask,"what the h--- are you doing"? I inform them that I am looking for knee prints in the ground. Knee prints, you see, are often the key element missing in the puzzle to determine "what went wrong". Any good operator, direct seeder or not, should get off the tractor, and get down on his knees, not necessarily to pray, but to find out just where he(or she) is putting the seed and adjusting the seed bed result if needed. Good seed-to-soil contact on a firm seed bed is mandatory. Operation speed is often the critical factor in deciding whether a success or a failure will occur. 4.5-5.5 mph is still the best operating speed to seed, and I take a lot of convincing to make me waiver from that point.

Weed control is the next big issue. We all know that farmers never shave rates (and get away with it). They always apply them under ideal conditions, unless it has been windy for 26 of the last 30 days. Most farmers are not afraid of G.M.O.s, and providing they have followed the proper education and information that the company has provided, they achieve good results. The farmers don't treat these products as "magic potions", but instead, value them as a tool made available to them only after having undergone years of research and extensive registration procedures to help them survive and be more successful. (and be around to purchase more products next season) Politics will always exist between nations around the world, and farmers are often the pawns in the game, whether it be technology or markets and the subsequent market protection influences.

If you are wondering about where all this is going, I am going to draw your attention to the many farmers in Saskatchewan who have switched to direct seeding. When you consider that in 1994, only about 3 or 4 percent of farmers operated a low disturbance type of seeding, with maybe another 20% operating under a high disturbance system, you will immediately notice a difference in the current figures. By today's measure, 38% of farmers operate a low disturbance type of seeding, along with another 30-32% operating a relatively high disturbance method. Now, multiply those figures with the 36 million acres we seed annually in Saskatchewan, and you will grasp what a monumental shift there has been in the commitment by farmers to a system that helps them survive economically in today's world marketplace, as viewed from the province. No, we do not have a commanding control position in that marketplace, but we sure have captured people's attention.

The partnering effect of the machinery manufacturers in this part of the world hasn't hurt either. Manufacturers, dealers and farmers have all benefited from this major shift in seeding technology.

And, believe it or not, I don't think we are anywhere near being done yet.

From the number of farmers attempting to retrofit a drill or machine to take advantage of the technology inherent with direct seeding, it seems there is still a lot of interest in the system. The "new" issue of carbon sequestration, or the building of organic matter in soils will continue to hold the interest of many of the world's farmers and land owners, who are interested in seriously doing something right in managing their soils. They too, will retain the interest if there is a reward for early adoption of a system that seeks to reduce the amount of carbon "pollution" in the world through a practical application of a rather simple farming practice that enables the process. It returns an element of control back to the farm and the farmers management system, and that gives a lot of satisfaction to the farmer. Remember that we haven't really been hungry in this part of the world yet, and food is relatively cheap in comparison to a lot of other things in our shopping basket, unlike other parts of the world. Next time you think you hear a farmer whining about the prices, remember how much he has invested in your future on your behalf, before you berate him.

There really are not that many farmers in the world today and they're on the decrease. I think it is inour best interests to try and preserve some of the ones we have left, before it is too late. The farmer should not be the only one who has put his money where his mouth is.

Think about that.

Plan now for Next Year's Chem Fallow

Eric Oliver, P.Ag.

Conservation Agrologist

Since this is a harvest issue, it never hurts to remind producers that if they are going to chem fallow a certain amount of land next year, it pays to plan now for it during harvest. Why should we think about chem fallow when it is at least eight months away? Well, anyone who has tried to seed through 12 or 16-inch tall chem fallow stubble (even with 12-inch row spacing) will understand the frustrations of plugging every two drill widths, would drive the most patient person to drink. The concept of chem fallow is great, with its snow trapping ability and significantly reducing the erosion potential. Seeding through first year stubble of that height generally is no problem since it is still anchored by the roots. However, what happens during that year of chem fallow is that the stubble essentially rots off at the soil surface. When you try to seed through this, a lot of the straw breaks off at the soil surface and thus converts your air drill or air seeder into an expensive rake. If this stubble has been cut short at harvest time, the plugging problem becomes significantly reduced. Therefore, do a little planning ahead when having chem fallow as part of your rotation. Cut that stubble short enough that your particular seeding unit will be able to go through it in the spring. That generally means cutting it no taller than the width of your row spacing or even a bit shorter to be on the safe size. It will also depend on how heavy the stubble is. If the farmer is using a direct seeding disc opener, then stubble height is usually not an issue. But, for those producers using a C-shank type of opener, a little planning ahead can save not only time, but a lot of frustration as well.

CLC Maps the Farm

By Laurie Hayes, M Sc, P Ag

CLC Manager

Yahoo, it's finally raining!!! Until Monday, June 26, we had had 0.5" of rain. That, combined with less than half normal snowfall this winter, contributed to very dry conditions. The wheat, peas and flax were seeded into moisture but by the time the canola was seeded, the ever-present winds had sucked up most of the moisture. The emergence of the wheat, peas and flax was good. The canola emergence is very spotty - nothing a good rain wouldn't fix! Thankfully, in the past couple of days, rainfalls are approaching another 1".

Our precision farming project is underway. The field was seeded May 30 to June 1 with 2663 InVigor canola. The field has been subdivided into four plots, as shown in Figure 1 below, and the fertilizer rates varied based on wet versus dry season recommendations and landscape. We varied the rates of both the granular and liquid fertilizer (thanks to Ag Leader for sending up a monitor that enable us to vary two products). Initially there were some problems with the prescription based on the way that the information from PFRA and our GPS information were merged. It got straightened out (more or less) and applied to the field. It was great!! We drove round and round the field and, as the machinery entered a new "zone," the monitor beeped three times indicating a change in the rate applied. It worked like a charm!! It's the easiest way to seed plots that we have ever used!! Thanks to Ryan Hutchison with Precision Vantage Network and Jason Patterson with PFRA for their help in getting the equipment and technology up and running.

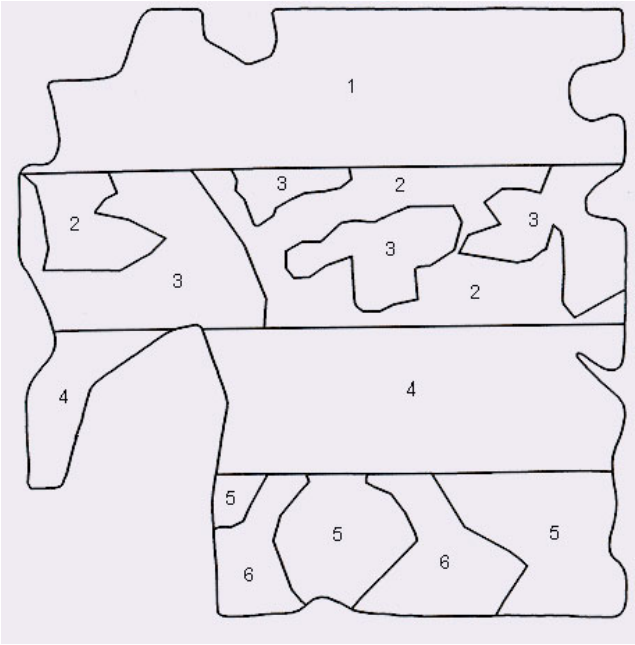


Figure 1. Map delineating fertilizer applications

Area	Fertilizer (in lbs)	Season	Slope
1	55 N 20 P 13 S	Wet	All
2	28 N 20 P 7 S	Wet	Lower
3	83 N 20 P 20 S	Wet	Upper
4	25 N 10 P 8 S	Dry	All
5	13 N 10 P 4 S	Dry	Upper
6	38 N 10 P 12 S	Dry	Lower

The original intent was to also vary the rate of application of herbicides. Unfortunately, due to problems getting sprayer parts in a timely fashion, there was no spring burnoff and in-crop spraying was delayed (we finished June 20). As a result, this crop has heavy weed competition. The growth stage of the weeds varied from cotyledon to bloom. The field was sprayed with full rate Liberty (1.35 L/acre) and half-rate Fusion (10 acres/case). The field will continue to be scouted and another application of Liberty applied in the next 10-14 days if necessary (which seems likely based on weed populations).

The electronic weather station (µMetos, Pessl Instruments) purchased this winter will, in addition to providing detailed weather data, be a valuable tool in predicting incidence of sclerotinia in the canola. There is a computer model contained within the instrument that can predict timing of highest susceptibility of infection (spore release) based on weather data collected. Fungicide application decisions can be made based on the information generated.

There is much discussion this year about the price of fertilizers and the efficacy of starter fertilizer in peas. We split a 50-acre field into three 17-acre plots with different rates of liquid phosphate fertilizer (10-34-0): full recommended rate (25#/ac P), half recommended rate (12.5#/ac P) and no fertilizer (0#/ac P). As nitrogen is a component of the liquid 10-34-0, the plots received 7.3#, 3.7# and 0# N per acre, respectively. Granular inoculant was applied with the Delta pea seed.

The last two fields were seeded to hard red spring wheat (2000 treated AC Elsa and AC Barrie and untreated 2000 produce) and CDC Bethune flax.

Other projects underway this year include demonstration plots of CDC Trilogy wheat (Clearfield variety), AC Cadillac wheat and a new liquid copper product. The summer technicians have developed projects: Denis Mercier will be studying rates and time of application of herbicides to remove an established alfalfa stand and Colleen Smith will be demonstrating the effect of time of cut (early versus late) and application of fertilizer (50# N) on regrowth in the forage plots.

Agriculture and Agri-Food Canada will be studying aster yellows in 25 varieties of canola as well as vegetables and barley.

The CLC hosted 1077 students through the school program this spring. A Girl Guide troup came out and did a program that contributed to earning their conservation badge. Again, thanks to Garry Brad and his associate Maurice Chalifour for a job well done.

A number of tours have been booked for this summer. Do not hesitate to contact us if you would like to tour the CLC.

Again, we thank our partners and sponsors for their support. Through their commitment, we can continue to offer a variety of programs.

Managing Risk with Winter Cereals

David Struthers, PAg

Executive Manager, Winter Cereals Canada Inc.

When we promote the benefits of winter cereals, we often talk about things such as spreading out the spring and fall workload, maximizing use of spring soil moisture and precipitation, and reducing pesticide use. These are important factors, but perhaps the greatest benefit to including a winter cereal in your annual crop rotation is risk management. Farming is all about risk management, whether it is financial, environmental or production risk.

On the financial risk side of the equation, winter cereals, especially winter wheat, have "penciled out" very well in cropping budgets due to their higher yield potential, and the reduced need for herbicides and insecticides relative to spring wheat. At today's commodity prices, net returns for winter wheat look very favourable. Plus, winter cereals can often be moved into the market right off the combine, reducing storage costs and generating cash flow early in the harvest season.

The spring of 1999 was a sober reminder of the need to manage environmental and production risk by diversifying crop rotations. Producers in south eastern Saskatchewan and south western Manitoba who seeded winter cereals in the fall of 1998 looked like geniuses the next spring when it was too wet to seed spring crops. Despite some flooding, winter cereals enjoyed the cool, wet spring season, and yields were significantly better than spring cereals. In contrast, the 2000/2001 growing season may not be a banner year for winter cereals. The crop established well in the fall, and winter injury was minimal. However, the lack of rainfall many areas have experienced this spring and summer has limited the yield potential of winter crops, and the recent rains will be more beneficial for spring crops. This underscores the importance of growing a diversity of crops and not having "all your eggs in one basket."

Risk management starts with rotation planning and includes pricing and marketing strategies as well as thorough knowledge of the cost of production for each crop to be grown. While there is no perfect rotation that fits on every farm, a "good" rotation should include cereals, oilseeds and pulse crops whenever possible. The cereal component should be split between spring and winter types. With the advent of fall seeded canola, farmers can diversify their risk even further by including both spring and fall sown canola. By altering crop types and seeding seasons, it is possible to effectively minimize the risk of losses due to weeds, insects, diseases and adverse weather conditions such as frost, drought, heat stress or excessive moisture.

If you are considering the addition of a winter cereal to your crop rotation, you can manage your risk by following these proven agronomic guidelines:

Plan Ahead - Successful winter cereal growers all have one thing in common - they plan ahead! Many of the winter wheat failures of the past two decades can be attributed to poor management practices that resulted from poor planning and decision making. Think about the fields you

intend to seed, how the spring crop residues will be managed, and what weed control practices will be needed. Make sure your seeding equipment is ready, and that seed and fertilizer needs have been arranged well before seeding. Consider how you will manage your equipment and labour needs, given that you will likely be seeding at the same time as spring crops are being harvested. By planning ahead you can reduce the time conflicts (and the stress) and increase the probability of getting your winter cereal crop seeding on time and with optimal agronomic practices.

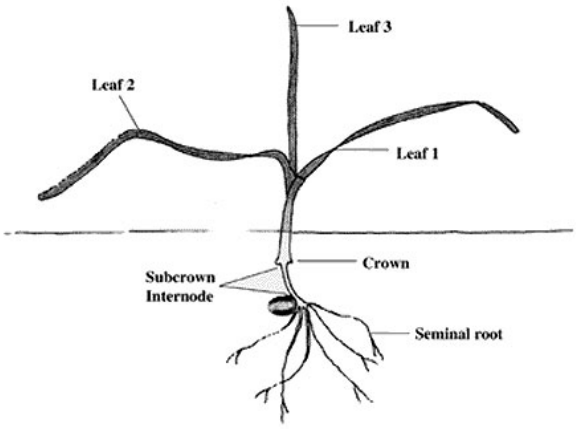
Direct seed (zero till) into standing stubble - Winter cereals, particularly winter wheat and winter triticale, need snow cover to insulate the plants through the winter. You can decide if your fields are suitable by calculating the snow trapping potential (STP) of your stubble prior to and after seeding. Post-seeding STP's greater than 20 are acceptable for winter wheat and winter triticale seeding. Lower STP's are acceptable for fall rye. Based on the stubble disturbance of your seeding equipment, you may need to set pre-seed STP targets of 40 or more. For reference, cereal stubble typically has pre-seed STP's of 80 or better, while canola and flax are normally in the range of 30 to 50.

STP = Stubble height (cm) x Stubble stems per metre of row x Stubble rows per metre

100

Seed Shallow - Winter cereals should never be seeded more than one inch (2.5 cm) deep, even when the soil is dry. Deeper seeding delays emergence and results in weak, spindly plants that are more susceptible to winter injury. Research indicates that improper seed placement usually results in later maturity and reduced yield potential.

One common mistake made by inexperienced growers is "seeding to moisture." In most stubblefields, soil moisture is often depleted, leaving a dry seedbed for winter cereals. Moisture conditions do not improve dramatically with depth. Seed at the minimum depth required providing good seed-to-soil contact. Moisture in the fall comes from above, in the form of rain. Shallow seeding allows the seeds to take advantage of small rainfall events. As little as 1/3 inch of rain is enough to successfully establish a winter cereal since they exhibit very little seed dormancy and are ready to germinate immediately after seeding.



Schematic of a winter cereal plant showing the development of the over-wintering crown tissue

Seed on time - In order for winter cereals to achieve maximum cold tolerance, healthy, vigorous plants must be established before freeze-up. A plant that has three or four true leaves and is starting to develop its first tiller would be ideal. By this stage, crown tissue has developed just below the soil surface. It is the crown tissue that survives the winter and regenerates roots and leaves in the spring when favourable growing conditions return. Fall soil temperatures influence optimal seeding dates. As a result, the optimal timing for seeding differs in each production region of western Canada. Research has demonstrated that seeding during the period from late August to early September (approx. August 25th to September 5th) consistently produces the best crops in terms of both yield and quality. It is always better to seed early rather than late as late seeding often results in reduced winter hardiness (Figure 1).

The stage of plant development prior to winter freeze-up also impacts the agronomic performance of the crop during the following growing season. Seeding too early often results in yield reduction and smaller seed size. Late seeding results in significant yield reduction, delayed heading, later maturity, lower bushel weights and increased problems with weeds and other crop pests such as insects and disease organisms

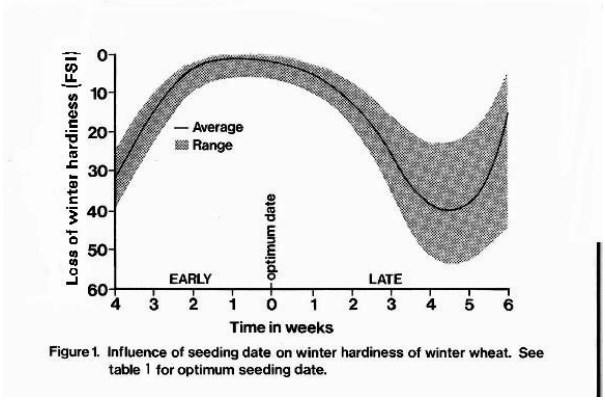


Figure 1. Influence of seeding date on winter hardiness of winter wheat. See table 1 for optimum seeding date.

All this being said, there are several uncontrollable factors that impact the crop's potential. This includes soil temperature, soil moisture and weather conditions the following growing season. Responses to seeding date cannot always be determined simply by looking at a calendar!

Crop nutrition must also be taken into consideration at the time of seeding. As with all other crops, the fertility requirements for winter cereals should be based on a reliable soil test, used in conjunction with knowledge of past management practices and local cropping conditions. It must be noted that winter cereals have the potential to out-yield their spring counterparts by 20 to 25%. To achieve the higher yield potential, winter cereals require higher rates of fertilizer than spring cereals, particularly nitrogen. It has been suggested that insufficient nitrogen fertilization is the leading cause of lower than expected yields of winter cereals relative to spring types.

The traditional method of applying nitrogen for winter cereals has been to broadcast 34-0-0 early in the spring. However, with the development of new direct seeding implements and openers, producers are looking at a number of alternatives for nitrogen. Sidebanding all the nitrogen requirements at seeding is becoming more popular with the development of double shoot sidebanding openers. Producers should be aware that the risk of fall leaching losses is high under this scenario. Conversion of applied nitrogen to nitrate is a factor due to the warm soil temperatures that prevail in late August and early September. If sufficient conversion takes place the nitrate will be subject to leaching.

Research data shows that the most consistent response in terms of both yield and quality is from spring broadcasting of 34-0-0. Urea (46-0-0) and urea ammonium nitrate (28-0-0) are subject to losses in the spring through volatilization, reducing the efficiency of application by as much as 10 - 20% depending on soil moisture and rainfall. In the next issue of the Prairie Steward, spring applied nitrogen will be discussed further.

Phosphorous, Potassium and Sulphur are essential for successful winter cereal production. Phosphorus enhances winter survival by promoting early plant development as well as vigorous root and shoot growth. The phosphate requirements should be seed placed or sidebanded at seeding time. Research indicates that phosphorus deficiencies have an impact on winter hardiness (Figure 2). Winter wheat seeded into soils with low residual phosphate levels that do not receive sufficient seed placed phosphorus can be subject to significant reductions in winter hardiness. The risk of winter injury increases, and adequate insulation from snow cover becomes more critical.

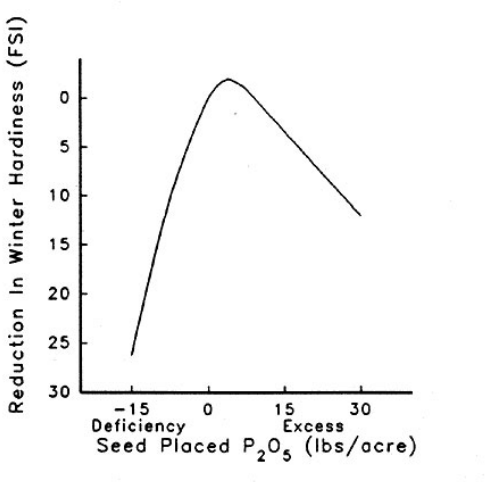


Figure 2. Impact of seed placed phosphorus on winter hardiness

Potassium chloride (KCl) helps plants tolerate moisture stress conditions and improves lodging resistance. The chloride component has been linked to lower incidence of certain foliar and root diseases. Sulphur is often required on winter cereals, particularly in incidences where the crop is sown on canola stubble. Sulphur helps to increase the efficiency of nitrogen and phosphorus applications and plays an important role in end use parameters such as flour yield and loaf volume. Application rates for phosphorus, potassium and sulphur should be based on soil test recommendations.

There are many other factors to consider, but these are the key "risk management" variables that can determine your success or failure as a winter cereal grower. More detailed information can be obtained from the "Winter Wheat Production Manual", the comprehensive how-to guide for winter cereal growers developed by Dr. Brian Fowler, the winter wheat breeder at the Crop Development Centre in Saskatoon. The manual, and other winter cereal information, is available from Winter Cereals Canada at (306) 782-8188.

Agronomics of Winter Cereal Production

David Struthers, Executive Manager

Winter Cereals Canada Inc.

Introduction:

Much of the current interest and success with direct seeding can be attributed to the learning experiences producers had with no-till winter wheat during the 1980's. In Saskatchewan, during the 1980's, the acreage of direct seeded winter wheat was greater than the total combined direct seeded acreage of all other annual commercial crops. Winter cereals are "systems" crops that have an excellent fit in direct seeding and zero tillage production systems. As more producers in Western Canada adopt these systems, the opportunity to successfully produce winter cereals will grow. However, to achieve this success producers must become familiar with the agronomic management practices that have been developed specifically for these crops.

Why Grow Winter Cereals?

Some producers have been reluctant to include a winter cereal in their rotation. The reasons commonly cited for not growing winter cereals include concerns about additional labour and equipment requirements at seeding time, the time conflict associated with seeding a winter cereal during the harvest of spring crops, and grain handling and storage concerns. All of these factors are management related and can be overcome with good planning. Producers who have learned to adapt their cropping systems to include winter cereals have noted the following benefits:

- Increased economic returns through higher crop yields and lower crop input costs
- More efficient use of spring soil moisture and precipitation
- Farm work load and labour requirements are spread more evenly throughout the year
- More efficient use of capital investments (equipment, etc.)
- Numerous potential end uses (grazing, green feed, silage, and grain) that help to diversify risk and provide greater flexibility
- Improved weed control and the opportunity for reduced pesticide use
- Soil, water and wildlife habitat conservation

Other agronomic advantages offered by these crops have also contributed to the renewed interest in winter cereal production. The earlier development and maturity of winter crops tends to reduce the risk of certain insect and disease infestations such as Orange wheat blossom midge and Fusarium head blight (scab). In the spring, the competitive advantage winter cereals have over weeds often provides an opportunity for producers to eliminate the use of grassy weed herbicides. This makes winter cereals an excellent tool for managing herbicide rotations and reducing the risk of weed resistance.

The Keys to Success!

The production of winter cereals is straightforward but requires different management practices than those used for spring seeded cereals. Much has been learned about successful winter cereal production over the past two decades. Dr. Brian Fowler, the winter wheat breeder at the University of Saskatchewan's Crop Development Centre, has devoted considerable time and effort into understanding and promoting the "best management practices" for winter cereal production in western Canada. His research and observations have been compiled into the Winter Wheat Production Manual, a comprehensive how-to guide for winter cereal growers.

1. **Pre-planning**

There is no substitute for good planning. Many of the winter wheat failures of the past can be attributed to poor management practices that resulted from poor planning and decision making. Successful winter cereal growers all have one thing in common - they plan ahead! The winter season, prior to planting of spring crops, is the time to gain more knowledge and start thinking about your winter cereal crops. There are a number of considerations:

a. *Field selection* - The physical characteristics and previous management history of the field that you plan to seed can have an impact on the success of the crop. Is the topography suitable? Is drainage adequate or is the field prone to flooding? What is the field history in terms of weeds, insects, diseases, etc? Are there soil factors that may limit the potential for winter cereals?
b. *Selection of the spring crop* - You want to have suitable stubble available for seeding by late August or early September so you need to consider the seeding date, days to maturity and management of your spring crop. Will it be harvested in time to fall seed your winter cereal? Will the chosen spring crop provide adequate standing stubble to support snow trapping? Are you planning to use a pre-emergence or post-emergence herbicide that will leave a soil residue?
c. *Sourcing seed and fertilizer* - It is a good idea to have your seed and fertilizer arrangements made by early summer, well ahead of fall planting time. Winter cereal seeding often occurs during breaks in the harvesting of spring crops. Having the seed and fertilizer ready on the farm means that you can make more efficient use of your time.
d. *Equipment and labour arrangements* - Seeding and harvest are the two busiest operations during the year. It is critical to plan the logistics of equipment and labour. Who will spray the field prior to seeding? Who will do the seeding? Is the seeding equipment field ready? What equipment is available in terms of tractors and trucks for seed and fertilizer? What about bin space?
e. *Managing spring crop residues* - Winter cereals, particularly winter wheat and winter triticale, require standing stubble that is capable of trapping snow to insulate the overwintering crown tissue. The spring crop should be cut as high as possible and the straw and chaff should be spread thoroughly to prevent seeding problems. Erect, dense stubble is the most effective. It is important to plan field traffic routes during harvest so that stubble knockdown is minimized. The snow trapping potential (STP) for any type of stubble can be easily calculated using the following formula:

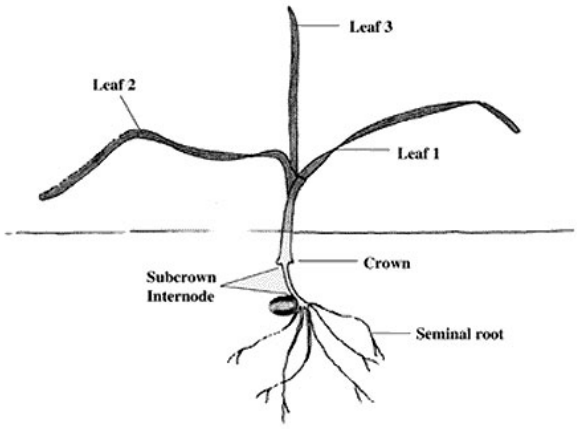
STP = stubble height (cm) x stubble stems per m^2

An STP index greater than 20 is acceptable for winter wheat and winter triticale. Values below 20 indicate a higher risk of winter injury. Fields with a lower STP are better suited for fall rye due to its winter hardiness. Cereal stubble such as barley or oats often have an STP index of 90 or greater, while canola stubble is often in the 25 - 30 range.

1. **Variety Selection**
2. There are several registered cultivars of winter cereals available. Provincial variety guides should be consulted since each variety has its own agronomic characteristics and regional adaptation.

Winter wheat	Fall rye	Winter triticale
AC Bellatrix	AC Remington	Bobcat
AC Readymade	AC Rifle	OAC Wintri
AC Tempest	Danko	Pika
CDC Clair	Dakota	
CDC Falcon	Musketeer	
CDC Harrier	Prima	
CDC Kestrel		
CDC Osprey		
CDC Raptor		

3. **Winter Survival**
4. Winter cereals overwinter as seedlings. In order to survive winter conditions, they must acclimate or "harden off". Soil temperatures at the depth of the crown tissue regulate the genetic system that induces cold acclimation. Cold acclimation begins in the fall once soil temperatures drop below 9^{o} C. Once this process starts, the degree of cold hardiness, and the maintenance of low temperature tolerance, are directly related to the sequence of temperature changes that plants are exposed to during the fall and winter. In other words, cold acclimation can be stopped, reversed or restarted by changes in temperature!



Schematic of a winter cereal plant showing the development of the over-wintering crown tissue

Soil temperatures gradually decrease as winter approaches. Four to eight weeks at crown temperatures below 9^{o} C is usually required to fully harden plants. Under normal circumstances, full cold acclimation is achieved by early December. At this point, the crown tissue can withstand short-term exposure to temperatures in the range of - 22^{o} C (Figure 1). Winter hardiness gradually decreases over the winter in order to allow the plants to "deharden" and resume growth in the spring. This process is also governed by temperature. Producers are often too hasty in deciding that slow growth in the spring indicates that the crop has suffered winter injury. In most instances, provided that proper agronomic practices were used, the crop has survived and the plants just need a few days of warm temperatures to resume growth.

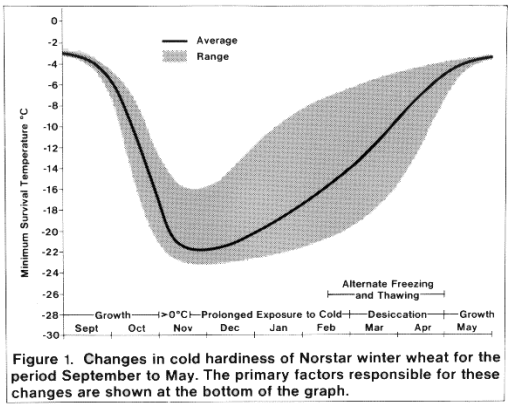


Figure 1. Changes in cold hardiness for the period from September to May

5. Seeding Methods

Research has shown that winter cereals are most successful when grown in a direct seeding or zero tillage production system. These systems provide the snow trapping potential that is required to insulate the plants from harsh winter weather and enhance spring soil moisture conditions. Many different types of seeding equipment can be used as long as they are capable of seeding shallow, at a consistent depth, with minimal stubble disturbance.

a. *Seeding Date* - In order for winter cereals to achieve maximum cold tolerance, healthy, vigorous plants must be established before freeze-up. A plant that has three or four true leaves and is starting to develop its first tiller would be ideal. By this stage, crown tissue has developed just below the soil surface. It is the crown tissue that survives the winter and regenerates roots and leaves in the spring when favourable growing conditions return.
b. Fall soil temperatures influence optimal seeding dates. As a result, the optimal timing for seeding differs in each production region of western Canada. Research has demonstrated that seeding during the period from late August to early September (approx. August 25th to September 5th) consistently produces the best crops in terms of both yield and quality. It is always better to seed early rather than late as late seeding often results in reduced winter hardiness (Figure 2).

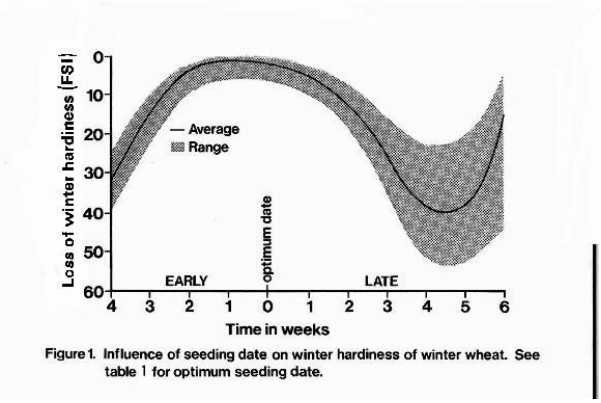


Figure 1. Influence of seeding date on winter hardiness of winter wheat. See table 1 for optimum seeding date.

Figure 2. Influence of seeding date on winter hardiness of winter wheat

The stage of plant development prior to winter freeze-up also impacts the agronomic performance of the crop during the following growing season. Seeding too early often results in yield reduction and smaller seed size. Late seeding results in significant yield reduction, delayed heading, later maturity, lower bushel weights and increased problems with weeds and other crop pests such as insects and disease organisms.

All this being said, there are several uncontrollable factors that impact the crop's potential. This includes soil temperature, soil moisture and weather conditions the following growing season. Responses to seeding date cannot always be determined simply by looking at a calendar!

c. *Seeding Depth* - Under optimal conditions, winter cereals should be seeded less than 1" deep into a firm, moist seedbed. Deeper seeding delays emergence and results in weak,

spindly plants that are more susceptible to winter injury. Research indicates that improper seed placement usually results in later maturity and reduced yield potential.

One common mistake made by inexperienced growers is "seeding to moisture". In most stubble fields, soil moisture is often depleted, leaving a dry seedbed for winter cereals. Moisture conditions do not improve dramatically with depth, so there is no advantage to seeding deeper than the minimum depth required to provide good seed-to-soil contact. Moisture in the fall comes from above, in the form of rain. Shallow seeding allows the seeds to take advantage of small rainfall events. As little as 1/3 inch of rain is enough to successfully establish a winter cereal since they exhibit very little seed dormancy and are ready to germinate immediately after seeding.

1. **Fertility Management**

As with all other crops, the fertility requirements for winter cereals should be based on a reliable soil test, used in conjunction with knowledge of past management practices and local cropping conditions. It must be noted that winter cereals have the potential to out-yield their spring counterparts by 20 to 25%. To achieve the higher yield potential, winter cereals require higher rates of fertilizer than spring cereals, particularly nitrogen. It has been suggested that insufficient nitrogen fertilization is the leading cause of lower than expected yields of winter cereals relative to spring types.

Nitrogen - Nitrogen is necessary for photosynthesis and is the major component of both yield and grain protein. Winter cereals demonstrate strong responses to applied nitrogen due to their higher yield potential and the fact they are seeded into standing stubble fields that tend to be low in residual soil nitrogen. The traditional practice for winter cereals has been to broadcast 34-0-0 early in the spring. However, with the development of new direct seeding implements and openers, producers are looking at a number of alternatives for nitrogen.

Timing	Placement	Forms of nitrogen
At seeding	Seedplaced	34-0-0, 46-0-0, 28-0-0
	Sidebanded	46-0-0, 28-0-0, NH_3
Late fall	Broadcast	34-0-0, 46-0-0
	Surface banded	28-0-0
Early spring	Broadcast	34-0-0, 46-0-0
	Surface banded	28-0-0

Research data shows that the most consistent response in terms of both yield and quality is from spring broadcasting of 34-0-0. Urea (46-0-0) and urea ammonium nitrate (28-0-0) are subject to

losses in the spring through volatilization, reducing the efficiency of application by as much as 10 - 20% depending on soil moisture and rainfall. Sidebanding all the nitrogen requirements at seeding is becoming more popular with the development of double shoot sidebanding openers. However, producers should be aware that the risk of fall leaching losses is high under this scenario. Conversion of applied nitrogen to nitrate is a factor due to the warm soil temperatures that prevail in late August and early September. If sufficient conversion takes place the nitrate will be subject to leaching.

Current research is demonstrating that the yield response of winter wheat to applied nitrogen is optimized at approximately 11.5% grain protein. The crop will utilize applied nitrogen to satisfy yield first - protein will only surpass 11.5% once the crop's yield requirements have been met. This response is also dependent on growing conditions, especially soil moisture and precipitation. Depending on market opportunities and protein premiums, there may be situations where nitrogen fertility can be managed to increase grain protein and improve economic returns.

In the big picture, the form of nitrogen used is secondary to timing, placement and rate. The important points to remember with nitrogen fertilization are:

- **Get lots on** - Winter cereals have a higher yield potential, thus a greater requirement for nitrogen. Rates should be 20 - 25% higher than those used for spring cereals.
- **Get it on early** - Winter cereals require nitrogen very early in the spring. Broadcasting or surface banding should begin as soon as the field will support the weight of equipment (i.e. mid April). Over 90% of the total nitrogen accumulated in a winter wheat plant is taken up early heading, which normally occurs in mid to late June. If you delay broadcasting until the spring crop is seeded, winter cereal yields will suffer. Successful growers fertilize early in the day when there is still enough frost to support their equipment.

- Observe the same precautions as spring cereal with respect to seed placement of nitrogen. Germination injury and increased risk of winter injury can result from high rates of seedplaced N. Row spacing, opener design and seedbed utilization are important considerations.

P, K and S

These nutrients are essential for successful winter cereal production. Phosphorus enhances winter survival by promoting early plant development as well as vigorous root and shoot growth. The phosphate requirements should be seedplaced or sidebanded at seeding time. Research indicates that phosphorus deficiencies have an impact on winter hardiness (Figure 3). Winter wheat seeded into soils with low residual phosphate levels that do not receive sufficient seedplaced phosphorus can be subject to significant reductions in winter hardiness. The risk of winter injury increases, and adequate insulation from snow cover becomes more critical.

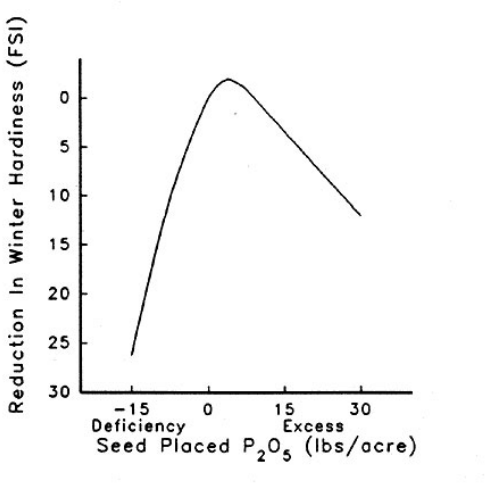


Figure 3. Impact of seed placed phosphorus on winter hardiness

Potassium chloride (KCl) helps plants tolerate moisture stress conditions and improves lodging resistance. The chloride component has been linked to lower incidence of certain foliar and root diseases. Sulphur is often required on winter cereals, particularly in incidences where the crop is sown on canola stubble. Sulphur helps to increase the efficiency of nitrogen and phosphorus applications and plays an important role in end use parameters such as flour yield and loaf volume. Application rates for phosphorus, potassium and sulphur should be based on soil test recommendations.

Micronutrients

Growers throughout Alberta have noted responses to applications of micronutrients, particularly copper. Soil texture, pH and interactions with other nutrients can significantly impact on the availability of these nutrients. Micronutrient fertility must be planned in conjunction with N, P, K and S to ensure the proper balance of nutrition is maintained. Growers who are optimizing their use of macronutrients, particularly nitrogen, are more likely to see responses to micronutrients, even in situations where there is no known micronutrient deficiency. It is advisable to conduct soil tests and plant tissue analyses to determine the potential responses from micronutrient applications.

6. Disease Management

Winter cereals are susceptible to many of the same disease problems found in spring cereals. This includes root, leaf and stem diseases as well as flowering diseases such as fusarium head blight. However, due to the earlier maturity advantage, winter cereals tend to be less affected by certain pathogens. Fields should be monitored carefully in conjunction with growing conditions to estimate infection levels and the cost-effectiveness of fungicide application. Fungicides such as Tilt and Dithane are registered for use on winter wheat.

Summary

The production of winter cereals is straightforward but requires different management practices and a different thought process than spring cereals. Growers who have made the transition are successfully capitalizing on the many agronomic, economic and conservation benefits offered by these diverse crops.

The First Step

By Tim Nerbas, P.Ag.

SSCA Conservation Agrologist

Watch out for that first step! When producers decide to start direct seeding into standing stubble, the stumbling block they often hit is just that: the first step. Or more specifically, they often forget the first step. Like so many of Mother Nature's plans, the preparation for the big event actually begins nine months earlier. I am referring of course to residue management during the previous year's harvest, in preparation for direct seeding.

When residue is properly managed it becomes a valuable asset that can increase overall production. Standing stubble is valuable not only for trapping snow, but also for reducing wind and water erosion. Crop residues can be a critical component in the successful establishment and wintering of winter crops like fall rye and winter wheat. The residue acts as an insulating layer, protecting the vulnerable rooting systems against low winter soil temperatures.

Crop residues provide a beneficial microclimate for emerging seedlings. They also assist a young crop by providing weed suppression. Residues, through decomposition, release crop nutrients, improve soil tilth and soil organic matter content, and improve the infiltration of water into the soil profile (figure 1).

Figure 1 - Water infiltration demonstration at Scott Research Station. Comparison of a Conventional tillage field (left) vs a direct seeded field (right). Notice the difference in the water infiltration tubes during a similar time frame

Obviously crop residue can be a vital asset in a direct seeding operation. But it is imperative that the residue be properly managed to provide the benefits described. A number of factors must be considered to achieve the desired outcome.

The type of crop grown has a large bearing on the amount of straw and chaff produced. For instance, wheat or barley produces large amounts of straw but relatively little chaff, whereas canola produces large amounts of chaff in comparison to the cereals. It is important that both straw and chaff are spread adequately.

The width of cut of the combine header or the swather will determine adequate spread. In a perfect scenario, both the straw and the chaff would be spread 100% the width of cut. A more realistic goal is to have the straw spread at least 80% the width of cut and the chaff spread more than 60% the width of cut. For example, on a 25-foot header, straw should be spread back over a width of 20 feet and chaff over a width of 15 feet on each pass (Figure 2).

Figure 2 - Good straw and chaff management

An alternative to spreading chaff is to use a chaff collection system: blowing the chaff into a wagon pulled behind the combine and dropping it in piles throughout the field. Not only does the chaff provide excellent cattle feed for the winter but it also serves to remove many weed seeds off the field.

A new and emerging technology is the McLeod Harvest system (Figure 3). It uses a specially designed harvester to separate the straw from the grain and chaff (referred to as graff) in the field. The graff is taken back to a stationary cleaning mill set up at the bin site. Here the graff is separated into clean grain and millings. These millings can be used as cattle feed. The millings typically have a nutritive value equivalent to medium quality hay. For more information on this system go to **www.mcleodharvest.com**.

The height of the stubble is influenced largely by the method of seeding. Tall standing straw poses little difficulty for disc type seeding equipment as there is less residue on the soil surface to cause hairpinning. However tall straw can be quite another problem to hoe-type or shank-type seeding units, as straw tends to wrap around the shanks and plug the machine. For units with shank mounted packers, a good rule of thumb is to leave the stubble height no higher than 1 x the row space of the machine. For example, if the row spacing of the seeding unit is 8 inches, the stubble should not be taller than 8 inches. For hoe-type machines with narrow openers and rear-mounted packers, the general rule of thumb is to not exceed 1.5 x the row space of the machine.

Figure 3 - The McLeod harvester

It is important to remember that the most efficient and cost effective method of managing residue is at the back of the combine. A poor job of spreading straw at harvest time can be rectified by a harrowing operation post-harvest. But there is an additional cost in doing so in equipment purchase or rental, time and fuel. Chaff, however, must be managed at the back of the combine by either spreading or collection. Chaff can not be spread by a harrowing operation.

When you are planning for harvest 2001, know your goals. The planning you do today will allow you to prosper tomorrow. Remember we have a toll free number to help you make your important cropping decisions. Give us a call at 1-800-213-4287.

Boosting Durum Yield and Protein with Appropriate Crop Sequences

Dr. Yantai Gan

Agriculture & Agri-Food Canada

Swift Current, SK

Inclusion of alternative crops such as pea, lentil, chickpea, and canola/mustard in cropping systems provides producers with options to grow cereal crops on different types of stubbles the following years. Fields of different types of stubbles may have been conditioned with different levels of soil moisture, nutrients, and other residual elements. Therefore, growing cereal crops in right crop sequences will allow the crops to best take the stubble advantages and thus to maximize their yields and protein.

A field experiment was conducted at the Agriculture and Agri-Food Canada's Research Centre in Swift Current to determine performance of amber durum grown on different types of crop stubbles or in different crop sequences from 1996 to 2000. Three pulse crops (chickpea, yellow pea, and lentil), one oilseed (oriental mustard), and one cereal (hard red spring wheat) were grown as the first year crops. In the following year (year 2), a common set of crops (i.e., wheat, an oilseed, and a pulse crop) were grown on the five previous crop stubbles. In the 3rd year of the crop sequences, Kyle amber durum was uniformly grown on all 15 combinations of previous crop types (i.e., five crop types from the 1st year x three crop types from the 2nd year). Each phase of the crop sequences was repeated for three cycles during the period from 1996 to 2000. The final cycle was finished in 2000.

Averaged over the five site-years, the Kyle durum seeded in the pulse-pulse-durum crop sequences produced the highest grain yield (48 bu/ac), followed by durum grown in the pulse-canola-durum (47 bu/ac) and mustard-pea-durum (47 bu/ac). The durum grown in the wheat-wheat-durum sequence produced the lowest grain yield (39 bu/ac), which was 19% lower than from the pulse-pulse-durum sequence and 17% lower than from the pulse-canola-durum sequence. It is apparent that the previous two years of pulse crops, and the pulse-oilseed or oilseed-pulse crop sequences provided the durum crop with significant rotational benefits. The increased durum yields in these crop sequences may be attributable to the slow-release of symbiotic soil residual N contributed by the previous pulse crops, coupled with the increased soil moisture conserved by the shallow-rooting lentil and pea crops.

Grain protein content of the Kyle durum was highest (>13.8%) when grown in the pulse-pulse-durum, pulse-oilseed-durum, or oilseed-pulse-durum sequences, followed by wheat-pea-durum (13.5%). Durum grain protein was lowest (11.8%) when durum was grown in wheat-wheat-durum, fallow-wheat-durum, or mustard-wheat-durum sequences. Grain protein levels were reduced sharply when durum was grown on 2nd-year wheat stubble, averaging a remarkable

2.7 %-units lower than when durum was grown on lentil or pea stubbles.

Over the five site-years, as durum yields increased from 26 bu/ac to 57 bu/ac, its protein content decreased from 17.8% to 10.2%. Further increases in durum yield (i.e. greater than 57 bu/ac) did not confirm a significant decline in protein content. The degree of the decline in protein with increased yields was stronger for durum grown in the wheat-wheat-durum sequence than when durum was grown in pulse-durum crop sequence.

The timing of nitrogen release from decomposing pulse residuals in association with soil organic matter dynamics may have contributed to the observed greater yield and protein benefits for the durum crops. In the long term, the inclusion of pulse crops in the crop sequence would significantly enhance the soil's nitrogen pool or improve soil nitrogen availability for cereal or canola crops to follow. Aside from the slow nitrogen release from pulse residuals, other factors also may have contributed to these sizeable rotational benefits, which requires further investigation.

Eradicating Alfalfa For Direct Seeding

By Garry Mayerle, P.Ag.

SSCA Conservation Agrologist

In the early 70's, northeastern Saskatchewan grain producers who were looking for alternatives to growing wheat started a dehydrated alfalfa industry. Although it is facing "hard times" right now, it has occupied a substantial land base (150,000 acres). One of the most costly aspects of growing alfalfa is getting the land back into annual crop production. With the introduction of direct seeding practices, producers are becoming more interested in taking the alfalfa out of production with less or no tillage.

Lyle Cowell, an agronomist with Sask. Wheat Pool out of Tisdale, initiated a demonstration project to evaluate the ability of various herbicides to take out alfalfa and the common weeds that often get started in alfalfa fields. There have been several projects conducted during the 90's which rated alfalfa control with a number of these products. Lyle used several herbicides that had not been on the market in these previous projects. However, the most unique aspect of Lyle's project was that he set up the demonstration to visually compare alfalfa and dandelion control with these products at three different times during the growing season.

Lyle set up the project in 2 different alfalfa fields close to Star City. One of the sites was heavily infested with dandelions and the other with a fair amount of quack grass. The products that he sprayed are listed in Table 1. He sprayed each of these products May 28, 2000 at the two sites with a plot sprayer at a water vol. of 10 gal/ac. These same treatments were applied again on July 19 and Sept. 28 on adjacent plots.

	Suggested retail price	% Control - Rated May 23, 2001 (mean of 2 sites)					
		Replicate Spray Date					
Herbicide	$/ac	May 28, 2000		July 19, 2000		Sept. 28, 2000	
		Alfalfa	Dandelion	Alfalfa	Dandelion	Alfalfa	Dandelion
Round-up 1 L/ac	$8.95	30	30	85	60	90	85
Round-up 2 L/ac	$17.90	70	40	90	70	95	90
Round-up 1 L/ac & 2.4-	$10.60	50	35	80	65	95	90

D ester 5oz/ac							
Round-up 1 L/ac & 2.4-D amine 5oz/ac	$10.37	50	35	85	65	95	90
Rustler 2 L/c	$12.00	65	35	90	60	90	90
Round-up 1 L/ac & Curtail M 0.4 L/ac	$14.70	65	35	90	70	95	95
Round-up 1 L/ac & 2,4-D ester (separate passes)	$10.60	60	40	85	75	90	90
Curtail M 0.8 L/ac	$11.50	60	45	85	60	95	80
2,4-D ester 12oz/ac	$4.00	55	40	85	55	95	80
Amitrol 2 L/ac	$12.40	60	50	85	70	75	75

TABLE 1 - Control Rating of Various Herbicides to Eradicate Alfalfa Stand - Lyle Cowell SWP agronomist

In summary these plots visually showed that the best time to spray out alfalfa for crop production the following year was late in Sept. Many perennial plants need several "kicks" before they can be eradicated. Alfalfa and dandelions are not exceptions. The treatments that were sprayed earlier in the season had varying degrees of control but given time, some of the alfalfa plants and perennial weeds did recover. To successfully produce an annual crop the following year, another "kick" would have to be supplied to continue the eradication process. For the treatments sprayed later in the fall, that "kick" could come with a burn-off and or during the in-crop herbicide application. It would be quite important to plan the rotation so that the in-crop herbicide would provide this good "kick" at the alfalfa and perennial weeds. Final control could be achieved with pre-harvest Round-up.

One of the benefits of a later spraying in dehy alfalfa is that you do get the revenue from 2 cuts of alfalfa. However, dehy alfalfa does deplete soil moisture reserves. To produce a decent yield

on alfalfa "breaking", you need good growing season moisture. Taking out the alfalfa earlier may help to build up that reserve of soil moisture. A good compromise may be to pre-harvest the second cut of alfalfa with 1.0 -2.0 L/ac Round-up. This starts to build up moisture reserves shortly after spraying. Also, many alfalfa fields have a lot of quack grass to get rid of. Using this pre-harvest method should go a long ways to reducing quack grass. When the alfalfa and weeds re-grow, you will probably need to take another "kick" at them. An application of 2,4-D ester might be a very economical choice. Of course, one of the difficulties of using this method is getting the dehy plant to approve the pre-harvest. Usually the difficulty for the dehy company is coordinating cutting times to be there on the right day after pre-harvesting. Leaf browning and drop can happen quickly with hot summer days and cutting should probably take place the 3rd day after the pre-harvest application. Some producers have overcome this hurdle by making an agreement with the dehy company that they will cut and bale the pre-harvested field themselves and it will be processed as a sun cured product. That way the producer can be more responsive to cutting times depending on how the weather is affecting the pre-harvested alfalfa.

Roy Button, a former Soils and Crops Specialist with Sask Ag and Food, did some alfalfa take out trials in the early 90's and found that frost could really affect herbicide control of alfalfa. Before Lyle Cowell sprayed the Sept. 28 replicate, there had been about 4° of frost. He suggests that especially with alfalfa, you would want less than 5° of frost. The latest date you should think about doing the spraying is the end of Sept. You will want at least 6 inches of regrowth to get good uptake of the herbicide. Spraying it later in the fall like this seems to take some advantage of our harsh winters to kill some of the alfalfa and dandelions.

Another issue to be aware of is the herbicide residue left by higher applications of some of these products. Lyle found evidence of herbicide residue after winter in the Amitrol, 2-4,D, and Curtail M treatments. These residues can usually be handled if you keep the right crops in rotation.

Wheat has been sown into one of Lyle's sites. The project will continue with final control ratings and wheat yields taken in 2001. Feel free to call early next winter for these final numbers.

Forage Rejuvenation - Alternatives to Stand Termination

By Jerome Lickacz, Alberta Agriculture, Food and Rural Development, Edmonton, AB

Adrian Johnston, Potash & Phosphate Institute of Canada, Saskatoon, SK

In western Canada most forage stands for grazing and hay production are usually established as grass-legume mixtures. Over time the productivity and livestock carrying capacity of these hay fields and pastures may decline, largely a result of reduced stand vigor, the invasion of unpalatable or less productive species, over-grazing, and poor soil fertility. Many farmers accept the gradual reduction in the proportion of legume forage in mixed forage stands, and reduced grass forage due to weeds, as a normal symptom of an aging stand. In the initial years of stand degradation, legume growth becomes variable and eventually grasses dominate the sward. In fact, the concentration of nutrients in ungrazed mature pasture grasses are commonly below optimum for efficient animal performance.

Various techniques have been used to improve unproductive stands, with fertilization using commercial fertilizer or livestock manure, often being an effective means of restoring forage productivity and quality. With the high cost and time associated with forage stand termination and re-establishment, farmers are anxious to identify all options for sustaining a forage stand. As a result, the use of fertilization of mature forage stands to both rejuvenate the stand and improve the forage quality can be important in managing established forage stands.

The nutrient requirements of top yielding forage crops are high as shown in the estimates of crop removal in Table 1. Given that the entire crop biomass is removed in the fodder, growing forages is one of the best means of drawing down the soils nutrient supply. It is estimated that only 25 percent of the improved pasture and hay is fertilized, and only 15 percent of alfalfa hay fields. Given the level of nutrient removal by forages, and these low levels of fertilizer addition, it is little wonder that farmers report that forage stands are only maintained for 3-5 years in high moisture regions of western Canada, and 6-9 years in the semiarid areas. A low forage yield is the most commonly cited reason for terminating a forage stand. Recent research carried out in Alberta and Saskatchewan indicates that there are some good opportunities to use fertilizer to rejuvenate established forage stands and avoid the cost of breaking.

Table 1. Nutrient removal by forage grass and alfalfa crops[1].

Crop	N	P_2O_5	K_2O	S

	--- lbs/A ---			
Alfalfa - 5 tons/A	261-319	62-76	270-330	27-33
Grass hay - 3 tons/A	92-113	27-33	117-143	11-14

[1] From Nutrient Uptake and removal by field crops, Canadian Fertilizer Insititute (www.cfi.ca)

Hay land Fertilization Results

A series of nutrient response trials were established on forage stands in north-central Alberta. In one study evaluating hay yield responses, a two-year old alfalfa and timothy stand that tested 2 lb/A for phosphorus, 446 lb/A for potassium, 12 lb/Afor sulphur, and the soil N level being below the detectible limit. The fertilizer treatments included a complete blend of N (urea) at 90 lb N/A, phosphorus (triple super phosphate) at 67 lb P_2O_5/A, potassium (potassium chloride) at 78 lb K_2O/A, and sulphur (ammonium sulfate) at 27 lb S/A, along with blends with each of the nutrients removed to determine which nutrient was most limiting to forage growth. Fertilizer was surface broadcast applied in the early spring and the forage harvested in July and September each year.

Results from this location indicate that while both N and P were limiting hay yield, P deficiency by far had the greatest impact (Figure 1). In fact, N accounted for approximately 23% of the forage yield response to fertilizer application, while P accounted for approximately 74%. High soil test K levels explained the lack of a response to K fertilizer application, and the application of S to the site in previous years would explain the absence of a S response. Given the low soil P levels at this locations, the impact of fertilizer P on forage yield was not surprising.

Based on the large yield response to N and P application, a fertilizer rate study was established at this location. The N rates applied were 0, 45 and 90 lb N/A, with a blanket application of 67 lb P_2O_5/A, 78 lb K_2O/A, and 27 lb S/A. The P was applied at 0, 22 and 45 lb P_2O_5/A, with a blanket application of 90 lb N/A, 78 lb K_2O/A, and 27 lb S/A. The mixed forage stand showed a response to the first increment of both N and P applied in this study (Figure 2). In the case of N, the majority of the response was recorded in the first cut in this two-cut harvesting system. However, with the P fertilizer addition improvements in dry matter yield were recorded in both the first and second cuts (data not shown). The absence of a response to the higher rate of P is supported by the yield and nutrient removal data in Table 1. The annual application of 22 lb P_2O_5/A is similar to the lower end of the removal rates in 3 tons/A hay yields.

Finally, an interesting observation was made in this 3-year fertilization project. There was an impact over years of fertilizer P application (Figure 3). The results indicate that annual addition of P fertilizer was improving both the vigour and regrowth of the forage stand, leading to improved yields as the study progressed. In fact, the best forage yield was harvested in 1999, which also was the driest year of this study, further illustrating the role of correcting nutrient deficiencies in sustaining forage productivity under a wide range of conditions. The response was immediate on the hay land site, reflecting that it was only in the early stages of stand

deterioration. However, in the 30-year old pasture stand, it took two years of fertilizer P application before a forage yield and composition response was recorded on this severely deteriorated stand.

Summary

Low prices for annual crops have increased interest in improving forage production to support farm operations diversified into beef cattle. High yielding and high quality forages use large amounts of nutrients, both from the soil and applied as manure or fertilizer. Developing a soil testing and nutrient management plan for your forage stands, that includes early spring fertilizer application, will ensure sustained productivity of a quality product for an increased number of years.

Figure 1. Mixed forage hay yield response to fertilizer application, 1997-99. Forage yields with the same letter are not significantly different using $LSD_{0.05}$

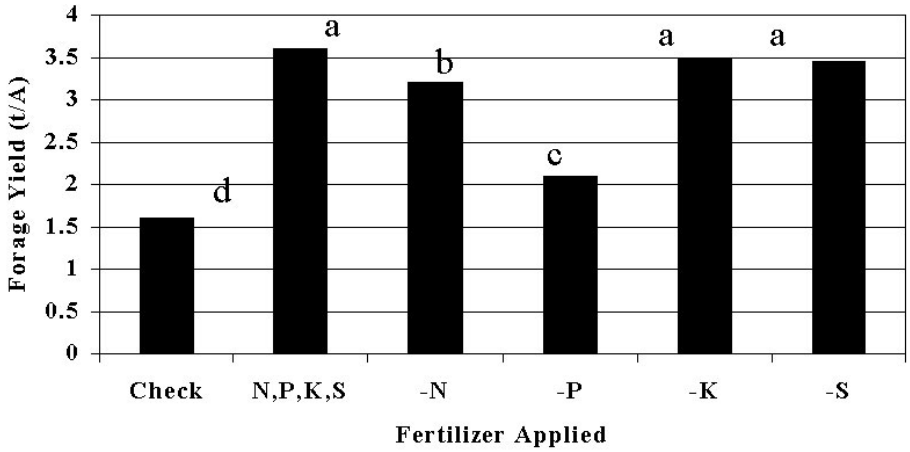


Figure 2. Mixed forage hay yield response to N and P fertilizer application rates, 1997-99. Forage yields with the same letter are not significantly different using $LSD_{0.05}$

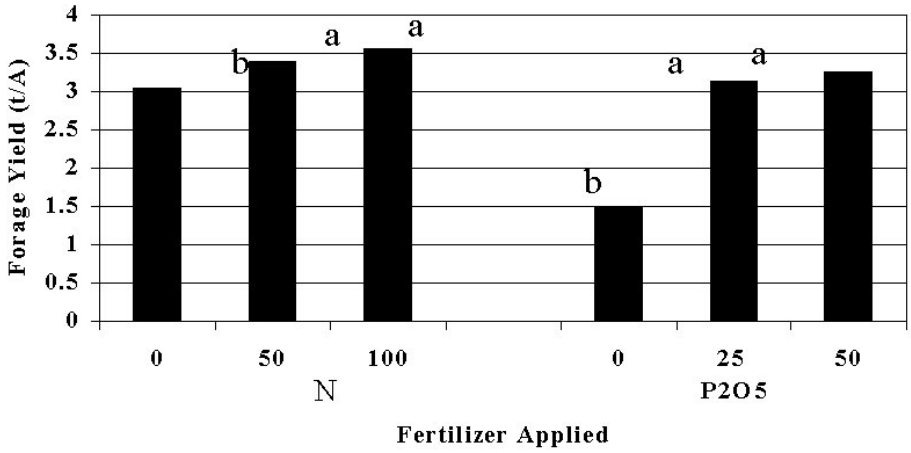
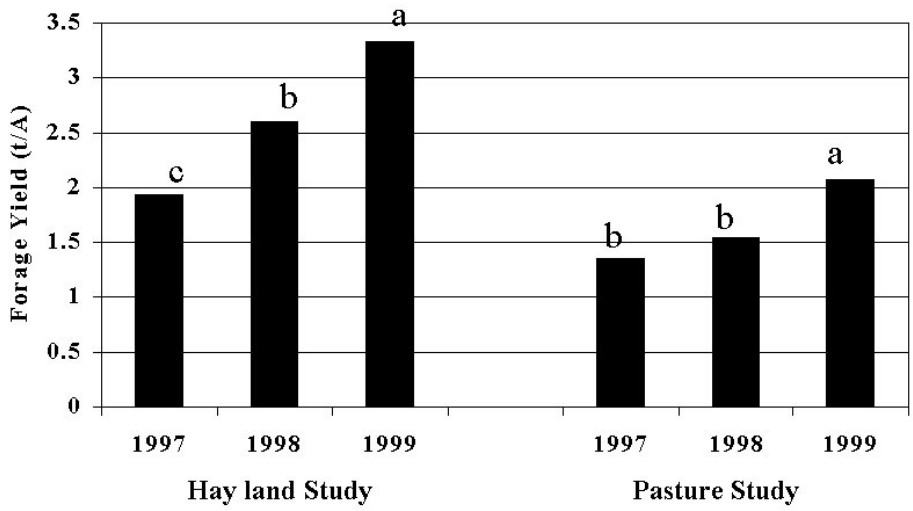


Figure 3. Annual effect of P fertilizer application on forage yield over the 3-year period, 1997-99. Forage yields with the same letter are not significantly different using $LSD_{0.05}$



Kyoto Update

By John Bennett

SSCA President

Since our last Newsletter, there have been many developments in the politics surrounding the ratification of the Kyoto protocol. This agreement was almost consummated at the COP6 meeting at The Hague last November. Our negotiators thought an agreement had been reached (with ag soil sinks included) until they reached the airport to return to Canada. They were disappointed to discover that the E.U. had backed away. Since then the U.S. Presidency has been resolved in the courts. The new President George W. Bush has changed his position several times both during and after the election campaign. During the election campaign, Bush made a point of promoting "green themes", including climate change. This was probably prudent as 75% of Americans consider global warming to be a "very serious" or "fairly serious" problem. (TIME/CNN poll).

On March 28 he announced publicly that the U.S. was withdrawing from the Kyoto protocol which resulted in International condemnation. On May 16, he released the National Energy Policy which promoted the increase of the supply of fossil fuels, the increase of coal consumption and the enhancement of nuclear power generation. This produced a stir both domestically and internationally. Since then there has been another reversal of policy.

The White House, under George W. Bush, requested the U.S. Academy of Science to review the science surrounding climate change. Some of the questions in this request included: " Are greenhouse gases creating climate change?", "Is climate change occurring?", " If so how?", " What will be the consequences of this change?".

The U.S. Academy of Science's report left little doubt that the problem is real and that it would not be prudent for the U.S. to ignore this issue.

Another factor at work here is the fact that the Senate has now changed from Republican to Democratic control.

In Bush's speech before leaving for Europe on June 11, he states," I am today committing the United States of America to work within the United Nations framework and elsewhere to develop with our friends and allies and nations throughout the world, an effective and science-based response to the issue of global warming". The U.S. is also retracting some sections of their energy policy paper.

Prime Minister Chretien states that Canada will pursue its Kyoto protocol goals. It is unlikely that Canada will ratify it in 2002 unless several conditions are met first. The dramatic evidence of climate change in the Canadian Arctic will probably influence our country's commitment to the issue.

There is a flurry of activity surrounding the international negotiations on Kyoto. The COP president has called for a high level meeting June 27-28. The different negotiating alliances are getting together to make plans. The objective of this meeting is to arbitrate differences of opinion prior to the formal resumption of COP 6 on July 16-27.

It will be interesting to see what the outcome of this will be. I suspect that an agreement of some sort will emerge. Keep watching for new developments.

Harvest Management: Looking into the future...

Dr. Guy Lafond, Indian Head Research Farm

The current economic conditions at the farm gate are such that not only should we be focusing on achieving higher grain yields, we should also be finding innovative ways of reducing costs. We must maintain a strong focus on lowering our unit costs of production, and not necessarily by producing more grain. The development of the one-pass direct seeding and fertilizing system is an example of a technology that has resulted in reduced production and capital costs and reduced labour requirements, as well as the soil and water conservation benefits. We can now observe large acreages being seeded with one operating unit.

One area of the production system that has received very little attention in more recent years is harvest management. Harvest management encompasses swathing, the actual grain harvesting operation, straw chopping, chaff spreading and any other relevant post harvest residue management such as baling, heavy harrows and mulching.

The current harvesting technology is getting more expensive and more energy consuming and yet still is a very time consuming process relative to the seeding operation. We should strive to develop a harvest management system that parallels what has been attained with direct seeding i.e. similar capital costs and performance in terms of acres per day.

Another aspect that also needs to be considered is the potential future uses of crop residues for industrial purposes such as building materials (strawboard) a source of pulp for the paper industry, as a source of energy e.g. co-generation plants using straw for creating electricity, converting cellulose from straw into ethanol. For instance, in North America, government officials are predicting a shortage of wood fibre for paper production, hence the opportunity for crop residues as a substitute for wood fibres. Assuming that these opportunities for new uses for crop residues do materialise over time, there is a window of opportunity to critically review our current harvest management systems and to start developing technologies to take advantage of these possibilities.

If you have any ideas to share, I would be very happy to receive them and use them in the development of a strategy to bring about changes in harvest management. You can send your ideas via email at the following address (lafond@em.agr.ca) or fax them to me at (306) 695-3445.

President's Message

By John Bennett

SSCA President

Hopefully by the time you read this, everyone is well on the way to a good crop and the price of everything is improving.

The Saskatoon weather summary confirmed that May was a very windy month with 25 days reporting 40k and over. Most of the burnoff here happened either in the very early morning or late evening. One of the identifying characteristics of a no-till farmer seems to be a light bar on the sprayer tractor. Post seeding burnoff prior to emergence was a "white knuckle " experience.

In the early years of no-till, when the skies were dark from blowing dust, I used to drop in on my neighbours for coffee and was able to feel smug that my soil was staying where it belonged. This spring on one of the dirtier, windier days, I drove past the R.M. crew digging out a culvert that had plugged last year after a dramatic downpour. The ditch was full of soil to the level of the approach, and at least three feet of eroded topsoil was being removed in order to clear the culvert. Here indeed was evidence of both wind and soil erosion both on the same day.

The persistent wind and the lack of precipitation in the western part of the province gave an object lesson in evaporation rates. I was feeling good about the levels of stubble that kept the seed bed from drying out. However, even with the moisture efficiencies, we kept seeding deeper and deeper and the canola emergence was spotty. Then it rained and the relief around here was extraordinary.

As a Board, we have spent considerable time and effort meeting with Provincial Cabinet Ministers and officials in an effort to see that the efforts farmers make to sustainable agriculture and their contribution to Canada's climate change challenges do not go unrecognized and are, hopefully, rewarded. Our goal is to be a voice for you.

Best of luck for the crop year!

Seeding Trends 2001: Looking Back, Looking Forward

By Juanita Polegi, P.Ag.

Conservation Agrologist

A drizzly day in the middle of a dry spring helped to bring out more than 300 farmers to the Seager Wheeler 7th Annual Field Day, June 6. Held on Seager Wheeler's actual farm site, the day was a testament to what a little vision and a lot of hard work can achieve.

The day began with a **panel of producers** presenting their thoughts on the theme, "Direct Seeding: Looking Back - Looking Forward. Larry Jansen of Rosthern, Terry Pearse of Tisdale and Perry Leech from the Leader area, all long-time direct seeders, shared their experiences with direct seeding and their visions of where prairie agriculture is likely to go. Dr. Jeff Schoenau, University of Saskatchewan and Dr. Bruce Goosen of Agriculture and Agri-Food Canada were also present to answer any of the more technical questions farmers had about soil and diseases.

Three concurrent sessions followed the panel discussion. Participants had their choice of attending a **tour** of the **forage** plots on the site; listening to a **presentation** on such timely topics as **plant diseases, fungicides, tissue testing and insects**; or participating in a **field demonstration** on **intensive fruit production** in the orchard area of the farm.

During lunch, John Bennett, President of the Sask. Soil Conservation Assoc. and a farmer from Biggar, addressed the topic " Soil Carbon: Looking Back, Looking Forward". John said that direct seeded acres can remove significant amounts of green house gases. Farmers might consider leasing their stored carbon to companies that require offsets.

Following lunch, Garry Mayerle lead the producers on a tour of his "Do's & Don'ts of Direct Seeding Flax" plots. Garry was able to show emergence patterns when various rates and forms of fertilizer were applied seed placed and side banded as well as the effect speed and depth have on flax seedlings.

For most of the farmers in attendance, the highlight of the afternoon was the demonstration of seeding and spraying equipment. Farmers watched as 5 different sprayers, including Rogator, John Deere, Flexicoil, Apache and Brandt, demonstrated their ease of set-up and floatation.

Eight different units were featured at the direct seeding demonstration where canola was seeded into barley stubble. The seeding pass made by each unit was flagged and will be signed so that anyone interested in a particular opener or drill can stop by and view the crop through to maturity. The drills and openers featured included Harvest Technologies side banding wing for liquid; Seed Hawk; Bourgault 5710 Mid Row Banders; Conserva Pak; Morris Maxim 2 with a

Morris 1¼ inch hoe point; Ezee On with the Dutch Paired Row opener; John Deere 1850 with the single shoot disc; and the Flexicoil 5000 Inter Row Shank machine.

Other activities included a presentation on landscape design and a tour of the flowerbeds.

The Field Day is the major fund raising event for the Seager Wheeler Historical Society. Numerous volunteers from the local area and representatives from business and government work very hard to ensure the success of the event. The SSCA is pleased to be involved in the Field Day where soil conservation and direct seeding are promoted.

Row Spacing Issues

Eric Oliver, P.Ag.

Conservation Agrologist

With the adoption of direct seeding, finding the right package of opener, row spacing, and packers that will seed and fertilize through standing stubble in a one-pass system, no matter what the conditions are at seeding time, has been a bit of a challenge. Recently, there has been some controversy regarding row spacing on seeding implements. This is not a new issue and there are many factors to consider when deciding what row spacing to choose when purchasing equipment or retrofitting. Unfortunately, there has tended to be more emphasis on the "perfect" row spacing; one that will be ideal for all seeding conditions, soils and soil zones. Results concluded from research in one soil zone, has in some cases, been assumed that the results will be the same in other soil zones. As we have learned from openers, what works well in one area of the province, may not work well in another for a variety of reasons.

There is a surprisingly large amount of research on the matter, but all too often the parameters of the studies were different, such as row spacing and openers used, seeding rates, border effects on small plots, or problems with fertilizer placement. There are still many issues that need researching with respect to row spacing. Interactions between a number of variables such as stubble height, amount of residue on the soil surface and the impact of weed densities still needs research to better understand their effect on row spacing.

As I see it, the whole issue of row spacing is important only when using narrow openers with low seedbed utilization, such as a knife or disc. The issue is moot if higher seedbed utilizations are achieved using openers like a spreader tip, paired row, spoon, mini-sweep or even a full sweep, because the negative impacts associated with row spacing generally occur only when narrow seed rows are being used.

In Saskatchewan, the trends from research have indicated that wider row spacings (i.e. 12-inch) perform as well or better than narrower row spacings in the Black, Grey, and Moist Dark Brown Soil Zones with respect to yields in most crops. However, research from Swift Current indicates that for some crops, the 8 or 9-inch row spacings provide a yield advantage compared to the 12-inch spacing. At Swift Current, results indicated that for flax, lentils and spring wheat, there was a 10-20% yield reduction when using 12-inch row spacing compared to 8-inch spacing. Durum and chickpeas had a 5-10% yield reduction on 12-inch rows. However, reduced seeding rates had more of an effect on field peas than row spacing. In addition, row spacing had little effect on canola and mustard yields. Once canola and mustard bolts, they create a full canopy very quickly.

So, why the difference in results from the Parkland regions and southwestern Saskatchewan? Granted, results can differ somewhat from year to year, but there are several factors that occur between these regions that can account for these differences. In the Black Soil Zone, cereal crops

develop quickly and can create a full canopy, which makes for very unfavourable growing conditions for weeds. In the Brown and much of the Dark Brown Soils, crops like wheat, lentils and chickpeas usually don't create a full canopy with 12-inch spacings. This has several consequences. First of all, when a full canopy is not achieved, weeds have an opportunity to become established and compete with the crop. In addition, because of the higher moisture limitations in these areas, even light weed pressure will have much more of a negative impact on yield as compared to the Black Soil Zone. In the southwest, less soil moisture is lost to evaporation and the moisture use efficiency is better with the narrower rows."

There is an argument that with wider rows, one can leave taller stubble for better snow trapping. However, in the southwest, the last couple of years did not exactly provide much snowfall and taller stubble will not overcome the increased evaporation from wide row spacing. Wider row spacings make a lot of sense in the Black Soil Zone, where very heavy residue conditions exist.

If the producer has to swath, 12-inch rows can create problems, particularly with thin stands or normally short cereals such as Harrington barley. Seeding on an angle can reduce some of this problem, but in our farming operation, I don't have time for this and it will also make it much rougher for the sprayer. Producers should also be aware that with the majority of the hoe type openers, there will be higher ridging when used with 12-inch row spacing versus 9-inch. It is not a big issue, but the wider row spacing do make a rougher surface.

What about plant disease in this issue? There needs to be much more research in this area, but studies conducted at the Saskatchewan Irrigation Development Centre in Outlook found very little difference in sclerotinia levels between wide or narrower rows. Studies at Indian Head and Brandon indicated that root diseases were less on wider row spacings. It has also been suggested that there could be some benefits with wider row spacings with crops like chickpeas. The idea is that it would allow the surface of the soil to dry out quicker and there would be less humidity under the canopy, which promotes ascochyta development. However, although this can be an advantage with heavier textured soils, there still remains a problem in that wider rows may allow for more rain splash to occur from the soil, which is a major source of ascochyta infection.

There are certainly advantages to using wider row spacing. There is less capital cost for the seeder and openers needed. There is also less draft when using wider row spacings. One can use a wider machine using the same horsepower with wider rows, which will speed up the seeding operation. There certainly is better residue clearance with hoe type openers on wider row spacing. On heavy clay soils, especially when wet, the wider row spacing can make a major difference.

So what is the farmer to do when faced with sometimes contradictory information on the same issue? In my opinion, farmers need to evaluate what conditions, soil types and amount of stubble that he/she might encounter on the farm on an average year. The next decision is what opener is going to be used on the seeder. If using single shoot openers, then fertilizer becomes an issue. Less fertilizer can be seed-placed on wider rows than on narrow. Therefore, the producer must do a banding operation, a split application, mid-row band, or use liquid fertilizer that is offset to the side of the seed row. Sidebanding openers can generally handle as much fertilizer as your wallet can provide. If your are in the Black, Grey or Moist Dark Brown Soil Zones and have

large amounts of stubble and surface residue to get through, then wider row spacing is a very good option. If in the Brown or Dark Brown Soil Zones, then the narrower row spacing, in the 8 to10-inch range tends to be more appropriate. However, it should be stressed that there are farmers quite happy with their row spacing that may be contrary to these suggestions. Row spacing is but one factor that needs to be considered when making equipment decisions. I'll conclude this article with a quote from Dr. Brian McConkey at the Swift Current Research Station; "Use as wide a row spacing as possible until you can't sleep at night."

Study shows more Growers Reducing or Eliminating Tillage

Reprinted from Farm & Ranch Guide, April 6, 2001

ST. LOUIS - Conservation tillage was used on an additional 12.3 million acres in the United States last year, according to a tracking analysis by Doane Marketing Research. Inc.

Conservation tillage (con-till) was used on more than 65 million acres in 2000, including 31.9 million soybean acres, 23.2 million corn acres, 5.8 million cotton acres and 4.2 million wheat acres. Doane found that U.S. growers have totally eliminated tillage on 24.1 percent of corn acres and 27.3 percent of soybean acreage.

"With higher costs for labor, diesel and irrigation, I'm not surprised that more growers are looking at the economic and agronomic benefits of conservation tillage," says Ross Bushnell, Monsanto director of U.S. Marketing. "Besides saving up to 3.5 gallons of fuel and $5 worth of machinery wear and tear, a grower can gain an extra half-hour of time for each acre shifted from conventional tillage to no-till. Farmers today appreciate every extra minute they can spend improving their farm management, expanding their acreage or earning off-farm income."

The growth in no-till corn and soybean acres parallels the use of products specifically designed for use in reduced-tillage systems, the Doane study shows. Corn acres receiving a burndown treatment grew by 44 percent between 1998 and 2000, while soybean acres receiving a burndown treatment grew by more than 17 percent during the same period. Even in cold northern climates with low no-till adoption, the study found more growers are trying strip-till and other modified tillage techniques.

"Our research shows conservation tillage is now used on more than a third, or 36.7 percent, of U.S. acreage. That's more than 109 million acres," says Dan Towery of the Conservation Technology Information Center (CTIC). "While the CTIC and Doane studies used different methodology and definitions, they both show that no-till is clearly on an upswing. We project that no-till could grow from 52 million acres to 88 million acres nationwide by 2005."

Tony Jones of Mt. Olive, N.C., converted half of his cotton acreage to no-till in 2000 and will use no-till for all 2,800 cotton acres in 2001. "I have increased production by one-third, and I haven't had to make any more equipment purchases," he says. "After we made a 100 percent commitment to no-till, it worked like a charm. We see substantial savings through planting with no-till, but the efficiency is the biggest benefit. We can do so much more with less equipment and labor."

Towery says farmers have access to several new technologies that are no-till enablers."We've got better equipment that can handle high residue, including planters, drills and air seeders, plus new seed that performs well even in cold, damp soil," Towery says. "With Roundup Ready soybeans,

cotton and corn, farmers can start fresh with a preplant burndown and control weeds without spring cultivation."

Bushnell says Monsanto is committed to offering technologies that make it easier for growers to reduce tillage without sacrificing yield. The company also has several efforts underway to help growers expand their con-till acres:

- Asgrow and DeKalb have identified several Roundup Ready corn and soybean varieties that offer excellent emergence, vigor, disease-resistance and yield in high-residue systems.

"Research shows Residue Proven seed will perform well in all types of tillage systems. The Residue Proven arrow makes it easy for growers to identify the best varieties for con-till," says Bushnell.

- Monsanto's Centers of Excellence demonstration farms test conservation-tillage techniques to help determine the best management practices for each area, not just a "one size fits all" recommendation.
- The Bottom-Line Booster Guarantee shares the risk for Midwest Growers who enroll by March 31 to try the Roundup Ready soybean system in reduced tillage. If it's not more profitable than a conventional seed and tillage system, Monsanto will refund the difference up to $20 per acre.

Why We Do It

By Tim Nerbas, P.Ag.

Conservation Agrologist

Do you remember that TV ad from the last summer Olympics? The one with the Canadian athletes talking about their preparation for the upcoming games in Sydney? In one clip, 3-time gold medallist rower, Marnie McBean, says, "I don't train for the good days. I train for the bad days".

This principal for training epitomizes that of the soil conservationist's for production: we farm to protect the soil on those "bad days". It explains why we direct seed, plant shelterbelts, seed grass runways and undertake many other conservation activities - to be prepared for the inevitable bad days that everyone gets, Olympians and producers alike.

For those of us raised on the prairies, the best way to describe our weather is "the only constant is change." We live in a climate where extremes are the norm. Drought has always been a fact of life. The old adage "we are always one rain away from a drought" holds true most years. Cloudbursts of 2 or more inches of rain are infrequent, but sometimes they cause as much or more erosion damage as the wind. Yes, let's not forget that wind - if it is calm now, wait 5 minutes. You never know what weather system will blow in next.

Be it a heavy down pour of rain or parched fields blasted by 70 to 100+ kmph wind gusts, the one thing experience has taught us is these extremes will repeat themselves. So as producers what can we do? By altering Marnie McBean's quote with agriculture in mind, it might read something like this: "we farm our soils with the bad days in mind, not the good". If we truly are stewards of the land, then we should keep soil conservation at the forefront of all farm-related activities.

As we farm our soil, every decision we make should meet this criteria: the soil will be left in a state in which it can survive and prosper not only on the good days but also on the bad days. These photos are not from the dirty thirties. They're not even from the 1988 drought. They were taken in 2001. Luckily, fields like this are the exception, not the rule. But soil drifting and difficulties establishing small seeded crops have been common problems in many areas this year.

The year 2001 has re-emphasized the need for our production decisions to be based on farming with the "bad days" in mind. Every action should meet this tough criterion of bad days. By protecting our soil resource we are investing in the future.

Like Marnie McBean, we never know if tomorrow is going to be a bad day or a good day, but planning for the tough ones gets us closer to the podium. If we farm with the bad days in mind, success both economically and ecologically, are sure to follow.

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!