The Newsletter of the Saskatchewan Soil Conservation Association

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What's Happened to the Spring Dust Storms?

By Juanita Polegi, P Ag

Conservation Agrologist

There's a story going around about an experienced farmer who says that in the 50 years since he's been farming, he hasn't seen a normal spring yet. But to those with good memories or completediaries, the early spring of 2000 has seemed a lot like 1988. The differencebetween the two springs, however, is that the dust storms we had in '88 weren'tas prevalent in 2000.

The weather conditions of the twoyears can be compared fairly easily because Sask. Ag & Food has beenkeeping records for several years. Terry Karwandy, an Agricultural Economistwith the Statistics Branch, sent me a bundle of 1988 Crop & WeatherReports. The first thing I did was to compare precipitation levels between the2 years for the R.M. of Lumsden #189 and the R.M. of Corman Park #344.

à`6*>	R.M. #189	R.M. #344
April 1, - May 30, 1988	27 - 39 mm	16 mm
April 1, - May 30, 2000	83 mm	à`6*>

The precipitation levels are alittle higher in 2000 than in 1988 but not high enough to keep all the soil athome. So then I compared the written analyses for each week of that time periodin the 2 years.

Beginning with the 1988 reports,the first report, dated April 11 shows a map of the crop districts. The topsoilmoisture conditions for districts 1A to 7B were rated as fair to poor, whiledistricts 5B, 5A, 8B, 9A & 9B were rated as good. There was very littlespring run-off so dugouts were either low or dry. Wind erosion was reported inmany parts of the south west and west central Saskatchewan. This was followedby the statement; "Field cultivation has been undertaken to alleviate thisproblem." And finally, it was reported that seeding had already begun inthe Radville area.

Between the April 18 and June 6reports from 1988, strong winds were reported three more times. Above normaltemperatures were reported in the April 18, May 30 and June 6 crop reports. ByJune 6, the report indicated that "Much ofSaskatchewan is under a great deal of heat stress".

The first report of 2000 alsoindicates that snowfall amounts across the province were below average but anearly April snowstorm improved the topsoil moisture conditions from what theywere at the end of March. The April 24 report indicated that winds caused somesoil drifting in south central regions. Most of the province had fair to goodmoisture conditions on cropland.

The May 1 & 8 reports of 2000indicated that winds had dried up the topsoil and had caused soil erosion inmany areas. By May 15, the southern grain belt had received some good moisturebut moisture conditions continued to deteriorate in the central and northerngrain belts. By the time the May 23 report was out, some of the farmers in thenorthern grain belt were waiting for moisture to finish seeding theirshallow-seeded crops. The Stats Branch continued to receive reports of somefrost and wind damage.

The May 30 edition of the reportshowed that the topsoil moisture situation had greatly improved on the easternside of the province but it continued to be dry on the west side. Strong windsand cool temperatures were making it difficult to do any spraying. The windshad caused soil erosion and some damage to emerging seedlings.

While the above discussion isn't astatistical analysis, there are some parallels between the 2 springs. In eitherspring, there wasn't a lot of run-off or a lot of spring moisture. Both springshad several days of strong winds. There was lots of dust in the air in '88 butnot so much in 2000. That's not to say there wasn't any soil in the air. Forthe dedicated listeners of CBC Radio, we all heard the host of the MorningEdition describe the dust storm she found herself in near Watrous during theMay long weekend. And there are many stories of people driving in various partsof the province that encountered some soil drifting across the road. Yet thegeneral feeling is that the amount of soil in the air this spring was less thanthat in 1988. What made the difference?

Dr. Fran Walley, a soil scienceprofessor at the University of Saskatchewan said she believes the reduction indust in the air this spring is a direct result of conservation tillagepractices. "When driving down the back roads this spring, it was very easyto see the impact of conservation tillage", she said. "Whereintensive tillage had been used on the field, the field was literally in theditch. But where fields had been direct seeded, there wasn't a problem withsoil in the air". Fran said a drive out into the country this springshowed that conservation tillage is a good production practise. "It's easyto make an argument for conservation tillage especially in dry springs. Not allof Saskatchewan was blowing and conservation tillage played a big role inkeeping soil in the field and out of the ditch."

Dr. Les Henry, also from theUniversity of Saskatchewan, said that 1988 was a much hotter and drier yearthan 2000 but he agrees that over the last several years, the dust in the airin the early spring has been reduced. "It used to be that there was dirtin the air every spring. Now, since the amount of summerfallow has dropped andthere are fewer tillage operations in the spring, you see dust only here andthere. There are no big clouds of dust like there used to be."

Sometimes in this farming game, itseems the harder you try, the more you spin your wheels. Yet in the area ofsoil conservation, Saskatchewan farmers have been making strides forward. Asthe number of passes across the field have been reduced, the ability to keepthe soil at home has increased. Hats off to all those who have changed theirtillage system from 1988. The tangible benefits to the change may seem smallbut the intangible benefits are huge! The slogan from the old Save Our Soilsprogram still rings true: Soil conservation … it's in our hands.

President's Message

By Don Kelsey

SSCA President

As I sit at my computer this morning contemplating what words of wisdom I can possibly pass on to our membership and all those who receive the Prairie Steward, I know why this article is at least a week late getting written. I'm great at having thoughts of wisdom with no pen or paper handy and either my memory is getting shorter or the initial thought couldn't have been that good.

As was mentioned in the last Steward, some major changes were coming the way of the SSCA. Staff changes have had Claire Neill and Ken Sapsford moving to other exciting job challenges and as of the end May, Doug McKell has finished his term as SSCA executive manager as indicated in the spring issue of the Prairie Steward. We welcome Blair McClinton, our former assistant manager to the role of executive manager .Blair's familiarity with the issues dealt with by the SSCA will provide stability during this time of staff changes. As was also mentioned in the last Steward Marilyn Martens has taken on the role of office manager and the SSCA board moved ahead with its plan to reduce field staff time to2/3 time.

SSCA executive officers attended part of the April planning meeting where our organization's priorities were worked in with a reduced field work plan and changes in staff responsibilities. April also saw a continuance of our participation in the carbon, Koyoto, atmospheric warming debate. Members of Canada's soil conservation organizations met with Alyden Donnelly of the GEMCO consortium at the Sask. Power building in Regina on April 17. The producer concerns that were raised ranged from use of soil sinks, input cost risks, management practises, credit for early adopters (baseline protection), discrepancies of CO_2 possible values by different parties, and share of risk given high energy use of fuels and fertilizer. Producers also had many questions about types of agreements that could be used to reduce the risks associated with any potential carbon sequestration agreements, outright or partial sale, lease agreements, also many other possible options. From the industry prospective some form of international agreement will eventually be signed, if not Koyoto, so any agreement they enter into must have verifiable reductions of carbon at the most reasonable price possible with the least amount of risk involved. The SSCA is looking carefully at all aspects of any national or international agreement that will have such a major impact on all producers.

Field tours of plots that SSCA has or participate in are ongoing. Please watch for notice in your local media and take the time to go. I thought it would be nice if your president attended the Seager Wheeler field day this year even if the SSCA didn'tparticipate directly in planning this year. Juanita spoiled my day by mentioning that perhaps I might want to check the date on my calendar; I was only two weeks passt June 6. Where did those days go?

Juanita also passed me a few thoughts as encouragement to get this article done on time The thoughts were great when I took the extra time to look at them in the context of the SSCA.. Now the quote I received was " farmers are the algae upon which everyone feeds"and knowing that this was not meant to be at all derogatory to society in general, it took, as I say, some in-depth thought. If we as people of the land look at our role on this planet we call home, not many of us would want to change too much except for the economic rewards and recognition for the role we play. Nature is what we providers of food are about. That rain in the morning that washed off the early tank of spray, the blow out of the rest of the day where you could have sprayed the whole quarter with just a little more elevation of the boom. That high-low elevation problem with seed emergence, cold soil packing, too dry, too wet. Why didn't that pre-seed burn off work better? Maybe we all need to slow down a little, keep working on that recognition problem, watch the calves, fawns, hatches of wild fowl in the creeks and ponds, and do the best we can with the limited amount of knowledge that nature allows us.

The last week of June the SSCA board will meet to discuss the many ongoing issues that affect the membership. The continuance of some projects, identification of funding sources, reviewing the changes adopted at our spring board meeting and their effect on staff job descriptions and performance, will all be looked at. Planning will also begin for our annual direct seeding conference to be held in Saskatoon in February.

Mid-row Banders and Fall Rye are a Great Fit

By Garry Mayerle, P.Ag.

Conservation Agrologist

The economics on fall rye include lots of nitrogen says Wayne Nontell direct seeder at Tisdale. His mid-row banders are working great for getting agronomically sound application of anhydrous ammonia.

Wayne has had 2 years of direct seeding experience with Bourgault's 5710 air drill equipped with mid-row disc banders. He farms 12 miles south of Tisdale on soils ranging from silty clay to light loam and even some sandy loam. He says Adrian Johnston former Ag. Canada researcher with the Melfort Research Station encouraged him to use lots of N to make fall rye pay. Wayne says I expect to grow 90 to 100 bushels of rye and if I hit the market at $1.50 with low input costs I can still make a dollar. Two years ago the price was $2.80 - 3.00 /bu.

Fall rye really works on his farm because it is harvested before his spring crops. He is growing the semi-dwarf variety AC Rifle. Last year he grew both Prima and Rifle and the Rifle was about 18 inches shorter. He also notes that it headed later but matured about the same time and they spent a lot less time combining it compared to the Prima. David Struthers with Winter Cereals Canada says the newer variety AC Remington has some advantages, especially giving a more uniform stand. Rifle has a lot of tall off types in it.

Wayne seeded this year's rye Sept. 10 last fall into pea stubble. Pea stubble has a good fit because it is supplying extra N, but it is important to seed shallow. Wayne says he seeded about 1 inch deep even though it was dry.

He then knocked off the spoons on his air drill and banded in 100 lb/ac of N as NH_3 the last week of Oct. Soil moisture conditions were very dry last fall and he did experience more loss of NH_3 than he is comfortable with. Keeping your speed down to 4 or 4.5 mph certainly reduces the loss. He feels the best time to do this operation is early in the spring. Now that he is direct seeding, his ground is much firmer and he thinks he would be able to get it on early enough. The first year he purchased his drill he applied the NH_3 in the spring and there was a lot less loss.

Although it is still obvious where the banders cut into the soil at the beginning of June they are 20 inches apart and have a very minimal effect on the crop. Indications are that the N had spread out enough to be available to the entire crop, as there was no yellow stripping.

Wayne does not find he needs any in-crop weed control but he does apply phosphate with the seed. Of course volunteering is a problem with fall rye and he thinks he should use some post

harvest Roundup. Wayne also points out that you should have a grain drier in your system to grow fall rye because it takes a long time to drop from 18% moisture to dry in the swath.

One of the strengths of fall rye is its winter hardiness. But now that Wayne has made fall rye work on his farm he wants to try the challenges of winter wheat!

Fall Seeded Canola: Some Bumps on the Road to Success?

By Garry Mayerle, P.Ag.

Conservation Agrologist

Fall seeded canola has been a hot topic for innovative farmers in the last two years. This past spring, fall seeded fields have faced many challenges and failures. Two long term direct seeders, David Newhouse and Herb Bartel, had some disappointments this spring but are still optimistic that dormant or fall seeded canola can have a place on their farms.

David Newhouse has been direct seeding at Birch Hills for eight years. He seeded two quarters of Extender coated Roundup Ready canola Oct. 30, 1999 into cereal stubble. He used Bourgault's mid-row disc banders to place NH_3 and a set of prototype knives from Bourgault to place the seed. He says the crop was establishing great even though he seeded a little too deep. He had most of the seeds in at 1.25 - 1.5 inches and ideal seed depth should be 0.5 - 1 inch. Plant counts ranged from 25 to 40 plants/m^2.

Fall seeding has been promoted heavily by Grow Tec the company that has the Extender coating. They have worked closely with Agriculture and Agri-Food Canada researchers at the Scott Research Farm. Eric Johnson, one of these researchers says the minimum plant counts for fall seeded canola is 15 plants/m^2 as long as the plants are uniformly distributed.

One of the reasons fall seeding has been so strongly promoted is that these researchers working with fall seeded canola have been amazed at young canola plants' ability to survive frost even up to -8° C. Of course we know the variability and severity of Saskatchewan's weather. Dr. Randy Kutcher, plant pathologist at Melfort Research Station, says that his plots in 1999 experienced some very cold nights but only had frost for 1 - 2 hours and then relatively warm temperatures in the day and they survived. This year however, they had long stretches of very cool highs and freezing lows. One night in particular, in the second week of May, temperatures at ground level fell below freezing at 9 PM and reached lows of -8 or -9 ° C and did not rise above freezing until 7 AM. During this week, most of the days were also cool and cloudy. Plants in his fall seeded canola plots could not survive such a long duration of low temperatures. However, Randy points out that he has been at the station for 4 years and this is the only year that they have lost the fall seeded plots. Another option that he is very positive about is early spring seeded canola.

Newhouse also lost both fields of canola and with the kind of frosts that they had, there was basically no plants left. He isn't ready yet to throw the proverbial baby out with the bath water. If canola prices increase and there is still a buck in farming, he may try some more fall seeded canola. For someone who has just re-seeded all of his 280 acres of fall seeded canola that sounds quite optimistic. The advantages of fall seeded crops for his farming operation is having some acres that can be harvested early. He also says the promise of higher yields is another reason to

try to make the concept work. Being able to avoid disease cycles like sclerotina are also a definite asset. He feels that heavy harrowing the cereal stubble before seeding is a good idea. Weed control should consist of seeding on a pre-harvested field or after a post harvest application of 0.5 L of Roundup. He is also very interested in the early spring seeded concept and feels it may be safer for his area while still providing a lot of the advantages he is looking for in fall seeded canola.

Herb Bartel has also been direct seeding for eight years now just north of Lanigan. He seeded two quarters of Extender coated canola the last two days of October and another two quarters November 6 & 7. They were all seeded on cereal stubble except one, which was seeded on canola stubble. Of course this field seeded on canola stubble broke a lot of the rules and this was the only field that had to be re-seeded. The low residue on this field allowed more warming too early and germination probably occurred on some warm days in March. The plants then froze before they even made it out of the ground. Herb says the highest plant counts on this field were 15 plants/m^2 with the lowest falling to 1 or 2 per m^2. The Grow Tec representative that came out also pointed out that there was a lot of damping off in the plants that were left on this field. Kevin Zachuk, Research Manager with Grow Tec, confirms that he has seen a lot of damping off this spring in the fall seeded canola because of the cool, wet conditions and slow plant growth.

Herb's other fields have plant counts that range from 29 to 54 plants/m^2. The severest frost he reports was -4° C for two nights in a row. At the beginning of June, Herb is complaining that these fields look quite ragged with some plants starting to flower and others the frost set back quite small. Kevin Zachuk also pointed out that it is important to see this crop through to the end. Things can look ragged and thin now, but in fields he has been in, branching is starting to happen and he is confident that a lot of these poor looking fields still have great potential.

There are several advantages that prompt Herb to try to make fall seeded canola work on his farm. One is the reduced workload in the spring. Another advantage is that they farm some very light land and he feels that the extra yield potential, with early flowering before the hottest part of the summer, might be especially beneficial to them. Spreading out the work load at harvest is also a consideration, though one that is not as important. If these three fields he has left pan out, he hopes to seed 50% of his canola acreage in the fall. He is very optimistic that fall seeding is going to be a part of his farm operation. Improvements he would make on this year's trial are seeding earlier and paying a little closer attention to weed control. This would mean paying attention to the need for a 0.5 L burnoff with Roundup in the fall and/or being out there early with the first application of Roundup in the spring. On this trial, Herb seeded the canola putting down only a dry blend of P & S at seeding time. Early this spring he dribble banded N. Herb now has a set of Morris prototype mid-row disc banders that he is confident are applying NH_3 the way he wants and he will be able to seed and fertilize with one pass.

Eric Johnson says they are certainly hearing of more failures with fall seeded canola than they anticipated. They have had such good success, losing plots at Scott only 1 year in the nine years that they have been experimenting with the concept. He prefaces this statement by saying that the reason they lost these plots were because they were seeded on summerfallow and crusting was too severe for the canola to establish. Direct seeding into good residue cover almost eliminates the crusting problem. He is suggesting there may be more geographical differences than

anticipated as he is hearing more complaints from the east side of Sask. and Manitoba. It is probable that the eastern side of the prairies has more severe springs and farmers will have to decide what the risks are that any spring they will experience this severe cold weather and frosts.

There are some great advantages to fall seeding canola and even in these potentially higher risk areas, some growers may decide to take that risk on a smaller portion of their acres.

More Low Cost Air Seeder Modifications

By Juanita Polegi, PAg

Conservation Agrologist

For several years, the common mantra chanted by SSCA staff has been, "If you're going to direct seed, you have to have on-row packers". Ensuring good seed-to-soil contact has been a key element in the success of direct seeding systems. Good packing has proven critical, especially in years where the moisture situation in spring has been less than adequate. But Barrie Gwillim, a farmer in the Strasbourg area, has been able to achieve good seedling establishment without the conventional round packers. Barrie uses chains.

Seven years ago, Barrie purchased a John Deere 655 air seeder and over the years, has been modifying it so that he can direct seed with it. One of the main limitations to the unit is that it has a solid hitch so there is no consistent depth control. Barrie said he solved that problem. " I quit growing canola! I now grow only chick peas, lentils and cereals. The seeds of these crops are much more forgiving than canola if I get them in a little too deep."

Once he figured out his rotation, Barrie then turned his attention to minimizing soil disturbance when he seeds. He chose an Atom Jet boot with a carbide tip. After seeing what a neighbour had created, he then made his own liquid kit. The liquid fertilizer is pressurized so that it squirts out the tubes at the rear and to the side of the boots. As he couldn't find a packer that he really liked, he decided to go with chains behind the boot to close up the furrow. In the first year, Barrie had some problems with the chains. "Initially, the chains were bolted on without any shock absorbers", he said. "When a shank snapped back into position after tripping on a rock, the force would break the odd chain. So I took chunks of tire and put them between the boot and the chain and since then, I haven't had any problems". The chains aren't anything fancy. He uses whatever chain he can scrounge. Each chain is about 24 inches long except those near the tires. Those are about 15 inches long.

But does the system work? "You bet!" said Barrie. "I figured I wouldn't have too much trouble as long as there was some moisture in the ground. Then in 1998, I seeded my last field of wheat into dust. We had no rain and yet the wheat came up in beautiful little rows".

So why does it work? Barrie's theory on the success of the system has to do with the location of the chains and the seedbed. "I think the first key to this system is that the chains are very low on the boots. They're basically buried, running just over the top of the seed. If they were any higher on the boots, they would probably bounce up and around. The other key is that the seedbed is so firm at seeding. I don't harrow the fields after harvest or before seeding." The row spacing on his air seeder is 12 inches so he has excellent trash clearance.

Will the SSCA change its tune about the need for on-row packing? Not likely. In 1990, Gord Hultgreen et al. found that increasing packing force from 0 to 38 lbs, increased canola emergence

by 37%. Emergence increased only slightly as packing pressure increased. In a study funded by the Western Grains Research Foundation conducted between 1997 and 1999, the effect of packing pressure on crop establishment was examined at three different locations in Saskatchewan. In the study, peas, canola and wheat were seeded with five different opener-packer combinations. Packing pressures were 0, 74 lbs, 124 lbs, 174 lbs and 224 lbs per packing wheel. Gord Hultgreen, a researcher with PAMI, was one of the scientists involved in the project. He said, "The results of this study were similar to those of the one completed in 1990. There was a great improvement in the seedling establishment between 74 lbs packing pressure and no packing but as the pressure increased from the first increment, there was little difference. The shape, size and down force of the packer didn't seem to matter a whole lot".

One of the features of Barrie's system is its price. To buy the air seeder and tank, openers, and liquid tank cost Barrie less than $20,000. The chains cost nothing. But Barrie doesn't have small seeded crops such as canola, mustard or flax in his rotation that require excellent seed-to-soil contact. In some years, chains may not be able to achieve that. An alternative to Barrie's chains is to use shank-mounted packers. When I called K-Hart Industries at Elrose, their manufacturer's suggested retail price was $140 per packer. To equip a 32 foot air seeder with shank mounted packers would cost roughly only $4500 more.

Barrie has been able to achieve good seeding success with his narrow opener and chains by seeding only those crops that don't require heavy packing. The system won't work for everyone. For those who have small seeded crops in the rotation and to guard against the dry years, the conventional wisdom of on-row packing with a packer wheel holds true.

Perhaps the new mantra for the SSCA staff could be, "The key to a successful crop is getting it established - every time. Make sure that whatever opener and packer combination you use can do that".

Notable Changes for the SSCA

By Blair McClinton, P.Ag.

SSCA Executive Manager

The SSCA has gone through many changes over the past few months. As of April 1, SSCA's five remaining regional staff positions were reduced to 2/3 time, while the Assistant Manager and West Central Regional Conservationist positions are being left vacant. As Doug McKell mentioned in previous newsletter articles, we were not successful with any of the funding applications we made to either federal programs (CARDS) or the provincial Agriculture Development Fund. While the Saskatchewan government is providing SSCA with some operating funds for the coming year, it was too little, too late for SSCA to maintain its existing field programs. The $200,000 announced by the Hon. Dwain Lingenfelter at the Direct Seeding Conference only amounts to about one third of SSCA's annual budget for the past few years. However, this funding does allow SSCA to maintain some core activities with a reduced level of staffing.

SSCA's main focus areas in the funding arrangement with Saskatchewan Agriculture and Food are: the Direct Seeding Conference, the Prairie Steward Newsletter, SSCA's web site and field demonstrations. In addition to these activities, the SSCA Board continues to work on the soil carbon issue and other policy areas to move soil conservation forward in Saskatchewan. A summary of the changes taking place with SSCA's projects follows.

Planning for the 2001 Direct Seeding Conference in Saskatoon, February 14 - 15, is well underway. This year's conference features keynote speaker, David Irvine and sessions on weed management, farm management, emerging issues in direct seeding and farming for the future. There are also concurrent sessions for both new and experienced direct seeders.

The SSCA has had an Internet presence on Ag Canada's PARIDSS server since 1994. It has evolved from a text-based "Gopher" format to "Web" format over these years. The SSCA will be giving our existing site (ssca.usask.ca) a major overhaul over the next few months. In addition to information from our newsletters and conference proceedings, members will be able to find technical information on different aspects of direct seeding, case studies of successful direct seeders, links to other related sites and a moderated discussion area. We want SSCA's site to be the site of choice for direct seeding and soil conservation information for Saskatchewan farmers.

As you will have noticed, the Prairie Steward has undergone a facelift, moving from a newspaper format to a magazine format. While the Prairie Steward may look different, it will continue to be the premier publication on soil conservation and direct seeding in Canada.

This spring SSCA staff established 20 demonstration sites throughout Saskatchewan. These sites located at the various research stations, spoke sites and demonstration farms in Saskatchewan,

evaluate a variety of direct seeding management practices. These plots will be included as part of the field tours being held at these research and demonstration sites.

The Project SOILS soil conservation education program was coordinated by Saskatchewan Environment and Resource Management (SERM) for the past six years. Due to the elimination of SERM's education programs, we needed to find a new partner to coordinate this important project. Last winter, Agriculture In The Classroom agreed to coordinate and promote Project SOILS to Saskatchewan's teachers.

While SSCA's field programs have been reduced, these efforts ensure that the latest management information on direct seeding is still available to producers. Good luck with the 2000 crop.

Opener/Rotation Study Update

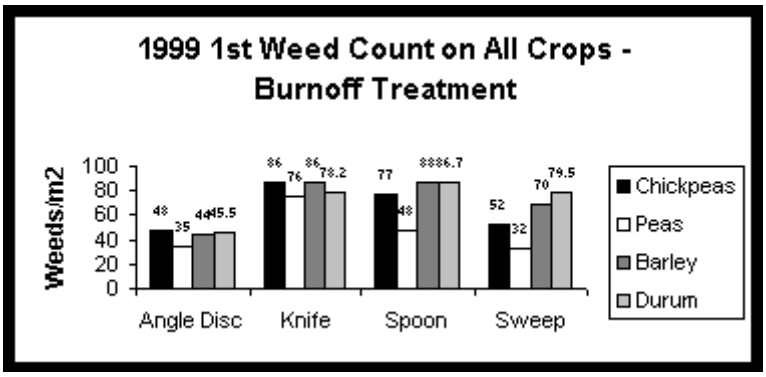
Eric Oliver, P.Ag.

SSCA Soil Conservationist

After making a presentation at the SSCA Annual Conference in February 2000 on the Opener/Rotation Study at Aneroid, I received several questions regarding why the weed populations with the knife opener was so high in 1999 as compared to the higher disturbance openers. I should clarify this situation and provide some more background that may shed some light on what is likely happening in this situation. Previous to the start of this study (three years ago), the field was seeded using sweeps for four years and hoe drills before that. This resulted in a significant weed seed bank population in the soil. Although the knife is a low disturbance opener, the hard fact is that it still disturbs the soil to some degree, depending on soil condition. In 1998, under very dry soil conditions, the sandy loam soil was totally fractured, even the subsoil, which stimulated weed growth. In 1999, under rather wet conditions, the surface was disturbed somewhat, but not the subsoil. However, the knife still produced high weed populations in '99. The rationale for this is that although it is a low disturbance opener, it apparently is going to take time before the weed populations from the existing weed seed bank in the soil are reduced. In addition, there is little weed control from the light tillage effect of the knife as compared to the sweep or even the spoon. The angle disc has so little soil disturbance that annual weed population reductions are immediate.

The next obvious question is "How long will it take before the weed populations become reduced using the knife?" That is difficult to answer. It will depend on soil zone and soil texture. In the Dry Brown Soil Zone of southwest Saskatchewan, it will likely take at least three or more years. In other areas, annual weed population reductions could be much sooner. The problem for farmers is this transition time from converting from a conventional or even high disturbance direct seeding system, to a low disturbance system using a knife. The benefits from going to that opener won't occur for a few years and the costs for weed control are still high. Hopefully, the farmer can hang in there during this period of transition because the benefits will certainly occur; not only in lower weed populations, but if using a diverse, extended rotation, the soil quality will also increase.

Another two years left in this study. The first weed count has just been completed at the time of this writing but the results have not been compiled. I will provide a further update on this project later in the year.


1999 1st Weed Count on All Crops - Burnoff Treatment
Weeds/m2
100
80
60
40
20
0
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35
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86
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86
78.2
77
48
86.7
86.7
52
32
70
79.5
Angle Disc
Knife
Spoon
Sweep
Chickpeas
Peas
Barley
Durum

How Can You Help the SSCA?

By Blair McClinton, PAg.

SSCA Executive Manager

Over the past few months, many concerned SSCA members have asked how they can help the SSCA. Here are two ways members can help.

1. Sell SSCA memberships to friends and neighbors, and renew your membership when it comes due. The revenue we receive from memberships supports SSCA's on-going programs. In addition, the larger our member base, the stronger our voice is when it comes to influencing policy makers.
2. Attend the Direct Seeding Conference. It's a great way to get the latest information on direct seeding agronomics and technology. It demonstrates to government and industry that producer interest in direct seeding is still growing. Governments take notice when over 1000 farmers regularly attend a non-political conference that provides information on direct seeding. This also provides us with a stronger voice when dealing with policy makers. When attendance is high at our Conference it demonstrates to industry a high demand from producers for related equipment and technology. In addition to being an important source of production information, the conference is also the largest fundraiser for our organization.

Planning Ahead When Chem Fallowing

Eric Oliver, P.Ag.

SSCA Soil Conservationist

I've had a few calls this spring from farmers expressing a serious plugging problem when direct seeding their chem fallow fields. Initially, they had left very tall stubble when straight combining - about 12 to 16 inches tall in order to trap snow and to minimize the erosion potential. This worked very well until they came to seed the fields. Plugging of the air drills or air seeders occurred immediately, even on 10 and 12-inch row spacing (and with C-shanks). Although these seeders would not have had a problem seeding through stubble this tall if it was stubble from last harvest; chem fallow stubble is a different matter. During the fallow year, chem fallow stubble begins to rot or break down the most at a point where the stubble meets the soil. Although the stubble is still standing and will trap snow during the winter, when a seeder tries to go through this stubble, it tends to break off at the level of the soil. If the stubble is quite tall, the seeding implement suddenly becomes a rather efficient rake, which will try the patience of the most religious farmer. If the chem fallow stubble is short, plugging problems become significantly reduced. Therefore, when planning to include chem fallow in your rotation, some planning ahead can reduce the stress levels at seeding time considerably. This is most easily accomplished at the time of combining or swathing. Simply cut the stubble that will be left for chem fallow no taller than the row spacing of your seeding implement or even a bit shorter. This will allow the seeding tool to pass through this stubble with minimal plugging problems. If a farmer uses or has access to a disc-type direct seeding implement, this problem does not occur. However, if using a C-shank type of seeder, a little planning ahead saves a lot of frustration.

Plan Now for Snow Trapping

By Eric Oliver, P.Ag.

SSCA Soil Conservationist

In the drier regions of the prairies, farmers always want to take advantage of available moisture since we all know how unpredictable the availability of moisture can be. Catching snow in the stubble is one-method farmers can use to increase the potential of stored soil moisture for the spring. However, it is often a neglected practice in the rush to get the crop in the bin. Snow trapping can result in significantly more stored moisture in the soil and if it is a dry spring, can make the difference in getting the crop started. There are a variety of methods to trap snow; high-low stubble cutting, leaving barrier strips of crop, permanent barrier strips, even leaving tall stubble. However, one must plan ahead to do this and also make sure that the seeding system you are using in the spring can go through the stubble. The important thing is that even with minimal amounts of snow in the winter, it is amazing how much moisture can be trapped in those fields.

Problem weeds - are they making you consider tillage

By Tim Nerbas, P.Ag.

Conservation Agrologist

Weeds. Weeds. Weeds. One of the main reasons producers consider returning to tillage after starting a low disturbance seeding system is the trouble they have with one or more problematic weeds. This is one of the most common complaints I have heard on my numerous field calls in the last few years. It may be dandelions, tansy, foxtail barley, narrow-leaf hawk's-beard or any of a host of others. The reasoning seems logical: "I didn't have the problem when I used to cultivate. Therefore, the way to control it is to return to tillage."

But remember: weed control is one of the pillars of direct seeding. A common thread among these producers considering a return to tillage has been the lack of a systems approach. They don't use all the tools they have in their toolbox or should have in their toolbox.

It must be human nature that we are always trying to keep things constant. The sun rises in the east and sets in the west, my weed spectrum remains stable and life is good. However when the weed spectrum changes, as it will when we make a significant management change such as moving to a low disturbance seeding system, some people see it simply as a challenge which will be overcome, while others view it as an end in it's self. Producers such as the latter tend to revert to the last management technique that they felt was successful. Is this wrong? Not necessarily. Everyone has a different comfort level associated with farming risks. It is important each producer determine this level. It has long being recognized that direct seeding or low disturbance seeding possesses a higher risk. The type of management implemented on the farm will dictate whether the risk is justified. Equally important, however, is continuing to be a steward of the land.

Producers who are successful at making the management change to a lower disturbance system are individuals who make wholesale changes in every aspect of their farming operation. They are continually monitoring their weed spectrum. They are upgrading their skills at weed identification and other management techniques. They are constantly learning about the growth habit of the new weed spectrum. They are using as many of the tools from the toolbox that are available to them.

So what tools should be in your low-disturbance toolbox? Pre-harvest, post-harvest, and pre-seeding applications of glyphosate or fall applications of 2,4-D are important. You may not need to do them every year, but having them in your toolbox and implementing them into your crop plans are both necessary.

Yes a plan. That should also be in your toolbox, near the top I might add. It's the old adage, "Most people don't plan to fail, they fail to plan." You may have had things well mapped out with your tillage operation, but have you developed a thorough strategy for your new low-disturbance operation? Developing a complete plan is important, and remember to keep an open mind.

Your toolbox should also include a more diverse crop rotation. What crops do you presently grow and what crops could you potentially grow?

For example, would forages be an option? Even if you're not into cattle, forages could benefit a neighbour. In turn, the manure from his livestock operation would likely be a benefit to your soil. Forages have long been recognized for their many beneficial characteristics, particularly their ability to suppress weed growth. Forage can provide a viable alternative to herbicide inputs. Work by Martin Entz in Manitoba has shown reduction in wild oats, Canada thistle, wild mustard and cleavers after as little as three years of alfalfa in the rotation. In fact wild oat populations in wheat following alfalfa were equal to wheat which had been sprayed with a wild oat herbicide. This is just one example of forage's potential for weed control, and a good example of the importance of a diverse crop rotation.

Including forages in your rotation also plays a significant role in alternating seeding dates. This is another vital tool for any seeding system. One of the easiest ways to select for a specific weed spectrum is to do the same things every year. If we seed particular fields either first or last every year we are selecting for a specific problem. The inclusion of forages allows us to diverge away from this constant. With forages we have competition throughout the growing season.

Having a diverse rotation of annual crops often allows the seeding operations to occur naturally at different times. The inclusion of fall seeded crops adds further diversity as to when crops are seeded. Crops like winter wheat, fall rye, triticale or possibly fall-seeded canola alter the time frame for when seeding takes place. They can also alter the time frame for when pre-seeding or in-crop herbicide applications take place. These alternatives help to keep the weed spectrum off balance. Throwing a curve at the weed spectrum is the key to successfully keeping specific weeds from becoming a problem.

Another important tool is a re-examination of summerfallow. For many years we believed that we had to include summerfallow in the rotation to allow the land to have a rest from crop production. However, there are no examples in nature that adhere to this adage. In general, nature covers the land in some type of vegetation at all times. A diverse rotation that includes pulses, oilseeds, cereals and even forages is important for keeping not only the weed spectrum in check, but also crop diseases and insects. As well a constant cover on the land helps to protect it from erosion. Remember the old adage "a change is as good as a rest".

Finally your toolbox should have some different approaches to fertilizer application. Fertilize your crop and not the weeds. Locate the fertilizer so the emerging crop has the advantage over the weeds. Fall banding, double shoot openers, mid-row coulters or coated fertilizer gives us the opportunity to put our crop one up on the weeds. Broadcast applications of fertilizer tend to give

the advantage to the weeds. But remember that it is important to select the type of fertilizer placement that works with your operation.

So do we need to revert to tillage? In most instances the answer is no. With a good plan in place, tillage is not likely required. However, tillage can always be used as a last resort. It is after all, another tool we have in our toolbox. But perhaps it could remain buried a bit longer while you plan out your tools of the new millennium.

Reap What You Sow

(But get ready for sowing)

by Bob Linnell

Conservation Agrologist

By now, you will all have gone through the exercise of planting a crop, puzzling over what to treat it with to control those pesky weeds and worried about what it will be worth later. That is, unless you are still hung up about how you are going to pay for all the inputs, how much hail insurance you are carrying, the "new" bug that is out there this year, and whether your spouse is actually going to run the truck for you this fall. She (or he) still doesn't quite believe you that the new canary seed is actually itchless.

Rule # 1 comes into play at this time of the year. You remember it very well about halfway through seeding, don't you?; (Residue management starts at the back of the combine). If you don't have a chaff spreader, maybe this is a good time to think about getting one, or at least making one that stands a chance of working. If you are going for one of the type that is hydraulically driven, try to plumb it into the back side of a fluid driven, knife or reel, so you have a ready made and cheap indicator that possible plugging will show up. The wrong place to connect is to the header height system, because that essentially stops the spin when you adjust the header, and as a farmer who did just that found out, constipation of a rotary machine from the back (due to a plugged spinner) can be very costly.

It is also important to carefully control the height of the stubble left, if you intend to seed directly into this field next spring, depending on the shank spacing on your seeder. Anchored stubble can often be about the same as the shank spacing and if the straw and chaff are well spread, can be 2 or 3 inches taller than the shank space. Remember, you may be able to move some straw around with heavy harrows (if the straw is dry), but you can never move chaff. Chaff is often the cause of diagnostic troubles the next year, when it comes to considering disease causes and volunteer grain control problems. Spreading the straw evenly over as much of the width of cut as possible has long been considered the norm.

Rule #2 is always considered in any good management unit in these days of limited profit margins and error controlled operations. (It's rotations - remember?).

Think about what you are going to plant on every field next year before you harvest this years' crop and you will likely end up with far less problems and definitely a lot less surprises.

Broadleaf crops go on grassy crop stubble and vice-versa. It is incumbent on every farmer these days to produce as much crop profitably as possible on the acres that are operated. An improper sequence of crops can lead to disasters of monumental proportions, when you forget which crop

protection product you used on a particular field last year, and you wind up losing an entire field due to herbicide residue or a forgotten disease incidence. Rotations can often be a money saving plan when utilizing inoculated pulse crops followed by cereal type crops, realizing the savings made possible through the extra nitrogen left by the pulse crop.

Rotations also mean a change in herbicides, to enable you to get away from using the same group each and every year, and some even give you an added benefit of having a slight residual for the next years' crop. Anything that can help on the input bill next year is always welcome. Rotations can also mean timing in seeding a field. If you seed the same field first in order each year, you will give the advantage to the competing weed populations, because they think they have you fooled. This eventually will lead to a certain species of weed always present in that field, because you have eliminated most others. Field diagnostic walks will show this single weed species very often, and the farmer will not likely know why.

Rule # 3 is the seed factor. Be aware of the quality of the seed you are currently using and plan to use for next springs' seeding. A germination test is always the minimum that should be done on a sample of cleaned seed. Pedigreed seed purchased on a regular basis is always a good investment, and assures you of a quality crop as it emerges. What the crop turns out like from that point onwards is now in your management hands. And the result should be very carefully evaluated before you consider it for any further growing . If you know, or suspect a disease incidence in your field, plan not to use the production for a seed source, because it is usually far more expensive to try and cure a problem after you notice it than to take preventative action before hand.Rule # 4 My advice is to keep careful notes on each field day-by-day throughout the year and be sure to include things like the temperature, wind strength and direction especially on spraying days.

The field notes are always a help even 2 or 3 years later, when you need to know if you used a certain product and at what strength, and what the results looked like as soon as you noticed them. Record seeding rates, dates, fertilizer used, crop products used, results, and estimated yields initially on harvesting, which can later be confirmed. Make notes of weed patches in the fields or unusual conditions as you observe them, because a note is always better than a memory. The new GPS systems are really nothing more than a big electronic notebook.

Here is your most valuable tool when it comes to evaluating what you did, whether it paid off, and for how much, and what are the best options you employed for the most economic yield and profit. A simple shaving of herbicide rates might seem expedient at the time, versus a high end input experience, but at the end of the day, you can say with finality "I should have done it this way, or I wish I had done it all the other way."

You get the picture.

Rule # 5 Consult an acknowledged Ag. expert anytime you would like to know more about what is actually happening out there. They are, for the most part, always willing to help you find the answers to dilemmas. If they are not willing to help, well then it is time to find another one. You get to build up a trust after a while, and you will soon know whom you can depend on for sound advice that you need, and when you need it.

I know that it is hard to think of seeding when your mind is bent on harvesting with all its pitfalls and particulars, but keep the notebook handy, and try to think seeding and what do I need to do to help me next year. Happy harvesting.

Seven Saskatchewan People Honoured for their Contributions to Agriculture

By Tim Nerbas, PAg.

Conservation Agrologist

The Saskatchewan Institute of Agrologists honoured seven people at the awards dinner held in Yorkton on April 7, 2000.

Distinguished Agrologist awards were presented to Stewart Brandt, P.Ag., Bazil Fritz, P.Ag., and Eric Johnson, P.Ag. Brandt, from Scott, is employed by Agriculture and Agri-Food Canada. He was recognized for his research and extension work relating to pulse crops and forage work in the dark brown soils. Johnson who is from North Battleford, is a Soils and Crops Agrologist with Saskatchewan Agriculture and Food. He was recognized for his service to farmers assisting them in their crop production, soil conservation and crop rotation systems. Fritz from Yorkton was cited for his work with livestock production including herd development and maintenance, nutrition, pasture management and marketing. He has recently moved to a new position with Saskatchewan Agriculture and Food and is now the provincial beef-feeding specialist in Regina.

An outstanding Young Agrologist award was presented to Juanita Polegi, P.Ag., in recognition for her work as a soil conservation specialist in the east central area of the province. Polegi, who works for the Saskatchewan Conservation Association (Congratulations Juanita), was recognized for her work in assisting producers as they became more involved in minimum tillage, new crop rotations and special crops. The award is presented to young agrologists who have made outstanding contributions to the agriculture and food industry early in their professional careers.

A Recognition award for Professionalism was presented to Brenda Machin, P.Ag. of the profession. Machin was recognized for her dedication to and interest in strengthening both the provincial and national professional organizations Regina. This award is presented to an agrologist who has provided outstanding service to. She served as president of the Saskatchewan Institute of Agrologists and is president of the Agriculture Institute of Canada.

Honorary Life Memberships were presented to Norman Roebuck and John Miller both from Yorkton. Roebuck was a longtime dairy producer and elite seed grower. He was also active in radio and television and served on the Yorkton Exhibition Association and as a 4H leader. Roebuck continues to be active in community activities. Miller, a long time farmer has been involved in both the Saltcoats and Yorkton agricultural societies. He has also been active in 4H, the Dairy Herd Improvement Association and the Chamber of Commerce. Miller resides in the Yorkton area and is involved in various community projects.

Is Your Land Blowin' in the Wind?

By Tim Nerbas, P.Ag.

SSCA Soil Conservationist

Most producers will remember the long weekend of May 2000 with a bitter taste in their mouth, or should I say a dusty taste. On May 22nd and 23rd, high winds caused severe blowing conditions on a number of fields throughout northwest Saskatchewan. The evidence of this weather system will be perceptible for years to come: ditches, or what used to be ditches, filled in with soil; fence lines that look like motorcycle jumps. It was two days of pure misery. Many producers watched helplessly as this spring's hard work was blown away before their eyes. It was once again a sobering reminder of the importance in maintaining residue cover on our precious soil resources.

Every few years we witness weather conditions like these that result in major soil erosion. It takes decades to build a single inch of topsoil. On May 22nd and 23rd one to two inches were eroded away on a number of farms. Any erosion can be devastating. Soil erosion on your fields is a sure sign that your farming practices are not sustainable. When you're sick and tired of driving past ditches full of soil, it's time to examine the changes you need to make to your present tillage practices.

It is not rocket science: tillage puts our soil in a vulnerable state to both wind and water erosion. My hope is that the distress over May's merciless winds can be put to good use. Now is the perfect time to reflect on what you are presently doing. How can your farming methods be improved so you're ready when the next major weather problems arise? Prepare for the unexpected. That means keeping your soil resource in a condition that can resist erosion from wind or water at all times. We don't know when these major weather conditions will arise. We only know that they will.

Building up the surface residue and soil organic matter gives our soil greater resistance against erosion. A reduction in tillage, a more diverse rotation, and possibly the inclusion of forages into the rotation, are all factors that will go a long way toward protecting our most precious resource - our soil.

A producer from this northwest area planted his 75th crop this year. That May weekend, as he watched the skies darken in dust, he shook his head in disgust. "In the 30's everyone farmed like that. The sky was black no matter which way you turned. We didn't know what else to do. Today we know better."

Boy, do we ever! When the next major weather system arrives, I hope you won't find your resources blowin' in the wind.

Lots to See and Do at the Conservation Learning Centre

By Laurie Hayes, M. Sc., P Ag

Manager, Conservation Learning Centre

The seed is in the ground and we were waiting for rain. Fortunately, over 2.5 inches has fallen since June 8. The ever-present wind however has hampered spraying efforts but we finally succeeded in spraying the fall-seeded SMART canola field that is looking quite lush but unfortunately it's not canola!!

The fall-seeded canola (Arrow and 46A73) came up very spotty - or so we thought - until June 3 when we were scouting for weeds and saw it coming up like gangbusters. After digging up a few plants, it was deduced that the seeding depth on the drill had not been reset for canola and as a result, the canola was seeded at least one inch deep. But dumb luck was on our side again as this oversight meant later germination and that meant the crop missed the killing frosts. I tell you, we have a secret supply of horseshoes.

Another problem discovered that day was that many of the runs were plugged when the barley (AC Metcalfe 2-row malting) was seeded. So the non-seeded portions were seeded, three weeks after the initial seeding, a new version of strip farming. But with the onset of some warm weather, the later seeded crop should almost catch up to the earlier one. If it doesn't, there is a neighbour down the road who has a 12' swather . . .

Within the field of spring-seeded Arrow canola, there are six canola seed treatments demonstrated at the farm this year: Gaucho Platinum, Adjust + Foundation Lite, Counter 5G + Vitavax, Helix, Vitavax RS and Virosoft-BA3, a biological control for bertha armyworms. Each plot is about 2.5 acres large and should show some good comparisons.

Last fall problems continued with the pump on the liquid fertilizer tank (insufficient volume) while seeding the canola. This spring, to ensure the crop has access to the recommended levels of nutrients, the lacking fertilizer was coultered into the Arrow canola and will be dribbled onto the SMART canola sometime before bolt. Liquid sulphur will also be dribbled onto a plot in the canola.

Another demonstration is the application of Accord on the Arrow canola together with Roundup and Lontrel. Split applications of Ronilan will also be demonstrated later this summer. As well, there are plots of Liberty Link fall-seeded canola and bromoxynil-resistant Cartier canola (Navigator system). Other new products on the farm include DB-Green seed treatment and Everest herbicide (in combination with DyVel DS) in hard red spring wheat.

The field of 2573 Invigor canola was seeded, varying the rate of nitrogen. Two polygons of high and low residual nitrogen were identified based on the grid soil samples done last fall. Phosphate was applied as granular fertilizer; nitrogen and sulphur as liquid. The variable rate prescription was applied to the liquid fertilizer. Therefore, the sulphur rates also varied with the nitrogen. The nitrogen level varied between 80# N and 40# N while the sulphur varied between 13# S and 7# S. The variable rate prescription was applied to one-half of the field with the other half receiving the Enviro-Test recommended rates. It will be interesting to see any differences during harvest this fall.

Other demonstrations include:

- The Aster Yellows disease plot is staked out and should be seeded shortly. The incidence of disease in a number of herbs and spices will be monitored.
- Just over one acre of caraway was seeded. Conventionally, a cover crop is used but it was decided to demonstrate establishment without a cover crop. Local spice grower, Martin Gareau, will be advising us.
- At the suggestion of Simplot, a small plot was seeded with ten of the new Bourgault openers on the outsides of the drill. The comparison between those openers and our current ones will be interesting.
- A demonstration comparing seed-placed granular copper with foliar applied (at flag leaf) copper in the Barrie wheat has been established.
- Other field plans include 100 acres of AC Elsa HRS wheat, 25 acres of Delta yellow peas and 32 acres of AC Metcalfe barley.

Agriculture and Agri-Food Canada will continue their research trials on disease, landscape and fertilizer rates. The University of Saskatchewan will be collecting data on their alfalfa inoculant plots.

Our school program continues to grow, by the end of June, 1,000 students will have visited the CLC - a 33% increase from last May and June!! We have also been approached by a variety of other groups for programs: 4-H, Boy Scouts, environment clubs, EnviroThon competitors (who won the soils component at the Western Canadian competition based on what they learned from Jason Fradette during their visit to the CLC), Saskatchewan Home School Association and an English Immersion group from Hong Kong. Again we thank the Saskatchewan Canola Development Commission for their commitment to educating our youth.

As you can see, we have a number of interesting projects for 2000. We welcome all visitors and encourage groups to contact us if they would like a tour arranged.

We thank those who furnish us with suggestions for projects and sincerely appreciate the continued support of our partners and sponsors.

Getting it right - the first time!

(How to be a successful winter cereal grower)

David Struthers, Executive Manager

Winter Cereals Canada Inc., Yorkton, SK

Winter cereals are "systems" crops that have an excellent fit in direct seeding and zero tillage production systems. 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

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.

As more producers adopt direct seeding and zero tillage production 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.

The Keys to Success

The production of winter cereals is straightforward but requires different management practices than those used for spring seeded cereals. As with spring-sown crops, there are many factors to consider, such as fertility, weed management, insects and diseases, and harvest management. However, the most critical decisions are those that will ensure the crop gets off to a competitive start and enhance winter survival. Here are the key points:

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!

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.*
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. Research the available varieties and find one that is adapted to your region. Winter cereal seeding usually 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?*
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.*

1. **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. Fall soil temperatures influence optimal seeding dates. As a result, the optimal timing for seeding differs in each production region of the Northern Great Plains. Research has demonstrated that seeding during the period from late August to early September (approx. August 25th to September 10th) 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.*
b. 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, 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 rainfall. 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.**

a. *Nitrogen - 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. Research data shows that this method produces the most consistent yield and quality response. Urea (46-0-0) and urea ammonium nitrate (28-0-0) may also be used but 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, 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 some of the nitrate will be subject to leaching.*

b. *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 seed placed or side banded at seeding time. Winter cereals 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. 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 when 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 quality parameters such as flour yield and loaf volume. Application rates for phosphorus, potassium and sulphur should be based on soil test recommendations.

These are just a few of the many management practices that are discussed in more detail in 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 University of Saskatchewan's Crop Development Centre. If you would like more information on winter cereal production, please write to Winter Cereals Canada at Box 22011, Yorkton, SK, S3N 4B2, or phone (306) 782-8188.

Crop Residue Burning Pilot Project in East Central Saskatchewan

By Juanita Polegi, PAg

Conservation Agrologist

On November 11, 1998, an atmospheric condition known as an inversion layer settled over the city of Regina and stayed there for more than 24 hours. The city was engulfed in smoke, making life difficult for those with breathing problems. As the number of hospital admissions climbed, so did public pressure for the government to "do something about all the smoke". It was assumed that the smoke was from burning straw in the fields surrounding Regina. In response to the public pressure, a Crop Residue Burning pilot project was set up in the Regina area in 1999. The project has been broadened to include the area around Yorkton in 2000.

While the Crop Residue Burning Project doesn't advocate burning, the committee members recognize that there are times and situations where an occasional burn may be the most reasonable and economical solution to a crop residue problem. The Committee, made up of representatives from Sask. Ag. & Food, Sask. Environment & Resource Management and Sask. Health, is trying to educate farmers about the best burning conditions. Jim Donovan, Extension Agrologist and member of the Committee for the Yorkton project said the project is designed to be educational. "The project is designed to show farmers when they can and when they should not burn their crop residues", he said. "In mid to late summer, we'll be sending out information packages to area farmers that discuss the advantages and disadvantages to straw burning. Near harvest, a toll free number will be made available for them to call to find out if the weather conditions are favourable for burning."

Weather conditions play a large role in how burning straw or stubble affects others. "Burning crop residues should be done only as a last resort for dealing with the straw. When a burn becomes necessary, farmers should wait until conditions will ensure the smoke rises rather than remaining close to the ground," Jim said. "If farmers learn to burn correctly, the health and safety issues surrounding burning will be diminished". Conditions that enable the smoke to rise include cloudy days when the clouds are very high. When burning occurs in the evenings, the smoke tends to move horizontally, close to the ground.

Until recently, farmers have been free to burn at their will. They could burn what they wanted, when they wanted. But with the public becoming increasingly conscious about health and environmental matters, there are several issues to consider before the match is struck and dropped in the windrow. The first is the **health issue**. Health agencies are concerned about the effect the smoke from burning crop residues can have on those with asthma and other breathing problems. **Safety** is also an issue. Thick smoke wafting across a highway or road is not safe for drivers. The surrounding **environment** is also an issue when burning occurs in a field. The public doesn't like to see potholes, sloughs and treed areas burning if the fire gets away. And

finally, **liability** is an issue. Who is liable when a fire jumps the fire guard and burns the neighbour's field or yard? Not only does the field become susceptible to the forces of the wind and rain, any accumulated soil carbon is lost as well as nutrients contained in the straw and stubble.

The East Central Crop Residue Burning Pilot Project should be in operation for 2 or more years. During that period, area farmers will have the opportunity to learn more about the favourable conditions for burning that will reduce the amount of smoke hanging in the air. Farmers will also be able to take advantage of the toll free number that connects to Environment Canada. The recorded telephone message will provide daily wind dispersion information for the area and a forecast for the next 2 days.

For more information on the Crop Residue Burning Pilot Project, contact Jim Donovan, Extension Agrologist, Yorkton (786-1528); or Wayne Gosselin, Environmental Policy Coordinator, Sask. Ag. & Food, Regina (787-6586).

Choice of Crop Stubble and Grain Yield

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Choice of Stubble

In recent years, many producers in the Brown and Dark Brown soil zones have been diversifying their cropping systems by including non-cereal crops such as canola, field pea, lentil, and/or chickpea in the system. The inclusion of those alternative crops in the cropping system provides producers with options to grow their crops on different types of stubble. Crops perform much better on one type of stubble than another type. Thus, the wise selection of crop stubble can maximize crop yield.

Research Experiment

A field study was conducted on a loam soil at Swift Current and a clay soil at Stewart Valley, Saskatchewan, from 1996 to 1999. Field pea, lentil, chickpea, mustard and wheat were grown in the experiment. The following year, canola and spring wheat was re-cropped on the five different crop stubbles. Nitrogen fertilizer was applied to the re-cropped canola and wheat with the total amount of soil available N equal to 65 to 70 kg N ha^{-1}, based on soil test. Nitrogen credits from the pulse stubble were taken into account in the fertilizer calculation.

Soil Water at Seeding

Soil water was measured to the 120 cm (4-feet) soil depth in stubble fields immediately before seeding. Large differences were found among the five types of stubble in conserving soil water (Table 1). Pea and lentil stubbles conserved about 10% more available water than wheat stubble. The soil available water in chickpea stubble was less than those conserved in pea or lentil stubbles, but was equivalent to that conserved in wheat stubble. Mustard stubble conserved the least soil water. The status of soil water at seeding time was closely related to the water-use characteristics of the previous crops. Pea and lentil used much less water than the other crops during the previous growing season, and thus a large portion of soil water was conserved below the 60-cm (2-feet) soil depth.

Table 1. Soil Available Water at planting in the following spring, measured in the five different stubble fields at Swift Current and Stewart Valley, from 1997 to 1999.

Crop stubble	1997	1998	1999	6 site-year mean	% over wheat stubble
	---------- mm ----------				(%)
Pea	158	125	48	115	11
Lentil	152	125	61	114	10
Chickpea	131	109	65	104	0
Mustard	139	115	36	99	-5
Wheat	135	106	67	104	0
Lsd (0.05)	20.7	14.9	22	11.3	---

Soil Residual N at Seeding When measured on the loam soil at Swift Current, pea and lentil stubbles had 17 to 23% more soil residual N in the 120-cm soil depth than wheat stubble (Table 2). On clay soil at Stewart Valley, the residual N conserved by pea and lentil stubbles was even greater; over 70% more than that conserved by wheat stubble. Chickpea conserved less soil residual N than pea or lentil, but it was significantly higher than those conserved by wheat or mustard. Those observations were similar across all the three years.

Table 2. Soil residual N at Planting in the following spring, measured in the five different stubbled fields on loam (at Swift Current) and clay soil (at Stewart Valley), from 1997 to 1999.

	Loam soil		Clay soil	
Crop stubble	Total soil residual N	% over wheat stubble	Total soil residual N	% over wheat stubble
	(kg ha^{-1})	(%)	(kg ha^{-1})	(%)
Pea	41	23	63	96
Lentil	39	17	55	70
Chickpea	35	5	46	45
Mustard	27	-19	42	32
Wheat	33	0	32	0

Fallow check †	94	180	80	150

† Fallow check data presented here for reference only.

We used the N equivalent information in fertilization management for crops grown on the different stubbles in the following years. For canola and wheat re-cropping, fertilizer N application was adjusted to provide an equal amount of soil available N, targeting an equal yield goal on all crop stubbles. In this manner, crops grown on the pea stubble received an average of 20 kg N ha^{-1} less than crops grown on wheat stubble. Crops grown on the lentil and chickpea stubbles received 10-15 kg N ha^{-1} less than those grown on wheat stubble. This size of N contribution from pulses was larger than expected. It appears that N contributions from the pulse crops, especially pea and lentil, have been underestimated by not accounting for conserved N below the 60-cm soil depth.

Grain Yield of the Following Crops

The type of crop stubble had significant influences on canola and wheat grain yields (Table 3). Averaged over six site-years (i.e., 1997, 1998, and 1999 at Swift Current and Stewart Valley), canola grown on pea or lentil stubble produced 20 to 40% higher seed yield than canola grown on wheat or mustard stubble. Canola grown on chickpea stubble produced 5% higher seed yield than those grown on wheat or mustard stubble. The yield patterns were somewhat similar to those with soil available water and residual N as discussed above. Great differences were found when wheat was grown on those five different stubbles. Wheat grown on mustard stubble produced 17% more grain than wheat grown on its own stubble. Three pulse stubbles (chickpea, lentil, and pea) resulted in significant increases in wheat grain yield (25 to 30%), as compared to wheat stubble. Thus, wheat stubble provided the least benefits to re-cropped wheat, while pea and lentil stubbles were the best for wheat to follow. As expected, wheat grown on summer fallow had the highest grain yield, which was over 50% more than wheat grown on its own stubble, and was 16% more than wheat grown on pea or lentil stubble.

Table 3. Grain yields of canola and hard red spring wheat grown on the five different crop stubbles at southwestern Saskatchewan, from 1997 to 1999.

	Canola yield		Wheat yield	
Crop stubble	6 site-year mean	% over wheat stubble	6 site-year mean	% over wheat stubble
	(kg ha^{-1})	(%)	(kg ha^{-1})	(%)
Pea	1493 a	42	2885 a	30
Lentil	1293 b	23	2866 a	29
Chickpea	1110 b	5	2764 ab	25

Mustard	1061 c	1	2598 c	17
Wheat	1055 c	0	2214 d	0
Fallow check †	---	---	3357	52
Lsd (0.05)	357	--	537	--

Yield values followed by the same letter within a column were not statistically significant ($P < 0.05$).

† Wheat was also grown on replicated, non-randomized fallow check. These data were not included in the statistical analyses but are provided here for comparison purposes.

Conclusion

Canola and hard red spring wheat grain yields can be significantly improved by growing either crop on stubble other than its own stubble. Pea and lentil stubbles boosted canola seed yield by over 20%, and increased wheat grain yield by around 30%. Chickpea stubble functioned similarly to mustard stubble in terms of water and nutrient conservation, and it is better to grow wheat than canola on chickpea stubble. Stubble also affects seed/grain quality. The seed size of both canola and wheat was significantly increased when those crops were grown on pea and lentil stubbles. The yield and quality benefits associated with pulse stubbles are in addition to nitrogen credit, since N benefits had been taken into account in fertilizer management.