Prairie Steward

Farming For Your Future Environment

The Newsletter of the Saskatchewan Soil Conservation Association Inc. Winter Issue No. 49, 2007

Carbon Issues, What's the Hype?

Edgar Hammermeister, PAg
President SSCA

After spending the summer ruminating on environmental issues, the Federal Government released, in October, 2006, the much-anticipated "Clean Air Act". The government is taking the approach that blends the issues of air pollution and greenhouse gas (GHG) emissions. Legitimately, both issues need significant attention but the strategy will create challenges in communicating priorities.

Specific to carbon trading, the Government wants to consult with the provinces and various industry groups on a course to reduce GHG emissions. The Government indicates that it will not spend taxpayer dollars on carbon credits but does encourage industry to develop whatever tools it feels appropriate to meet eventual domestic environmental targets. No mention was made of the Kyoto Protocol and Canada's obligations under this international law. The 40+ year timelines indicated for action on GHG reductions are pretty friendly to the emitters.

Direct seeding increases soil carbon.

The federal opposition parties are crying foul and have threatened to take down the minority government because of the lack of concrete action. The act is now under review in parliamentary committee and will no doubt receive many amendments before going to parliament for final approval. That is, if it ever goes for final approval. It may very well die on the "order paper" as there are already rumblings of a spring '07 election.

There is a lot of uncertainty in the Canadian process right now and it will be a challenge to sort out the "noise" coming from Ottawa. The ramifications of not meeting our Kyoto commitments are not clear. Assuming there is a "Kyoto II", Canada would incur significant penalties by having increased emission reduction targets (1.3 times targeted reductions in Kyoto

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II). This would be a huge challenge to Canada as we are approximately 30% above our current Kyoto target. However, Kyoto signatories are yet to agree on new targets that would take effect when the current Kyoto commitment period ends in 2012. With no agreement, there is no second round. With no second round, what penalties could be incurred? Trade barriers are possible. France, for instance, announced in November, 2006 that it would introduce a carbon tax on products from countries that don't take on commitments beyond 2012. The European Union is also studying the idea. It is only talk for now but the ramifications could be significant to the Canadian economy overall.

There was a lot of hype about carbon credit trading in the summer of 2006. The SSCA's project with PERRL issued its first cheques to participating farmers across Canada. This pilot project has taught both the SSCA and Environment Canada many valuable lessons pertaining to carbon contract details.

The summer of 2006 also saw the promotion of a carbon contract working with the Chicago Climate Exchange (CCX). This contract had the phone lines to the SSCA and several Directors extremely busy for a time at the end of July and early August. Was it a good deal? The SSCA took a neutral position, neither endorsing the aggregator nor standing in their way. We asked some very important questions, had the contract reviewed by our lawyer and presented the information so farmers could make a more informed decision. The contract did present a unique opportunity, payment for past services rendered with only one year of production risk. Values per acre were not great but the cumulative cheque for four years actions did sound enticing given CCX carbon values at the time. To many, "a bird in hand was worth more than two in the bush". Others felt the scheme would limit future opportunities. Only time will tell.

The summer's experience did reveal a few things including:

1. Farmers will respond to opportunities to contract for carbon sequestration services where the perceived liability is minimal.
2. The response is even greater when farmers are under economic duress.
3. Farmers prefer the short duration contract available through the CCX contract.
4. **Farmers felt they needed independent information to aid in their decision making process.**

It will be interesting to see what value eventually is returned to the farmer. During the promotional period, acre payment calculations were based on CCX carbon values in June, 2006. The aggregator will have the challenge of marketing a huge block of carbon credits in a low volume, voluntary market place, with "emerging liquidity".

I give them a lot of credit. The aggregator took advantage of an opportunity to market carbon credits to the CCX. The opportunity was created by the policy vacuum resulting from the change of government in Ottawa. Had the Liberals retained power, we would have been talking Canadian credits, at much higher values, meant to meet a Kyoto target.

The aggregator was able contract over 5 million acres. This is a clear indication many Saskatchewan producers have some appreciation for the subject of carbon trading. **That is a definite feather in the cap for SSCA.**

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Executive Manager's Report

Blair McClinton, PAg
SSCA Executive Manager

To say that the past few months have been very frustrating for the SSCA would be an understatement. For the first time since 1993, the SSCA was forced to layoff its field staff at the end of September. We received a short reprieve last spring when the Soil Conservation Council of Canada (SCCC) was succesful in finding six-month bridge funding for the organizations that helped deliver the GHG Mitigation Program. We had hoped that this would evolve into something new. However, it became apparent over the spring and summer that it was going to take the new federal government some time to develop their new agriculture and environmental agenda.

In the meantime, we were approached to put together an Agri-Environmental Group Plan (AEGP) for the Whitesand River watershed in the Yorkton-Melville area. (An article on an AEGP project was featured in the last issue of the Prairie Steward). We were very interested in this idea. SSCA has historically supported group-planning processes and over the years have worked with several organizations on different conservation planning efforts. In addition to the Whitesand River, we also looked for other watersheds that also could benefit from this process. We decided to submit proposals for the three watersheds: Whitesand River, Carrot River and Battle River. Unfortunately, none of the proposals were accepted. This means that local farmers and residents of these three watersheds will not benefit from a local Group Plan. If the proposals had been accepted, SSCA would have been able to re-hire three of our staff (who were laid off at the end of September) as the local project agrologists.

In late summer, the AAFC's national ACAAF board put out a call for proposals for Environmental Goods and Services (EGS) pilot projects that are national in scope. SSCA has an interest in three of the proposals. SSCA sits as a member of the Saskatchewan ALUS Task Force along with APAS, SARM, PCAB and Delta Waterfowl. PCAB submitted a proposal on behalf of the ALUS Task Force. The Soil Conservation Council of Canada (SCCC) submitted a proposal involving several provincial conservation groups. SSCA also submitted a proposal on a pilot emission-trading project. This proposal involved a broad range of interests including: Alberta Reduced Tillage Linkages, University of Saskatchewan (Ag Economics), Alberta Agriculture, Alberta Environment, Climate Change Central, Saskatchewan Agriculture and Food, SK and AB Crop Insurance corporations, EpCor, Sure Northern Energy, Agrium, SCCC, Canadian Cattlemen's Association and the Canadian Pork Council. We should hear in the early New Year on the fate of these proposals.

You will note that unlike past Prairie Stewards, this issue does not include many articles from SSCA staff members. I would like to thank and acknowledge the contributions from AAFC scientists and Alberta Reduced Tillage Linkages for providing us with articles.

What's in SSCA's future? The loss of our field staff will mean major changes in how the Association operates. In addition to the obvious loss of the ability to the deliverly of field level programming, it will also mean that greater demands will be placed on the SSCA Board and remaining staff. However, the SSCA has a proud history of representing farmer's interests on soil and water issues, and will continue to do so in the future.

REQUEST FOR SUBMISSIONS

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

The Prairie Steward
c/o SSCA
Box 1360, Indian Head, SK, S0G 2K0
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It's ALL About Relationships

Edgar Hammermeister, PAg
SSCA President

The SSCA originated from a strong desire of like-minded farmers who believed that farming practices needed to change if the soil resource was to be protected. Producers knew that there had to be another way to farm and had to persevere in spite of skepticism from their peers as they experimented with practices "doomed to failure". These early adopters understood that to speed their success, they would have to build relationships and share their experiences. The SSCA was this relationship builder.

Over time, circumstances saw the work of the SSCA move beyond just the membership. Program opportunities had the SSCA providing education and extension activities across the province to all Saskatchewan producers. The SSCA was able to exceed all expectations on delivery with the hiring of a dedicated and enthusiastic staff. The staff valued and fostered relationships with farmers and industry. It was and continues to be the success of the SSCA.

Over the years the SSCA has frequently partnered with Saskatchewan Agriculture and Food (SAF) on various projects. The grassroots structure that SSCA provides has proven to be highly successful **(in fact we are used as an organizational model for other conservation groups across Canada)** and it compliments the capabilities of SAF. This relationship is an asset to be nurtured.. There is no need to re-invent the wheel. There is no need to build another garage every time you get a new car. SSCA and SAF have a history of working together successfully. There are many programs yet to be delivered to the province's farmers. In the days of tight fiscal management, it is ever more important to deliver cost effective programs to producers using the infrastructure or relationships already in place.

The SSCA has had to lay-off most of its field staff. Existing funding projects have run their course. While in most sectors success breeds success, the SSCA reality is one of uncertainty. New proposals have been submitted and are currently under review by provincial/federal bureaucracies. **Regardless of what happens, the SSCA will continue being the farmers' advocate on issues related to soil and water conservation**.

Carbon trading issues and policy continue to receive SSCA attention. The Board is also focusing on water quality and environmental goods and services. As farmers, you would just like to farm and do a good job of it. **The reality finds farm practices are under increasing scrutiny. To avoid cumbersome regulation by our distant city cousins, we must recognize that we need to stay ahead of the curve addressing environmental concerns**. A further incentive is this: being a good steward of the land often also benefits the farm's bottom-line.

I invite all farmers to take out or renew a SSCA membership. There is definite strength in numbers as we advocate on your behalf.

Executive Report

Beginning with this issue of the newsletter, the Executive of the SSCA Board will highlight the activities in which they have been involved over the past several months. It is at these events and meetings that the Board is representing the SSCA and you, its members.

President Edgar Hammermeister

- Attended 2 meetings of the ALUS steering committee to discuss the pilot project
- Participated in 2 conference calls about a proposed Canadian carbon trading pilot project
- Had 3 speaking engagements at various venues including a PFRA national broadcast over the internet; Farming for Profit Conference in Moose Jaw; and SSCA Field Day near Carlyle
- Attended the Soil Conservation Council of Canada (SCCC) summer meeting in PEI
- Presided over the SSCA Board Meetings in June and November
- Attended the first consultation on the Ag Policy Framework II. There will be more such meetings in the future.
- Attended 3 meetings on the soil carbon lobby which involved a mix of representatives from both government and the grassroots industry
- While SSCA is not an official member of Minister Wartman's Farm Leaders' Advisory Group (FLAG), I attended 2 of their meetings as I am a Member-At-Large
- Responded to numerous enquiries on the C-Green Carbon Contract – July/August

1st Vice President Laura Reiter

- Participated in the planning of the 2007 Conference
- Conference call to plan a meeting on the soil carbon lobby
- Spoke at the Seager Wheeler Field Day on Carbon Trading

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19th Annual "Farming Moving Forward" Conference in February

The SSCA has experienced a lot of changes this past year, including the format of the upcoming conference. This is one change, however, which is seen to be a positive.

The Saskatoon Inn is the site for the SSCA's 19th Annual newly formatted Conference. Entitled *Farming Moving Forward*, the Conference will be held February 14 & 15, 2007. As in past years, the conference will feature a variety of speakers. In fact, thirty six people, including Agriculture & Agri-Food Canada (AAFC) research scientists, university professors and farmers, will share their latest research findings and experiences with farmers.

Day 1 is full of speakers and activities. Conference registration begins at 8:00 am with the first presentation to begin at 9:45. Key Note speaker Dr. Christoph Weder from Rycroft Alberta is well known in the farming community for the insightful articles he contributes to Grainews. He is also a rancher in the Peace River country. Dr. Weder's presentation will focus on our attitude to agriculture and how that has an impact on the industry. Other sessions on the first day include *New Crop Technology; Soil Microbiology & Crop Production; Forage & Livestock Management;* and *Reducing Ag GHG Emissions & the Effect on the Environment.*

During the lunch hour, the authors of scientific posters will be present and available to answer questions about their research findings.

Following the day's sessions, the SSCA's Annual Business meeting will run concurrently with the Agriculture in the Classroom's *Youth Vision for Agriculture Challenge*. The Challenge will feature students from two high schools who will look at a hypothetical farm or ranch and develop short and long term goals for the operation. It's always interesting to hear the students' plans.

The 2007 SSCA conference is being held at the Saskatoon Inn on February 14 - 15. Conference details on pages 10 and 11.

During the banquet, the SSCA Award of Merit and the Ducks Unlimited Canada Farm Family Award will be presented.

The ever popular Bear Pits will follow the banquet. These sessions will hve a slightly different format than in previous years. Only two Bear Pits will be held and in each there will be a couple of short presentations. There will, however, be lots of time for questions and an exchange of ideas between the farmers and the researchers.

On Day 2, sessions include *Alternative Uses for Prairie Crops; Improving Pesticide Efficiencies; and New & Emerging Issues.* A variety of topics will be discussed during this final session. One of the speakers, Dr. David Schindler of the University of Alberta, is a world-renowned scientist and Professor of Ecology. He has a variety of research interests including the effects of climate change and UV radiation on lakes, and global carbon and nitrogen budgets. Dr. Schindler will discuss the importance of conserving our water and ensuring our farming practices do not endanger our water supply.

The Closing Speaker, Dr. David Posen, is an expert in dealing with some of life's most stressful problems. The author of three books and an outstanding speaker, he will discuss Stress Management and Work/Life Balance.

The elimination of the equipment tradeshow has enabled the planning committee to increase the variety and number of speakers. This, coupled with the low registration fee, makes the SSCA Conference a great educational event that is highly affordable.

The full conference agenda is found on the SSCA's website www.ssca.ca

The website also features the SSCA's policy statements, past conference proceedings and Agronomic Fact Sheets.

Seed Bashing – Is it happening on your farm?

By Roger Andreiuk PAg
Alberta Reduced Tillage LINKAGES

Over the last number of year's we've seen improved genetics in pulse varieties, we have more herbicide options, seeding equipment has improved and we have good seed treatments. We are able to deliver more seed and fertilizer more accurately and place it more precisely than ever before. With all these improvements, we still occasionally find poor emergence in the pulse crops we seed. Of course there are the usual reasons for poor plant stands like cool soils, seedling disease, poor seed/soil contact, dry springs, bad seed, too dark, too light, seeding too fast – the list goes on.

One factor that contributes to less than adequate plant stands is **seed bashing**. Seed bashing may conjure up images of lambasting seed varieties as poor performers, however; in this case, seed bashing refers to the damage to seed that can occur during the seeding operation.

There have been major improvements in air seeder technology in recent years and the ability to adjust airflow rates. It's best to set airflow so that damage to seed is minimized. However, if you've ever plugged your seeder it's likely the airflow is set to never plug again. Pulses are sensitive to damage especially if the seed moisture content is much below maximum safe storage levels. Excessive airflows can result in physical damage to pulse seeds and a major reduction in germination.

In 2005 and 2006 Alberta Reduced Tillage LINKAGES partnered up with the Alberta Pulse Growers to carry out extension activities related to field pea stand establishment. A component of this was the collection of pea seed samples during the seeding operation. The objective of this collection was to demonstrate and evaluate the impact of the seeding operation on seed and inoculant viability. Samples were collected from nine farms in 2005 and twelve farms in 2006 for a total of 96 individual samples.

Samples were collected from the truck or bin through to the openers during farmers seeding operations. Samples before or after the opener were collected by pulling a hose, taping a gunnysack to it and collecting seed during the farmers normal seeding operation.

Fig. 1. Seed collection during seeding operation.

Fig. 2. Damage to the pea seed that can happen during the seeding operation.

The samples were transported in coolers and analyzed by 20/20 Seed labs in Nisku. Analysis included germination, % splits, % seed moisture, and inoculant counts. Inoculant counts were determined using standard plating methods and expressed as Colony Forming Units per seed (CFU/seed).

Table 1 shows a number of instances where pea seed suffered reduced germination and inoculant numbers through the seeding operation, as well as other instances where there was no appreciable damage to seed or inoculant. On samples where percentage split was measured the amount of split peas generally increased through the seeding system. Farm # 1 had no appreciable damage to seed through the seeding system and maintained good germination and inoculant numbers (CFU/seed). In contrast, Farms 2 and 3 showed a definite decline in both germination and inoculant numbers from the truck through to the openers with drastic inoculant decline on Farm #3. The percentage of split peas also increased from 0.3% to 3.3%, through the seeding system on Farm 3. Farms 4 and 5 maintained germination but inoculant levels dropped.

In some cases where samples were collected at low and high fan speeds there was more damage to seed with higher airflow rates (Farms 2 and 3) while in other cases higher fan speeds did not result in appreciably greater damage (Farms 4, 6, 7 11).

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Table 1. Pea Seed Integrity and Inoculant Viability from selected samples (2005 & 2006)

Farm #	Sample location	Germination %	Ave. Seed moisture %	Rhizobium (CFU/seed)	% Split
1	Tank	94	13.1	1,300,000	
	Boot	93		320,000	
	Truck	95		94,000	
	3850 rpm Before Boot	84		38,000	
2	3850 rpm After Boot	88	10.4	36,000	ND
	4250 rpm Before Boot	82		51,000	
	4250 rpm After Boot	74		63,000	
	Truck	84		73,000	0.3
3	3600 rpm Before Boot	84	12.4	7,800	1.8
	4800 rpm Before Boot	76		7,400	3.3
	After Treatment in Auger	99		91,000	
4	3800 rpm Before Boot	97	13.3	22,000	ND
	4850 rpm Before Boot	98		7,100	
5	Truck	79	11.3	110,000	ND
	4540 rpm Before Boot	77		16,000	
	Bin	95			
6	4250 rpm Before Boot	95	12.7	ND	ND
	5100 rpm Before Boot	94			
	Tank	95			3
7	3600 rpm Before Boot	96	15.2	ND	3
	4250 rpm Before Boot	94			6
8	Truck	92	10.2	ND	ND
	Before Boot	82			
9	Truck	88	16.4	ND	ND
	Before Boot	85			
10	Truck	81	13.0	ND	4
	Before Boot	77			10
	Tank	85			
	3500 rpm Before Boot	82			
11	3980 rpm Before Boot	84	12.4	ND	ND
	3500 rpm After Boot	83			
	3980 rpm After Boot	83			
12	Truck	85	12.0	ND	2
	Before Boot	73			6
	Truck	95			
13	Tank	87	11.7	ND	ND
	Before Boot	81			

ND. Analysis not done because granular or in-line inoculant used and no splits observed.

SEED BASHING ... CONTINUED FROM PAGE 7

GERMINATION

The information in Table 1 clearly shows that seed bashing can have an impact on the pulse stand. With reduced germination the calculations carried out before seeding to establish a seeding rate are no longer valid. If the seeding operation results in appreciable seed bash, a thin plant stand and all the implications of that (a less competitive stand, lower yield, poorer crop standability to name a few) may result.

Finding out how much bash damage occurs during the seeding operation won't help with the crop just seeded, but knowing what Table 1 shows can help plan the upcoming seeding operation. Have seed tested for germination close to seeding as germination can change through the storage period. Find out the moisture content of the seed and factor that in to your decision process. If seed moisture is much below the maximum safe storage level consideration can be given to moisturizing the seed. To find out how to moisturize pulse seed refer to PAMI's research update # 704: Moisturizing Pulses to Reduce Damage. If moisturizing is not an option, consider increasing the seeding rate to compensate for possible seed damage.

Inspect the seeding system to make sure there are no obstructions in the airflow that can bash seed as it flows through the system. Some farmers will band fertilizer through a new seeder or new openers to take off any sharp edges left from the manufacturing process. Air brakes are another consideration, although they only help prevent damage downstream of the brake. Above all, adjust your seeder to minimize seed damage.

INOCULANT VIABILITY

Inoculants are living organisms and desiccation and heat are the biggest culprits in rhizobia loss. To achieve best inoculation results follow label recommendations and the sooner that inoculated seed can be placed in the soil, the better the potential for delivering higher nodulation.

This sample collection showed that many farms achieve very close to recommended levels of seed applied inoculants at the truck, but inoculant levels on the seed decreased through the seeding system. The acceptable level of colony forming units (CFU's) for inoculant on peas as set by the Canadian Food Inspection Agency is 100,000 CFU's per seed. In most cases, the number of CFU's per seed drops as the seed passes through the seeding system. It is expected that nodulation of the plant will not be as good as it could be if more inoculant stayed on the seed through the seeding system. Inoculant works better in close proximity to the seed.

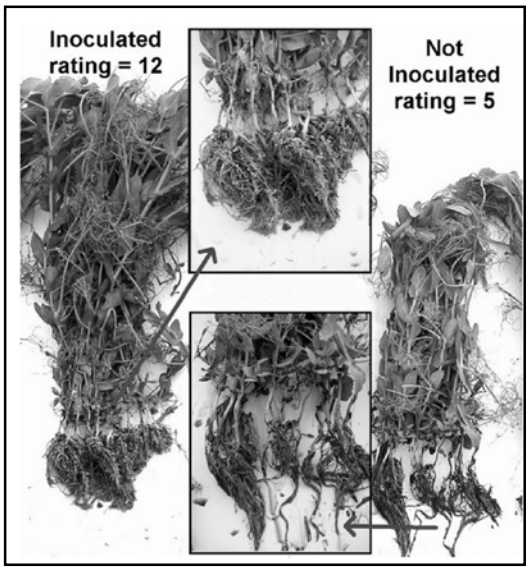

Fig. 3. Inoculant ratings

A formal assessment of in field nodulation was not carried out in this sampling. A next step in assessing air seeder impact on inoculant viability might be to see if replicated trials would show nodulation, nitrogen fixation or yield differences due to lower levels of CFU's on the seed as a result of air seeder damage.

A good guide to assess nodulation in pulse fields is available as a download from 20 20 Seed Labs website, www.2020seedlabs.ca, under the technical bulletin section. This guide explains how to collect samples and assess nodulation of pulses, factoring in plant vigour and growth, nodule color and number as well as nodule position to arrive at a final score.

EXECUTIVE REPORT ... CONTINUED FROM PAGE 4

- Attended a meeting on the soil carbon lobby with government and the grassroots industry
- Attended the June and November Board meetings
- Handled a number of telephone calls and a radio interview concerning the C-Green contracts
- Conference calls on the Environmental Goods & Services pilot work

Doyle Weibe, West Central Director

- Attended one meeting of the National Roundtable on the Environment and the Economy

Each member of the Executive will be attending a number of meetings over the course of the winter. We will report on these in Issue #50 of the Prairie Steward. The invitation is open for members to contact their respective directors or a member of the Executive if they have any questions about the Board activities. Check out SSCA's website for the latest news releases, position papers and 2007 Conference agenda.

Environmentally Smart Nitrogen and the Direct Seeding Advantage

Ross H. McKenzie[1]and Stewart Brandt[2]
[1]AAFRD, Lethbridge, AB; [2]AAFC Scott Research Farm, Scott, SK

Reprinted with permission from Reduced Tillage LINKAGES - Direct Seeding Advantage Conference

INTRODUCTION

New slow-release, polymer-coated urea fertilizer, ESN™ (Environmentally Smart Nitrogen) was registered for use in Canada, in July 2006, for both food and non-food crops. This new polymer slow-release technology is leading edge and world class. Agrium is now the world leader with this technology. Over the past 10 years, Agrium Ltd. has undertaken development of this unique polymer to coat urea to control the release of N to improve fertilizer use efficiency and minimize N losses to the environment. Presently, all ESN used in North America is manufactured in Alberta, at the Agrium Carseland plant.

The efficiency of applied N fertilizer is a function of a number of factors. Environmental conditions, N fertilizer form, and time and placement of N fertilizer all strongly influence potential losses of applied N fertilizer. The most common commercial N fertilizer applied to soil is urea [$CO(NH_2)_2$]. Urea converts to ammonia (NH_3) and can potentially be lost to the atmosphere (**volatilization**) at this stage before conversion to ammonium nitrogen (NH_4^+). When soil conditions are warm, moist and well aerated, ammonium is rapidly oxidized to nitrate nitrogen (NO_3^-) through nitrification, a biological process performed by highly specialized soil bacteria. Loss of nitrate is caused when soils are warm and wet causing an anaerobic process (**denitrification**), where soil microbes strip oxygen from nitrate to convert it to gaseous nitrogen forms. Wet soil conditions will also result in downward movement of nitrate below the plant root zone and into ground water (**leaching**).

The porous polymer coating permits water to slowly permeate through the coating into the fertilizer granule to slowly dissolve the urea, then allow the dissolved urea to gradually diffuse through the polymer coating into the surrounding soil. Soil moisture and temperature are the two environmental forces that have the greatest effect on the rate of urea release. By coating urea fertilizer granules with this polymer, the urea is protected from environment losses. ESN polymer coated urea products offer huge opportunities to significantly reduce potential N fertilizer losses (volatilization, denitrification and leaching), which would result in increased nitrogen fertilizer use efficiency, result in higher crop yields and improved crop quality.

A major benefit of ESN is reduced N losses resulting in higher N use efficiency by crops. This would lead to reduced N fertilizer requirements if N fertilizer uptake was more efficient; higher yield potential of 5 to 15 % and for crops such as spring wheat could result in higher protein levels, and premium payment for higher protein.

By slowing down the release of N using polymer-coated urea, significantly higher N rates can be safely seed-placed. Recent work with two proto types of polymer coated urea seed-placed with winter wheat, showed that up to 120 kg N/ha of coated urea could be safely seed-placed versus only 30 kg N/ha of urea (McKenzie et al. 200x). Much higher rates of coated urea versus urea could likely be seeded-placed with spring wheat, barley and canola but this must be determined in a range of field trials in various soil types, under various environmental conditions. If substantially higher ESN rates can be seed-placed with reduced N losses, this would have a huge benefit to prairie farmers. Additional field operations specifically to apply N fertilizer could be eliminated and all N fertilizer could be safely seed placed. For direct seeding systems, single shoot openers could be used instead of more costly double shoot openers, which are presently needed to side band higher rates of N fertilizer. Using single shoot openers versus double shoot openers would result in less soil disturbance, less soil moisture loss reduced horsepower requirements and lower fuel consumption.

ESN USE WITH WINTER WHEAT IN SOUTHERN ALBERTA AGRICULTURE

Two field experiments were conducted over three years at three locations in southern Alberta to evaluate different options of applying ESN to winter wheat (McKenzie et al. 200x). In the first experiment, three N fertilizers (20-day ESN, 40-day ESN and urea) were seed-placed and side-banded at the time of seeding at 0, 30, 60, 90 and 120 kg N/ha. Stand densities were substantially reduced by seed row application of urea at rates greater than 30 kg N/ha, but were unaffected by seed row application of ESN, even at the highest rate of N application. When N fertilizer was side-banded, stand densities were unaffected by fertilizer type or N rate. Yield gains due to N application were reduced by application of high rates of seed-placed urea, but similar for other treatments. Grain protein concentration and N uptake were also similar for ESN and seed-placed urea.

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Farming Moving Forw

SSCA's 19th Annual Conference and Meetin
February 14 & 15, 2007
Saskatoon Inn, Saskatoon, Saskatchewan

WEDNESDAY, FEBRUARY 14

8:00 a.m. **Registration**

9:30 a.m. **Opening Remarks**

9:45 a.m. **Keynote Address:**
"Attitude & Agriculture" - Dr. Christoph Weder, Producer and Grainews Columnist, Rycroft, AB

SESSION 1 NEW CROP TECHNOLOGY

10:30 a.m. **"Frequency of Field Pea in Rotation: the issues and opportunities"** - Dr. Guy Lafond, PAg, AAFC, Indian Head, SK

10:50 a.m. **"Cold Hardy Wheat"** - Dr. Brian Fowler, PAg, U of S, Saskatoon, SK

11:10 a.m. **"Malt Barley Research"** - Dr. Ross McKenzie, AAFRD, Lethbridge, AB

11:30 a.m. **"The Quest for New Herbicide Chemistries"** - Eric Johnson, PAg, AAFC, Scott, SK

SESSION 2 CONCURRENT SESSIONS

A. SOIL MICROBIOLOGY AND CROP PRODUCTION

1:15 p.m. **"Herbicide Residue & Effect on N Fixation"** - Ken Sapsford, PAg, U of S, Saskatoon, SK

1:35 p.m. **"Symbiotic Root Fungi"** - Dr. Chantal Hamel, AAFC, Swift Current, SK

1:55 p.m. **"Rejuventaing Alfalfa with Granular Inoculant"** - Dr. Diane Knight, U of S, Saskatoon, SK

2:15 p.m. **"Soil Biological Amendments: Pros & Cons"** - Dr. Rich Farrell, U of S, Saskatoon, SK

B. FORAGE AND LIVESTOCK MANAGEMENT

1:15 p.m. **"Forage Fertilization & Rejuvenation with Fertilizer"** - Dr. Jeff Schoenau, PAg, U of S, Saskatoon, SK

1:35 p.m. **"Effect of Manure on Soil Carbon"** - Tom King, U of S, Saskatoon, SK

1:55 p.m. **"N Derived from Winter Grazing Beef Cows"** - Dr. Bart Lardner, PAg, WBDC, Humboldt, SK

2:15 p.m. **"Combining Grain & Cows"** - Tim Nerbas, PAg, Farmer, Waseca, SK

2:40 p.m. **Refreshment Break & Poster Session**

SESSION 3. REDUCING AG GHG EMISSIONS & THE EFFECT ON THE ENVIRONMENT

3:00 p.m. **"Reducing GHG Emissions & the Benefit to the Farm"** - Dr. Marie Boehm, AAFC, Saskatoon, SK

3:20 p.m. **"Nitrous Oxide Emissions"** - Dr. Reynald Lemke, AAFC, Swift Current, SK

3:40 p.m. **"Mitigating Methane in Pasture Systems"** - Dr. Alan Iwaasa, AAFC, Swift Current, SK

4:00 p.m. **"Energy & Energy Use Efficiency in Zero Till"** - Dr. Bob Zentner, AAFC, Swift Current, SK

4:30 p.m. **Agriculture in the Classroom's (AITC) "Youth Vision for Agriculture"**

6:00 p.m. Awards Banquet

8:00 p.m. **Bearpit Sessions**

BEARPIT SESSIONS

#1 CROP MANAGEMENT

Practical tips on minimizing production risk and improving management of crop establishment, fertility, weeds, and diseases.

#2 CATTLE AND GRAIN

Practical tips on livestock and forage management, and integrating cattle into grain operations.

"Last Cattle Frontier" - Don Surminsky, PAg, SAF
"Grazing Arrangements" - Sandy Russell, PAg, SAF
"From Grain to Grass" - Greg Stokke, Farmer, Watrous, SK

ACCOMMODATIONS

Rooms at the **Saskatoon Inn** have been blocked for the conference under the Saskatchewan Soil Conservation Association's name. Rooms must be reserved before **January 13, 2007** to receive the conference rate.

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THURSDAY, FEBRUARY 15

SESSION 4. ALTERNATIVE USES FOR PRAIRIE CROPS

8:30 a.m. **"Opportunities & Obstacles for Biofuels"** - Lionel Labelle, Sask Ethanol, Saskatoon, SK

9:10 a.m. **"Opportunities for Hybrid Poplar"** - Dr. Ken van Rees, U of S, Saskatoon, SK

9:30 a.m. **"How Alternative Crop Uses May Enhance My Farm"** - John Serhienko, Farmer, Blaine Lake, SK

10:00 a.m. **Refreshment Break**

SESSION 5. PESTICIDE MANAGEMENT

10:30 a.m. **"Residue Limits & the Impact on Grain Marketing"** - Denise Maurice, Agricore United, Calgary, AB

11:50 a.m. **"IPM Strategies to Optimize Herbicide Use"** - Dr. Neil Harker, AAFC, Lacombe, AB

11:10 a.m. **"Pesticide Rates, Water Volumes & Nozzles"** - Dr. Tom Wolf, AAFC, Saskatoon, SK

11:30 a.m. **"IPM on My Farm"** - Stacey Moskal, Farmer, Brooksby, SK

12:30 p.m. **Lunch**

SESSION 6. NEW AND EMERGING ISSUES

1:00 p.m. **"Conserve our Water!"** - Dr. David Schindler, U of A, Edmonton, AB

2:00 p.m. **"Glyphosate Resistance"** - Dr. Hugh Beckie, PAg, AAFC, Saskatoon, SK

2:20 p.m. **"Make $300/acre on $5/bu canola!"** - Dr. Don Flaten PAg, U of M, Winnipeg, MB

2:50 p.m. **Closing Address:**

"Be Good to Yourself AND the Bottom Line" - Dr. David Posen, Best-selling Author, Ontario

3:35 p.m. Draw for Conference Prizes

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Soil Biology – Arbuscular Mycorrhizal Fungi

Chantal Hamel, Agriculture & Agri-Food Canada, Swift Current, SK

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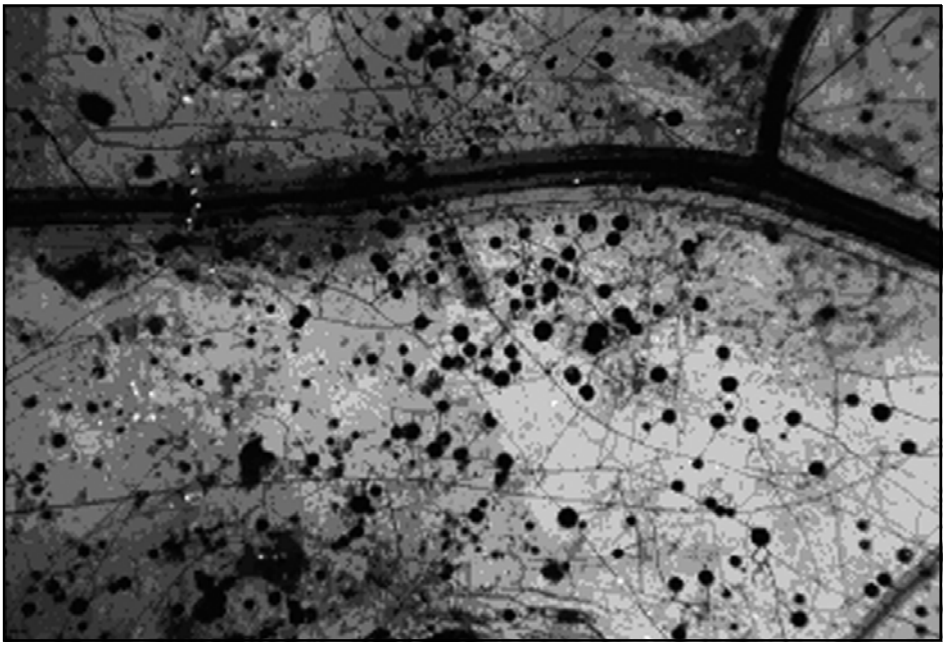

Figure 1. AMF network associated with an alfalfa root.

The soil offers protection against harmful radiation and desiccation, and large surface area for support and nutrient exchange. It is highly favourable to life, which proliferates abundantly in its environment. In soil, life occurs in the form of numerous minute organisms embedded in the soil matrix and invisible to the naked eye. At the microbial scale, the soil matrix is highly heterogeneous, a condition favouring the emergence of biodiversity and, by far, most of the biological diversity of planet Earth is contained in soil. Soil biodiversity is tremendous with 5000-10000 species of microorganisms per gram (Wardle et al. 2004), and it is also dynamic, with high mutation frequency and plasmid exchange in bacteria, and random nuclei distribution in the thallus of coenocytic fungi. The world of interactions that are intertwined in all this biodiversity is modulated by the physico-chemical environment of the soil, which varies with weather conditions, seasons, and cropping systems. Complexity in the pedosphere is just mind boggling. The soil is, definitely, the last frontier in science. The main approach to the discovery of the soil has been to concentrate efforts on dominant or key functional groups of organisms. Arbuscular mycorrhizal fungi (AMF), the topic of this presentation, constitute one of these groups.

AMF FORM AND FUNCTION

AMF are abundant in soil. They account for about 25% of agricultural soils' microbial biomass (Hamel et al. 1991; Olsson et al. 1999), and live in symbiosis with about 80% of land plant species, including most economically important species (Note: Mustards and canola are non-mycorrhizal species). The arbuscular mycorrhizal association was so successful that in the course of evolution, AMF became obligate biotrophs i.e., they can not live without connection to, and carbon supply from, a living host plant. This feature has important implications on the life of AMF in cultivated soils. AMF are found close to plant roots and most of their biomass is in the top 0-20 cm of the soil (Kabir et al. 1998b). And they are most abundant directly under the row, thinning out in between the rows, under row crop species that can form arbuscular mycorrhizal symbioses (Kabir et al. 1998a). Years of fallow reduce the vigour of their population.

Physically, AMF appear as networks of fine tubing of a few micrometers in diameter, filled with cytoplasm, and producing spores (Fig. 1). These networks are extensive, often with tens of meters per gram of soil (Leake et al. 2004). It is important to keep in mind that AMF isolates are not all the same, and vary functionally and morphologically. Isolates capable of anastomosis can theoretically grow hyphal networks as large as four 1-mile^2 section i.e., from road to road, while the isolates unable to fuse appear as hair-like structure on roots. These networks, enmeshing the soil matrix, connect to plant roots, spreading internally, and penetrating cell walls of the root cortex area without disrupting plant cells' plasma membrane, where they acquire carbon- and energy-rich photosynthesis products (Hamel 2007). In turn, plants tap on the mineral nutrients contained in these networks.

AMF networks were shown to provide plants with all essential nutrients, but they are particularly important as a source of P, Cu and Zn (Liu et al. 2007). These nutrients have a low solubility in soil and as a result are often found in low concentration in the soil solution. Thus, they are more difficult to extract from the soil matrix than highly soluble nutrients like nitrogen, for example.

AMF are useful to insure the adequate nutrition of their host plant, but they also are a very important component of soil quality

in Agricultural Soils

(Jeffries et al. 2003; Six et al. 2004). Their 'sticky' hyphae and soil enmeshing hyphal networks contribute importantly to soil aggregate stabilization (Six et al. 2004), enhancing soil aeration and water infiltration, and reducing the erodibility of soils. AMF's abundant mycelium, which is supplied by plant photosynthesis, distributes carbon compounds in soil. Carbon availability is the factor generally limiting the activity of soil microorganisms, and carbon distribution in soil is probably the major mechanisms explaining the relationship between AMF and soil microbial diversity (Fig. 2) and the impact of these fungi on soil microbial community structure (Andrade et al. 1998; Marschner and Baumann 2003). Soils hosting AMF are often healthier for plant growth. AMF have long been associated with reduced population of soil-borne pathogens and disease incidence (Dehne 1982; St-Arnaud et al. 1995).

FACTORS AFFECTING AMF

As true as Mother Nature is the best genetic engineers, AMF, the product of 400 million year of co-evolution with plants and soils (Pyrozinsky and Dalpé 1992; Redecker 2002), play a key role in the balance of the soil ecosystem. It might be wise to preserve these fungi in agricultural soils. Arbuscular mycorrhizal associations differ from pathogenic associations in that plants control the growth of their associated AMF. It appears that this regulation is based on nutrient availability to plants. When availability is low, the level of mycorrhizal colonization increases, presumably along with carbon input to AMF. Since AMF have mineral nutrients requirement of their own, increasing nutrient availability also increases AMF network development (Balser et al. 2005; Hamel et al.), up to a certain level beyond which the plant reduce carbon supplies to its fungal associates.

The soil environment can also be hostile to AMF. Low soil pH (Hamel et al. 2005), prolonged periods of time in absence of host roots during a fallow (Kabir et al. 1997) or a non-host phase of a crop rotation (Fraser et al. 2006), adversely affect AMF. A high population of predators such as fungi feeding nematodes or springtails in the soil environment may transform AMF into an important carbon drain to plants and result in yield losses by feeding on them (Giannakis and Sanders 1990).

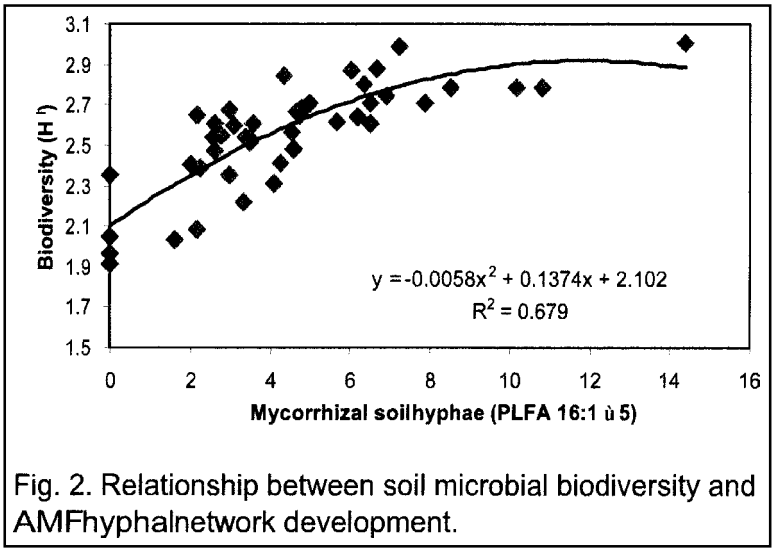

Fig. 2. Relationship between soil microbial biodiversity and AMFhyphalnetwork development.

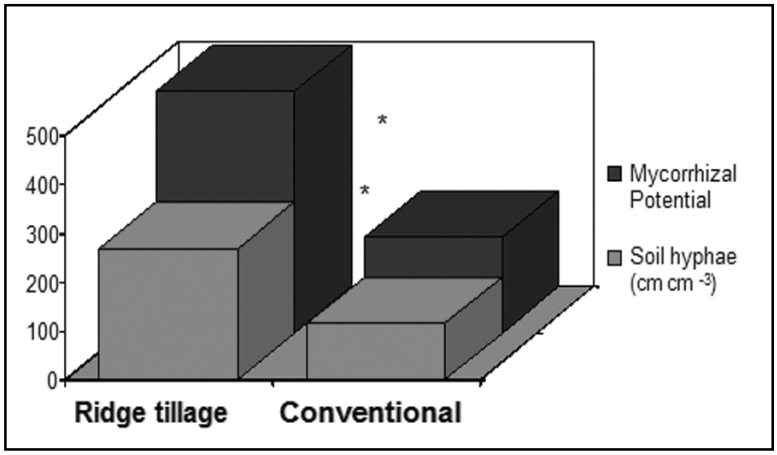

Fig. 3. Tillage systems influence mycorrhizal fungi under maize. Data from commercial fields under soya-maize rotations and tillage systems since 5 years or more. n=4

CURRENT RESEARCH

AMF are biotrophic soil dwellers, which have always been difficult to study. However, advances in biochemistry have recently provided a tool for the study of AMF. Different groups of living organisms utilize different fatty acids as building blocks for their cells, or as storage of carbon and energy. The fatty acid 16:1ω5 dominates in AMF and is rare in other organisms. It can be used as biomarker for AMF. We found that the mycorrhizal potential of soils could be assessed through the measurement of 16:1ω5 in the neutral fraction of soil lipid extracts. Such an analysis could be used along with soil test P values to improve the precision of P fertilization recommendations (see McKenzie et al. 2003), if they were less costly (≈$50 per sample). The recent analysis of an extensive data set indicated that climate and

CONTINUED PAGE 14

soil properties largely reflect the abundance of 16:1ω5 in the phospholipid fraction of soil lipid extracts, suggesting that soil type and climate determine either the development of AMF networks in soil or the species composition of AMF populations, two factors likely related to mycorrhizal efficacy. This result opens the possibility to predict AMF contribution to crops based on soil pedological maps and climate data, which are already available. It might thus be possible to improve the precision of P recommendations at no cost.

A new complication in soil ecology arises in the prairie ecozone. Plants are colonized by fungi other than AMF. The abundance of these fungi, sometimes called 'dark septate endophytes' - that we call type B fungi since ours are not all dark - often exceed that of AMF. We found over 30% of root colonization by type B fungi in healthy native and tame forage plant species. It is hard to believe that organisms occurring in such abundance in roots have no effect on plant growth. Fungal endophytes were associated with plant growth stimulation (Waller et al. 2005), resistance to extremely high temperature (Redman et al. 2002), and early season nitrogen uptake (Schardl et al. 2004). Some of these type B fungal endophytes might be useful in the establishment of native prairie on land no longer economically cultivable under a changing climate.

CONCLUSION

The soil is an extremely complex system that is still largely unknown. Whereas we know that soil microorganisms are important players in soil ecosystems, their use in crop production is still in its infancy. AMF have been more studied than most other microbial groups due to their importance. However, we largely ignore how to manipulate them to maximize their contribution to crop production. More efforts and resources are required to harness the immense biological resources contained in soils, for the benefit of agriculture and societies.

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Root Dynamics Biofertilization and Carbon Contribution to Soils

By Yantai Gan
Agriculture and Agri-Food Canada, Swift Current, SK

RATIONALE

Record-high prices of inorganic fertilizers significantly increase the production costs of annual crops. This has encouraged researchers and producers to seek other bio-source alternatives to reduce inorganic fertilizer inputs in production systems. Biofertilizer is a recently coined term which most commonly refers to the use of a substance that contains living micro-organisms which, when applied to seed, plant surfaces, or soil, colonize the rhizosphere or the interior of the plant and promotes plant growth by increasing the supply or availability of primary nutrients to the host plant. Only certain types of micro-organisms function as biofertilizer where an intimate association forms between plant roots and micro-organisms. Such an intimate association will stimulate the root growth of the host, allowing production of more root mass and high microbial biomass, and contribute more carbon to the soil.

Soil carbon is one of the key measures in assessment of soil quality. Policy-makers and scientific modellers have been trying to assess carbon contribution and 'credits' of annual crops in a quantitative manner. Crop roots account for a large portion of the total carbon production, but only sporadic research has been done on cereal crops and there is virtually no information available regarding the amounts of roots and their carbon contributions to soil in alternative crops (mainly pulse, oilseed, fibre, and specialty crops). There is a great need by policy-makers and modellers to have root data of alternative crops because these crops account for a large portion of the total production areas in western Canada.

OBJECTIVES

One research project undertaken at the Agriculture and Agri-Food Canada's Research Centre, in Swift Current, is aiming at the assessment of root biomass, carbon contribution and biofertilizer opportunity in alternative crops. The specific objectives of this study are (1) to determine the architectural variability of root morphological traits among alternative crop species, root growth patterns during the cropping season, and root distributions in the soil profile; (2) to characterize root rhizospheres of pea, lentil, and chickpea that is inoculated with *Penicillium bilaii* (a micro-organism isolated from a soil in western Canada) and assess the biofertilizer potential, and (3) to evaluate soil microbial biomass carbon produced by different crop species under wet and dry conditions.

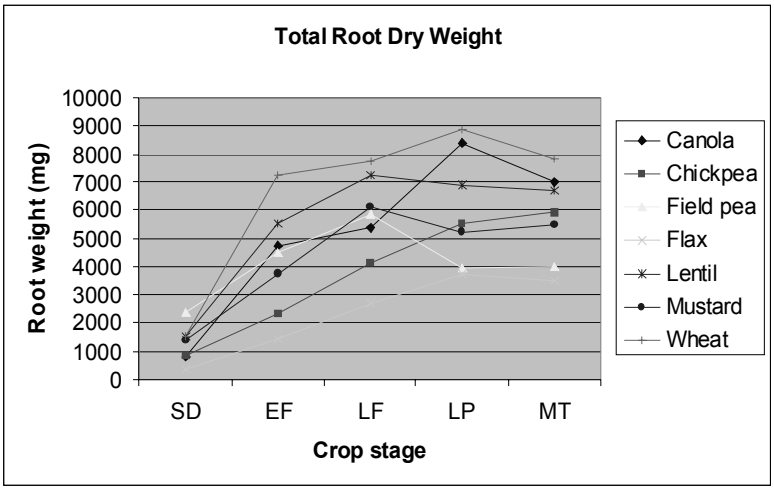

Fig. 1. Root biomass dry weight of various crop species measured during seedling (SD), early-flowering (EF), late-flowering (LF), late-podding (LP), and maturity (MT) stages at Swift Current 2006.

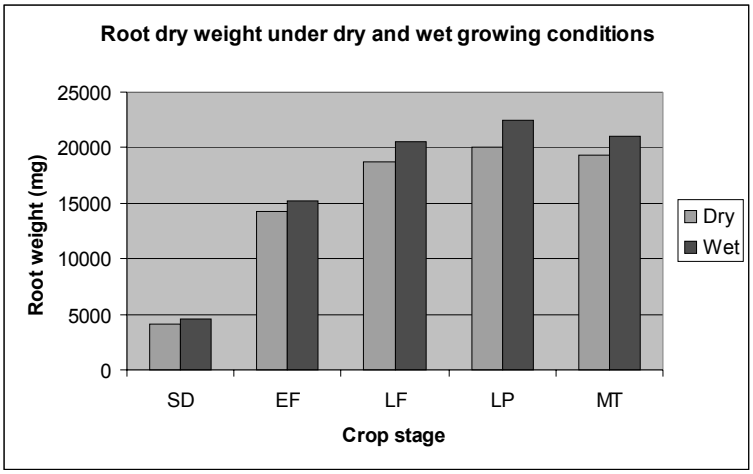

Fig. 2. Root biomass dry weight of various crop species grown under dry and wet growing conditions; the measurements was done during seedling (SD), early-flowering (EF), late-flowering (LF), late-podding (LP), and maturity (MT) stages at Swift Current 2006.

METHODOLOGY

Seven crop species (field pea, lentil, chickpea, oriental mustard, hybrid canola, flax, spring wheat) were grown under rainfeed and irrigation conditions at Swift Current in 2006.

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The three pulse crops were inoculated with *Penicillium bilaii* in comparison with non-inoculated treatments. Specially constructed tubes, called Lysimeter tubes,

were placed in the field at the time of seeding and the various crop species were seeded into the lysimeters and the treatments implemented. At the crop stages of seedling, early-flowering, late-flowering, late-podding, and physiological maturity, the lysimeters were lifted from their field positions and transported to the laboratory for analysis of the root and the soil attributes.

Cross sectional slices of the soil-root matrix were made at 10 cm intervals. All segments were weighed, and then two sub-samples were taken from each segment for analyses of moisture, $N0_3$-N, exchangeable NH_4-N, and microbial biomass carbon. The roots in each of the segments were then separated.

PRELIMINARY RESULTS FROM 2006 TRIALS

The 2006 results showed that root carbon production peaked at late-flowering (LF) stage for mustard and lentil crops, but the peak was delayed to late-podding (LP) or maturity (MT) stages for other crop species (Fig. 1). Wheat produced greatest root biomass among the seven crop species during the entire growing season and flax the lowest. At a given growth stage, the root biomass dry weight was greater for crops grown under wet (irrigated) conditions compared to dry (rain-fed) conditions (Fig. 2).

The total root length was highest at late-flowering for field pea and mustard, but highest at late-podding stage for the rest of the crop species (Fig. 3 below). Wheat had the greatest total root length measured at any a growth stage, and flax and desi chickpea the shortest in root length.

Use of *Penicillium bilaii* in legumes increased the number of root tips for all the three legume crops under both dry and wet conditions with one exception (Fig. 4), suggesting that use of this micro-organism in legume crops may help increase sites on the root that facilitate nutrient uptake or increasing root carbon potential.

The 2006 results also showed that root biomass that was distributed within the different soil depths varied between crop species and also varied among growth stages substantially (data not presented). Some crop concentrated biomass more in the top soil layers, while other crop species distributed root biomass down to the deep soil layers. Further analyses on the images taken from the individual segments of root samples will be conducted, which will provide more insights about root distributions in the soil profile.

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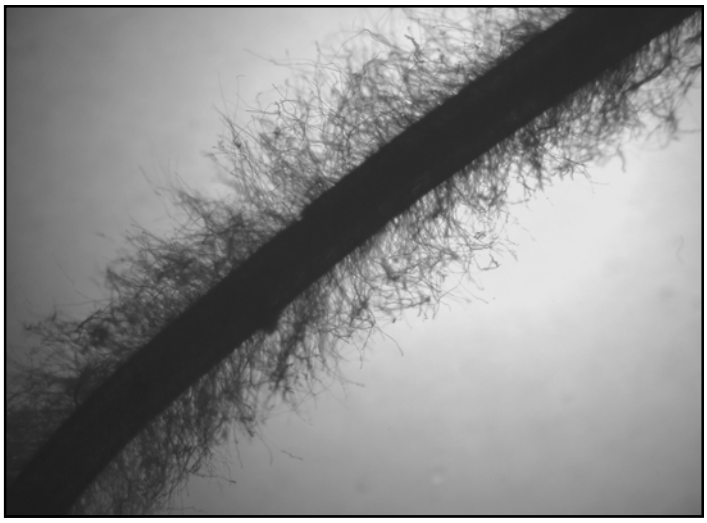
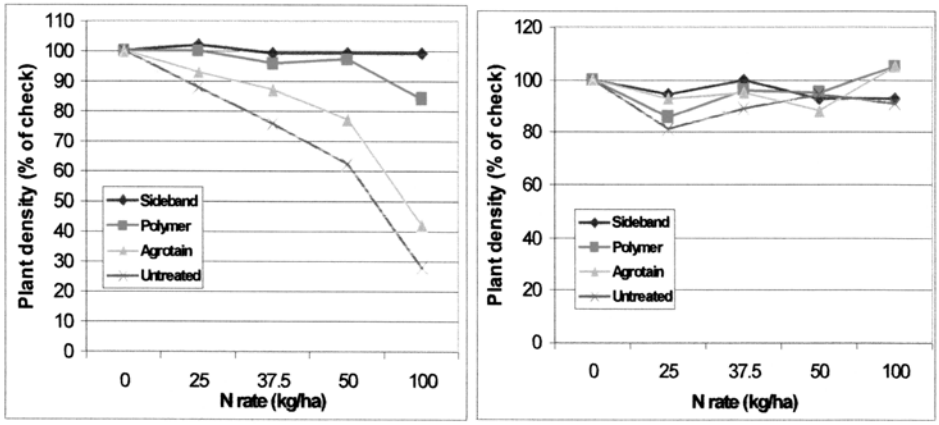


Use of micro-organisms in field pea and chickpea consistently increased root tips and root hairs.

Fig. 3. Total root length of various crop species measured during seedling (SD), early-flowering (EF), late-flowering (LF), late-podding (LP), and maturity (MT) stages at Swift Current 2006.

Fig. 4. The number of tips on the roots of legume crops inoculated with *Penicillium bilaii* (i.e., Pb treatment) in comparison with non-inoculated (NPb treatment) pulses under dry and wet conditions.

Figure 1. Plant densities (% of the unfertilized check) as influenced by urea treatment, placement and rate (Brandt et al. 2005).



A. Scott 2003, 2004 and Swift Current 2004, where damage was severe.

B. Canora and Redvers 2004 where damage was minimal.

In the second experiment, three N fertilizers (ESN, urea and ammonium nitrate) were broadcast at 30 kg N ha^{-1} in early spring on plots that had received 0, 30 or 60 kg N/ha of CRU at the time of seeding. Inadequate release of spring broadcast ESN was indicated by reduced grain protein concentrations relative to conventional N fertilizers. Under the conditions experienced in our study, ESN substantially increased the maximum safe rate of seed-placed urea, provided minimal benefits to N response relative to side-banded urea, and was less effective than conventional N fertilizers when broadcast in early spring.

Fall application of ESN, either seed-placed or side-banded, was an effective means of supplying N for winter wheat in southern Alberta. Application of ESN did not reduce stand density when seed-placed at rates as high as 120 kg N/ha, although further study is required to confirm the safety of these rates under conditions less favourable for plant survival. Grain yield, protein concentration and N uptake were similar for ESN and urea when products were side-banded in the fall. Spring broadcast application of ESN was less effective than ammonium nitrate or conventional urea.

ESN USE WITH IRRIGATED TIMOTHY

Two field experiments were conducted with Irrigated Timothy at two locations, at Bow Island and Lethbridge (Hohm et al. 2005). The first production year at Lethbridge was in 2004 and at Bow Island was 2005.

The first experiment evaluated the effects of spring broadcast ammonium nitrate, urea and ESN at rates of 0, 50, 100, 150 and 200 kg N/ha. At both Lethbridge and Bow Island (first cut) in each year, the spring broadcast coated urea treatments consistently yielded lower than the urea and ammonium nitrate treatments. Varying nitrogen rates resulted in a significant yield response for both first and second cutting at both locations. In 2005, yields increased significantly to the 150 kg ha^{-1} treatment at Bow Island on the first and second cut and at Lethbridge in the first cut. Yield on the second cut at Lethbridge, increased to the 200 kg ha^{-1} treatment. Protein content was significant for nitrogen form at Lethbridge on the first cut (coated urea significantly lowest) and at Bow Island on the second cut (coated urea significantly highest).

The second experiment evaluated four treatments: a check (0 kg N/ha); early fall ESN broadcast application at 100 kg N/ha; ammonium nitrate spring broadcast at 100 kg N/ha; and 75 kg N/ha spring broadcast ammonium nitrate + a simulated fertigation application of 25 kg N/ha ammonium nitrate. For nitrogen fertilizer type and timing at both locations, yield results of the fall applied coated urea treatments were the lowest (significant) for first and second cut. This data suggests that release of the coated urea is either too slow. A contributing factor to the delayed release is possibly due to the coated urea getting hung up in the heavy thatch layer. Number coated urea granules could be found in the within the thatch layer weeks and even months after broadcast application. Protein results at Lethbridge on the first cut, indicate that the spring applied urea resulted in significantly highest protein. At Bow Island, the coated urea treatment resulted in the lowest protein content on the first cut however, resulted in the highest protein content on the second cut. The low yield and high protein content of the coated urea treatment at Bow Island on the second cut, suggests that nitrogen release of the coated urea may have been too slow to contribute to timothy yield.

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ESN SEED-PLACEMENT SASKATCHEWAN STUDIES

Brandt et al (2005) in Saskatchewan examined the affects of urea, Agrotain and ESN on crop establishment and yield. Each fertilizer form was seed-placed N at rates of 0, 1.0, 1.5, 2.0 and 4.0 times the recommended safe rate for seed-placed urea with wheat at Scott, Swift Current, Canora and Redvers. The rates for wheat were 0, 25, 37.5, 50 and 100 kg N/ha. They used seed-placed untreated urea as a check, as well as untreated urea side-band for comparison at the same N rates. Emerged seedlings were counted at 10 to20 days after seeding to evaluate treatment effects on crop establishment.

Work by Brandt et al. (2005) clearly showed that the impact of treatments on plant density varied considerably across locations. At Scott and Swift Current, which were very dry after seeding, the untreated urea placed with the seed had the greatest impact on reduced plant density. Agrotain and ESN also led to decreases at high N rates. ESN was very effective at reducing damage from seed placed urea, and damage at 100 kg/ha was similar to untreated seed placed urea at 25 kg/ha. ESN still resulted in fewer plants than side-band at high 100 kg/ha.

At the Canora and Redvers sites, significant rain occurred within 5 days after seeding, and seedling damage was minimal (Figure 1B). At these locations, none of the treatments had a significant impact on emergence. Brandt et al. (2005) noted that the fact that damage was minimal at the two Black soil zone locations, and extensive at the Brown and Dark Brown soil zone sites should not be taken to mean that there is no risk of damage on Black soils. The difference in emergence at the sites were largely a reflection of the different soil moisture conditions during germination and emergence of the wheat.

ESN SUMMARY

Initial work with seed-placed and banded ESN with winter wheat has been very positive. However, spring broadcast application of ESN on both winter wheat and irrigated timothy has not been as effective as broadcast ammonium nitrate or urea.

ESN does have excellent potential for seed-placement with spring-seeded crops as demonstrated by Brant et al. (2005). Safe rates will have to be determined for crops such as wheat, barley and canola in the different soil and agro-ecological areas of Alberta.

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ROOT DYNAMICS, BIOFERTILIZATION ... CONTINUED FROM PAGE 16

SIGNIFICANCE TO SOIL CONSERVATION

Soil carbon is known to represent the primary origin of energy for soil micro-organisms. The preliminary results from this study indicate that the carbon pool in a soil can be largely influenced by crop type, water availability, inoculation with micro-organisms, and root biomass left in the soil profile. The essential scientific data can be used to quantify the amount of carbon a particular crop species and a cropping system can contribute. This information can also be used to develop strategic plans by selecting crop species and maximizing root biomass production to increase soil carbon. Improved rooting systems with use of biofertilizering micro-organisms is reflected on larger amounts of root tips and root hairs, and provide great beneficial effects on soil biological properties. Improved rooting systems may increase the ability of plants to tolerate drought and other abiotic stresses. The maintenance and improvement of soil carbon is desirable for long-term land use because of the multiple beneficial effects on nutrient status, water holding capacity, and soil physical, chemical and biological attributes.

A hydraulic-powered grader was used to place lysimeters (i.e., tubes) into the 120 cm depth of the soil before a crop was seeded into the lysimeter.

Project Showcases Agriculture

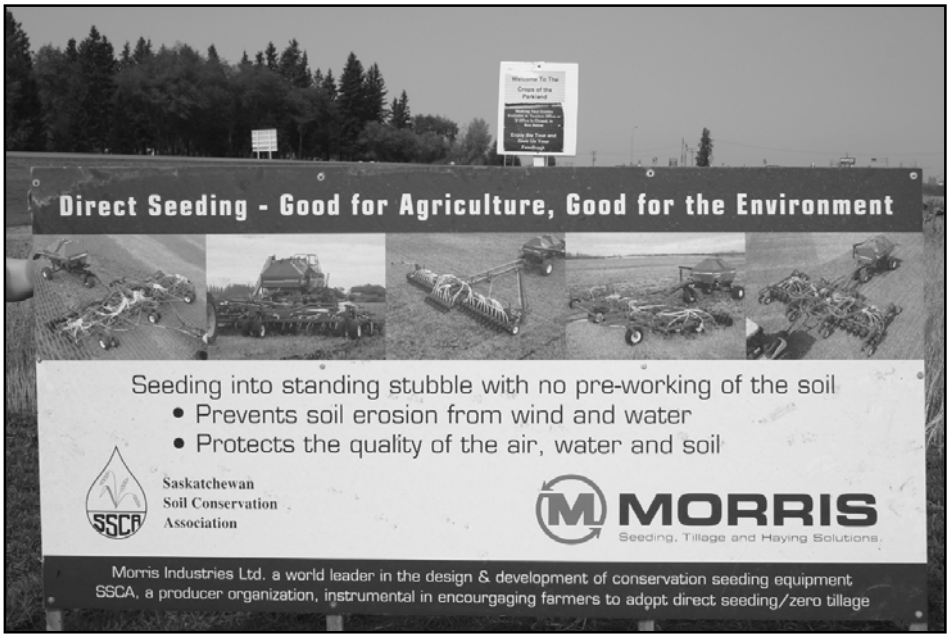
By Juanita Polegi, PAg
SSCA Assiatant Manager

"We use lots of these spices at home but we never knew where they came from!" That's what one couple from Minnesota told Thom Weir PAg when they visited Yorkton's Crops of the Parkland site. Yorkton's newest tourist attraction, with its decidedly agriculture theme, is a pet project of Thom's. He played a pivotal role in establishing the Crops of the Parkland plot at the city's Chamber of Commerce and Tourism offices. Located on the south east side of the city near the junction of Highways # 10 & 16, the plot has attracted a great deal of attention from area residents and tourists alike.

The Crops of the Parkland plot is an example of how a little idea, shared over a cup of coffee, can become a successful cooperative effort. Since the building of the new Chamber and Tourism offices, Thom noted that the parcel of land on which they were located would be an ideal spot for a demonstration of some kind. The city's mayor at the time agreed. It was decided that showing all the crops that are grown in the area was a good place to start. "We believed that this was an opportunity to educate the urban population about the agriculture going on around them by showing them what crops are being grown and why farmers do what they do", explained Thom.

The next step was to sell the idea to the Yorkton Chamber of Commerce and Yorkton Tourism. They liked it. Thom also discussed the idea with Sask Wheat Pool's (SWP) Corporate office. They, too, were supportive of the idea thus enabling Thom to become fully involved in the project. In October 2005, an ad hoc committee was then formed and planning for Crops of the Parkland began.

Thom is pleased with the interest in the project shown by the businesses and groups he contacted. "There was good support from the Chamber of Commerce, the City of Yorkton, local businesses and industry and provincial producer groups," he said. While the City of Yorkton prepared and maintained the site, seed was donated by SWP, U of S Crop Development Centre, East Central Research Foundation, Friendly Acres Seed Farm and Northern Quinoa. SWP Ag Research & Development seeded the plot.



Sign promoting benefits of direct seeding at the Yorkton demonstration site.

A number of producer groups, such as the Canola Council and Sask Pulse Growers, sponsored various plots of grains. The Yorkton Branch SIA sponsored the Heritage Cereals plot that included Thatcher, Marquis and Red Fife wheats; Spelt, rye and triticale. Donations of product were also made by Sask Can Pulse and Grain Millers Canada. Red lentils and rolled oats were bagged by Tourism Yorkton into single serving sized portions along with a recipe. These were very popular with visitors. In fact, one lady from Montreal phoned the office and asked for more samples! When the office suggested she visit her local grocer and purchase the product there, she replied "I didn't know this was available in the store!"

Morris Industries and the Sask. Soil Conservation Association (SSCA) got involved in the project by joining together to purchase a sign that described direct seeding and how it benefits the soil, air and water quality.

Crops in the plot included, canola (featuring hybrids and open pollinated varieties a High Eurcic Acid variety and a Low Linoleic variety); mustards (including brown, Oriental, yellow and Juncea); sunflower, safflower; 3 varieties of dry beans; red and green lentils; green and yellow peas; faba beans; soy beans; Kabuli and Desi chick peas; flax; linola; fibre flax; borage; quinoa; coriander; dill; canary seed; annual forages (including corn, 4 varieties of millet and a sorghum/sudan hybrid); wheat (including durum, CPS & HRS); barley (including 2 & 6 row malt, 2 row feed and a forage variety); and oats (including milling and forage varieties and a new beta – D - glucan variety).

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There was also an agronomy section to the demonstration. This feature demonstrated the benefits to such practices as inoculating peas; treating seed; applying herbicide; and applying foliar fungicide. Each treatment had an untreated plot beside it so comparisons could be made.

Harvesting of the plot was going to prove a bit more challenging than the seeding as no small plot combine was readily available. But Mother Nature intervened and on August 10, a severe wind and hail storm swept through the Yorkton area devastating the plot, in essence, eliminating the need to do any harvesting.

Clean-up of the plot began in early September. Measuring the success of Crops of the Parkland has taken various forms. Yorkton Tourism prepared a questionnaire for visitors to make comments. The Guest Book is showing a number of visitors to the plot, both local people and tourists. "We had 3 school tours including 2 High School ag classes and an inner city school from Winnipeg visit the plot", Thom said. He also indicated that whenever he drove by in the evening, he usually spotted a few people strolling in the plot. "When I had time, I'd stop and have a chat with the visitors. Most often they were people who were staying either at the campground or a hotel and had noticed the sign and plot on the way into the city. They found viewing the plot was a pleasant way to spend an hour or so on a summer evening".

Thom Weir PAg explains to a high school Agriculture class the unique properties of one of the crops demonstrated in the Crops of the Parkland project.

Crops of the Parkland will be on demonstration again in 2007. As Thom looks to the future, he would eventually like to seed some forage plots that include perennial and native varieties. Perhaps the plot could even become an Interpretive Centre.

Overall, Thom believes that Crops of the Parkland is achieving the goal set by the committee in that it's helping to make people in towns and cities aware of where their food comes from, how it's produced – and that it's safe. **"The demonstration is helping to educate the consumer about prairie agriculture and that can only benefit farmers in the long run",** he said. Another benefit to the demonstration is that it's serving as a bridge for people who grew up on a farm but now live in the city to reconnect with agriculture. "This plot allows people to reconnect with the farm. Lots of these people take their kids out to the plot to show them grains they remember growing on the farm when they were kids", explained Thom.

Crops of the Parkland is a project that has generated a lot of interest. Building on that one little idea for a plot of some kind and turning it into a reality could prove to have some very long term benefits to the agriculture industry.

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