Prairie Steward

Farming For Your Future Environment

The Newsletter of the Saskatchewan Soil Conservation Association

Summer Issue No. 68, 2016

Nitrogen Application Can Help Peas with Pea Leaf Weevil Damage

By Shannon Chant MSc PAg
Regional Crops Specialist for Ministry of Agriculture (Swift Current)

In the past number of years my colleagues and I have spent a couple weeks in late May to early June surveying for pea leaf weevil damage in the western and southern parts of Saskatchewan. When we were out surveying this year we noticed that there was a lot more damage than usual and the insects were unusually easy to find in some fields. Pea leaf weevils are nocturnal and will fall off the plant and play dead if they detect people nearby so they are normally difficult to find when out surveying. During surveying, staff counts the number of notches on the plant and if there is damage to the clam leaf on 50 plants per field.

Pea leaf weevils overwinter

Notches in leaves from pea leaf weevil. Photo courtesy of Kowalski.

CONTINUED PAGE 2

In This Issue:
Click on article

Nitrogen Application Can Help with Pea Leaf Weevil Damage…continued from page 2

in Saskatchewan and the milder winter this past year is likely a big part of the reason for the higher numbers seen this year. The economic threshold for applying an insecticide is three out of 10 plants with a notch in the clam leaf (top leaf) of the pea plant before the six node stage. Unless defoliation on a plant is severe, the plant can usually compensate and outgrow the damage to the leaves. The major damage comes from pea leaf weevil larvae that feed on the nodules on the pea roots and disrupt or stop nitrogen fixation.

Table 1. Average pea yields (bu/ac) in a few southwest Saskatchewan RMs (2005-2014) and the nitrogen required (lbs/ac) to obtain that yield.

RM #	Average yield (bu/ac)	Nitrogen needed (lbs/ac)
78	28	87
106	25	78
111	36	112
135	29	90
137	32	99
166 & 168	31	96
228	33	102
229	34	105

Most peas are past the six node stage now but if you noticed a lot of damage to your pea crop and the crop is showing signs of nitrogen deficiency you can top-dress nitrogen to help meet the pea crop's nitrogen needs. Pea crops require an average of 3.1 pounds of nitrogen per bushel. To calculate the amount of nitrogen your pea crop needs, multiply the expected yield for pea on your farm or in your area in bushels and multiply by 3.1. Some nitrogen will be supplied from the soil and you subtract the nitrogen that you had in your soil test from the total nitrogen needed to determine the amount you need to apply. Remember that different fertilizer sources have different levels of efficiency and that will need to be accounted for when calculating the amount of fertilizer to apply. ▪

Click here to return to menu

www.ssca.ca

email: info@ssca.ca

www.prairiesoilsandcrops.ca

Head Office

Return Mail to:
Box 37029 North Park PO
Saskatoon, SK
S7K 8J2

Gerry Burgess - Office Manager
306-371-4213 Office

SSCA's mission is "to promote conservation agriculture systems that improve the land and environment for future generations."

SSCA's vision is "to be the recognized driver and facilitator of change that leads to conservation agriculture being practiced on prairie agriculture land."

Soil Organic Matter on the International Stage

By Dr. Dan Pennock,
Professor Emeritus, Department of Soil Science at the University of Saskatchewan and Canadian Representative, UN/FAO Intergovernmental Technical Panel on Soil

Soil science rarely features prominently in the news media – I used to joke with my soil science classes at U. of S. that we've yet to see a "world-famous soil scientist". The activity generated by the U.N.'s declaration of 2015 as the International Year of Soil did, however, generate substantial coverage, in part because of a series of major international events that occurred in that year. Soil organic matter and its management through agricultural practices was a central part of several of these international initiatives.

The visibility of soil science internationally was boosted several years ago when the Food and Agriculture Organization (FAO) of the U.N. formed the Global Soil Partnership to promote soil science issues at the highest, intergovernmental level. The committee I serve on, the Intergovernmental Technical Panel on Soil (ITPS), was formed to provide scientific support for the work of the Global Soil Partnership. One of our major tasks on the ITPS was to produce the first-ever Status of the World's Soil Resources report, which included regional reports for the trends in major soil threats in the different regions of the world. The North American chapter (and the overall report) is available at http://www.fao.org/documents/card/en/c/c6814873-efc3-41db-b7d3-2081a10ede50/.

Globally the status of soils is somewhat bleak, but western Canadian cropland generally is on a much more positive trend than elsewhere in North America and the world more generally. The report documents the decrease in soil erosion potential and increases in soil organic matter in western Canada that have occurred due to the wide-spread adoption of improved crop residue management and reduced tillage by western Canadian producers. This degree of international recognition for the benefits of conservation agriculture in western Canada is welcome, and certainly stands in contrast to the continued decline in soil quality in other regions of the world.

A second major development internationally stemmed from the climate change meetings held in Paris last December. At those meetings the French government proposed adoption of the "4 per 1000" initiative, which states that if we increased the amount of soil organic carbon by 0.4% a year we could offset the annual increase in carbon dioxide from human sources into the atmosphere (for more information go to http://4p1000.org/understand). One aspect of the initiative is the adoption of reduced tillage in cropping systems, but it also involves adoption of measures such as planting of shelterbelts, optimal pasture management, and restoration of degraded soils. Adoption of these measures would decrease the amount of carbon dioxide in the atmosphere but would also increase the fertility of soils and increase their ability to withstand climatic shocks such as drought or abnormally wet conditions.

It is easy to dismiss these international developments - they seem far removed from the day-to-day work of farming in Saskatchewan. However as noted in the Status of the World's Soil Resources report, the practices associated with the "4 per 1000" initiative have been adopted by many Saskatchewan producers over the past few decades, and many of those producers would agree that recognition of the effect that they have had on soil quality is overdue.

CONTINUED PAGE 11

How Sustainable is Your/Our Phosphorus Management?

By Don Flaten
University of Manitoba

All of our agricultural food and feed crops require P and remove P when they are harvested. However, in the food system, P is not always used or recycled efficiently, increasing our dependence on imported P rock and P fertilizer to replace the P that's exported and not recycled. Although there is no immediate shortage of P rock, there will be a very serious shortage in the long term, unless we improve our overall management of P and also the recycling of P between areas where agricultural crops are grown and where those crops are consumed.

The P "paradox" … falling levels in some fields and rising levels in others - In Manitoba, the number of fields with soil test phosphorus (P) concentrations below the critical level for crop production grew from 57% to 64% between 2010 and 2015, according to the North American Soil Test Summary published by the International Plant Nutrition Institute last winter. According to the same summary, 81% of Saskatchewan's soils are testing below the critical level, virtually identical to the level of 82% measured in 2010. However, these overall figures do not portray the diversity of P fertility within the Prairies. In areas where crop production is the main farm enterprise, P fertility is often low and declining, threatening the long term sustainability of food production. Conversely, in places where crops are being consumed on intensive livestock farms, P fertility is often high and rising, threatening water quality due to excess P in runoff.

Some of the reasons for this "paradox" of P deficits and surpluses include:

High rates of P removal by crops relative to rates of P applied - One of the reasons for declining soil P levels in the eastern prairies is high yields, especially for canola and soybeans, that end up exporting more P than farmers are applying as fertilizer. For example, Manitoba has been enjoying high yields of canola and soybeans and those crops remove between 0.8 and 1 pound of phosphate per bushel. Meanwhile, many farmers are applying between 20 and 30 pounds of phosphate (40-60 lbs of 11-52-0) per acre on their canola and often no phosphate at all on their soybeans. So, each crop of canola and soybeans usually lowers the P fertility of our fields.

Land tenure - Another reason for declining P levels in soil may be land tenure. Applying P fertilizer to match the rate of P removal by crops is an important investment for the long term productivity of land, but that investment might not be justifiable for farmers who have short term lease or rental agreements. The same economic disincentive may apply to farmers who are near the end of their farming careers and who are not likely to see a long term reward for applying P fertilizer at rates that are high enough to maintain P fertility.

Separating areas of <u>feed</u> production from areas of feed consumption – Part of our problem with some areas having excessively low and others having excessively high P fertility is because we often separate crop and livestock production from each other. Some observers have noted that specialized farms have converted a solution (integrated crop and livestock systems) into two problems (low fertility on specialized crop farms and excessive fertility on specialized

CONTINUED PAGE 5

How Sustainable is Your/Our Phosphorus Management?...continued from page 4

livestock farms). Therefore, one of the most cost-effective ways to address this disparity between low and high P fertility is to encourage crop and livestock producers to work together locally to help each other balance their phosphorus input and output.

Separating areas of <u>food</u> production from areas of food consumption – The largest long term challenge, however, is at a much larger scale, where agriculture is continuing to grow and export P as food to consumers, and then the consumers don't recycle those nutrients back to the farmland where the P came from. For example, the City of Winnipeg disposes its wastewater P into the Red River or into the Brady Landfill. There is virtually no recycling of those nutrients and that is simply not sustainable in the long term.

Restoring P balance … conventional techniques – Over the medium term, we will continue to rely heavily on conventional fertilizers and livestock manure to replenish the P that is removed by crops. Many agronomic recommendations for P are based on the "short term sufficiency" approach, which aims to supply just enough P to produce a good yield for the current crop, but runs the risk of depleting P fertility over the long term. Another approach is to consider the longer term productivity of the soil, which is referred to here as the "long-term sustainability" approach. This approach uses buildup, maintenance and drawdown strategies to move soil test levels into a medium range (Figure 1).

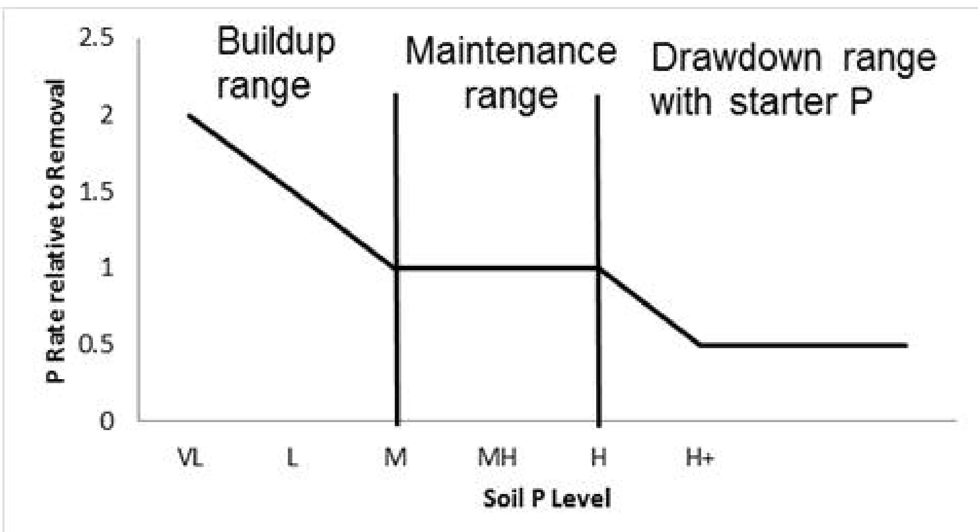

Figure 1. Long-term sustainability fertilization approach. Adapted from Ontario Soil Fertility Handbook.

Recommended options for implementing the buildup or maintenance phase of a long term sustainability strategy for P fertilization include:

1. Sideband and/or midrow band P fertilizer at planting to match P rate to crop removal without risk of seedling injury – most crops other than cereals (eg. canola and soybeans) are sensitive to salt toxicity from P fertilizer applied in the seedrow. Therefore, safe rates of seedrow P in these crops is usually not sufficient to match crop removal. However, sidebanding or midrow banding all or some of the P in these crops can overcome that limitation.

2. Maximize seedrow P in crops such as cereals that tolerate more than their removal – farmers who do not have access to sidebanding or midrow banding equipment can maximize the P rate in the cereal phase of their rotation, to put on "surplus" P for that year, to help balance the P "deficits" in years with pulse and oilseed crops. This "rotational" fertilization concept aims to balance P application with P removal for the overall crop rotation, even if some crops have deficits, while others have surpluses.

3. Apply manure to meet crop N requirements … which will supply P for several years – the ratio of available N to P_2O_5 in manure is

CONTINUED PAGE 12

Saskatchewan Soil Formation

By Joanne Kowalski, MSc, PAg,
Regional Crops Specialist for Ministry of Agriculture (Prince Albert)

In the article about the health of the agricultural soils in Saskatchewan, it is evident that the practices of the adoption of zero-tillage, the reduction of summerfallow and the diversity in crop rotations have all contributed to reclaiming their health. Now, I would like to backtrack a bit and talk about the formation of these fertile soils that are the basis for food, fibre and fuel production that serves a large part of the globe.

As students in the College of Agriculture and Bioresources, soil science classes teach how our prairie soils were formed and also how they were classified. Recently I was reading a soil survey map for a producer as he had inquired as to the soil type on his land. It made me realize again how intricate the system in place is that describes our Saskatchewan soils.

It all began with the last Ice Age, the Wisconsinan Period, that ended about 11000 years ago. As the great glaciers retreated, they left behind their mark on the land. These are the Parent Materials upon which all the soils developed, whether they are in the form of old lake beds (lacustrine), old river beds (fluvial), huge boulders carried over miles and miles and dumped in what appears to be the middle of 'nowhere' (glacial till) or old sea beds (marine).

Several soil classification groups are well defined based on observable properties. These properties and horizons developed over time and in response to environmental controls. For the Prairies, these controls include: climate, vegetation, the parent material, topographical position of the soil, presence or absence of groundwater in the soil, the length of time the soil has been developing and the soil-altering effects of human use of the soil.

The Canadian System of Soil Classification has four main levels:

1. Soil Order: in Saskatchewan the main order on farmland is the grassland Chernozemic Order.
2. Soil Great Group/Subgroups: for grasslands, these orders are divided into soil zones based on the colour of the surface horizon that indicates how much soil organic matter has accumulated, these soil zones are called Brown, Dark Brown, Black and Dark Gray.
3. Soil Series is the finest level, and is assigned to a particular soil subgroup occurring on a specific soil parent material and are referred to as soil horizons or profiles. These profiles are described using A, B or C horizons and are defined further by the many diverse characteristics that affect soil development. For example, an Ah horizon is one that is enriched by organic matter and an Af horizon is one enriched with aluminum (Al) and iron (Fe) combined with organic matter.
4. Soil Associations: these are genetically related soils that share a parent material and other characteristics, and that occur over very short distances on the landscape. They are typically named after the closest town to where they were first described, e.g., the Yorkton Association, the Oxbow Association or the Elstow Association.

Agriculture and Agri-Food Canada began surveying arable

CONTINUED PAGE 9

What's in the Soil May Affect What Happens on the Top of the Soil

By Sherri Roberts PAg
Regional Crops Specialist for Ministry of Agriculture (Weyburn)

As a new planting season approaches, decisions regarding what crops will be planted and where they will be planted are being made. A wide pool of scientific literature is piling up on the connection between a healthy population of arbuscular mycorrhizae in your fields and increased yield. Arbuscular mycorrhizal (AM) fungi form a close interaction with plant roots. Studies show they improve the uptake of nutrients such as Nitrogen, Phosphorus, Zinc and Copper in soils that are deficient in these elements. Data also exists which indicates that the pathogen protection benefits of AM fungi might be as significant as the nutritional benefits to many plants. Crop rotations will affect AM species diversity and some studies also show certain pesticides can have a detrimental effect on AM and interfere with nodulation formation.

The number of different AM fungi species varies with the type of crop and the crop rotation. Crops that belong to the Brassicaceae (canola), Chenopodiaceae (quinoa) and Caryophyllaceae (buckwheat) families do not form associations with AM fungi.

It has been suggested that including non-mycorrhizal crops in rotation might affect the concentration and viability of indigenous AM fungi in soil thereby affecting the growth of AM-dependent crops following in the rotation. It has been reported that both the growth of corn including shoot weight, grain yield and AM formation were enhanced when the previous crop formed mycorrhizae. On the other hand, canola has been reported to inhibit AM fungal growth. AM fungi colonization of flax was 3.5% larger after wheat (a highly mycorrhizal crop) than when canola was the previous crop. Seed yield of flax was increased by threefold when grown after safflower versus a flax after flax rotation.

Continuous monocultures can both decrease populations of AM spores as well as shift the AM species composition of the community toward species which may not be beneficial to the crop. Studies done on corn and soybeans both indicate that certain AM fungi species that become numerous with continuous monocultures may contribute to the yield declines over time noted for such crops.

The percentage of roots that are mycorrhizal is low in young plants but later increases to a high level.

In soybean the rapid increase in mycorrhizae begins as the third trifoliate leaf becomes fully expanded and continues until about 8-12 days before flowering in field-grown plants, and until early pod stage in plants grown in controlled environments.

Inoculum of AMF exists in soil in three forms: spores, soil-borne

CONTINUED PAGE 11

Saskatchewan Soil Quality and Health and the SSCA

By Joanne Kowalski, MSc, PAg,
Regional Crops Specialist for Ministry of Agriculture (Prince Albert)

Since the Saskatchewan Soil Conservation Association (SSCA) was formed in 1987 to focus on promoting soil conservation practices, the reduction of summerfallow acres through the adoption of zero-tillage and direct seeding has been one of its most notable accomplishments. In relation to the health of Saskatchewan soils, these practices have made significant contributions.

2015 was the International Year of Soils (IYS) declared by the General Assembly of the United Nations through the Food and Agriculture Organization (FAO). The FAO statement on soils says in part that "Soils have been neglected for too long." But is this true for Saskatchewan? On World Soil Day 2014, Dr. Rigas Karamanos discussed the impact of changes on soils in western Canada making the distinction between soil health and soil quality. The two are not synonymous.

So, what is soil health? In essence, soil health *measures a wide spectrum of perceptions about the "fitness" of the soil to be a desired medium for the activities of the varying objectives of groups of people*. Determining soil health is both a scientific and socioeconomic exercise as fitness of a soil can mean something different to different groups, e.g., soil fitness means something different to a farmer than to a regulator than to a member of the public.

As for soil quality, there are two components: inherent and dynamic. An Inherent soil quality is static over time, such as parent material, topography, mineral content and soil texture. Farming practices that cause losses due to soil erosion can result in the reduction of a soil's quality.

Dynamic soil quality refers to the properties of soil that can change over the short term such as microbial biomass, nutrient status and nutrient mineralization rates. Again, some farming practices can result in changes that can occur over the growing season or even over hours or days.

Nonetheless, some farming practices can have a positive outcome on the health of a soil and can prevent soil degradation and in some instances reverse negative effects. Some examples include:

- Introduction of zero-till and direct seeding. A recent study by Dr. Richard Gray at the University of Saskatchewan shows that onsite, long run benefits of the adoption of zero tillage since 1985 is worth a touch over $9 billion. These benefits were identified as reduced wind erosion and soil salinity and increased soil organic matter and production or soil quality.
- Elimination of summerfallow. The huge reduction in summerfallow acres has followed the same trend, and Gray's study shows that the onsite short run benefits are worth a touch under $9 billion. These benefits would include cost reductions for machinery, labour, fuel and other inputs as well as increased production.
- Adoption of proper crop rotations. Crop rotations in continuous cropping systems that utilize nitrogen fixing crops and perennial cover can have positive effects on soil quality through the addition of nutrients and organic matter, regulation of pH and salinity and improvement in nutrient holding capacity.

So, in Saskatchewan: have our soils been neglected and are our

CONTINUED PAGE 9

Saskatchewan Soil Quality and Health and the SSCA…continued from page 8

farming practices sustainable? The definition of sustainable management is open for discussion but it's true that the adoption of the conservation practice of zero-tillage has benefited Saskatchewan farmers both economically and environmentally over the long term. A negative aspect of modern production is that it does rely on nonrenewable energy consumption in both the production of inputs (e.g., fertilizers and pesticides) and in fuel for field operations. These concerns are important especially when combined with the issues related to managing the risks of climate and markets.

In Gray's study, some offsite benefits from zero-tillage practices are also counted, including reduced carbon dioxide emissions through soil carbon sequestration and fuel use reduction and reduced nitrous oxide release. In total, the onsite and offsite benefits add up to $18.7 billion.

The main concerns of agricultural sustainability in the 1997 article by Carter et al. *Concepts of soil quality and their significance* were:

- maintaining or improving farm productivity,
- avoiding or minimizing adverse impacts on natural resources and associated ecosystems,
- maximizing the net social benefit derived from agriculture, and
- promoting flexibility of farming systems.

In this quote from Odum out of Ecology and Our Endangered Life Support Systems, he outlines the struggle to define and to maintain soil health in sustainable agricultural systems: *Ultimately, the fate of the soil system depends on society's willingness to intervene in the marketplace and to forego some of the short-term benefits that accrue from "mining" the soil so that soil quality and fertility can be maintained over the long-term.*

In the 1995, Agriculture and Agri-Food Canada publication The Health of Our Soils: Toward sustainable agriculture in Canada, Acton and Gregorich stated that *some Canadian agricultural soils are improving in health and becoming less susceptible to erosion and other damaging forces, mainly because of increased use of conservation farming methods over the past 10 years*. Twenty years along, this is especially true for Saskatchewan where over 70% of producers practice conservation, minimum or zero-tillage. ▪

Click here to return to menu

Saskatchewan Soil Formation…continued from page 6

soils in Saskatchewan in the 1940s and continued into the 1970s. This on-the-ground hard work resulted in soil maps for every RM with specific information about agricultural soils down to the acre. The survey maps contain other symbols that tell about slope classes (level to very steeply sloping), surface forms (whether the land is hummocky or level), the salinity level, the agricultural capability (from no limitations to no capability for crop production), among others.

All of this information together can tell a producer a great deal about their fields and assist in decision making regarding production management including fertility expectations, what crops may do better than others and where there may be problem areas in the field manifested by drought or high rainfall.

For more thorough information, please check out the Soils of Saskatchewan website: http://www.soilsofsask.ca/. ▪

Click here to return to menu

2016 SSCA Conference – Speaker Presentations

The 28th Annual Conference, **"Transitioning to Sustainability"**, was held on January 11 at Prairieland Park in Saskatoon during Crop Production Week and it was a great success.

If you did not attend the conference, or if you did attend and simply want to review some or all of the speakers' presentations, all of the PowerPoints can be found on our website here (http://ssca.ca) or click on the links below for the individual PowerPoints.

Keynote Speaker: Succession Soil Development Ecological Intensification: Going Where No Grains Have Gone Before!
Tim Crews, PhD, Director of Research at The Land Institute, Salina, Kansas, USA
http://ssca.ca/images/conference/2016/Succession-Soil-Development-Ecological-Intensification-part-1.pptx
http://ssca.ca/images/conference/2016/Succession-Soil-Development-Ecological-Intensification-part-2.pptx

The Role of Cover Crops in a Sustainable Farm
Garry Richards, Richards Family Farm and Livestock Ltd., Bangor, SK
(This PowerPoint is temporarily unavailable, but should be back on the website soon)

Soil Fertility Benefits of Short-Rotation Forages
Dr. Jeff Schoenau, Department of Soil Science, U of S
http://ssca.ca/images/conference/2016/Soil-Fertility-Benefits-of-Short-Rotation-Forages.ppt

Nurturing Soil Microbial Partners for Healthy Agro-Ecosystems
Dr. Bobbi Helgason, Agriculture and Agri-Food Canada, Saskatoon
http://ssca.ca/images/conference/2016/Nurturing-Soil-Microbial-Partners-for-Healthy-Agro-Ecosystems-updated.pptx

Managing Weed Seed Production: The Next Revolution in Weed Control
Lena Syrovy, PAg, Department of Plant Sciences, U of S
http://ssca.ca/images/conference/2016/Managing-Weed-Seed-Production-updated.pptx

Non-Herbicidal Weed Control
Dr. Steve Shirtliffe, Department of Plant Sciences, U of S
http://ssca.ca/images/conference/2016/Non-Herbicidal-WeedControl-part-1.pptx
http://ssca.ca/images/conference/2016/Non-Herbicidal-WeedControl-part-2.pptx

Managing Wheat to Make the Most of a Tough Growing Season: Lessons From 2015
Sheri Strydhorst, PhD, Ministry of Agriculture & Forestry, Barrhead, AB
(This PowerPoint is temporarily unavailable, but should be back on the website soon)

Wetlands in Agro-Ecosystems: A Mixed Blessing

CONTINUED PAGE 11

What's in the Soil May Affect What Happens on the Top of the Soil...continued from page 7

hyphae and colonized roots.

The presence of non-mycotrophic plants, such as members of the Cruciferae (such as canola), decreases the inoculum of AMF.

As AM fungi form their beneficial relationships with live plant roots, studies have shown fallowing land substantially reduces their numbers. In fact, this reduction has been shown to be as great as forty percent with just one season of fallow. ▪

Click here to return to menu

Soil Organic Matter on the International Stage...continued from page 3

The Government of Canada is a member state of the FAO and is a partner in the "4 per 1000" initiative, and by participating in these initiatives the government commits itself to action. Last year the U.N. adopted a revised World Soil Charter (available at http://www.fao.org/fileadmin/user_upload/GSP/docs/ITPS_Pillars/annexVII_WSC.pdf) and the governments that adopted it, including Canada, committed to "Incorporate the principles and practices of sustainable soil management into policy guidance and legislation at all levels of government, ideally leading to the development of a national soil policy". As organizations such as the SSCA work with different levels of government to achieve recognition of the positive trends in Prairie cropping systems, it is useful to draw their attention to the commitments that Canada has already made. ▪

2016 SSCA Conference - Speaker Presentations...continued from page 10

Dr. Angela Bedard-Haughn, Department of Soil Science, U of S
http://ssca.ca/images/conference/2016/Wetlands-in-Agro-Ecosystems-updated.pptx

The Returns to Conservation Tillage Research and the Dearth of Funding
Dr. Richard Gray, Dept. of Bioresource Policy, Business and Economics, U of S
http://ssca.ca/images/conference/2016/The%20Returns%20to%20Conservation-Tillage-Research-and-the-Dearth-of-Funding-updated.pptx ▪

Click here to return to menu

2016 SSCA Conference – Sponsor Acknowledgement

The most recent conference, "Transitioning to Sustainability" was a great success – more people, more great discussions, more enthusiasm.

We would like to acknowledge our Platinum Sponsor, SaskCanola, without whose support the SSCA would not be able to hold this valuable event.

SaskCanola™

How Sustainable is Your/Our Phosphorus Management?...continued from page 5

often around 1:1 or less, which is a lot lower than the ratio of the crop's N requirements to P removal, which is usually 3:1 or greater. This means that when manure is applied at a rate to meet the crop's N requirements, it will supply enough P to match crop removal for at least three years.

Recent innovations ... struvite, a "natural" granular fertilizer from urban wastewater or liquid manure - One of the strategies that could help us to restore P cycling between areas of crop production and crop consumption is the processing of manure and wastewater P into a more concentrated form that enables cost-effective long distance transport. Towards that end, engineers and soil scientists at the University of Manitoba have been researching the manufacture and utilization of struvite fertilizer from the P in liquid manure.

Figure 2. Granular struvite fertilizer manufactured from liquid pig manure (photo: Yeukai Katanda)

Struvite is an ammonium-magnesium phosphate mineral that forms naturally in kidneys as kidney stones or wherever wastewater or liquid manure are stored or processed. Dr. Nazim Cicek and his students have developed processes to enhance the creation of granular struvite from liquid pig manure (Figure 2). Dr. Francis Zvomuya and his students have been evaluating the agronomic effectiveness of that struvite as a fertilizer.

One of Dr. Zvomuya's students, Yeukai Katanda, evaluated the agronomic response of wheat and canola to struvite recovered from hog manure compared to commercial 11-52-0 fertilizer. In her growth chamber experiment, struvite's agronomic performance for canola was similar to 11-52-0 for the first crop (for dry matter yield and for phosphorus uptake) and superior to 11-52-0 in the second and third crops. Conversely, even though neither source of phosphate provided a dry matter yield response for wheat in any of the three crop phases, wheat uptake of P from 11-52-0 was greater than uptake from struvite in the first crop phase. Yeukai's research also found that emergence of canola was unaffected by granular struvite applied at rates in the seedrow that reduced seedling emergence by 50% when 11-52-0 was applied. So, struvite is a very safe fertilizer for applying in the seedrow for crops that are sensitive to salt injury.

Summary - In the Prairies, P depletion is a concern. However, there are ways to rebalance the P budgets for our fields. For more information on this topic, please refer to a recent factsheet co-authored by John Heard (Crop Nutrition Specialist, Manitoba Department of Agriculture), Cindy Grant (retired soil scientist from Agriculture and Agri-Food Canada) and Don Flaten (University of Manitoba), available at http://www.manitobapulse.ca/phosphorus-fertilization-strategies/. The site also has a simple spreadsheet-based P balance calculator for crop rotations, to help agronomists and farmers estimate whether their P fertilization practices are building, maintaining or depleting the P fertility of their fields. ▪

Click here to return to menu

President's Message

By Ian Boyd
SSCA President

After many years of inactivity, the Carbon Committee of the SSCA has once again become active. With the change in Federal government last fall, and talk of a carbon tax being imposed on all carbon emissions, the SSCA's Carbon Committee is working towards both the recognition, and financial credit, of zero-tilling to sequester carbon into the soil. Our view is, if producers are going to be taxed for the carbon they are emitting into the atmosphere, then they should be equally credited for the carbon they are sequestering into the soil by way of their zero-till management practices. The basis (and proof) for this statement is the Prairie Soil Carbon Balance Project, which can be found on the SSCA website at http://ssca.ca/images/new/PSCB.pdf. This long term study proved, and quantified, the ability of zero-tilled farm soils to capture and hold carbon from the atmosphere at various rates depending on the soil zone within the province. The Carbon Committee has received support from six of the commodity commissions (Sask Barley, Sask Canola, Sask Pulse, Sask Flax, Sask Oats, and Sask Wheat) as well as from APAS and SARM to proceed with our work. ▪ Click here to return to menu