Clubroot Monitoring is Still Key in Saskatchewan

By; Faye Dokken-Bouchard, PAg Provincial Specialist, Plant Disease Crops and Irrigation Branch

Field affected by clubroot

Although results from 122 soil samples from the 2013 clubroot survey were negative for the disease, there continues to be a risk of clubroot spreading into and across Saskatchewan.

Since 2008, 1,315 canola crops have been surveyed visually for disease and 476 soil samples have been collected for clubroot DNA analysis from fields in Saskatchewan. No above- or below-ground clubroot symptoms have been observed during these surveys. Clubroot was detected in two soil survey samples from west-central Saskatchewan, one in 2008 and one in 2012. No confirmed cases of clubroot were reported from the 2009, 2010, 2011 or 2013 soil surveys and the pathogen has not been detected again in the area where it was found in 2008 or 2012. Clubroot symptoms were reported in two fields in Saskatchewan by Cargill in the fall of 2011. Fields where clubroot has been detected have been managed under the guidance of the Ministry and the affected rural municipalities.

Once introduced to a field, susceptible plants, whether non-resistant varieties, volunteers or susceptible weeds, can become infected and increase the amount of inoculum in the soils. While extremely valuable, resistant varieties are no guarantee due to the risk of resistance breakdown. Other management tools for clubroot include avoiding soil movement between regions and fields, diversifying crops using a sound rotation and resistance sources, and scouting regularly for root symptoms at field entrances.

The canola disease survey will be conducted again this summer and soil samples will be collected for the 2014 clubroot survey. Upgrades to the Crop Protection Laboratory, including a PCR lab, have enabled the Ministry to do the clubroot analysis for the survey since 2013.

If you are interested in having a field surveyed and tested for clubroot, please contact your local Regional Office. More information on clubroot management can be found in the Ministry fact sheets www.agriculture.gov.sk.ca/clubroot-management-plan and www.agriculture.gov.sk.ca/clubroot-canola as well as at http://www.clubroot.ca/.

Crop Damage from Sprayer Contamination Completely Preventable

By: Clark Brenzil, PAg, Provincial Specialist, Weed Control, Crops and Irrigation Branch

Each year, several cases of crop damage from herbicide contamination in sprayers are diagnosed by the Saskatchewan Agriculture Crop Protection Laboratory. In all situations, this damage could have easily been prevented by frequent tank cleaning throughout the spray season.

Occasionally, plant injury does not resemble the typical damage caused by the mode of action of the herbicide applied and/or there is a dramatic change in the pattern of damage reported in the field from one sprayer tank load to the next. These two situations strongly suggest sprayer contamination from a previous application. The field pattern can provide clues to the sprayer filling routine in the field where the crop damage occurred.

The crop most commonly damaged from sprayer contamination is Liberty tolerant canola for several reasons, but contamination injury has also been seen in other crops. Liberty is a very "soapy" formulation that is very effective at removing contaminants from the sprayer and canola is generally very sensitive to many of the broadleaf herbicides. Solvent-based adjuvants like *Merge, Amigo* and *Turbocharge* also remove contaminants aggressively from sprayers. However; these adjuvants should not be used as tank cleaners due to the risk of damage to the environment and potential for adjuvant burn to the crop area that the rinsate is applied to for disposal.

Group 2 herbicides are the most common source of damage from sprayer contamination, largely because they are active at such low rates. This means very little needs to remain or be removed from the sprayer to result in damage to a sensitive crop. Certain Group 2 herbicides may also have some challenges with solubility if the pH of the solution is not optimal or because of incompatibilities with certain formulations of mix partners. For example, Group 2 herbicides other than the imidazolinone (IMI) herbicides (*Assert, Solo, Odyssey*) are generally more soluble in higher pH solutions. This is where the use of household ammonia comes into play when cleaning non-IMI Group 2 herbicides from the tank. Authority and the diflufenzopyr component of *Distinct* are also more soluble at higher pH. Adding ammonia raises the pH of the cleaning solution so that it can dissolve greater quantities of the herbicide molecule. This encourages more efficient removal of any deposits of these herbicides that may have formed on sprayer surfaces during application and mixing.

Mixing incompatible herbicides can also result in solubility problems and can cause deposits to form on sprayer surfaces more readily. The following products have restrictions on the salt or formulation type of glyphosate that can be mixed with them; *Aim* (glyphosate top-ups of *CleanStart*), florasulam (*Priority,* or glyphosate top-ups of *PrePass*), flumioxazin, *Focus*, and *Inferno Duo*. In some cases, these restrictions are because of incompatibilities that increase the potential for these products to deposit more readily in sprayers, but not necessarily all. The important thing to remember is that restrictions are on product labels for a reason and need to be followed to avoid problems.

In addition to the potential loss of efficacy from some herbicides, the challenges with the water-solubility of pesticides may be further aggravated by the use of low application water volumes.

Herbicides that utilize oil-based adjuvants, whether built into the formulation or added to the tank with the herbicide, may accumulate as fatty or oily deposits on the inside of sprayers. The labels of these types of products will often contain a recommendation of periodic tank cleaning after repeated applications. When not cleaned out regularly, fatty deposits may accumulate sufficiently to form a barrier that may trap the residues of herbicides in the sprayer and not allow access to these herbicides of other cleaning agents like ammonia for proper cleanout. When these herbicides are very phytotoxic in low amounts, such as most Group 2 herbicides, the risk of damage from the uncontrolled removal of these deposits during subsequent applications is high, when a subsequent application of another pesticide able to cut these deposits.

Not only do these deposits have the potential of trapping other herbicides, but they can interfere with the proper function of the sprayer itself, particularly the functioning of screen elements and nozzles. Obstructed in-line screens can place undue physical stress on the pump unit of the sprayer and deposits in nozzles and nozzle screens can cause variances in flow/pesticide application rate from nozzle to nozzle.

Originally, glyphosate formulations contained built-in adjuvants with alcohol-based non-ionic surfactants. Most glyphosate formulations now contain "polyethoxylated tallow amine" adjuvants. These adjuvants not only spread the water droplets over the surface of the leaf but they also aid in the movement of the glyphosate from the leaf surface, into and through the waxy cuticle layer of the leaf. This provides improvements in rainfastness and protection from other environmental challenges the herbicide faces before entering the leaf.

Tallow is another term for animal fat, and as such glyphosate has the potential to build up fatty deposits on the inside of the sprayer over time. This may trap the residues of tank mix partners within the fatty deposits sprayer until something is added to the sprayer that aggressively breaks down fatty deposits.

The addition of detergents to the cleanout operation will greatly enhance the removal of oily or fatty deposits. With a hydrophilic (water loving) element on one end and a hydrophobic (water hating or oil loving) element on the other end, detergents have the ability to make oil and water bind to one another, where normally they are repelled from one another. Detergents are soap-based cleaners whereas de-greasers are generally solvent-based and may have negative environmental effects, similar to solvent-based adjuvant, as well as the potential to damage certain sprayer parts. The addition of detergent will not have a negative effect on other cleaning components but may result in the production of foam, so the addition of an anti-foam agent is advisable. Detergent can be found at most industrial cleaning supply distributors. Discuss with the dealer what products are best suited to the task.

Multi-function tank cleaners remove a lot of the guesswork from the cleaning process and may contain anything from just ammonia to a combination of pH modifier, detergent and surfactant for reducing the formation of water droplet residues. Keep in mind that some products that claim to be three-way tank cleaners are simply ammonia, so look at the ingredients and ask for a sprayer cleaner with the three components above. Multi-function cleaners are available through most pesticide retailers.

If sprayers are cleaned regularly, there is less opportunity for fatty deposits to form and trap tank mix partners in the sprayer with them. Cleanout is also more effective when conducted on a regular basis and there is less material to remove. A good rule of thumb is to clean sprayers whenever they are stopped long enough for the power plant to be shut off. Spray solution should never be left in the sprayer for an extended period if it can be helped at all. Leaving the spray solution in the tank without agitation will allow any suspended material to settle and cake in the sprayer. Situations do arise where spraying is cut short by weather, but efforts should be made to minimize the chance of pesticide solutions remaining in sprayers for extended periods. In these cases the power plant and agitation should remain on until the solution can be applied.

The use of stainless steel sprayer tanks may reduce the amount of accumulation of the various deposits slightly when compared to polyethylene tanks, but much of the plumbing under the tank is constructed of various plastics as well, even on sprayers with stainless steel tanks. Sprayer plumbing is most vulnerable to the accumulation of deposits, since there are many seams for material to accumulate, where elbows and other structures mate. Screen housings and pumps also have many cavities for deposits to accumulate.

Don't rush the sprayer cleaning process. Expect the entire process to take at least an hour. The additives for cleaning discussed above will need a minimum amount of time to adequately remove pesticide residues from the sprayer. The longer the interval between cleaning operations, the longer it will take for the cleaning process to be effective. Be sure to remove nozzles and screens, including all in-line screens (there may be several) and allow them to soak in their own container of cleaning solution while working on the rest of the sprayer. Inspect and remove any visible material from the screens and nozzles, using a nylon brush, before reinstalling.

Unlike the sprayer tank, the plumbing is largely inaccessible for aggressive physical cleaning with a power washer, and therefore needs more time passive methods such as cleaning additives. One strategy for improved cleaning effectiveness is to begin the process immediately following the wind up of spraying for the day, and complete the cleanout process to the point of the addition of and circulation of the cleaning additives through the sprayer including the booms, then allow the cleaning solution to sit in the sprayer for an extended period, for example overnight, before completing the remainder of the cleaning protocol. Allowing the cleaning solution to sit in the sprayer allows the cleansers to work on heavy deposits so that they may be easily flushed out when agitation resumes.

Regular cleaning, using cleanout procedures found on each product label, performed immediately after the end of spraying for the day, will reduce the risk of the accumulation of herbicide residues leaving the sprayer when they can result in crop damage.

Crop Diagnostic School 2014

By: Shannon Chant Regional Crops Specialist, Swift Current, Regional Services Branch

Field scouting at the 2013 Crop Diagnostic School

Saskatchewan Ministry of Agriculture is excited to be partnering with Saskatchewan Crop Insurance Corporation, SaskCanola, SaskFlax, Saskatchewan Pulse Growers and Western Grains Research Foundation to host the second Crop Diagnostic School. The school is a one-day workshop in Scott and Melfort to advance your agronomic knowledge.

The Crop Diagnostic School is a hands-on opportunity to examine plants, dig in the soil, pull weeds, catch insects and hone your diagnostic skills. The six areas of focus for 2014 are:

- Insect Scouting and Identification - learn how to use a sweep net and identify pests and beneficial insects in a real field situation.
- Disease Scouting and Identification - test your knowledge of wheat and barley leaf diseases, and various diseases on canola, fababean, soybean and flax. Experts will be on hand to assist with identification and to teach you about disease diagnostics.
- Weed Identification - what weed is that? Sharpen your weed identification skills. This session will focus on plant identification using live demonstration plant material of seedling and mature plants found in fields throughout Saskatchewan.
- Crop Establishment - observe various factors that can affect plant establishment in canola, peas, wheat, flax and soybeans. Seed quality, seed size, depth of seeding, as well as other factors will be demonstrated. A hands-on crop staging exercise for canola, wheat, corn and soybean is also planned.
- Fertility/Soils/Nodulation- where have all the flowers gone? It could be that they never appeared. Come see the damage wrought on wheat, flax and canola by the wrong, the missing, the untimely and the misplaced N, P, K and S. See why the 4R's of nutrient management are important. Learn

about nodulation and what factors are critical for nitrogen fixation.

- Herbicide Injury Symptoms and Application Technology - observe and identify injury symptoms caused by different groups of herbicides on select cereals, oilseeds, pulses and a variety of weeds. Learn about application technology and the factors that affect herbicide effectiveness.

Scott, Saskatchewan is where Agriculture and Agri-Food Canada's Scott Research Farm and the Western Applied Research Corporation are located, and is in the Dark Brown Soil Zone. The Crop Diagnostic School at Scott on July 22 or 23.

Melfort, Saskatchewan is where Agriculture and Agri-Food Canada's Melfort Research Farm and the Northeast Agriculture Research Foundation are located, and is in the Black Soil Zone. The Crop Diagnostic School at Melfort on July 29 or 30.

Registration begins at 8: a.m. and the event runs from 8:30 a.m. to 4:30 p.m. The cost is $140 per person (includes lunch).

Attendees should come prepared for the weather (bring rain gear, rubber boots, sunscreen, a hat, etc.). This will be a great opportunity to take pictures, so bring your camera. Continuing Education Units (CEUs) are pending for Certified Crop Advisors. Sweep nets and resource books will be available for purchase by cash or cheque only.

To register, please visit http://www.prairiecca.ca/. Follow the link under Crop Diagnostic School 2014. Space is limited so register early to ensure your spot. More information is available by calling the Agriculture Knowledge Centre at 1-866-457-2377.

Crop Establishment in Cold Conditions is Difficult

By; Sherrilyn Phelps, PAg, Regional Crops Specialist North Battleford Regional Office

Early frost can be detrimental to crops especially if the development has been delayed. The extent of damage caused by frost depends on the temperature, length of exposure time, humidity levels and how long the crop takes to reach freezing temperature. Due to the many factors involved, it is very hard to give a definite temperature to which crops can tolerate frost. Even if the air temperature reaches 0 C, the crop itself can be four or five degrees cooler because plants can lose heat faster than the surrounding air.

In order to understand the effects of frost, one must understand plant cells. Plant cells contain not only water but also many substances such as proteins, sugars, amino acids and other solutes that can lower the freezing temperature and protect the cells against intracellular ice formation (similar to antifreeze in your car). This means even though water freezes at 0 C, a plant cell may need temperatures down to -4 C or lower before the cells will freeze and damage occurs. Different parts of the plant, different stages of development of the plant and different types of plants can have varying levels of these ‘antifreeze' compounds that result in a range of susceptibility to frost. Environmental conditions such as drought, cold temperatures or heat can also influence the levels of these compounds, and hence the tolerance of the plant to freezing temperatures. Typically, when a plant is exposed to stress it becomes more hardened which can moderately increase the tolerance to frost.

Frost damage occurs as moisture within the plant crystallizes and expands. This causes cell walls to rupture and fluid to leak out, hence the watery appearance of plant tissue or seed after a damaging frost.

Effect of Moisture:

Cold air holds less water than warm air. As temperatures drop overnight to a level below the point where the relative humidity reaches 100 per cent (dew point), the air becomes oversaturated and condensation occurs. If this occurs close to the earth's surface, fog or dew forms. When water changes state from liquid to solid (ice), it gives off heat. So as the dew on the plant is exposed to freezing temperatures and undergoes the process of freezing, it gives off heat which can help keep the plant tissue above freezing. While water continues to freeze on the outside of the plant (extracellularly) it remains at 0 C until all the water is in the frozen state. Once this occurs the temperature can then drop and there is no longer heat to protect the plant. Hence, the duration of the frost is critical.

<u>Spring Frost</u>

Crops: Spring frosts can damage germinating seedlings and the extent of damage will depend on the location of the growing point (above or below ground) and the level of anti-freeze properties contained within the plant. Exposure to cooler temperatures over time can harden off plants so that they are more tolerant to frost. A gradual change in temperature has a lesser effect than a dramatic change in temperature. Plants are able to resist injury if the temperature changes are gradual or are only encountered for a short period of time.

Environmental conditions also play a role in crop tolerance to spring frost. Dry soil conditions and high wind with high evaporation potential aggravate frost injury. Moist soils or heavy dews can reduce the injury.

Plants that have been hardened can survive lower temperatures than plants that have not been hardened. Cool conditions for a few days prior to a frost will help harden the crop. Plants can lose their hardened condition and improved tolerance to frost after exposure to warm temperatures and good growing conditions. Plants that are growing rapidly are damaged more by frost in comparison to those that are growing slowly. Other stresses that cause the plants to grow slowly can help harden the plants and protect them from frost damage.

Cereals: The growing point of cereals is below ground until approximately the five-leaf or jointing stage. This protects the plant from severe frost injury in the spring. The plants may lose above ground leaf matter but will regrow from below ground. Partial injury can be seen when the tips of leaves or leaf edges become damaged, yellow and then turn brown and become brittle. Severe injury to cereals where all above ground matter is damaged can result in a delay in maturity due to the plant having to regrow. Cereals have good frost tolerance and will tolerate frosts down to -4 C and if hardened can withstand -6 C.

Flax: Flax is quite sensitive to frost when it is coming out of the ground. Temperatures that reach -2 C can injure flax up to the two-leaf stage. As flax grows it becomes more tolerant to frost. After the two-leaf stage, flax can withstand temperatures down to -7 C and even slightly lower if the plants have been hardened.

Frost canker can be a problem with flax during early stages of growth and can reduce stands by as much as 50 per cent. Damage is most severe in thin stands on light soils and in low spots. Symptoms of frost canker are similar to heat canker. There will be plants or areas in the field where the plants have toppled over. At or near the soil surface, the plants will be girdled and have constricted stems.

Canola: Newly emerged canola at the cotyledon stage can be very susceptible to spring frosts. The growing point is above ground between the cotyledons. Plants at the three- to four-leaf stage are much more tolerant and can withstand a couple more degrees of frost. Typically, canola can tolerate temperatures down to -4 C. Hardened plants can tolerate temperatures down to -7 C and possibly colder. Research by Agriculture and Agri-Food Canada (AAFC) at Beaverlodge showed that canola can tolerate temperatures of -8 to -2 C if fall seeded or early seeded.

A light frost that burns the leaves may not injure the growing point. If there is regrowth or green material at the growing point then the plants could recover (Figure 1). It will take a few days to really assess the damage and green growth should be visible after four to ten days. Within the field, there can be damaged and undamaged plants close together (Figure 2). To determine the viability of the damaged seedlings the growing point needs to be green and viable and the stem healthy. Severely damaged plants will pinch off at the top of the stem and the whole seedling will brown off (Figure 3).

Peas/lentils: Peas and lentils have good frost tolerance. They have growing points (bracts) which remain below ground during early development. The above ground material may be severely injured by frost but new growth will resume from the bracts and will appear approximately seven to 10 days after the frost. Figure 4 shows frost injury to peas.

Spraying after frost: As herbicides work best when crops and weeds are actively growing, spraying immediately after a frost should be avoided. Wait at least 24 hours or preferably 48 hours after heavy frost to allow the weeds and crop to recover and resume growth. The crop needs to be actively growing to prevent injury from the herbicide and the weeds need to be growing so the herbicide can work.

Spraying during the warmest part of the day when the plants are actively growing is also a good idea. For glyphosate applications, the air temperature should be greater than 8 C for at least two to four hours.

Weed tolerance to frost will also determine how soon herbicides can be applied. The more tolerant the weeds are to frost, the sooner they can be sprayed. Winter annuals and dandelions have good frost tolerance. Other perennials such as quackgrass and foxtail barley are less tolerant while Canada thistle and perennial sow thistle are the most sensitive perennial weeds.

SUMMARY

Frost is very hard to predict in terms of damage potential in the crop as there are so many factors that affect the tolerance. Evaluating the damage is difficult and should be done approximately 24 to 48 hours after the frost for initial symptoms and up to a week to ten days for full extent of damage. Heavily damaged crops will quickly show signs of frost injury including discoloration, darkening, and water-soaked appearance of fleshy tissue.

Crop Protection Laboratory News

By; Cecilia Peluola, PAg, Supervisor, Crop Protection Laboratory

Pink Rot found in potatoes

The past fall and winter were busy seasons at the Crop Protection Laboratory. Survey samples for Fusarium head blight on barley and wheat kept us busy all throughout the fall. Adding to our excitement was the commencement of clubroot soil testing using Polymerase Chain Reaction (PCR), a recent upgrade to the Crop Protection Laboratory testing capacities. For more information on the clubroot survey, see the article in this edition of Crop Production News.

Since January 2014, the laboratory was busy with testing for herbicide resistance in weeds. Because of a record number of samples submitted, testing of weed samples for resistance to herbicides continued into May this year.

Most of the lab submissions this time of year are greenhouse vegetables or issues with storage. We have seen a tomato sample with leaf spot disease caused by *Septoria lycopercisi.* Pink rot and pythium leak diseases caused by *Phytophtora* sp. and *Pythium* sp. were diagnosed on potato samples. *Phytophtora* sp. of pink rot of potato is different from *Phytophtora* sp. that causes late blight of potato. Pink rot and pythium leak of potato attack mature tubers at harvest and in storage when warm, wet soil conditions persist during tuber formation. Pink rot is recognized when infected tubers are cut open, the internal tissue easily turns salmon pink after a few minutes of exposure to air and later turn brownish black after about an hour. Affected tissues are spongy and exude liquid when squeezed.

Pythiumm leak found in potatoes

An evergreen sample submitted was diagnosed as having needlecast disease caused by *Lophodermium* sp. or *Lirula* sp. Other spruce samples were submitted due to environmental effect. For more information on needlecast, see the article on Shelterbelts in this issue of Crop Production News.

Recently submitted weed samples were identified as:

- Stink grass - *Eragostis cilianensis*
- False Ragweed- *Iva xanthifolia*
- Absinth- *Artemisia absinthium*

Each of these samples was comprised of remnants of plants that had grown the previous season.

DriftWatch

DriftWatch is now available for Saskatchewan. DriftWatch software allows commercial beekeepers, organic growers, orchards, or vegetable growers to log the location of their extra-sensitive crops on a map of the province. The Ministry, with financial assistance from industry launched programs in May. This makes Saskatchewan the first province in Canada to provide this program to producers and applicators. While just getting started, there are already over 150 sites recorded on the map. Check it out at http://fieldwatch.com/

Evaluating Inoculation of Pulse Crops Maximizes Yield

By; Dale Risula, PAg, Provincial Specialist, Special Crops Crops and Irrigation Branch

nodules on Faba Bean

Having healthy looking pulse plants doesn't necessarily mean you have healthy nodulation and nitrogen fixation. Variations in soil attributes and soil nitrogen can lead to vigorous growth hiding problems that might be associated with nodulation.

You must assess plants' growth characteristics and properly assess nodulation to know the potential to fix nitrogen effectively. This involves examination of the plants' root systems.

Nodules should be assessed at early flowering. Generally, nodules begin to form about two weeks after the crop emerges, but may take longer under adverse conditions. By mid-flowering, the maximum number of nodules is usually developed and nitrogen fixation peaks. When flowering is complete the efficiency of the nodules is reduced and nitrogen fixation diminishes.

Begin walking through your field in an X pattern sampling plants from various areas exhibiting different growing conditions, i.e. high spots, low spots, etc. Examine five to 10 plants from two to three of these characteristic areas. Sampling from field edges is not recommended.

As you sample each site, do not pull the plants from the soil or nodules may be stripped from the roots. Use a small trowel or spade to gently dig up the plant with its root system intact. Obtain at least two plants from each representative site. Increase the overall number of plants sampled if there is much variability of plants in the sample area. Carry a bucket of warm water along with you to help wash the soil from the roots so you can assess the nodules easily.

The most visible effect that poor nodulation might cause is poor plant development and stature. Look for yellowing leaves at the base of the plant prior to flowering, and assess plant size and vigour. You can assign a score to the plant based on the following criteria:

1. <u>Plant Condition</u>

- Plants green and vigorous 5
- Plants green and relatively small 3
- Plants slightly chlorotic (less green) 2
- Plants very chlorotic 1

Next count the number of clusters of nodules on each plant and carefully slice open the nodules. A vibrant pink colour indicates the nodules are alive and fixing nitrogen. Other colours, white, green or brown indicate the nodules are not functioning.

2. <u>Nodule Colour and Number</u>

- Greater than five clusters of pink pigmented nodules 5
- Three to five clusters of predominantly pink nodules 3
- Less than three clusters of nodules, or whitish/greenish nodules 1
- No nodules, or white/green nodules 0

Finally, inspect the crown region, where liquid or peat inoculated seeds usually form nodules. Alternatively, lateral nodulation is more common when seeds were inoculated using granular inoculants or where native rhizobia species exist in the soil. Peas have a slightly differently shaped crown region compared to other crops. It appears as an eight cm diameter cylindrical formation extending approximately eight to 10 cm deep.

3. <u>Examine Nodule Position</u>

- Crown and lateral nodulation 3
- Generally crown nodulation 2
- Generally lateral nodulation 1

Tally the numbers to determine your crop's nitrogen fixing potential.

<u>Evaluation</u>

Total Score	Nodulation Assessment:	
11 to 13	Effective Nodulation Nitrogen Fixing Potential: Good.	

	No further Steps required	
7 to 10	Less effective nodulation. Nitrogen Fixing Potential: Reduced. Check inoculation method for errors; could also be a result of less than optimal growing conditions.	
1 to 6	Unsatisfactory Nitrogen Fixing Potential: Poor. Re-evaluate inoculants used, inoculation method and growing conditions.	

Links:

Have You Met Your Regional Crop Specialist?

The Saskatchewan Ministry of Agriculture's Regional Crops Specialists are located in 10 offices across the province. For further convenience these staff members are also available by appointment in seven additional satellite offices.

Our mandate is to ensure farmers, ranchers, producer groups and industry have access to production and business information and services. Extension activities are part of the service and include training events, meetings and field calls. We encourage anyone in the agriculture industry to call us with your questions. We are dedicated to getting you the information you need to make your farm successful.

Kindersley

John Ippolito, PAg

Ph: 306-463-5442

john.ippolito@gov.sk.ca

John has a Bachelor of Science in Agriculture from the University of Saskatchewan. He has worked in agriculture extension with a focus on crop production and farm management since 1987. His main areas of focus have been specialty crop production with an emphasis on lentils and canary seed. John also works on assisting producers in adoption of precision agriculture practices.

Swift Current / Shaunavon Satellite Office

Shannon Chant, PAg

Ph: 306-778-8291

shannon.chant@gov.sk.ca

Shannon grew up on a grain farm southwest of Regina and has a master of science and bachelor of science in agriculture in plant sciences from the University of Saskatchewan. Since joining Saskatchewan Agriculture, she has worked in various regions in western Saskatchewan. Shannon is especially interested in new crops, value-adding and providing producers with results from local research.

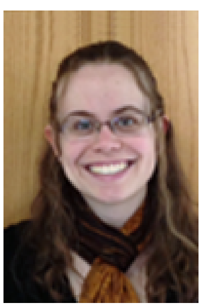
Moose Jaw / Assiniboia Satellite Office

Shannon Friesen, PAg

Ph: 306-694-3592

shannon.friesen@gov.sk.ca

Shannon has a bachelor of science in agriculture from the University of Saskatchewan with a major in agricultural biology. She worked in west-central Saskatchewan for several years as a retail agrologist prior to joining the Ministry of Agriculture in 2011. Since then, Shannon has worked out of the Weyburn and Moose Jaw regional offices providing technical information on all aspects of crop management and production to local producers and industry. In addition, she works on the Crop Report and other technological initiatives.



Danielle Stephens, PAg

Ph: 306-694-3587

danielle.stephens@gov.sk.ca

Danielle has a bachelor of science in agriculture majoring in plant science and a master of science in pollination biology from the University of Saskatchewan. She comes from a grain farm near Balcarres and currently lives in Regina. Danielle worked with the Agriculture Knowledge Centre, first as an agrologist intern, and now as a Regional Crops Specialist in a term position.

North Battleford / Meadow Lake and Lloydminster Satellite Offices

Sherrilyn Phelps, PAg, CCA

Ph: 306-446-7475

sherrilyn.phelps@gov.sk.ca

Sherrilyn has a master of science and a bachelor of science in agriculture from the University of Saskatchewan. Sherrilyn brings education and experience in agronomy, research and business development to Saskatchewan Agriculture. She continues her involvement with field research through association with the Western Applied Research Corporation, and Agriculture and Agri-Food Canada. As a regional crops specialist, Sherrilyn works in applied research, helping producers and the agriculture industry adapt to changing practices and opportunities in crop production and utilization.

Outlook

Diana Dunlop, AAg

Ph: 306-867-5506

diana.dunlop@gov.sk.ca

Diana Dunlop is a recent graduate from the University of Manitoba with a bachelor of science in agriculture, majoring in animal systems and a minor in entomology. She has worked the last two summers as an Entomology Research Technician at the University of Manitoba as well as a summer with a private industry on crop research trails. Diana has a special interest in entomology, both crops and livestock pests. She also has hands-on experience in agriculture as her family grain farms near the village of Dunrea, MB. She is looking forward to working with producers, colleagues and the industry to discuss agricultural issues in crop production and assist with locally applied research.

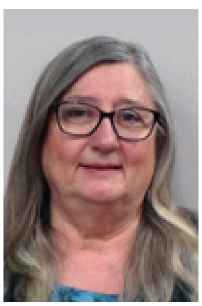
Tisdale

Kim Stonehouse, PAg

Ph: 306-878-8807

kim.stonehouse@gov.sk.ca

Kim holds a bachelor of science in agriculture, a master of science in agricultural and bioresource engineering and a master of science in environmental engineering. Before joining the Saskatchewan Ministry of Agriculture, he conducted agricultural research for the East Central Research Foundation in Canora. Kim works with producers to solve crop production problems, identify applied research opportunities and assist producers in adopting new crop production technology to make their farms and businesses more profitable.



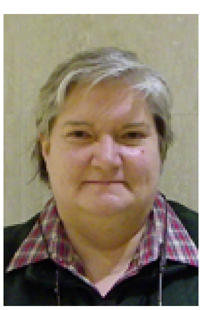
Prince Albert

Joanne Kowalski, PAg

Ph: 306-953-2362

joanne.kowalski@gov.sk.ca

Joanne graduated from the University of Saskatchewan, College of Agriculture with a bachelor of science in agriculture and a master of crop science and agriculture extension, focusing on the adoption of conservation practices in Saskatchewan. She has worked in various roles as Research Associate at the University of Saskatchewan, as an Agrologist and Communications Manager for the Saskatchewan Forest Centre, and as Development Consultant for a private consulting company. Her strong farm background and connection to the farming community enhances her work for the Ministry as she assists producers with production inquiries and knowledge transfer activities.



Weyburn / Estevan Satellite Office

Sherry Roberts, AAg

Ph: 306-848-2856

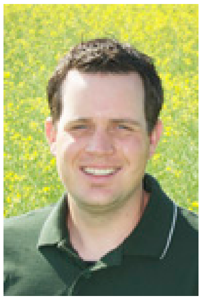
sherry.roberts@gov.sk.ca

Sherri graduated from the University of Minnesota with a bachelor of science in agricultural education with a minor in agricultural engineering. Growing up on a diversified livestock farm in east-central Minnesota instilled a love of agriculture in her. She has extensive work experience in the horticultural industry as well as governmental weed control and inspection and in teaching agriculture both at the high school and post-secondary levels. Sherri has a special interest in designing online learning strategies for producers and agricultural specialists alike.

Yorkton / Moosomin Satellite Office

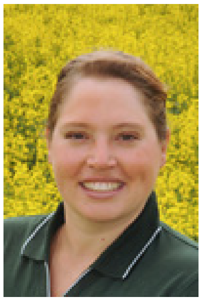
Lyndon Hicks, PAg

Ph: 306-786-1508



lyndon.hicks@gov.sk.ca

Lyndon has a bachelor of science in agriculture from the University of Saskatchewan with a major in plant science. Lyndon began working with the Ministry of Agriculture in 2009 and has since worked out of the Tisdale and Yorkton regional offices. Lyndon provides technical information on all aspects of crop production and management. Lyndon is originally from a mixed farm near Mortlach, Saskatchewan, and currently resides in Yorkton.



Watrous / Wadena Satellite Office

Erin Campbell, PAg

Ph: 306-946-3216

erin.campbell@gov.sk.ca

Erin has a bachelor of science in agriculture from the University of Saskatchewan with a major in crop science. She has worked in crops-related positions for private industry, as well as for the University of Alberta where she completed her master's degree. As a Regional Crops Specialist, Erin works with producers and industry on weed identification, weed control strategies, crop production and crop pests.

Increase the Rate of Starter Phosphate a Bit

By; Ken Panchuk, PAg, Provincial Specialist Soils, Crops and Irrigation Branch

Help crop growth catch up and take advantage of the long growing days of June by increasing the rate of phosphate a bit while staying within the guidelines for safe rates of phosphate applied with the seed. The following link provides the guidelines for safe rates of fertilizer applied with the seed: http://www.agriculture.gov.sk.ca/Default.aspx?DN=e42316e3-15ea-4249-ac0e-369212b23131

Phosphorus is a vital nutrient for every cell in plants and its primary function is in converting the sun's energy as part of photosynthesis. That's why starter phosphate is so important in early healthy root growth and seedling vigor, helping the plants cope with cool soils. However, the starter phosphate needs to be banded with or very near the seed to be accessed by the first seedling roots to optimize this ‘starter effect' or ‘pop-up effect".

A soil test indicates the amount of available soil phosphorus and recommends the level of phosphate fertilizer needed to optimize crop growth and yield. Any additional phosphate, over the safe rate applied with the seed, needs to be banded away from the seed row to minimize injury to the seedlings. The banded nutrients will be accessed as soon as the soil warms and the plant roots proliferate, exploring the soil within the early weeks of growth when phosphorus is needed most.

Sluggish plants in June can translate into delayed maturity.

Phosphate is an important component of the 4R nutrient stewardship system for profitable and sustainable crop production. The 4Rs are the Right source applied at the Right rate at the Right time and with the Right placement. Phosphorus sources used are monoammonium phosphate (such as:12-51-0); liquids (10-34-0 or dilute starter fertilizers containing phosphate) and JumpStart (a phosphorus solubilizing inoculant that helps plant roots access soil phosphorus early).

Insects to Watch for and Monitoring Programs in 2014

By; Scott Hartley, PAg, Provincial Specialist, Insect and Vertebrate Pests, Crops and Irrigation Branch and Brent Flaten, PAg, Agriculture Knowledge Centre

Insect surveys and monitoring programs provide an estimate of insect pest risk for producers leading into the 2014 growing season. Estimating risk to an individual crop requires regular field scouting during the growing season. Ultimately, climatic conditions will have the most significant impact on insect populations.

Below normal temperatures in April and May were not highly conducive for insect activity or development. The cabbage seedpod weevil and wheat midge are two of the insect pests to be on the lookout for in 2014, but others could present problems.

Diamondback moths are a species that do not commonly over-winter on the Canadian Prairies. Most often, economic infestations come in on winds from the southern United States and Mexico. Data from Environment Canada on wind currents is assessed by Agriculture and Agri-Food Canada for potential sources of diamondback moth infestations. The majority of the winds coming across the prairies in the spring of 2014 have originated in the Pacific Northwest area. Recently, there have been some wind trajectories favourable for carrying moths from areas with brassica crops in Texas and Northern Mexico north into Saskatchewan. The wind currents are not necessarily carrying moths. A sentinel system of pheromone traps (33) provide information on diamondback moths arriving in the province. Moth counts from traps have been low, with only a few sites reporting single moths - Hazlet, Regina, Rosetown. The highest is nine moths captured in a trap near Marquis (south central), still relatively low but indicates there are diamondback moths in southern Saskatchewan.

Alfalfa producers have been dealing with high levels of the **alfalfa weevil** for several years. Surveys in 2011 and 2012 showed this pest is established in most regions of the province. Early reports suggest a reduction in levels of damage this spring in fields near Swift Current and south of Moose Jaw.

The 2013 survey for **pea leaf weevil** damage to peas (see map fig. 1) shows that this insect is expanding its range out of the southwest, east toward Moose Jaw. For the first time weevil feeding was noted in pea fields north of the South Saskatchewan River. Sources from Alberta observed pea leaf weevil feeding on winter peas in mid-May. Seed treatments containing an insecticide registered for the weevil, higher nitrogen levels in the soil and increased crop vigour will reduce the level of damage from the pea leaf weevil.

Although **flea beetles** have not been at significant levels in most of Saskatchewan in recent years, there have been areas with higher infestations. In some cases foliar insecticide applications were required. Keep in mind that seed treatments are efficacious for a limited period. Slow germination and growing conditions can result in reduced control while the seedlings remain more vulnerable to flea beetle damage. Research has indicated that the majority of seed treatments work best under warm dry conditions. There were reports of increased flea beetle populations in some areas last fall. High numbers of flea beetles noticed at fall during harvest area good indication of population levels and associated risk. It is these adult beetles that over-winter and cause damage to canola seedlings in the spring. However, this is more relevant to crucifer (black) flea beetles. In many areas, there has been a species shift with striped flea beetles becoming more dominant than the crucifer flea beetles. The striped species tend to start feeding earlier in the spring and enter over-wintering sites earlier in the fall.

Cutworm populations have been on the decline in most areas for the last three years. However, it is still important to monitor crops for cutworms. Timing of cutworm infestations will depend on the species present. Dingy cutworms are one species that overwinter in a larval stage.As a result, they are active as soon as temperatures increase sufficiently. Red-backed and pale western cutworms over-winter as eggs and tend to be more damaging later in the growing season. They are smaller than cutworms that over-wintered as larvae. Symptoms of cutworm feeding may be cutting of the seedlings at or below the soil surface, or above ground defoliation, depending on the species.

Cutworm research projects funded by the Canola Agronomic Research Program (CARP) will continue in 2014.

Collecting cutworms for the cutworm survey and associated research projects.

Your help is needed to source and collect cutworms.

- Larvae should be handled as little as possible and always gently.
- Include as many specimens as possible.
- Place larva plus feeding material into a **clean** container (e.g. sour cream container). Alternatively, small paper bags can be used for collecting and shipping cutworms **IF** the paper bag is protected from compaction (i.e. shipped in bubble wrap).
- Larvae require feeding material both for humidity and food, so some leaves should be added to the container. Secure the container with tape to prevent it from opening during shipment. Use a box for shipping. Paper bags will work well for those who drop off samples.
- Do not include soil with the cutworm specimen as it damages the cutworm.

Every larva must have collection data, include the following: (1) collection date, (2) collector's name, (3) collector's email or phone number, (4) nearest town, (5) GPS or legal land description of field, (6) name of host crop/plant the worm was near or feeding on, and (8) previous year's crop.

Shipping cutworms.

In Saskatchewan, drop off samples at the nearest Saskatchewan Agriculture Regional Office or at the Crop Protection Laboratory in Regina, or use priority post to ship them to the Crop Protection Lab. No collect shipments please. If priority post is used, the submitter of the sample is responsible for the mailing fees. If unsure of how to submit, contact Scott Hartley, Insect and Vertebrate Pest Management Specialist at 306-787-4669

Grasshoppers have started to hatch. Young (first instar) grasshoppers were observed in southwest Saskatchewan the last week of May north of Maple Creek. The fall **grasshopper** survey suggests low risk for most of Saskatchewan. However, there are some hot spots noted, and even lower populations put lentil flowers and developing pods at risk. Although grasshoppers had a slow start in 2013 climatic conditions were very favourable for grasshopper development in the summer and the extended fall allowed for a longer period for egg-laying. Agriculture and Agri-Food Canada conducts an annual grasshopper egg survey. They reported that eggs were relatively easy to find compared to most years, suggesting the potential for more problems from grasshoppers in 2014.

It was a record year for the **cabbage seedpod weevil** in Saskatchewan in 2013. This beetle is expected to be a key pest of canola in southern regions in 2014. In last year's survey, there were high populations of the weevil in the Southwest and South Central Regions. Significant populations were noted further east than in previous surveys, nearing the Manitoba border. The range of the weevil now extends north to Kindersley and Outlook.

Pheromone traps for **bertha armyworm** adult moths are being distributed and data collection will commence in June. Moth numbers from about 200 traps will be compiled and mapped on a weekly basis. Mapped results from the trapping program will be posted on the Ministry of Agriculture website. It is anticipated that the current outbreak period is largely over and bertha armyworm numbers will decline resulting in lower risk from this pest for most areas.

The **wheat midge** forecast indicates the most severe risk for this pest is in the eastern regions of Saskatchewan. Higher moisture favours the wheat midge, as noted in the southwest where there was a resurgence of this pest in 2013. Midge tolerant wheat varieties are available as an additional tool to manage this pest. Refer to http://www.midgetolerantwheat.ca/farmers/seed-varieties.aspx for midge tolerant wheat varieties available in 2014.

There are many species of **wireworms** and the methods of management include insecticide, but effectiveness may vary depending on the dominant species in your area. Dr. Bob Vernon, with Agriculture and Agri-Food Canada in Agassiz, B.C., is continuing to collect wireworms from various areas to identify which species are dominant and where. If you see wireworms, you can participate in this survey by collecting several of them in a sealed plastic container with some moist soil (not too wet). You can drop them off at a Regional Saskatchewan Ministry of Agriculture Office, mail them to the Crop Protection Lab at 346 McDonald Street, Regina, SK S4N 6P6, or mail them directly to Dr. Bob Vernon, Agriculture and Agri-Food Canada, 6947 #7 Hwy, P.O. Box 1000, Agassiz, B.C. V0M 1A0.

Shelter Belts Do Their Job if You Do Yours

By; Sherri Roberts, PAg, Regional Crops Specialist, Weyburn Regional Office, Regional Services Branch

Winter is over. I did my job. I saved you money by reducing your heating bills by cutting the wind, made your life safer by reducing snow drifting, increased the moisture for crop growth by snow trapping and reducing evaporation and made your place look beautiful. So, how about a little consideration?

I realize you figure you did me a favor by tilling up the soil around me BUT I hope you realize my feeder roots - where I get all my moisture and nutrients from - are in the top three to five inches of soil. So you actually did me more harm than good. It would be better if you would allow some turf grass to grow up and mow it or to conserve moisture - mulch me!

Like you, I occasionally get sick. Needlecast is a fungal disease that can be treated with a fungicide. I could also use a little fertilizer. I shouldn't be this light green colour. A product that's designed for acid loving plants would make the evergreens very happy and the rest of us would benefit from some 10-10-10. If you're not sure what else may be ailing me, take a sample into a Regional Crop Specialist - they can help you.

One last thing, can you replace these deadbeats? There not pulling their weight anymore and they're just making the rest of us more susceptible to diseases and insects. Replacements can be bought: HELP International Shelterbelt Centre.

The shelterbelt centre in Indian Head, Sask., is getting back into the tree business. A non-profit group called Help International has received a licence to operate the centre's tree farm and will start selling trees to Prairie farmers through its website immediately.

Landowners can buy tree seedlings for $1.50 each for orders of 300 or more,

Trees may be ordered online at http://help-shelterbelts.weebly.com/ or over the phone at 306-842-2433

or 306-861-0814

What is New and Who is New at the Crop Protection Laboratory

By; Cecilia Peluola, PAg, Supervisor, Crop Protection Laboratory

Updated Crop Protection Laboratory submission forms went online at http://www.agriculture.gov.sk.ca/Crop_Protection_Lab on April 17, 2014. The updated diagnostic forms included changes to sample submission timing, invoicing and result delivery. These changes apply to all of our core services such as herbicide resistance testing, plant disease/disorder diagnosis and plant and insect identification forms.

Most notable are changes to our herbicide resistance diagnostic form. The deadline to submit herbicide resistance samples changed from April 1 to March 1. This means that herbicide resistance weed samples submitted between now and March 1, 2015, will be tested in 2015. Samples received after March 1, 2015, will be not tested until 2016. The laboratory will continue to receive samples throughout the year but when they are tested will be based on the time of submission. Testing is done on a first come, first served basis.

Previously, results and invoice for payment were sent separately. Now, the invoice for payment will be sent at the same time as the results, to the person who is indicated on the form. If anyone who is not being invoiced for the submission wishes to receive a copy of the result (such as a specialist or agronomist who is submitting a sample on behalf of a grower, but is not paying for the testing, or vice versa), a request should be indicated on the form or by contacting the lab. Electronic result delivery is also available if requested on the sample submission form.

Also new this year to herbicide resistance testing is the addition of ‘Clethodim' which may control some wild oat populations that are resistant to other ‘dim' herbicides such as sethoxydim.

The success of our services at the laboratory is partly dependent on a good and representative sample accompanied by properly filled forms. Completed forms and an adequate sample should be mailed to or dropped at:

346 McDonald Street
Regina SK S4N 6P6

Forms can also be sent to the laboratory electronically by email: croplab@gov.sk.ca or by fax: 306-787-8803

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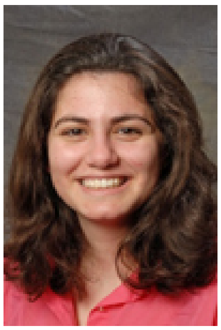
For detailed information, please call us at 306-787-8130

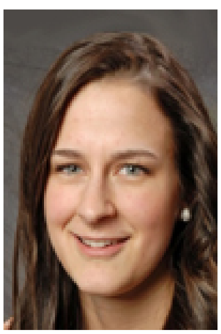
or check our website at http://www.agriculture.gov.sk.ca/Crop_Protection_Lab

Who is new?

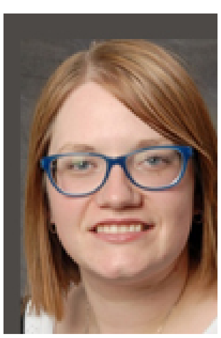
Joining Cecilia Peluola and the Plant Health Technicians, Jacquir Shiplack and Sharla Lozinsky are four new staff at the lab.



Sandy Kassir is a **Crop Protection Lab Technician** at the Crop Protection Lab in Regina. Sandy is a Co-op student from the University of Regina. She is currently in the second year of a master of science program in biochemistry at the University of Regina.

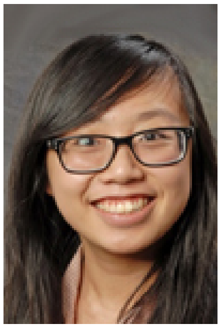


Kimberley Higgins is the **Dutch Elm Disease Laboratory Technician** at the Crop Protection Lab in Regina. She has completed the third year of her science degree, majoring in biochemistry.



Sarah Zwaal is a **SIAST Practicum student** at the Crop Protection Lab in Regina. She was born and raised in Regina. She is currently finishing her second year in the BioScience Technology program at

SIAST Kelsey campus.



Alicia Mah is the **Crop Protection Lab Administrative Technician** at the Crop Protection Lab in Regina. She is currently a student at the University of Regina within the Faculty of Science. She is planning to transfer to the University of Saskatchewan in the fall to study microbiology and immunology.

Yet Another Wet Spring: What is the Effect of Last Year's Wet Soils?

By; Joanne Kowalski, PAg, Regional Crops Specialist, Prince Albert Regional Office

Saturated soil near Prince Albert

In the spring of 2013, an article on managing wet soils seemed more than appropriate. For areas around Prince Albert, the spring of 2014 is much of the same. The Water Security Agency Spring Run-off Map shows which areas had above-normal run-off potential, as of April 1, 2014. Dr. Jeff Schoenau from the University of Saskatchewan has explored the effect of saturated soils on crop production. With that information in mind, what effect will saturated soils from last year have during the current growing season?

Too Wet To Seed, Saturated For Duration of Season

> Losses of any residual available N from the previous season are likely to be substantial and if the depression areas dry out, mineralization contribution over the growing season may be significant.

Too Wet to Seed, But Dried Out Later and Kept Weed Free

Lower losses of available N are expected compared to continuous saturation/flooding.

If weed growth is controlled early, there will be some accumulation from mineralization and a higher available soil nutrient content can be expected, unless flooded again.

Too Wet to Seed, Weed Invasion

Weeds will assimilate soil nutrients during their growth. If weeds are controlled when young, the nutrients in the weed biomass are likely to be recycled. If weeds are allowed to grow, the high C:N ratio will result in lower available soil nutrients at start of the next season.

Seeded and Fertilized, Flooded Out Later

If fertilizer N was applied at seeding and flooding took place shortly afterwards, losses of N by leaching and denitrification may have been limited because at the time of flooding the fertilizer N was in the ammonium form, which does not readily leach or denitrify. Flooding and lack of soil aeration will inhibit conversion of ammonium to nitrate. Expect losses of fertilizer P and K to be minimal. Some applied sulfate may have moved downward by leaching.

A Note on Sulfur

Sulfate-rich water can migrate to the soil surface via evaporation and capillary rise when water tables are high. The result is the accumulation of sulfate salts at the surface which will show up on soil tests.

Action To Be Taken

In general, a best management practice (BMP) useful for mitigating impacts that can occur on wet soils is the use of a cover crop. A cover crop can address several problems, such as the prevention of crusting and the development of salinity as soil dries and can prevent run-off and erosion especially when used in waterways. Usually left in the field to decompose and add back nutrients, cover crops can also break disease and other pest cycles.

When wet soils delay seeding, care should be taken to reduce field operations wherever possible, an example being to forego pre seeding applications of nitrogen. Top dressing with fertilizer will then be a consideration and has proven to be effective in getting nutrients to crops post seeding when there is a risk of volatilization. An example of a good top dressing fertilizer source that is resistant to volatilization is ammonium nitrate. Another option is to band strip a dry source of nitrogen.

Soil testing will be very important as unseeded fields with excess moisture are likely to have different soil nutrient availability. In this case, the response to fertilizer will be different than fields that were seeded and grew normally. *Sample separately* and adjust fertilizer rates. This can pay off with better fertilizer efficiency and improved return on dollars spent.