



Plant Disease Scouting 101

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CROPS

Why disease scouting is important:

Scouting for plant diseases is one of the most important practices you can adopt to help combat diseases on your farm. Scouting allows you to:

- Accurately identify disease symptoms early in the growing season so you have time to make a decision regarding foliar fungicide application before the disease becomes well-established in your crop and economic losses occur.
- Determine the effectiveness of your fungicide program. This will aid your decision about whether subsequent applications are needed, when they should be applied and what product to choose.
- Save time and money in the end.

The goal is to develop a regular and systematic approach to disease scouting. If you become accustomed to a regular weekly scouting routine, the process should become second nature, saving time and maintaining efficiency.

Scouting equipment kit (to take to the field):

Assemble a scouting kit that you can take to the field to assist in accurate diagnosis and proper sample collection:

- A magnifying glass is a useful tool when looking at disease symptoms and will aid in the differentiation of disease lesions from other types of damage.
- Factsheets, disease publications and crop disease pictures are excellent resources that assist in disease detection and identification.
- Electronics such as a digital camera or a GPS. Taking a photo of a symptom can be an advantage as it can serve as future reference if the problem occurs again, or it can be emailed to an agronomist for a second opinion. Furthermore, a GPS can help record the location of damage so you can find it again, or monitor it next season.
- A small digging trowel should be used when looking for root diseases or looking at symptoms close to the soil line. Plants should always be dug out and not pulled, to prevent the loss of root material, or insects located close to the root in the soil. If you want to examine the plants at another location, transport the roots/soil ball in a plastic pail.
- If you are entering a field you suspect or know is infected with disease, carry a spray bottle of sterilizer (e.g. diluted Lysol solution) for cleaning boots or equipment between fields, or use disposable plastic boot covers. This precaution is more important for field scouts and agronomists, as it will help prevent transmission from diseased fields to healthy fields.

- Paper or plastic bags and other containers for collecting samples. If you encounter a disease symptom or other plant injury symptom that you cannot identify, collect a sample to take to an agronomist at your local agri-retailer or to a diagnostic laboratory (Crop Protection Laboratory, Regina - see address below). A cooler with an ice pack is useful to keep the sample from wilting during long distance transport.

How to collect a plant sample (for submitting to the lab):

1. Sampling

- Choose specimens showing various stages of disease symptoms such as light to severe symptoms. Include some healthy specimens for comparison.
- Submit whole plants including the roots to determine if a root pathogen is the cause.
- Record the parts of the plant that are affected, the distribution of the symptoms within the field and the cropping history of that field.
- It is important to include information on chemical use both in the present cropping season and for the previous four years, fertilizer timing and rates and any extreme weather events noted.

The Crop Protection Laboratory (CPL) diagnostic form should be filled out as completely as possible. This form can be accessed and printed off the Saskatchewan Agriculture website at: <http://www.agriculture.gov.sk.ca> under Crop Protection Laboratory Services. The form can also be completed and a copy sent by email to the CPL email address found on the form.

2. Packaging and handling

- Wrap specimens in dry paper towel or in a paper bag. Do not add moisture and do not use plastic bags. The exception to this rule is if a viral or bacterial disease is expected. In this case, keep the plant material as fresh as possible. Wrap the sample in slightly moistened paper towel and submit to the lab as quickly as possible.
- When including a root/soil ball, tie this portion off in a plastic bag leaving the above ground parts loosely packed in dry paper towel.
- Submit the sample in a rigid container like a cardboard box or Styrofoam cooler. Loosely pack newspapers or paper towel around the plant sample to prevent it from moving during shipping.
- Whole plants, including roots, should be submitted. Do not worry about sending what you think is too large a sample or too many plants! The more material the lab has to work with, the better.

The Crop Protection Laboratory is open Monday through Friday from 8 a.m. to 5 p.m. Telephone: (306) 787-8130. Samples can be dropped off or sent by courier during business hours to 346 McDonald Street, Regina SK, S4N 6P6.

The CPL fees range from \$20 for visual disease identification to \$40 for culturing of pathogens. The CPL also conducts weed and insect identification (\$10), as well as herbicide resistance testing in weed seeds (\$35-\$100).

When to start scouting:

Ideally, scouting should occur weekly from crop emergence to maturity. A good time to start looking for unusual crop growth is during the emergence stage while carrying out weed control operations. Keep a notebook handy and record areas you would like to return to later.

Scouting specific crops more intensively at particular times is also important because of different periods of vulnerability. By spending a little extra time and effort at these peak periods, you can greatly increase crop protection.

- **Seedling diseases** in all crops will be visible at the seedling stage, just after emergence.
- **Canola** is most susceptible to diseases such as sclerotinia stem rot just prior to or during the flowering stage.
- **Cereals** should be scouted throughout the growing season. However, during the period of flag leaf growth they are most susceptible to loss of yield from leaf diseases and should be scouted more frequently. Risk of fusarium head blight should be determined at the early heading stage.
- **Chickpea** is highly susceptible to ascochyta blight and scouting should begin at the seedling stage and continue until pods have well-formed seeds.
- **Lentils** should be scouted at the vegetative (eight to 10 node) stage until after flowering for both ascochyta and anthracnose.
- **Field pea** should be scouted during the early bloom stage until after flowering is complete.
- **Forage crops** should be scouted for leaf spots prior to head emergence (grasses) or the vegetative to early bloom stages (legumes). For alfalfa, risk of blossom blight should be determined at early bloom until after flowering is complete.

It is important to note that after periods of rain and high humidity, scouting should occur more frequently and with greater diligence.

How to scout:

For leaf diseases (such as ascochyta blight in pulse crops), use flags to mark specific areas for regular monitoring during the growing season. This allows you to return to a specific site to look for lesions developing on new plant growth and to determine the effectiveness of your fungicide program. If you are using flagged sites, remember to walk the rest of the field as well, or use a different path to get to the site so you do not miss new areas of infection.

If the field is less than 100 acres, check a minimum of five sites and if the field is greater than 100 acres, check a minimum of 10 sites.

Be most diligent scouting fields at greater risk to disease that include:

- Fields that were planted to infected or poor quality seed;
- Fields that have a short crop rotation or are adjacent to infested crop residue from the previous season; and
- Fields that were planted to a susceptible crop variety.

In addition, check for areas in the field that are potential hot spots for disease development:

- Areas of the crop that may be heavier seeded or have increased fertility (e.g. headlands);
- Areas where moisture may have accumulated (e.g. hollows or near fence lines); and
- Areas where plants received damage from wind-blasting, drought, herbicide injury, frost, hail or other stresses.

Symptoms may occur in patches, be limited to field edges or be scattered across the whole field. That is why it is important to determine the full extent of the problem by scouting the entire field. Walk in a W-shape pattern or a large circular pattern throughout the field, stopping to inspect five to 10 sites. Keep your eyes open for discoloured plants and/or small discoloured spots on the leaves. Stop at each site and look down within the crop canopy, remove some plants and closely inspect the leaves and roots.

Inspect both the top and bottom of leaves. Use a magnifying glass to help distinguish small spots and to look for tiny chew marks or shredding, which could indicate damage caused by insects. Remember to rub small spots with your thumb—if they come off easily, they likely are not disease.

Inspect the roots. Root rot usually results in stunted growth and the plants may be light green, yellow, or brown in colour. Plants with root rot will pull easily from the soil. Look for lesions on crown region or on roots. In cereals, common root rot is observed as streaks on the subcrown internode. In pulses, root rots are often accompanied by poor nodulation or death of nodules.

Disease Surveys – What do the numbers mean?

Disease Prevalence: number of crops with disease / total number of crops surveyed.

Disease Incidence: number of infected plants / number of total plants surveyed.

Disease Severity: severity of disease on the plants: may be rated as trace, slight/light, moderate, severe; may be rated using a scientifically derived rating scale specific for the disease or type of disease (eg. per cent of leaf tissue with symptoms).

Disease Distribution: where the symptoms are showing up in the field or an area – groups, slopes, knolls, low areas, scattered, most of field, margins, patchy, etc.

Accurately diagnosing the problem:

Other stress factors can cause discoloured splotches on leaves or plants that may be mistaken for disease. It is important to be able to differentiate between stresses and disease symptoms in order to prevent costly application of fungicide.

Every time a field is scouted, it is important to keep the big picture in mind and undergo a process of elimination for other causes. Be investigative and systematic in your approach to disease scouting, even if you or your client want an immediate answer. For example, it is important to consider prior weather events and to review the field records for details as to herbicides, fertilizers, dates, crop rotation, etc.

Also, keep in mind where the problem is occurring in the field and if there is a pattern to it. A uniform pattern, such as damage only along a field edge, within a seed row, or in an area as wide as a sprayer boom, could indicate agronomic problems. However, if the damage occurs in a random pattern or is spreading, it could be caused by a disease or insect pest.

Eliminate problems caused by determining:

1. Linear and/or repetitive symptoms:

Possible causes:

- Abiotic (not spreading)
- Related to sowing
- Old swath row
- Overlap / miss of a chemical application

2. Random symptoms only affecting individual plants:

Possible causes:

- Biotic (spreading)
- Infected seed / soil-borne pathogen
- Airborne spores
- Wind-blown insect vector
- Abiotic (herbicide residue, nutrient)

These initial infection sites, called foci, serve as inoculum sources to spread to surrounding plants, usually by rain-splash or root-to-root spread, and would result in patches of infection (i.e. ascochyta blight in pulse crops, anthracnose in lentil, cereal leaf spotting diseases).

3. Environmental stresses: This could include dry soils, waterlogged soils, high temperatures, frost, hail and strong winds causing sandblasting. Scout your fields within two days following an extreme environmental occurrence to determine its effects on the crop. Record weather events on a calendar for future reference.

4. Nutrient deficiencies or toxicities: Nutrient stresses are often exhibited as a yellow, red or purple discolouration of the plant tissue, and in extreme cases, as stunting or plant death. Some nutrients are mobile within the plant, so deficiencies will show up on older leaves, whereas others are not mobile and symptoms occur on new growth. It is important to become familiar with nutrient deficiency and toxicity symptoms so they are not mistaken for diseases.

5. Herbicide injury: One of the most common injuries results from the improper timing of application, as herbicides can cause severe crop damage if applied at the wrong growth stage. As well, some herbicides can have negative residual effects on future crops for one to five years. It is very important to check the product label and plan your rotations accordingly. Finally, herbicide injury can occur when herbicide drifts from the target crop to a neighbouring crop. A primary indicator of herbicide drift is injury symptoms near the field edge. Proper application techniques as specified on the product label must be followed in order to prevent herbicide injury.

6. Insect damage: Insect feeding on plants may be mistaken for disease. Insects can also serve as vectors of plant diseases. Carry a sweep net and insect identification guides with you to help distinguish insect damage from disease damage.

7. Physiological or genetic off-types: Physiological flecking can occur on some varieties of crops, such as winter wheat. Although the causes are not fully understood, physiological damage could be a result of environmental or nutrient issues. Occasionally, genetic off-types will occur within a plant population and show up as malformed growth, white/yellow striping on leaves, or different coloured flowers. These symptoms may be mistaken for diseases caused by viruses or phytoplasmas, but they are very infrequent within the field. The best way to remove off-types is by roguing.

For more information contact:

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