THE WIREWORM MANAGEMENT GUIDE
Introduction

Wireworm management starts here

Wireworms are among the most economically significant early-season stress factors for many western Canadian crops. They prefer to feed on cereals, but wireworms can also cause significant damage to lentils, potatoes, corn, soybeans, sugar beets, canola and sunflowers.

They are wily creatures that live for several years in the soil and seem utterly resistant to adverse conditions, making them difficult to detect and even more difficult to control.

Use this guide to help identify wireworm damage, better understand the factors that influence their behaviour and develop control strategies to protect your crops.
# Wireworm Management Guide

## What's in This Guide?

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Identification

Wireworms cause damage only in their larval stage, but it helps to know what the other stages look like so you can identify whether a field has an infestation or is at risk of developing one.

- **Larvae** are slender with hard, smooth, jointed bodies. They are usually reddish-brown, but can be yellow or white, with three pairs of legs behind the head and a notched tail segment.

- **Pupae.** When larvae are fully grown, they pupate below the soil surface. This usually happens in the middle of summer and lasts less than a month. Adults overwinter in the soil and emerge the following spring.
Identification

- **Adults.** Click beetles are hard-shelled and black-brown in colour. They make a distinctive clicking sound when they flip from their backs to their feet.

- Full-grown larvae range from 0.5 to 1.5 inches in length, while adult click beetles range from 0.25 to 0.5 inches long.

- There are about 30 different species of wireworm, however not all are economically significant.
## Life cycle

<table>
<thead>
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<th>Season</th>
<th>Life cycle stage</th>
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<tr>
<td>Winter</td>
<td>Adults overwinter in soil throughout a field.</td>
</tr>
<tr>
<td>Late April - Early May</td>
<td>Adults emerge in early spring.</td>
</tr>
<tr>
<td>Late May - Early June</td>
<td>Females lay between 200 and 400 eggs, ranging from the soil surface down to a depth of 15 cm.</td>
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<tr>
<td>Late May - Early September</td>
<td>Larvae hatch within three to seven weeks and spend the next three to five years feeding on roots and germinating seeds, moving up and down in the soil profile as conditions dictate.</td>
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<tr>
<td>Variable</td>
<td>When they’re ready, usually around July, larvae go through a short, one month pupation about 5-10 cm below the soil surface. Emerged adults overwinter in the soil.</td>
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Because of their long and somewhat variable life cycle, a field infested with wireworm is likely to contain populations at all growth stages, all at the same time.

See the life cycle chart below for more information.
Outbreak factors

A single generation of wireworm can live in the soil as larvae for up to five years. Factors that prompt or suppress their feeding activity include the following:

Weather

- When soil temperatures warm up in the spring and reach 10°C, wireworms move up into the top few inches of the soil surface, ready to feed.
- Hot, dry weather (around 25°C) sends wireworms deeper into the soil profile; they can burrow down as far as a metre.
- Cool, damp weather in the spring is ideal for wireworm feeding on susceptible crops.
Outbreak factors

Soil conditioning

- Fields with cereal crops in their rotation are highly susceptible to wireworm damage.
- Recently broken sod is prone to high wireworm populations.
- Silty, medium-textured, well-drained soils appear to be favourable to wireworm damage.
- Wireworms will survive a summerfallow rotation, even when a crop is not planted. They can survive on nothing but humus (decaying plant matter) for up to two years.
- Decomposing crop residue from the previous year creates CO$_2$ and attracts wireworms to the soil surface.
Outbreak factors

Food supply

• After a long winter, wireworms are ready to start feeding in the spring. As soon as crops are planted, germinating seeds start to release CO\textsubscript{2}, attracting wireworms to vulnerable seedlings. When feeding intensity is high, a significant reduction in stand establishment results three to four weeks after planting.

• Wireworms migrate vertically in the soil profile during the growing season. After harvest, as winter approaches, they move deeper into the soil.
What’s at stake?

- Patchy plant stands and yield loss.
- Wounds on seeds, roots and below-ground stems are openings for disease.
- Wireworm feeding can kill seedlings outright.
- In Alberta, wireworm damage in wheat crops ranges from one to 50 percent annually.\(^1\)

\(^1\) Alberta Agriculture and Forestry, Wireworm Factsheet
Affected areas

Wireworm survey results
Syngenta conducted surveys in 2010, 2016 and 2017 to detect the presence of click beetles and wireworms (the larval form of click beetles) across the Prairies.

The map below indicates where wireworms were found in 2010 (orange pins), and where click beetles were found in 2016* (blue pins) and 2017* (green pins). Pins indicate sampled areas where wireworms or click beetles were found; the absence of a pin does not necessarily indicate wireworms or click beetles were not present in the area.

*In some 2016 and 2017 locations, we also looked for wireworms. Visit Syngenta.ca/wirewormmap for detailed survey results.
Scouting

Because they are extremely elusive, it’s often difficult to accurately identify crop damage caused by wireworms – it can be mistaken for a seeder miss, a poor seed lot, dry growing conditions, cutworm damage or herbicide carryover. Careful examination is needed for accurate identification.

Telltale signs of wireworm feeding include:

- Hollowed out seeds and dead seedlings.
- Stems that are shredded, but not cut off. (That’s cutworms.)
Scouting

- Plants where the central leaves are dead, but outer leaves are still green.
- Row sections missing in otherwise healthy stands. (Wireworms tend to feed along crop rows.)
- Thin stands or no stand.

Wireworm-damaged plants will emerge and then die off, causing patchy and uneven emergence in the field.
Scouting

Confirm your suspicion

If you think you see wireworm damage to the crop, dig into the soil to find the insects. Do this early in the spring when warm soil temperatures and germinating seeds are keeping them close to the surface. You may need to dig deeper if conditions are dry.

Wireworm feeding damage occurs mainly underground and leaves wounds that are ideal for disease establishment.
Scouting
Assessing the problem

Because wireworm larvae tend to remain where they hatch, moving vertically through the soil profile rather than side to side, infestation levels can vary widely from field to field and even acre to acre. If digging confirms the presence of wireworms, bait balls can help you assess where they are in the field.

Bait balls are typically made from wheat flour or oatmeal and release CO₂ to attract wireworms looking for food. They should be used prior to planting so they do not compete with a germinating crop as a food source for hungry wireworms.

It’s important to remember that bait balls are a good measure of insect presence, but not density.
Scouting

To make one bait ball, mix 1 to 1½ cups of oatmeal or wheat flour with 2 tablespoons of honey and up to a half cup of water until the mixture sticks together enough to make a ball. You can put the ball directly into the ground, or tie it up in a mesh bag (ie. onion bag), old sock or cheesecloth for easier retrieval.

Bury the bait balls in 4- to 6-inch deep holes and mark them with flags. About 20 evenly spaced bait balls per acre will give you a reasonable assessment of the presence of wireworms. Check the baits 10 to 14 days after installation.

Bait balls aren’t infallible. If, for example, there are other food sources, such as volunteer crops from the previous year, wireworms may not come to the trap. However, they are the best means of determining the extent of a wireworm problem and are an excellent assessment tool.
Scouting

**Vernon pitfall traps** are another good in-season assessment tool. Developed by wireworm researcher Dr. Bob Vernon of Agriculture and Agri-Food Canada, pitfall traps are baited with pheromones and efficiently capture adult male click beetles during the mating period. The traps are inexpensive and easy to use for monitoring beetle populations as an indication of wireworm severity, or for mass trapping to reduce egg laying in heavily infested areas.

Contact your Syngenta representative for more information or to learn about any testing or scouting programs running in your area.

Using wheat in a bait trap as your source of CO$_2$ is another option. For a video demonstration of how to build an alternative bait trap, featuring Ted Labun, Syngenta Seedcare Technical Lead for Western Canada, please visit [Syngenta.ca/buildabaittrap](http://Syngenta.ca/buildabaittrap).
Management practices

Once in a field, wireworms cannot be eradicated. Strong stand establishment is key to mitigating damage.

1. **Soil conditions.** Planting into warm, moist soils will encourage rapid, strong crop emergence so seedlings can better recover from any wireworm feeding.

2. **Increase seeding rate.** If you know the field has high wireworm populations, consider increasing your seeding rate to compensate for seedling loss.

3. **Watch seeding depth.** Optimizing seeding depth by crop is very helpful in minimizing wireworm damage. Seeding too deep weakens young seedlings and delays emergence, making them vulnerable to wireworm damage and resulting in a poor plant stand and establishment.

4. **Treat your seed.** Use an insecticidal seed treatment in fields with known wireworm infestations.

Remember to include a test strip to use as a baseline for assessing how well your wireworm management strategies are working over the years.
Cruiser® is a trusted insecticide that is included in several Syngenta Seedcare formulations to help growers manage wireworms in cereals, pulses and soybeans.

**How does Cruiser work?**

- Systemic insecticidal active ingredient moves through seeds, roots and shoots as they grow
- Wireworm larvae must feed to ingest the active ingredient

Once ingested, wireworms will stop feeding, allowing the crop to get past its most vulnerable stages.
Get complete protection in a uniquely simple Seedcare™ solution for cereals.

For the results you want, get the protection you need. With four fungicides and one insecticide, plus the added benefits of Vigor Trigger® and Rooting Power™, Cruiser® Vibrance® Quattro seed treatment delivers excellent disease and insect control for enhanced crop establishment – all in a convenient pre-mix formulation. Take a stand against threats with Cruiser Vibrance Quattro.

Benefits

- Convenient, ready to apply pre-mix covering a broad range of seed- and soil-borne diseases
- Excellent control of *Fusarium* and *Rhizoctonia* wireworm protection
- Four fungicides, an insecticide, and the added benefits of Vigor Trigger® and Rooting Power®
- Liquid formulation allows for on-farm application with no build-up in treater
Application tips

- May be applied on-farm or by commercial treaters using closed transfer (including closed mixing, loading, calibrating and closed treatment equipment)

On-farm rate

- 325 mL of Cruiser Vibrance Quattro per 100 kg of seed (barley, oats, rye, triticale, spring wheat, winter wheat)
- When wireworm activity is high, Cruiser Vibrance Quattro can be tank-mixed with Cruiser 5FS seed treatment to achieve a total use rate of 30 g of thiamethoxam per 100 kg of seed.*

*Consult each product label for registered use rates and follow all label directions.
Give your soybeans the Seedcare™ they deserve!

Cruiser Maxx® Vibrance® Beans protects your soybeans against a broad range of insects and diseases and delivers best-in-class Rhizoctonia control. Plus, with the added power of Vigor Trigger® and Rooting Power™, you’ll see faster emergence, stronger stands and more consistent yields.

Benefits

• Powerful seed-applied insecticide for early season wireworm protection
• Systemic and contact fungicide activity
• Safe on seed and compatible with most Rhizobium-based inoculants*
• Consistent performance under a wide range of growing conditions

*Cruiser Maxx Vibrance Beans is available only in commercial seed treatment facilities and sold on pre-treated seed.
Watch your pulse crops grow faster and stronger.

Cruiser Maxx® Vibrance® Pulses seed treatment combines an effective insecticide with three fungicides to protect your pulse crops. Plus, Cruiser Maxx Vibrance Pulses delivers *Rhizoctonia* control as well as:

- The broad-spectrum seed- and soil-borne disease protection of Vibrance Maxx, plus the early-season insect protection of Cruiser® 5FS insecticide
- Contact and systemic activity that protects growing seedlings from both insects and diseases
- Improved yield potential due to better plant stands, root systems, uniformity and overall plant health from diseases
- Compatibility with Rhizobium-based inoculants and seed safety*

*Check with Rhizobium inoculant suppliers for details.
Application tips

• May be applied on-farm or by commercial treaters using closed transfer (including closed mixing, loading, calibrating and closed treatment equipment)

On-farm rate

• Cruiser 5FS seed treatment: 50mL/100 kg seed
• Apron Maxx® RTA®: 325mL/100 kg seed
• Vibrance 500FS: 10mL/100 kg seed
For more information, visit Syngenta.ca or contact our Customer Interaction Centre at 1-877-SYNGENTA (1-877-964-3682).

Always read and follow label directions. Cruiser Maxx Vibrance Beans is an on-seed application of Cruiser Maxx Beans Seed Treatment insecticide/fungicide and Vibrance 500FS Seed Treatment fungicide. Cruiser Maxx Vibrance Pulses is an on-seed application of (i) Cruiser 5FS Seed Treatment insecticide; (ii) Apron Maxx RTA Seed Treatment fungicide and (iii) Vibrance 500FS Seed Treatment fungicide. Apron Maxx®, Cruiser®, Cruiser Maxx®, Rooting Power™, RTA®, Seedcare™, Vibrance®, Vigor Trigger® and the Syngenta logo are trademarks of a Syngenta Group Company. © 2018 Syngenta.