

Can I Expect Wireworm Damage in My Potato Crop?

Wireworm Monitoring to Predict Damage a Year Before Planting

This simple and direct technique is like peeking inside the land to see if there are wireworms that will cause damage to the potato crop next year. Monitoring for wireworms uses a bait trap, and is done on land which is presently in a rotational crop (grass or forage hay, mustard, buckwheat, grain), has been cropped to one or a combination of these crops for at least two years (counting the current year), and will be planted to potatoes next year. *You want to know if you can expect wireworm damage to those potatoes.*

The technique is based on research that has found:

- wireworms are attracted to sources of carbon dioxide (CO₂) which comes from decaying organic matter, plant roots, potato seed tubers, and germinating seeds. This characteristic has been exploited to make bait traps (Figure 1) which attract wireworms. This knowledge has also been used to understand when wireworms will leave tilled crop residue and be attracted to bait traps.
- if a small portion of the rotational crop is tilled in the spring and kept fallow over the summer (Figure 2), wireworms will gradually leave the tilled crop residue as it decomposes, and be attracted to bait traps in the fall, once the crop residue in the soil is exhausted (Figure 3).
- a good correlation between bait trap catches in tilled areas and the wireworm damage to potato the following year.

Question: *What is a wireworm bait trap?*

Answer: *Any point source of CO₂ that can be easily inspected for wireworms or evidence of their presence.*

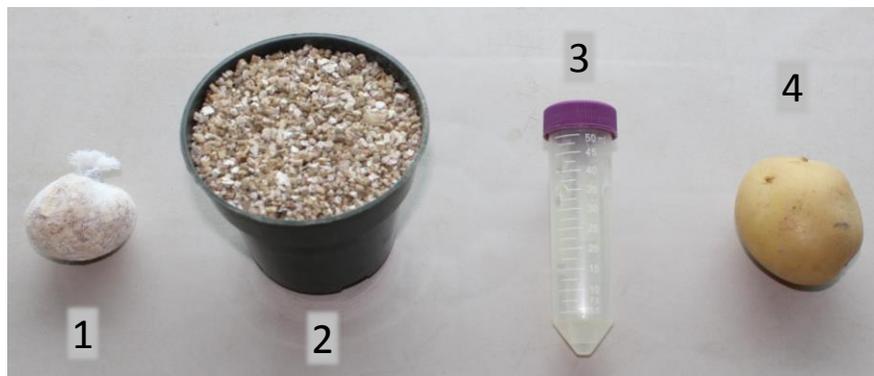


Figure 1. Bait traps make CO₂ to attract wireworms. 1–bait balls contain rolled oats or flour; 2–grain bait trap with vermiculite; 3–probe trap; 4–potato (used in monitoring technique described here). Except for the potato, bait trap material must be wetted to activate CO₂ production caused by microbial activity or seed germination.

Field preparation and maintenance – a single tilled strip across the field, kept fallow

To predict wireworms in a potato crop, the field must i) currently be a rotational crop such as grass/forage/green manure, or a seeded annual such as grain, mustard, or buckwheat; ii) have been in one of these crops the previous year, at least; and iii) be planted to potato next year. If presently or planned as a seeded annual, it must be grown to at least 10cm (4"). *In the spring or early summer* (sometime in May or early June), till (but don't plough) a strip down the *full length* of the middle of the field (Figure 2) in the direction of other routine tractor operations. With this orientation, it will be easier to carry out other summer

tractor operations without crossing the strip. Tillage must be aggressive to incorporate much of the rotational crop. *Throughout the remainder of the summer*, keep the strip free of vegetation by either chem-fallow (i.e. herbicide) or *light tillage* with a harrow or s-tine (rototiller). Make sure the light tillage equipment to be used in the summer is not wider than the tilled strip. If it is, then make the initial tilled strip the width of the light tillage equipment.

Research has shown that over time, wireworms will leave the tilled crop residue and become attracted to wireworm bait traps, with maximum (and more reliable/predictive) catches occurring in the fall (Figure 3).

Installation of wireworm bait traps

The bait trap described here is the simplest – *a potato tuber*, either whole (minimum 4oz.) or cut in half (minimum 8oz. cut in half to make two 4oz. halves). During a warmer stretch of weather in September, use a spade shovel to pry out a hole in the soil to about a 15cm (6”) depth and deposit the potato into the bottom of the hole. Cover the hole, firm the soil on top with your foot, and mark the surface above or alongside the potato to indicate its precise position (use a flag or coloured plastic marker). Begin 5m (16’) from the field edge and do this every 10m (33’) through the middle of the *full length* of the tilled, fallow strip (Figure 2). A minimum of 15 traps covering 150m (656’) must be used, but if your field is longer use the entire length. After two weeks, use a shovel to pry out the potato in a single motion to remove the potato and the soil surrounding it. Inspect both the tuber and the soil surrounding it for wireworms and their feeding holes in the tuber. *Record the number of wireworms found at each bait trap location and the number of wireworm holes in the potato.*

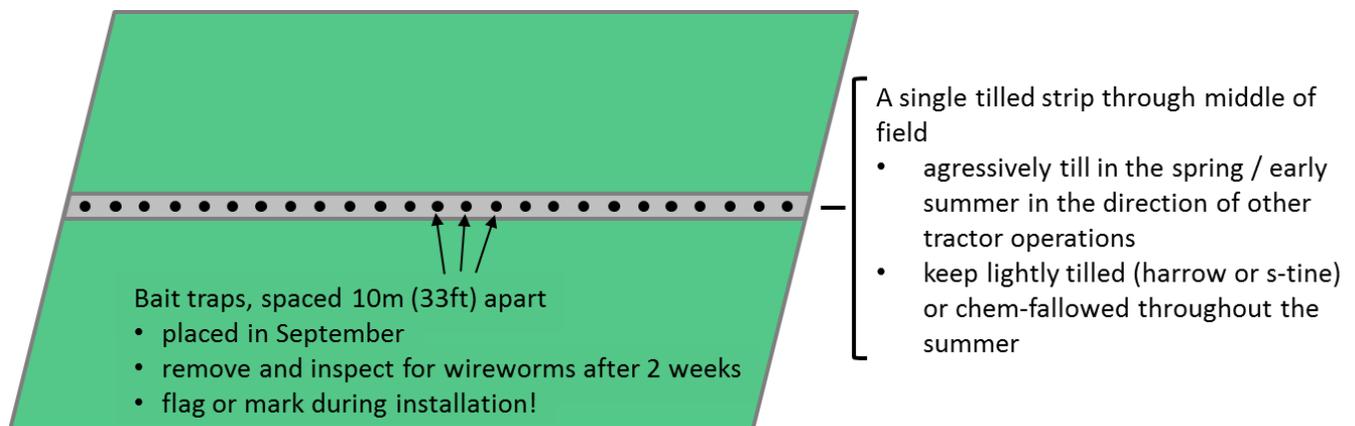


Figure 2. A rotational crop with a single tilled strip in the direction of tractor operations. Potato baits (black dots) are placed every 10m (33’) in September. In irregular fields, make sure the tilled strip goes through the wider section of the field, but remains parallel with the direction of the summer’s tractor operations.

The tilled strip simulates cultivating the land in preparation for planting; light tillage or chem-fallowing during the summer simulates weed control in the crop; the potato bait placed in September simulates new tubers of the harvested crop. Basically, this monitoring technique is like planting a potato crop on a very limited scale one year beforehand.

Q: What happens with wireworms after a rotational crop is tilled?

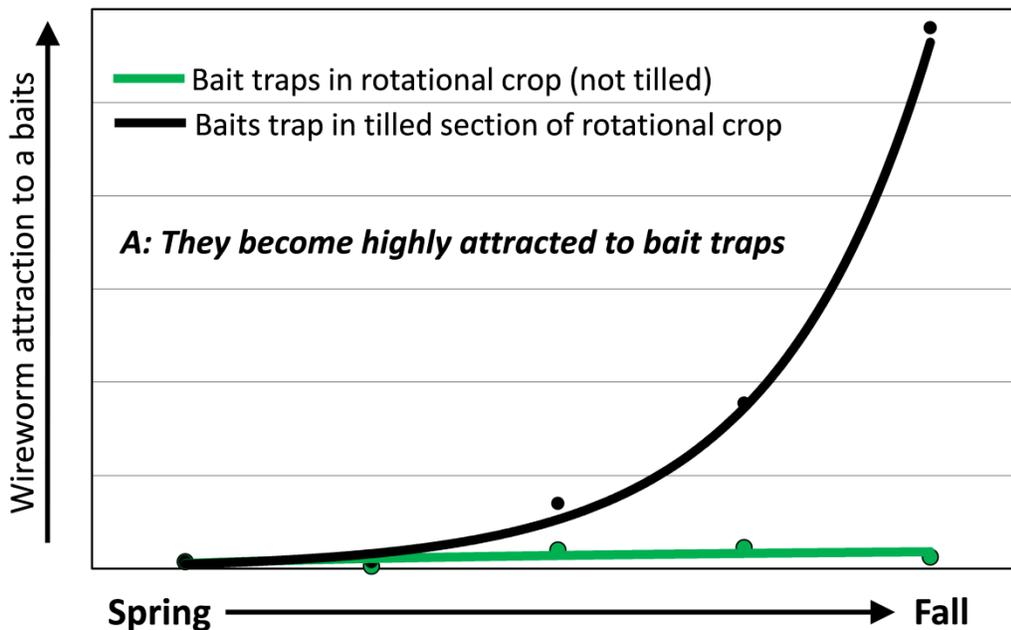


Figure 3. Grass that is tilled in the spring/early summer gradually decomposes in the soil, allowing wireworms to become more attracted to wireworm bait traps over the growing season.

Interpreting wireworm bait trap catches

1. Calculate the *average* number of wireworms per bait trap: count all the wireworms that were found and the number of holes in the potato baits. Add these numbers together. Divide this number by the number of potato bait traps you inspected.
2. Calculate the *proportion* of traps with wireworms: count all the traps that had any number of wireworms or their holes in the potato baits. Divide this number by the number of potato bait traps you inspected.

If the answer to either calculation is 0.05 or greater, you can expect wireworm damage to your potato crop the following year. If it is less, repeat bait trapping in case the trapping period was not optimum for wireworm activity. Offset the new trap locations by 5m (16') - in other words, in between the previous trap locations.

In BC, research has shown a good correlation between wireworm bait trap catches and the damage to potatoes the following year. The variability of conditions under which monitoring would be carried out on farms (e.g. variability in wireworm species; soil type, moisture, and temperature; the amount of rotational crop residue, the number of weeds in the tilled strip, potato variety) means that different results will be obtained depending on the state of these conditions. In other words, there is no exact science covering all conditions, so a threshold of 0.05 should be used with caution. Given the wireworm infestation in PEI, **never assume there will be no damage risk** to the following year's crop, even if your number is less than 0.05. Outliers do occur, meaning that sometimes, even when no wireworms or holes are found, there could still be crop damage. While wireworm monitoring (as described here) is a better predictor of crop damage than click beetle catches, catching large numbers of click beetles is a warning of a wireworm problem. See the click beetle monitoring section of the 'Wireworm Assessment Tool' fact sheet.

WIREWORM MONITORING TECHNIQUE SUMMARY

1. The field must have been a rotational crop for at least two years
2. If the rotational crop is a seeded annual in the year of monitoring, the stand must be 10cm (4")
3. Aggressively till (but don't plough) a strip through the middle of the field
4. Keep the tilled strip free of vegetation by light tillage or chem-fallow through the summer
5. In September, use a spade to pry out soil and place a whole or half potato tuber 15cm (6") deep every 10m through the middle of the tilled strip
6. After 2 weeks, pry out the potato using a spade and inspect the soil and potato for wireworms and their holes in the tuber. Record these numbers for each potato bait site.
7. Calculate the average number of wireworms per bait trap and the proportion of traps with any number of wireworms or their holes
8. If the average number is greater than or equal to 0.05, expect wireworm damage to the potato crop the following year. If less, repeat bait trapping, but do not assume you are not at risk.

The best approach for wireworm monitoring described here is through consultation. We would like to improve monitoring and value your feedback.

Todd Kabaluk, Research Biologist
Agassiz Research and Development Centre
Agassiz, British Columbia
Todd.Kabaluk@agr.gc.ca



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Growing Forward 2

A federal-provincial-territorial initiative