



Wireworm Trapping Guidance and IPM

Document produced by Dr Kerry Leslie for the Plant Health Centre project *"PHC2024/O4: Understanding the risk to Scotland's plant health arising from wireworm (click beetles) and the monitoring and Integrated Pest Management requirements"*

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Figure 1: Top – Dozens of click beetle (adult life stage of wireworm, brown, approx. less than 1 cm in length, *A. obscurus*) caught in a pheromone trap.

Middle – Wireworm protruding from damage hole in potato.

Below – Wireworm larvae (orange/yellow/brown in colour). Species belonging to the *Agriotes* genus have two identifiable spots of the 9th abdominal segment (wireworm picture courtesy of Blackthorn Arable).

Introduction

Wireworm are the larval life stage of click beetles which are causing increased incidences of crop damage across the UK. Wireworm belong to the Elateridae family and can be found across many UK habitats from wetlands, meadows, hedgerows, forested areas, and crop fields etc. Wireworm are soil dwelling pests which feed on a range of plant roots and tubers. Wireworm hatch from eggs before spending multiple years in the soil as crop damaging larvae where they go through 8 to 13 instar stages depending on local environmental factors. Wireworms then pupate for around 2 weeks before becoming adult click beetles who lay eggs to complete the life cycle.

With an average lifecycle in regions of cooler climate (e.g. the UK) taking four years to complete, the damage to surrounding crops can be substantial. Female click beetles can lay approximately 50–200 eggs in their lifetime which are laid in multiple clutches across the summer months. Wireworm damage to potato crops in the UK is predominantly caused by members of the *Agriotes* genus with species of note being *A. obscurus*, *A. lineatus* and *A. sputator*. *Agriotes* species can feed on many crop plants outside of potatoes however, making them a challenging pest to manage across rotations. Other crops at risk of feeding damage from *Agriotes* wireworm include cereals, grasses, carrots, lettuce, sugar beet, beans, peas and alliums. Feeding damage can cause considerable yield losses across economically important crops if wireworm populations are not controlled. Trapping to assess for the presence of wireworm in a field is the first step to integrated pest management (IPM).

Wireworm Field Risk Factors

Like many pests, it is likely that the wireworm/click beetles are not spread evenly across fields. Areas are more likely to have higher populations of wireworm if they have the following associated risk factors:

- Proximity to water source e.g. burn, river, or reservoir.
- Lower lying more humid areas in-field.
- Having large grass areas around field edges.
- Planting directly up against field margins e.g. beds around edge of field.
- Neighbouring fields of those with known wireworm populations.

Overarching risk factors for fields include:

- Multiple cereals and/or grass in rotation.
- Long-term grass in 'recent' history.
 - Highest risk if the field has come out of grass in the two years before potatoes.
- Root crops such as carrot or sugar beet in rotation.
 - Such crops can suffer feeding damage too, however, if they are planted in the years ahead of a susceptible crop then they can reduce the damage risk to them due to the intensive harvesting methods temporarily reducing wireworm populations present.
- Soil type – loamy soils with organic matter above 5% are at a greater risk for increased wireworm juveniles' survival rate. Note this is not the only soil type suitable for wireworm.
- A lack of cultivation and management after harvest, e.g. leaving cereal stubble to develop a high weed burden is a particularly high-risk practice.
- Lack of any bare soil time in rotation – breaks between crops remove food sources for existing populations.

Research is ongoing, but it is speculated that use of regenerative practices such as cover crops, minimum tillage, and/or flower strips may contribute to wireworm population increases in the future. For example, it is thought that a mixture of minimum tillage and tighter time margins (reduction in time where fields are left as bare ground) can lead to increased risk of wireworm populations establishing. Flower strips are thought to build up reservoirs of natural predator species, however, adult click beetles will feed on flowers too so evidence on this is still to be gathered.

Wireworm Trapping Guidance

If you suspect wireworm in your field, it is useful to set traps to assess the infestation to inform future management strategies. There are two types of trap that can be set: bait and pheromone traps.

Bait traps using seed balls can be set in early spring or in autumn and work by attracting wireworm (Figure 1 and 2, larval life stage) to juvenile root tissue. Timing of bait trapping can be selected based on gaps in current crop rotations where soil will be bare for ~14 days. Pheromone traps are also set in spring and are situated in field throughout the summer to catch click beetles (the adult wireworm life stage). Bait ball traps are the cheap, quick, and simple option to assess presence of wireworm; however, they must be closely monitored as they are commonly dug up and eaten by local wildlife such as badgers and rabbits. Pheromone trapping is done over a longer period and requires some investment (buy traps and pheromone or consult with local advisors about renting traps) but are less likely to be disturbed. Pheromone traps also take additional time to empty and assess weekly throughout the growing season.

It is important to note that at this time there is little evidence to equate wireworm number to damage observed in stocks accurately, therefore thresholds are not available. Although integrated pest management advice can be given based on the positive finding of wireworm/click beetle in a field, it is not possible to determine how much damage will be seen in a harvested stock grown in an infested field. For example, a capture of many wireworm does not always equate to a large damage output in stocks. Equally, large amounts of damage can be seen in stocks when minimal numbers of wireworm were caught ahead of the rotation. Despite this, presence of wireworm will always increase the risk of crop damage significantly.



Figure 2 – *Agriotes* wireworm found in a Scottish potato crop 2025

Bait trapping Placement

Firstly, determine when and where to place the traps. Bait traps should ideally be set when there are no other plants e.g. bare soil between crops, either in early spring or autumn. Wireworm will be attracted to the CO₂ produced by the trap as its root system is established. It should be noted that any practices which disturb the soil e.g. ploughing ahead of planting are likely to damage the bait traps so trapping should be done first. Placing a bait trap in an established sown crop may limit the number of wireworm attracted to the bait as they may already be actively feeding. A bait trap should be planted 10 meters or more from the headland to avoid being planted too close to established plants. If placing multiple traps in one field they should also be approx. 10 meters apart from each other.

Due to the patchy nature of wireworm, increasing the number of bait traps in a field will increase the likelihood of identifying a problem. **It is recommended to set a minimum of 10 traps per 4-hectare block.** However, many more are recommended if you require an in-depth population evaluation.

TIP – Digging and sieving a soil pit (20x20x20 cm) in grass found in the headland at the same time as bait trapping may also identify wireworm. This may indicate risk of wireworm ingress into the field and trapping within fields is then recommended.

Weather

Bait traps are most effective when soil is moist. Exceptional levels of water will reduce wireworm movement, lowering the likelihood of them moving to feed on bait traps. Conversely the likelihood of trapping wireworm in extremely dry conditions is lowered as they migrate deeper into the soil to find moisture.

Temperature

It is advisable to test the soil temperature for a week before you intend to place the trap. The soil temperature needs to be consistently $\geq 8^{\circ}\text{C}$ to establish a good level of bait seed growth.

Timing

Spring traps are usually planted between April and early May however if conditions are favourable, they could be planted in late March. Due to the beginning of the potato planting season coinciding with this timescale it may be more appropriate to trap the field a year (or more) in advance.

Autumn trapping can also be carried out during September if spring trapping is not feasible with your field plans.

Seed Choice

Wheat is ubiquitous in its use in bait traps. Work in England has seen that a 50:50 mix of maize and wheat is highly effective at attracting wireworm however maize is unlikely to germinate in the colder climates of Central – Northern Scotland if used in spring bait balls. For consistent results from a bait trap in Scottish conditions use one of the following options –

- Equal mix of wheat, barley, oats.
OR
- Equal mix of maize, wheat, and barley (maize unlikely to grow in Central/Northern Scottish conditions).
OR
- 50:50 mix of oats and wheat.

Around 50 grams of seed per bait trap is required and all seed used needs to be untreated. Best practice is to germinate seeds for bait traps by submerging in water for 24 hours then pat dry. Wrap seeds up (in small paper bags for example) and store in a warm dark place for at least 24 hours. Once small sprouts are visible mix you can apply bait directly to the soil (Figure 3) and seed can be mixed with a small amount of soil, suet or honey to gently form bait balls. Alternatively, bait seed can be wrapped in stockings before planting – Instructions for this can be obtained through [Blackthorn Arable LTD](#). These traps are then ready to be planted. Cut potato segments can also be used as bait; however it is less successful than recommended cereal-based bait balls.



Figure 3: Left – Bait ball about to be planted. Seed germinated for approx. 5–7 days before planting. Right – Bait ball dug up 14 days after planting.

Bait Trap Set Up Instructions

1. Identify area for trap – 10 m away from headland/growing crop/other traps. Can be in stubble or bare soil. Soil should be moist, consistently above 8 °C, and loose (not compacted).
2. Dig a hole approximately 2–3 inches wide and 6–8 inches deep.
3. Place the bait ball into the hole and cover over. Place marker (labelled cane) next to trap to aid later identification.
 - a. Bait traps are at high risk for tampering by wild animals (rabbits, badgers). It is advised to surround them (e.g. with chicken wire) to prevent them being dug up/eaten.
4. Wait 10–14 days. Three weeks (21 days) in the ground is also acceptable if there are temperature fluctuations or other environmental changes which may negatively affect bait ball root production.
5. Dig up the root ball of bait trap and surrounding soil.
6. Place soil into plastic tray to prevent escapees – wireworm move surprisingly quickly!
7. For assistance identifying the contents of a trap, place findings in sealable bag labelled alongside some soil with date and field location (Name and W3W), contact your local advisory service for advice. Presence of any *Agriotes* species indicates risk of crop damage; however species identification is available through SAC Consulting Potatoes Team or FERA Biosciences if required.

Pheromone Traps and Placement

Pheromone traps use chemicals from the female click beetle to attract adult male click beetles present on the surrounding soil to the trap. Most pheromone traps are a pit-fall design, meaning the beetles walk into them and cannot get back out. This does mean that other small insects can be caught in these traps as well.



Pheromone traps often come in a set of three for the three most prevalent species that cause damage to potato crops. Each pheromone trap is specific to the species of click beetle being trapped for. Most traps are colour coded for ease of identification: *Agriotes sputator* (GREEN), *Agriotes lineatus* (BROWN/GREY), and *Agriotes obscurus* (BLACK). This colour scheme is broadly accepted by those sampling wireworm regularly, however as the pheromone lure is applied to the traps manually the colour of the trap is non-specific to any specific species prior to set up (Figure 4). Other pheromone traps are also available (e.g. multispecies trap systems), but these were not tested as part of the Plant Health Centre project.

TIP – It is advised to write the name of the species on the lid of each trap for easy identification.

Pheromone traps require emptying every ~7 days. If content is left longer than this, it increases the risk of cannibalism, reducing the accuracy of trapping. To mitigate this a small volume of insecticide can be added to the trap cups to kill any insects that fall into the trap, however this is optional and health and safety practices as per product labels should be followed. Best practice would include disposal of click beetles found weekly in traps to reduce breeding population present.

Timing and Placement

Pheromone traps can be placed in fields from mid-March onwards. Traps can be placed in April/early May and still yield results, however the earlier the better to give a clear spread of data across the season. Unlike bait traps, pheromone traps can be placed within growing crops e.g. cereals. Through the 2025 survey project traps were placed in both cereal and potato fields. When placing pheromone traps, do not place in tram lines or access pathways in crops due to likelihood of trap damage by agricultural machinery. If placing in potato crops it is suggested to put traps between rows of single beds. It is important to note that it is not currently possible to equate adult catches with damage volume seen in the following crop due to the extended nature of the larvae life stage. Pheromone trapping can be used to estimate risk up to four years prior to potato planting, allowing better planning of crops in rotation. If cereals/grasses are kept to a minimum in the years prior to potatoes then there will be less egg laying by the adult population, leading to a reduction in damaging larval stages further in the future.

Weather

Pheromone traps are covered by a lid, so can withstand rain throughout the season; however it is advised not to place traps directly in areas prone to flooding. If there is a large volume of rainfall while trapping, please inspect and empty traps at the earliest convenience. This is of particular importance in potato fields as traps placed between drills and in tram lines are at risk of collecting water.



Figure 4 – Pheromone traps for adult male click beetles. From left to right – green trap for *Agriotes sputator*, brown/grey trap for *A. lineatus*, and black trap for *A. obscurus*.

Pheromone Trap Set Up Instructions

1. Identify area for traps – a minimum of 10 m away from headland and other traps. Can be situated in crop throughout growing season.
2. Dig a small area to insert trap in soil. Lip of trap should sit level with soil surface.
3. Place plastic cup in base of trap.
4. Place lure (plastic tube) in the central hole on underside of the trap lid.
 - a. Handle lures using gloves and **do not open lure cap**.
 - b. Lures last approximately 6 weeks. You will be supplied with an additional lure to swap in mid-season. Store extra lure in fridge/freezer until required.
5. Insert lid into trap base (Two large lid pins insert into holes on base). Place marker (labelled cane) next to trap to aid later identification. If traps appear tampered with by wildlife, it is suggested to pin lid into soil using pegs (camping/tent peg) however these are not supplied as standard with the traps (Figure 5).
6. Empty traps on a weekly basis (7-day interval) into individual sealable bags labelled with sample date, field location (Farm Name and W3W), and either species trap name and/or trap colour. For assistance identifying the contents of a trap, contact your local advisory service for advice. Presence of any *Agriotes* species indicates risk of crop damage however species identification is available through SAC Consulting Potatoes Team or FERA Bioscience if required.

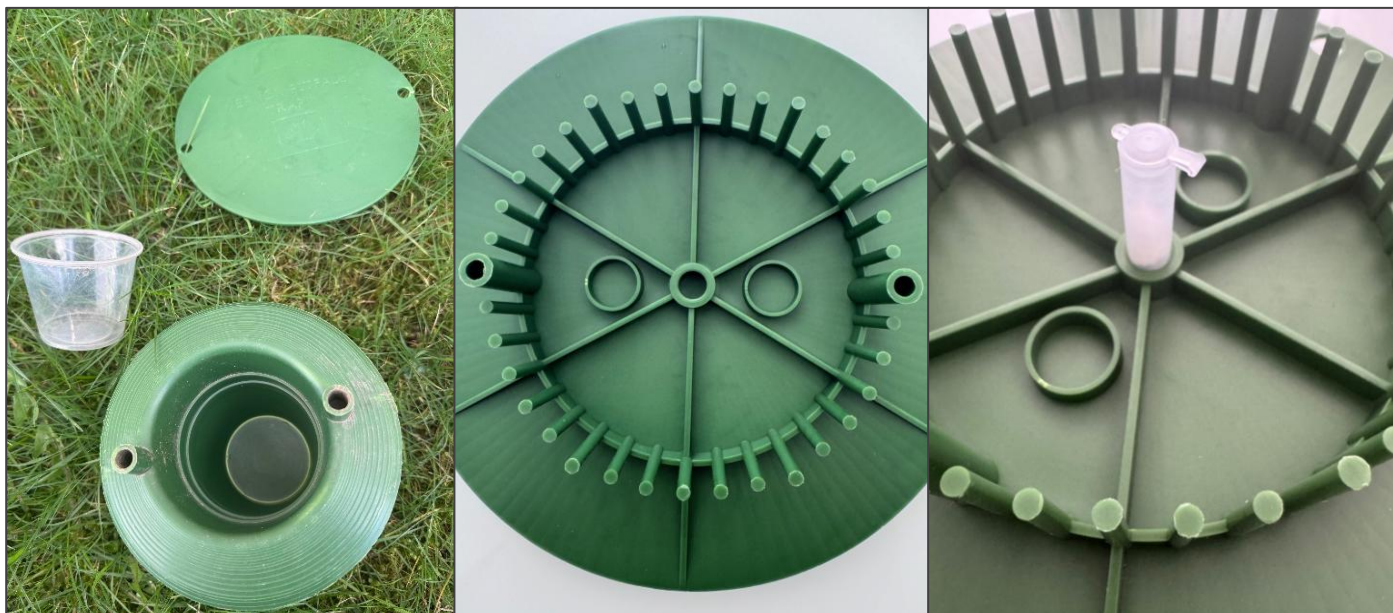


Figure 5 – Left – lid, base and cup from an *A. sputator* pheromone trap. Middle – Underside of lid, Right – pheromone lure inserted in underside of lid, Below – Pheromone trap placed in field.



Wireworm Integrated Pest Management

Like many potato pests it is best to get a handle on the problem (or risk of problem) in a field before it is planted. It is advised that either bait or pheromone trapping is carried out in fields which meet risk criteria outlined on page 3. It is also worth developing notes on which fields you have experienced wireworm damage from in the past and what the damage looked like (Figure 6A, B).

Wireworm damage can look different depending on when it was created in the tuber's life cycle. Early season damage can be dry inside as the tuber has started to heal the wound. In these cases, skin can sometimes be found inside the damage holes with 'elephant hide/drycore' characteristics associated with *Rhizoctonia* present (Figure 6C). Damaged caused late in the season can also be 'wet' with secondary, opportunistic infections present too.

IPM practices should be introduced multiple years in advance of potatoes in the rotation for the best results at mitigating risk of wireworm damage.

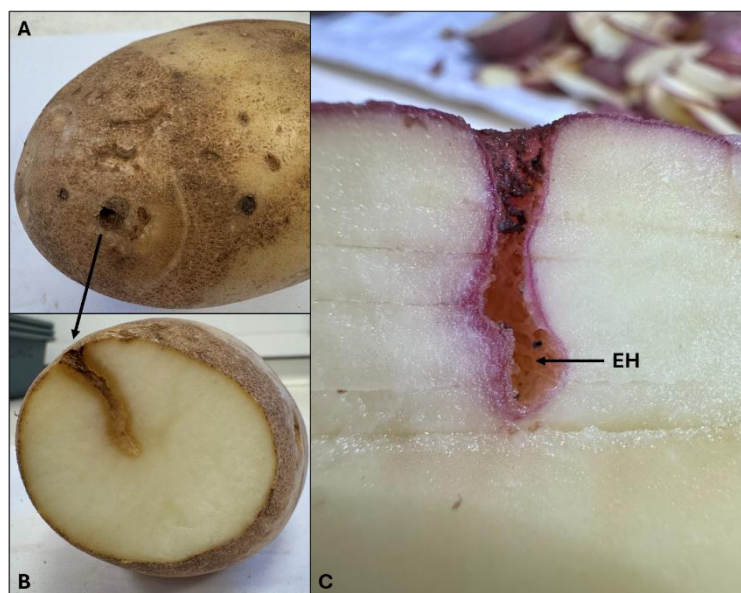


Figure 6 – Wireworm damage in potato. A – Small entrance holes (usually between 2–6 mm diameter). B – Internal tuber damage varies in depth, and consists of narrow "straight" passages, often dry inside damaged areas with brown demarcation between damage site and healthy flesh. C – Elephant hide (EH) symptoms observed inside wireworm damage hole.

Chemical Use

In terms of chemical intervention there are very few products approved for use against wireworm in the UK (2026). Nemathorin the nematicide/insecticide with the active fosthiazate has wireworm control on label (15 kg/ha broadcast and incorporated at the time of tuber planting). It is worth noting that other nematicides such as Velum Prime do not have wireworm control on label so cannot be used interchangeably with Nemathorin for this purpose.

In the past, products containing actives such as neonicotinoids or pyrethroids were used against wireworm however with subsequent withdrawals and loss of product use it is speculated that this may in part be the cause of increasing populations.

Some pyrethroid products are used in UK insecticide programs for aphid control. Application of these throughout the growing season may contribute to keeping wireworm populations down in the background despite not being an on-label target of the product. In-furrow application of pyrethroids is common practice in countries such as the US for wireworm control. It is hoped that in future the UK will see the availability of new products which can be used in this format.

There are currently insecticide products with the active cypermethrin (e.g. Signal 300 ES) approved for use against wireworm in cereals wheat and barley. Incorporation of these products in the rotation ahead of potatoes may go some way to reduce damage seen. **Always consult pesticide product labels and discuss use of chemical products with a BASIS qualified adviser before application.**

Cultural Practices

Historically, ploughing with bird activity afterwards was relied upon to remove wireworm, however it cannot be relied upon as a sole management method. Shallow cultivation can be effective in summer to reduce population build-up as it will kill eggs and neonates (newly hatched larvae). Disk cultivating or ploughing in the autumn can kill adults and small larvae still may be better at short term controlling populations than other minimum tillage practices. Modern non-inversion tillage is carried out at a fast pace meaning larvae have a better chance at escaping back into the soil before birds can feed on them. Ploughing is still relatively slow and gives the most time for birds to find larvae on the soil surface. Periods of stewardship for a field (even as short as a few years) can

significantly increase wireworm populations. Growers must weigh up the pros and cons plus the risk associated with these practices on a field-by-field basis.

Control of weeds with specific attention to grass and volunteer cereals will reduce available food sources for wireworm populations between crops. **Having a high weed burden in cereal stubble can increase wireworm populations and raise risk for subsequent crops.**

Variety Choice – Some varieties are known to be more affected by wireworm feeding damage than others. For example, Marfona, Innovator, Daisy, Nectar, and Electra have been shown to receive a higher number of damage holes over all when compared to the varieties Baby Lou, Lady Claire, Royal, Allouette, and Kelly. Most varieties are “somewhere in the middle” for damage susceptibility e.g. Maris Piper and Rooster, and outputs are very much dependent on population size and other environmental factors in any given year.

Alternative/Cover Crops and The Rotation

No specific cover crops can be targeted as increasing wireworm populations more than another in isolation with current working information, however time of planting is key to keeping wireworm populations low. Due to duration of the juvenile wireworm stage (up to 4 years) they can take a few years to mature to a population size that creates significant damage. If a cover crop that supports wireworm is planted 2–3 years before potatoes in rotation, they could allow larvae to feed and grow, leading to cause damage to future crops. It is reported that buckwheat and brown mustard are deterrent crops for wireworm, however anecdotal experience from England suggests that their success is limited as a cover crop against wireworm under UK conditions if planted the year before potatoes.

Cereal crops are key for wireworm egg laying and susceptible to feeding damage so are considered a major risk factor. Subsequently it is important to assess cereal placement in the rotation as well. The more cereals in the rotation the higher the risk for wireworm and including cereals in cover crop mixes will increase this risk more.



Figure 7 – *Agriotes obscurus* click beetles collected from Scottish fields in 2025.

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