A Practical Guide to Integrated Management of Slugs and Leatherjackets

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Summary

- **The days of simply reaching for the bag of slug pellets or bottle of insecticide are now over for managing slugs, leatherjackets and other pests. The use of cultural approaches such as soil management, use of traps, or sampling for the pest to assess the risk are necessary as part of an integrated pest management (IPM) approach that limits the risk of environmental contamination by pesticides (e.g. metaldehyde in drinking water catchments), and protects the biodiversity of our farmland.**
- **Birds such as lapwings, curlew, starlings, rooks that feed on surface insects such as leatherjackets and slugs; hedgehogs and frogs that feed on insects and slugs; and insects, bees and earthworms will all benefit from the withdrawal of these pesticides.**

Introduction

Both slugs and leatherjackets have benefitted from the withdrawal of popular and effective pesticides in the last few years: methiocarb for slugs and chloropyrifos for leatherjackets.

Chloropyrifos is highly toxic to mammals, birds, fish, aquatic inverterbrates and honey bees and moderately toxic to aquatic plants, and earthworms.

Methiocarb is highly toxic to mammals and birds, extremely toxic to fish, and moderately toxic to earthworms. Seed treatments pose a risk to grain-eating farmland birds such as finches, sparrows and partridges.

There are still options available for slugs although there are stewardship guidelines for the use of metaldehyde which has restricted its use. The loss of chlorpyrifos currently leaves leatherjackets with no approved pesticides for their control.

This guide summarises the options now available for managing slugs and leatherjackets with an emphasis on integrated approaches.

Slugs

Factors such as soil and stubble management, planting methods, weather, slug trapping and monitoring should all be considered as part of an integrated slug control programme.

Slug trapping can be used to assess the risk from slugs in a particular field prior to sowing, particularly for winter crops. To get the best from slug trapping the bait placed under the trap needs to grab the slugs' interest and to keep them there. The best bait is a dry food bait such as the breakfast cereal 'Alpen' or similar, or chicken feed (layers mash). Do not use slug pellets as bait. A tablespoon of the bait should be placed under the trap, which can be a slate, fertiliser bag, slug mat, an upturned flower pot base, wooden board or something similar. Timing of trapping is crucial – place traps after there has been some rain, and the soil surface is moist. Traps should be checked in the morning before the day warms up too much, 1-2 days after being placed in the field. Consider using several traps per field so that you can determine whether some areas are more 'sluggy' than others,

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and trap regularly. If slug numbers exceed 4 per trap, especially if conditions have been suitable for slugs to be feeding on the soil surface (damp soil and humid nights) then the following winter wheat crop is likely to be at risk from slug damage. Only one slug per trap is enough to put winter oilseed rape at risk, and any slugs being caught is a risk to potatoes.

Slugs don't like fine, firm seedbeds, so good soil cultivation can reduce the risk of slug damage, as can deeper sowing of wheat seed (3-4 cm), although ilater-sown wheat should not be drilled that deep. Minimum tillage also helps as this allows predators of slugs such as ground beetles to survive and pick off the slugs.

Some cereal seed treatments can provide protection from seed hollowing by slugs - NipsIT INSIDE, Deter, and Redigo Deter will protect the seed from slugs to a great extent, but damage to the shoots will still be a threat. These seed treatments are primarily targeting barley yellow dwarf virus (BYDV), so whilst they can be useful in protecting crops from cereal seed hollowing by slugs, an application of slug pellets may still be needed to protect the shoots.

For potatoes, fields should be monitored for slugs before planting with slug traps. An autumn treatment of slug pellets and soil cultivation will also help reduce the numbers of slugs surviving the winter and hatching in the spring.

Use of slug pellets

Slug pellets should be considered a last resort and only considered if there is a risk from slugs. Because of problems with metaldehyde ending up in drinking water catchments, there are restrictions on the use of metaldehyde and how much can be applied in a calendar year. Guidelines issued by the Metaldehyde Stewardship Group (MSG) should be followed and are summarized below.

A field's soil type, topography and proximity to a water course are key to whether metaldehyde applications could be a risk that will subsequently impact drinking water quality, and should always be considered. If treatment is necessary, it's imperative to refer to the full set of MSG guidelines:

- No metaldehyde pellets to be allowed to fall within a minimum of 10 metres of any field boundary or watercourse
- Use minimum active of metaldehyde per hectare to avoid drainage and run-off losses
- Maximum application rate 210g metaldehyde a.i/ha
- Maximum total dose from 1st August to 31st December: 210g metaldehyde a.i./ha
- Maximum total dose rate: 700g metaldehyde a.i/ha/calendar year
- Do not apply when heavy rain is forecast
- If drains are flowing do not apply metaldehyde based slug pellets

The MSG has clarified that labels on packs of slug pellets remain unchanged for 2017. However, the MSG is clear that the highlighted steps should be implemented with immediate effect. More information on the enhanced stewardship can be found at www.getpelletwise.co.uk

Note that ferric phosphate slug pellets do not have any restrictions on use and tend to be just as effective as metaldehyde slug pellets, and can be applied up to the field boundary.

Scottish Water has a Drinking Water Protection Scheme (DWPS) running at the moment in the North East of Scotland where the aim is to limit metaldehyde detection in drinking water catchments by replacing its use with ferric phosphate products. The DWPS can provide 100% finance of the increased cost incurred by using ferric phosphate instead of metaldehyde.

Generally, a pre-emergence application of pellets with a follow up post-emergence if damage is seen tends to do the job in both wheat and winter oilseed rape. However further treatments may be necessary if the crop is slow to emerge or slug pressure is severe. Consequently, ferric phosphate should be considered a necessary partner with metaldehyde in a slug management programme.

In potatoes timing of slug pellet applications are crucial. Key timings are one application just before crop canopies meet across the rows, and another at burn down of the crop. Applications between these two timings should be in response to the weather – apply pellets if there has been substantial rainfall, or if crops have been irrigated. Both ferric phosphate and metaldehyde are effective, and can be used in a programme (e.g. ferric phosphate, metaldehyde, ferric phosphate). If planning to use a metaldehyde product note the requirement for a 10 metre buffer zone to the edge of the field where no metaldehyde pellets should be applied.

Test digs should be undertaken from early August to determine if damage is occurring, and try to lift the crop as early as possible if damage is evident.

During wet conditions at harvest (all too common in Scotland) slugs can be taken into store and cause further problems, so grading and washing soil from tubers is recommended.

Leatherjackets

The loss of the organophosphate insecticide chlorpyrifos, in 2016 means that it is even more important to start plans for managing the threat from leatherjackets sooner rather than later.

Leatherjackets are the grubs of crane flies (daddy long legs), and the fly tends to lay eggs in grass or grassy stubble in the summer months, with the grubs tending to hatch from September onwards, feeding through the winter into the late spring. Consequently, grass can be damaged all winter, as can winter cereals, and particularly spring cereals sown after grass.

The likely impact on a field will depend on the population density of the grubs, the proposed use of the field and – importantly – at what point you realise that a damaging level of grubs is present. Although chemical control is no longer feasible, you still have options if you establish the risk present in each field early enough.

SRUC carries out a survey of grassland every winter to determine the levels of leatherjackets infestation. Whilst there are local differences in numbers, the survey can identify whether we are in for a high risk of leatherjacket damage.

The Table below summarises the results from the SRUC leatherjacket survey over the last few years, and relates the populations found to established damage thresholds.

Summary of Leatherjacket Survey Results 2005/06-2016/17

Survey	Mean	Percentages of fields in each population category		
Year	**Poulation (millions/ha)**	**Over 0.60 Population (millions/ha)**	**Over 1.00 (millions/ha)**	**Over 2.00 million/ha**
2005/06	2.50	85%	75%	39%
2006/07	2.11	77%	63%	39%
2007/08	0.32	21%	8%	1%
2008/09	0.68	38%	26%	7%
2009/10	1.24	67%	51%	19%
2010/11	0.67	39%	27%	8%
2011/12	0.61	33%	19%	5%
2012/13	1.89	86%	68%	37%
2013/14	2.54	89%	78%	56%
2014/15	0.37	23%	8%	1%
2015/16	0.88	50%	34%	10%
2016/17	1.63	77%	62%	31%

A density of over 0.6 million grubs per ha in a grassland field is likely to result in severe damage to any cereals subsequently sown into that field in the spring. A density of over 1.0 million grubs per ha in a grassland field is likely to markedly reduce the subsequent growth of grass in that field in the spring. A density of over 2.0 million grubs per ha in a grassland field is likely to result in severe and visible damage to that sward in the spring.

Growers can request sampling of key fields from SAC Consultants and FRBS offices to know what densities are present so the results can inform spring management decisions.

For example, if high levels of grubs are found within a particular field you can decide if it is worth continuing to use that land for forage production (knowing that yields will be affected) or instead decide to concentrate your efforts in another field with lower grub densities. If the highly infested field was supposed to have a spring crop after grass then you might consider the practicality and feasibility of carrying out additional cultivations before sowing - or much more likely focus your spring crop attention in a different field with much lower levels of grubs to start with.

The lack of any 'quick fix' through chemical control with the loss of chlorpyrifos now means that the focus has switched to damage limitation. Therefore identifying where you have high grub numbers, well before they start to cause damage, will be key before time, effort and money is wasted applying fertiliser to fields where the forage yields will be much lower or planting a spring crop and seeing it decimated by the grubs still present after ploughing and cultivation.

There are a few options available to try to reduce the risk of leatherjackets:

- In final year of ley, graze down hard in August/September to reduce egg-laying by crane fly.
- Soil sample grass for leatherjackets before ploughing - then you know the risk.
- Plough ley in January, at least two months before anticipated sowing date of cereals. Leatherjackets will start feeding voraciously in March and hopefully die because of a lack of food. An added benefit of this approach is that more soil nitrogen is released giving higher grain yield, compared with later ploughing.
- If winter ploughing is not possible, and the forecast is high for leatherjacket populations, delay ploughing until late April/early May.
- Ploughing can reduce leatherjacket populations by about 50%, so does an extra cultivation.
- Roll the seedbed with a heavy roller immediately after sowing.
- Harrowing crop for weed control will help reduce leatherjackets.
- Observe cereal seedbeds at night during days immediately after sowing but before the crop emerges. If leatherjackets are present in large numbers, use a flame weeder at night to destroy the grubs (suitable for small areas only).
- Cover damaged patches with a tarpaulin overnight after rain, and collect grubs in morning and destroy (small areas only).

In the absence of any chemical options for the time being, cultural approaches as outlined above are necessary to try to keep leatherjacket damage down.

There is research underway at SRUC and elsewhere into looking at alternative approaches to leatherjacket management, but it is still early days.

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