

**FACT SHEET**

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# Pest and Disease Control in Grass and Forage Crops



Cranfa Amaethyddol Ewrop ar gyfer  
Datblygu Gwledig Ewrop yn Buddsoddi  
mewn Ardaloesoddi Gwledig  
The European Agricultural  
Fund for Rural Development  
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Llywodraeth Cymru  
Welsh Government

## Introduction

Pests and diseases can have a significant effect on the establishment, yield and longevity of grass and forage crops. In grassland, new reseeds are most vulnerable to attack and problems are more likely to occur where grass is the main crop in the area and particularly when grass follows grass.

- Frit fly, leatherjacket and chafer are the most important pests of ryegrass.
- Slugs and sitona weevils commonly attack white clover and lucerne.
- Cabbage stem flea beetle can be a major pest of brassicas.
- Crown rust is a common fungal disease of rye grass.

**This fact sheet aims to help Welsh livestock farmers:**

- identify the most important pests and diseases that threaten grass and forage crop productivity
- understand their life cycle and the methods of cultural and chemical control.

Pesticides are facing increasing scrutiny and their use may be restricted in future (EU review). It is also important to remember that many of the “pests” control other crop pests and/or are an important source of food for a variety of birds and bats so play an important role in the food chain.

## Crown Rust

Crown rust forms distinctive yellow-orange pustules on the leaves of rye grass occurring mainly in late summer and early autumn. Crown rust has spread north and west in the last 10 years and is now frequently seen in Wales as a result of warmer temperatures and reduced nitrogen fertiliser use.



### Risk

- Warm, dry days followed by dewy nights.
- Sward containing ryegrass varieties with poor resistance to crown rust and secondary grass species.

### Control

- When reseeding, incorporate a proportion of crown rust resistant seeds in a mixture - resistance to crown rust increased by 44% between 1963 and 2007 (Wilkins and Lovatt, IBERS).
- Manage existing swards carefully to prevent them becoming long mow/top if necessary.
- Ensure grass has sufficient nutrients to combat the fungus. Follow the Fertiliser Manual RB209 guidelines; [www.gov.uk/government/publications/fertiliser-manual-rb209](http://www.gov.uk/government/publications/fertiliser-manual-rb209)

### Effect on grass

Infections can reduce forage yield and quality, palatability and the competitive ability of plants.

Work carried out at IGER showed that an infection level of 10% results in a 1.4% reduction digestibility (D-value). A one point reduction in D-value equates to a 5% decrease in animal performance, so even low level crown rust infections are costly. In more extreme cases crown rust will cause long term damage to swards and accelerate the need to re-seed.

# Frit Fly

Frit fly lay their eggs on grass producing three generations a year. The larvae are yellowish-white and grow up to 5mm long. They feed on the central shoot, killing the plant or leaving patches of stunted and dying seedlings and moving from seedling to seedling before pupating in the soil and hatching the following spring.

## Risk

- Italian ryegrass reseeds are more susceptible than perennial ryegrass and clover. (Cocksfoot and timothy are not affected).
- Autumn reseeds when grass follows grass are very high risk as frit fly populations are higher in grassland than under arable crops. In autumn, seedling germination coincides with peak frit fly numbers and larvae can develop from eggs laid on the newly germinated grass (larvae also migrate from the old swards to feed).
- Direct drilled grass or seed beds containing trash from previous grass swards.
- Sowing in the main egg laying period between July and October.



## Control

- Reseed outside the main egg laying period.
- Leave a gap of at least four weeks between grass crops, ideally using a break crop such as brassicas.
- Chemical control, chlorpyrifos is recommended but this does reduce populations of beneficial beetles that feed on other insect pests. Follow application guidelines to protect the environment.
- For land in agri-environment scheme agreements, prior approval will be needed.
- Monitor the emerging crop very carefully and react quickly to any damage as soon as possible.

### Note:

*There is concern over the way chlorpyrifos is currently being used in the UK and there is a major campaign to safeguard its continued availability. All users are urged to adopt a 20 metre no spray zone around water courses and to use low drift nozzles to reduce the risk that its use will be restricted and/or that it may be removed from the list of approved chemicals in future.*

## Threshold

The threshold for action is at around 10% of seedlings affected.

## Effect on grass yield

Reductions in silage yield of one tonne of DM per hectare have been recorded at first cut (source Dow).

The cost of replacing this with concentrates at different silage qualities is shown below:

Silage Yield Loss (1 tonne DM/ha)	
Quality ME	Cost (£) to replace lost crop energy with concentrates
12	301
11	276
10	251

Bought in silage can also make up any shortfall but this varies widely in quality and DM and should be analysed to confirm that it represents a cheaper option of energy (and protein) on a dry matter basis than bought in concentrates.

Damage can result in the need to increase the frequency of reseeded particularly of Italian ryegrass crops. Where an Italian ryegrass crop has to be replaced after the first year due to frit fly damage, the cost will be in the region of £500/ha.

# Leatherjackets

Leatherjackets are the larvae of craneflies commonly known as 'daddy-long-legs'. They are up to 50mm long, a dull olive green, with no obvious head and no legs. Leatherjackets' skin is tough and rubbery. Adults lay eggs between July and September in grass and cereals, the eggs hatching after 2-3 weeks. The larvae eat the roots and stems of grass plants at or below ground level leaving severed leaves and causing stem base damage so plants yellow then die. They feed in mild spells over the winter before pupating in the soil in late May-June.

Signs of leatherjacket activity include yellowing and/or bare patches in crops with birds flocking to feed on the larvae. Damage occurs when leatherjackets are active but most commonly in April/May when they are almost fully grown. Larvae are found near damaged plants.

Established grass and clover swards, new leys, cereals and legumes are all susceptible, particularly if it is the first crop to follow infested grass in a rotation. Severe winters do not reduce leatherjacket numbers; in cold and frost they feed less and eat when the weather warms up.

Adult crane fly stay and lay eggs close to where they emerge, so that the population in the field will increase unless it is controlled.

Leatherjacket grubs are an important food source for a variety of birds and the adult crane flies are an important food source for bats so both play an important role in maintaining biodiversity.



## Risk

- Grassland farming areas.
- Reseeds: when grass follows grass without a break.
- Established grass with a history of damage.
- High yielding productive grasses are most susceptible.
- Large numbers of adult craneflies are seen in July and August.
- Mild wet autumns favour the survival of eggs and young larvae.

## Control

Assess the number of leatherjackets present to identify the fields at risk. Sampling is the best way to guide choice of control method as insecticides should not be applied routinely.

- Ploughing grassland in July can reduce leatherjacket populations by 50%.
- Think rotation: introduce a brassica crop as a "break" crop.
- Where grass follows grass aim for minimum of two weeks between crops to reduce damage - the longer the break, the better.
- Rolling to consolidate the soil may restrict damage in the short term.
- Encourage plant growth to help plants to recover from attack e.g. apply fertiliser.
- Sample fields to identify if leatherjacket numbers are high (see left).
- Chemical control is likely to be the only method to prevent crop failure if bare patches develop.

## Field sampling

Sample any field that has been in grass for more than two years. Commercial companies offer sampling services and the most common method of DIY sampling is to dig and count.

Sample at least 10 representative sites across a field, the greater the number, the better the quality of the information.

- Dig a turf approximately two spades wide 31 cm x 31 cm (12" x 12").
- Search soil and place larvae in a tray and count.
- Calculate the average number per turf and convert the counts to population estimates.

Average Count	Population per hectare	Yield loss Tonnes dry matter/ha	Cost (£) to replace lost crop energy with concentrates
5	500,000	1.25	376
10	1,000,000	2.5	753
20	2,000,000	5 tonnes plus (damage visible and bare patches in grassland)	1,500

## Chemical control

Chlorpyrifos applied from mid November when it is mild. Pre-ploughing treatment (7-10 days before) is most effective. The response decreases, the later spray is applied. Chemicals must be used in accordance with statutory instructions and directions for use on the product label. For land in agri-environment scheme agreements, prior approval will be needed.

## Other control methods

Nematodes are used to infect leatherjackets with a lethal bacterium. They do not act as quickly as chemical insecticides and need a more exact soil temperature and moisture for best results.

# Sitona Weevil

Adult weevils are 3-5mm long, varying from grey to dark grey-brown with three pale stripes between head and wing covers. The snout is short and broad with a pair of antennae attached to the front. Adults feed in the early morning and late evening and hide in soil at other times. Larvae are small, white, legless grubs up to 5mm long, living in the soil near plant roots.

Adults are active from spring to autumn. Most eggs are laid in autumn in the soil around the base of plants and hatch to burrow into the soil. Larvae feed through winter into spring, when they pupate in the soil and emerge as adults in late spring/early summer. Adults can fly considerable distances, so infestations can start without a previous history of damage.

The adult weevil feeds on the leaves of clover and lucerne cutting 'U' shaped notches in edges of leaves. Larvae damage legume root nodules, reducing the plant's ability to fix nitrogen. Feeding damage predisposes tissue to attack by crown and root rot fungi.



## Risk

- All legume crops including white and red clover and lucerne are at risk.
- Sitona weevil are more numerous in warm dry weather: April and August sowings are particularly vulnerable.

## Control

No chemical control is currently specifically approved for sitona weevil. Discuss options with a BASIS qualified consultant.

## Effect on legume yield

Research has shown sitona weevils are among the most common and injurious pests of clover and lucerne in the UK and can cause severe damage (Mowat and Shakeel, 1989; Clements and Murray, 1991; Lewis and Thomas, 1991).

In a survey in England and Wales (Lewis and Thomas, 1991) the mean number of leaves damaged by sitona weevils ranged from 3% to 62%. There appear to be no reliable estimates in cash terms of the losses caused but damage impacts yield, sward quality and nitrogen fixation capacity, resulting in the need for more regular reseeding.

In New Zealand, Harris (1995) calculated that when the clover content was reduced from 20% to 10% the relative pasture yield must increase by 15% to give the equivalent gross margin.

# Slugs

There are three main types of slug of concern to farmers, of these, the grey field slug is most common. It breeds at any time of year when conditions are suitable. In a wet summer they breed quickly, each laying up to 300 eggs that can hatch in less than two weeks. Eggs laid in spring produce adults that lay eggs in summer/early autumn.

Slugs graze and shred grass leaves. White clover and grass/clover reseeds are more vulnerable to severe damage than mature swards where the slugs feed on new leaves in spring reducing yield.

## Risk

- White clover is at greater risk of slug attack than ryegrass.
- Grass/clover reseeds are more vulnerable to severe damage than mature swards.
- Slot-seeding increases losses: slugs follow the sown strips and eat the seedlings.
- Crops on heavy land and cloddy, poorly rolled seed beds.



## Control

- Look out for slime trails and take action at the first sign of damage.
- Ploughing reduces slug populations; shallow cultivation is not as effective.
- A fine, firm seedbed with no cracks or clods allows slugs to be exposed and eaten or dried out.
- Rolling decreases the chance of slug damage.
- Sampling of fields is the best approach to guide choice of control method as pesticides should not be applied routinely.
- Use slug traps to assess slug numbers and identify fields at risk.

## Sampling

Sample at least 10 representative sites across a field; the greater the number, the better the quality of the information. Trap during mild weather (5°-25°C) before fields are cultivated when the soil surface is moist.

## Slug trapping

- Put two heaped teaspoons of chicken layers' mash under a plastic container approx. 25cm across e.g. plant pot saucer.
- Leave overnight, examine early next morning; count slugs in each trap.

## Threshold

Slug threshold level of four per trap justify the use of chemical control.

## Chemical Control

Where four or more slugs per trap are detected at sampling, apply pellets just after drilling or rolling. Broadcasting is more effective than applications with seed unless seedbeds are cloddy. There are several propriety products available based on methiocarb, metaldehyde, ferric phosphate and copper silicate.

Slug pellets must be used in accordance with statutory instructions and directions for use on the product label. For land in agri-environment scheme agreements, prior approval may be needed.

*Note: Extra care must be taken when using metaldehyde; if it reaches water supplies, it is virtually impossible to remove. There is serious concern about the level of metaldehyde in drinking water in parts of the UK and there is a possibility that its use will be restricted or that it may be removed from the list of approved chemicals.*

## Effect on grass yield

The severity of slug damage and its impact on yield is difficult to predict because of the influence of the weather on slugs and on crop growth. There appear to be no reliable estimates in cash terms of the losses caused.

Benefits of slug control can be assessed by considering the cash cost of replacing a 10% loss in yield in a grazed sward.

The cost of buying in concentrates to replace 10% yield loss from slug damage in a sward yielding 9 tonnes DM/ha is between £225 and £270/ha.

## Cabbage Stem Flea Beetle

Adult cabbage stem flea beetles are approximately 5mm long, shiny metallic greenish - or bluish-black or sometimes bronze. They have long antennae and powerful hind legs and move by leaping or flying. The larvae are white with a brown head and three pairs of legs up to 2.5mm long. Adults over-winter in grass tussocks and hedges emerging in July and August. Eggs are laid in the soil beneath the crops and larvae emerge after 2-3 weeks. From late autumn the larvae migrate to the soil to pupate. There is only one generation per year.

Damage is caused by both adults and larvae feeding. Adults eat cotyledons, stems and young leaves leaving characteristic pits and small holes (shot-holing). The larvae tunnel into the plant tissue.

The beetle is now found throughout most of England, Wales and southern Scotland. There is a risk that flea beetle numbers will increase with climate change.



### Risk

- Short rotation.
- Large area of brassicas in locality.
- Warm, dry autumn in the previous year.

### Control

- Carefully designed crop rotation.
- Monitor brassica crops closely for pests, particularly during the first six weeks.
- Consider using treated seed where the risk of attack is high.
- Where flea beetles are identified seek advice from a qualified agronomist and, if organic, your certification body, on appropriate treatments and application rates.

### Effect on yield

Flea beetles can severely check growth, stunt young plants and, where pest pressure is high, plant loss will result.

### Threshold

Treatment thresholds have not been identified for forage brassicas so the guidance used by agronomists is the same as for oil seed rape.

The economic threshold for treatment to control larvae in oilseed rape is when numbers average over two larvae per plant (HGCA 2007).

Consider applying an early pyrethroid spray when adults have eaten:

- Over 25% of the leaf area at the 1-2 true leaf stage, or
- Over 50% of the leaf area at the 3-4 leaf stage, or
- The crop is growing more slowly than it is being destroyed.

The table below highlights the cost to replace lost crop energy per 10% loss of crop yield with concentrates.

	Yield (tonnes DM/ha)	Cost (p/kg/DM)	Average Quality ME	Cost (£) to replace lost crop energy with concentrates per 10% loss of crop yield
Stubble turnips	6.5	3.8	12	176
Grazing turnip	4.0	5.6	12	108
Hybrid brassica	8.0	3.2	12	216
Forage rape	4.5	5.5	12	122

## Chafer Beetle Grubs

Chafer grubs are the larvae of chafer beetle. The larvae are white, up to 2cm long with light brown heads, with three pairs of legs at the head end. They can be found in the soil under loose turf. Beetles lay their eggs between May and July in grass and larvae hatch after two weeks and feed on grass roots until late autumn when they move deeper into the soil to over-winter. Where chafer grubs are active, grass growth is poor and it may go brown. The larvae cause more damage as they grow bigger. Damage is seen in September and October when grubs can be found in the soil under the turf. Birds and badgers feed on the grubs, with badgers rooting up the turf, leaving bare patches of soil.



### Risk

- Older permanent pastures with a high proportion of secondary grass.
- Infested grass tends to be re-infested in subsequent seasons.

### Control

Where the field contains more than 25-30% ryegrass, white clover and other agricultural species and is not in an agri-environment scheme consider:

- Checking and correcting soil pH, phosphate and potash levels.
- Planting a break-crop and reseeding the pasture.
- Discussing appropriate agro-chemical treatment with a BASIS qualified adviser.

### Effect on grass yield

Grass yield can be significantly reduced the following season. There appear to be no reliable estimates in cash terms of the losses caused. As chafer activity tends to occur in lower productivity swards, the economic cost is equivalent to the income foregone from a well managed reseed. Reseeding can boost production from permanent pasture over five years by £2,000/ha after typical reseeding costs (Recommended Grass And Clover Lists 2012).

## Summary

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- Pest and diseases can have a significant effect on the establishment, yield and longevity of grass and forage crops.
- Through correct identification and an understanding of life cycle, methods of cultural and chemical control, the threat to grass and forage crop productivity can be minimised.

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**80% funding for one-to-one advice on grassland management and other technical issues related to production is available for eligible businesses via the Farming Connect Whole Farm Plan.**

**For more information, please get in touch.**

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