Introduction

When oilseed rape became a crop of choice in the 1980’s, the crop had few major pests, but as the area of cropping increased, several pests appeared and took advantage of the expanded area of food plants available to them. In the mid-late 1980’s, when low-glucosinolate varieties of rape became the norm, slugs suddenly became a problem, as the glucosinolates in the seed and cotyledons had previously kept them at bay.

Crops can be damaged from emergence (slugs, flea beetles), to flower budding (pollen beetle) and through to pod formation (cabbage seed weevil, brassica pod midge) and spring-sown crops may be more susceptible to damage than the more tolerant autumn-sown crop. With other changes such as the withdrawal of lindane seed treatments, the range of pests that may attack winter and spring oilseed rape has increased, with cabbage stem flea beetles appearing in Scotland in the summer of 2000. This, coupled with financial concerns in growing the crop suggests a fresh look is needed at the pests attacking oilseed rape, the damage they cause, and the potential methods for their management.

Slugs

The enforcing of low-glucosinolate levels in rapeseed resulted in a large increase in the palatability of emerging rape seedlings to slugs. Slugs can cause significant damage to both winter and spring-sown rape by eating the cotyledons and first true leaves (Fig. 1). If plants are killed, the resulting gaps in the crop are attractive to pigeons, and subsequent damage to the crop may occur in areas where pigeons are a problem. Slug damaged winter rape crops are more susceptible to damage from insect pests such as pollen beetle, as the vigour of the crop is reduced, and its ability to cope with further pest damage is diminished.

Slugs prefer heavier soils, and often production of a fine, firm seedbed is not possible, which increases the risk of slug attack. If crops can emerge quickly, they can escape the worst period of slug damage, which is from the cotyledon to the 1-2 true leaf stage. Beyond this they can grow away from further damage as the slugs concentrate on the older leaves. The use of slug pellets to protect the crop at emergence is recommended if the field has a history of slug problems, but it is advised that prior to sowing, slug traps be used to determine the risk of slug damage. Traps can be as simple as an upturned flower pot base, baited with chicken feed, or slug pellets. To make the most out of slug monitoring, traps should be employed when the soil surface is moist so that the slugs will be coming up the soil surface at night. If 3-5 slugs are found per trap (several traps should be used to identify problem areas within a field) then slug management in some form is recommended. Molluscicide pellets should only be used if creation of a fine seedbed is not possible. There are a wide range of molluscicide products available containing the active ingredients metaldehyde, methiocarb and thiodicarb. What should be borne in mind is that the more pellets that are applied, the more likely a slug is to find them and feed on them, so it is recommended that products with the higher application rates be used. To maximise the efficacy ofslug pellets, they should be applied when the soil surface is moist, and no rain is forecast, as mud splash can render pellets unpalatable to slugs and some pellets deteriorate when they get wet.

Fig. 1. Typical slug damage to oilseed rape leaves.
Aphids

In England, aphids are often a problem in the autumn as the peach-potato aphid (*Myzus persicae*) can transmit Beet Western Yellows virus (BWY), which can lead to reduced yields. In Scotland, this virus is insignificant, and whilst aphids may be found overwintering on rape, they do not cause any significant damage until the summer.

In the summer months, colonies of the cabbage aphid (*Brevicoryne brassicae*) may be seen on the stems, leaves and pods of both winter and spring rape plants (Fig. 2.).

![Fig. 2. Cabbage aphid infestation on oilseed rape](image)

The infestation of aphids can look severe on individual plants, but throughout the crop, the number of plants infested is usually low and does not warrant an insecticide treatment. Problems are more likely in dry summers, and an aphicide treatment is recommended if approximately 10% of flowering heads of winter rape are infested with aphids during flowering (GS4,5-4,9), and 5% of spring sown rape plants infested during green-yellow bud (GS3,3-3,7). Note that insecticide treatments applied for other pests such as pollen beetle will have an effect against cabbage aphids as well.

If applying any insecticide to a flowering rape crop, contact local beekeepers at least 24 hours prior to treatment to allow them to close hives and prevent bees foraging in crops during spraying. It is recommended that spraying take place in the early morning or evening to minimise exposure of bees to insecticides.

Cabbage stem flea beetle

Cabbage stem flea beetle (*Psylliodes chrysocephala*) has been a pest of winter oilseed rape crops in England for many years, but tended to be of minor importance due to routine insecticide treatments in the autumn and the use of insecticide treated seed. The beetle has been reported sporadically in Scotland in the past: in the mid 1980’s, the occasional beetle was found in insect traps in Tayside, Central Scotland, the Borders, Strathclyde and Dumfries & Galloway. However, an intensive search for it over 3 seasons in the mid-1990’s did not uncover a single specimen in Scotland. However, in August 2000, large numbers of the beetles were caught up in the rape harvest and it appears that the beetle is now present and breeding in Scotland, and could pose a threat to winter rape crops.

Whether the appearance of cabbage stem flea beetle in Scotland is a consequence of the banning of lindane seed treatments is a matter for conjecture, but the beetle is now in Scotland, seed treatments are currently not available and growers and advisers need to be aware of the potential threat that the pest may cause to winter rape crops.

The beetle is 3-5 mm in length, and is a metallic blue-black colour (sometimes light brown), with powerful hind legs that allow them to jump (Fig. 3).

![Fig. 3. Adult cabbage stem flea beetle](image)

The adult beetles appear in June/July and feed harmlessly on leaves and pods of rape crops for a couple of weeks before undergoing a summer diapause before reappearing in mid August/early September, often being caught up in the rape harvest. The beetles won’t damage the harvested seed, but their numbers can be very high and the beetles can cover trailers, walls, machinery and seed in their thousands as they seek a way out of the store.

The beetles need to feed for 2-3 weeks before they will begin to lay eggs near germinating rape plants. They will feed on brassica weeds and also the cotyledons and young leaves of emerging winter rape, and whilst this is not the most damaging stage of the pest, the shot-holing of cotyledons (Fig. 4) and young leaves (Fig. 5) can lead to stunting of the crop, particularly in combination with slug damage.

![Fig. 4. Shot-holing of oilseed rape cotyledons by adult cabbage stem flea beetle](image)
The beetles will feed and lay eggs until temperatures approach 0°C, so egg laying and hatch of larvae may continue for several weeks.

It is the larvae of cabbage stem flea beetles that are most cause for concern. From October, possibly into the following year, the newly hatched larvae will seek out young rape seedlings and chew their way into the petioles of leaves, and tunnel their way into the stem of the plant and occasionally the growing point (Figs. 6 & 7). This weakens the stems and allows water to enter their feeding tunnels which, when frosts occur, cause the leaves to freeze, contributing to the winter loss of plants and foliage.

In the spring infested plants will remain stunted and topple over if the stems are severely damaged (Fig. 7). The larvae (up to 7 mm long by this point) exit the plants in the spring and pupate in the soil, the adults emerging from June onwards. If, on average, the beetles are damaging 10% of the leaf area, then an insecticide treatment to prevent further damage by the beetles may be worthwhile. Make sure that cabbage stem flea beetle damage is not confused with that caused by slugs; slug damage tends to lead to larger, ragged holes of leaves and whole sections of leaf material eaten (see Fig. 1).

Plants can be checked for the presence of cabbage stem flea beetle larvae from November onwards, and if, on average, 3-5 larvae are found per plant, then an insecticide treatment may be worthwhile. Combining this treatment with the light leaf spot fungicide treatment or autumn herbicide application may be worthwhile, but the insecticide should not be used purely as an insurance treatment. As the grubs are very susceptible to insecticide prior to burrowing into the leaf, an insecticide treatment may give several weeks protection on the plant surface. Note that you may find some legless white grubs in some leaf petioles – these are leaf miner grubs and are not a problem. Beetle grubs have 3 pairs of legs, have a distinct head and are lightly spotted (Fig. 6).

Pollen beetles (Meligethes spp.) (also known as blossom beetles) are probably the most common pests seen on Scottish rape crops (Fig. 8). The greenish, black beetles, 2.5 mm in length, are seen on rape crops from late April onwards.

As their name suggests, the beetles feed on the pollen of crops, and they are damaging when crops have yet to flower, as they chew their way into flower buds to get access to the pollen within. Once crops have flowered, the pollen is readily accessible and damage is minimal. The beetles also lay eggs in rape flower buds and the larvae feed on the pollen and nectaries inside the buds. Damage by the adult beetles and their larvae result in ‘blind stalks’ (Fig. 9) and a resultant loss in yield.
Winter rape plants tend to be able to compensate for some loss of pods by diverting resources into producing larger seeds, but if the crop has suffered from significant slug or pigeon damage, then this ability to compensate is reduced. Consequently, there is a different treatment threshold for backward winter rape crops.

Winter rape crops that have overwintered well and suffered little stress from slugs or pigeons, need to exceed 15 pollen beetles per plant throughout the crop at the green-yellow bud stage (GS3,3-3,7) before an insecticide treatment is likely to be worthwhile. In Scotland most winter rape crops have begun flowering before pollen beetles migrate into crops, and whilst the 15 beetles/plant threshold may be exceeded during flowering, this is no threat to the crop, and no insecticide treatment for pollen beetle should be applied to a flowering rape crop.

Backward rape crops cannot compensate for pollen beetle damage, and consequently as few as 5 beetles per plant at green-yellow bud may be sufficient to justify an insecticide treatment.

Spring rape crops are very susceptible to pollen beetle damage, having little capacity to compensate for pest damage. Consequently, one beetle per plant at green-yellow bud is capable of having a significant effect on yield, and an insecticide treatment is recommended if this threshold is achieved throughout the crop. More than one insecticide treatment may be needed as recolonisation of the crop can occur rapidly. Once crops have flowered, no insecticide treatment is needed regardless of how many pollen beetles there are per plant.

**Cabbage seed weevil**

Cabbage seed weevils (*Ceutorhynchus assimilis*) may be seen on crops from late April (Fig. 10). The adults feeding on buds, and pods cause little damage, but they lay eggs in developing pods, and the legless grubs feed for 4-5 weeks within the pods on the seeds. The grubs exit the pod via a pin-sized exit hole, which can allow diseases to enter as well as providing an entry point for brassica pod midges to lay eggs within the pod.

Seed weevil numbers need to exceed 2 per plant throughout the crop from flowering onwards to justify an insecticide treatment, and in most seasons this threshold is not reached.

**Brassica pod midge**

Brassica pod midge (*Dasineura brassicae*) lay their eggs within developing oilseed rape pods. On hatching, the small (1-2 mm) white or pale-yellow larvae feed on the inside of the pod wall, leading to distorted pods which eventually lead to pod-shatter and loss of seed (Figs. 11 & 12). Pod midge utilise holes in developing rape pods for egg-laying, and these holes may be due to feeding or oviposition punctures by cabbage seed weevil, or feeding punctures by other insects such as capsids.

**Fig. 9. ‘Blind stalks’ caused by pollen beetle damage**

**Fig. 10. Cabbage seed weevil on an oilseed rape pod**

**Fig. 11. Adult brassica pod midge (top) and its larvae within an oilseed rape pod (bottom)**
Fig. 12. Splitting of an oilseed rape pod due to brassica pod midge larval feeding

This pest is present in Scotland, mainly in eastern areas as far north as Grampian. However, its presence is not usually noticed, as infested pods are usually concentrated on the edges of crops where damage by birds often masks low infestations. In Scotland spring rape crops appear to be more at risk of attack than winter rape due to the phenology of the midge. Control of pod midge has tended to rely on the prevention of feeding/oviposition punctures by cabbage seed weevil, and adequate control of seed weevil should minimise any risk of pod midge attack. However, it is not yet clear how important capsid damage to pods is for pod midge oviposition.

Other pests

Occasionally, particularly if winter and spring rape is emerging in dry soil conditions, flea beetles (*Phyllotreta* spp.) may cause shot-holing of cotyledons and the first true leaves (Fig. 13). The withdrawal of insecticide seed treatments may increase the risk of flea beetle damage, and emerging crops should be checked for damage in dry conditions. If damage is extensive up to the first two leaves, then application of an insecticide may be justified if the weather is forecast to remain dry. Flea beetles are less damaging in wet weather.

Cabbage leaf miner (*Phytomyza rufipes*) often causes noticeable mines in the lower leaves of autumn-sown rape (Fig. 14). However, the damage is seldom threatening to the plant and providing the crop is not late-sown or too backward, plants can grow away from the damage.

Sporadically damage is seen from cabbage stem weevil (*Ceutorhynchus quadridens*) in the summer, and rape winter stem weevil (*C. piciarris*) in the winter. The larvae of both these weevils burrow into the stems of plants and can lead to stunted plants prone to lodging. Damage is usually patchy and is not a cause for concern.

Management of oilseed rape pests

The scope for cultural control of rape pests is limited to some extent as pests such as pollen beetle and cabbage seed weevil can fly several kilometres from their overwintering sites (the previous season's rape crop) when they emerge in the spring. However, avoiding having this season's rape crop in fields close to the previous season's rape will reduce the risk of infestation to some extent. Similarly, steer clear of growing spring and winter crops near to each other, as pollen beetles tend to leave the winter crop after flowering and having a spring rape crop close by is asking for trouble.

Effective and regular monitoring of crops is essential to determine whether any action is necessary for the control of pests. Monitoring can begin before the crop is planted by using baited slug traps to gauge the risk from slugs, and creating a fine seed bed will reduce the risk of slug damage to some extent. Whilst harvesting this season's winter and spring rape, are shiny, dark blue beetles found on the walls of the trailer? This can be an early warning that cabbage stem flea beetles are on the farm and may pose a threat to the next crop of winter rape.

Checking the crop regularly from emergence and looking for signs of pest activity: shot-holing of leaves, slug slime trails, beetles hiding under leaves can give valuable information. For the spring pests such as pollen beetles, cabbage seed weevil and cabbage aphids, regular monitoring of crops from green bud (GS3,3) will determine whether any insecticides are needed.
**Molluscicides/Insecticides**

The table below gives a list of the active ingredients approved for use against pests of oilseed rape (valid in January 2001). Check the label and approval status for each active ingredient and product examples listed for any changes since publication of this technical note.

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Product examples</th>
<th>Pests targeted</th>
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<tbody>
<tr>
<td>metaldehyde</td>
<td>Escar-Go 6, Metarex, Optimol</td>
<td>Slugs</td>
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<tr>
<td>methiocarb</td>
<td>Decoy, Drona, Exit</td>
<td>Slugs</td>
</tr>
<tr>
<td>thiodicarb</td>
<td>Genesis, Judge</td>
<td>Slugs</td>
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<tr>
<td>alpha-cypermethrin</td>
<td>Contest, Fastac</td>
<td>Aphids, cabbage stem flea beetle, flea beetle, pod midge*, pollen beetle, seed weevil</td>
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<td>bifenthrin</td>
<td>Starion, Talstar</td>
<td>Cabbage stem flea beetle</td>
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<tr>
<td>cypermethrin</td>
<td>Toppel 10, Cyperkill</td>
<td>Cabbage stem flea beetle, pod midge*, pollen beetle, seed weevil</td>
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<td>Decis</td>
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<td>deltamethrin + pirimicarb</td>
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<td>Hallmark Zeon, Lambda-C</td>
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<tr>
<td>lambda-cyhalothrin + pirimicarb</td>
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<td>Aphox, Phantom</td>
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<td>tau-fluvalinate</td>
<td>Mavrik</td>
<td>Aphids, pollen beetle</td>
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<td>zeta-cypermethrin</td>
<td>Fury, Minuet</td>
<td>Cabbage stem flea beetle, pod midge*, pollen beetle, seed weevil</td>
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* Pod midge control relies on control of seed weevil

**Photograph acknowledgements**

Figs. 1, 2, 4, 5, 7, 12, 14. V.H. Paul (Soest, Germany)

Fig. 3. E. Bartlet (IACR Rothamsted)

Figs. 6, 9, 13. R. Coutin (OPIE, France)

Fig. 8, 11 (top). K. König (Munich, Germany)

Fig. 10. S. Carré (INRA, France)

Fig. 11 (bottom). R. Büchi (FAP, Switzerland)