

Control of bruchid beetle on broad beans

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Introduction

The bruchid beetle (bean seed beetle) is now widespread in all varieties of broad and field beans in many parts of England. The most severe infestations always seem to occur in a band south of the Wash and stretching from the West Midlands to East Anglia and extending down to the south coast. Damage has only rarely been seen in crops grown to the north of Yorkshire and hardly ever in the

Borders and Eastern Scotland. This factsheet describes the biology of the bruchid beetle in the UK and provides guidelines on improving control. It provides a summary of the information that was developed in HDC HortLink project FV 322. This project was set up because control practices were not effective in reducing damage by bruchid beetles and there were large gaps in the knowledge of the

biology and behaviour of the pest in locating host crops and egg-laying during the critical flowering and pod forming stages in early summer. The factsheet gives recommendations for more precise insecticide applications to be made to broad beans which to improve control and reduce the risk of pesticide resistance.



1 Bruchid beetle damage on broad beans

Damage

In broad beans, the entry hole of the newly hatched larvae can be seen as a small hole or cut in the seed coat of the shelled bean (Figure 1). This may darken after vining. If the beans are cut open, the immature larva can be found feeding within the seed (Figure 2) making them unacceptable for processing or fresh market. Damage to mature or field beans is characterised by a circular hole in the seed where the adult bruchids have emerged.

Blemished or infested beans in a load may lead to crop rejection by the processors or hand-picked beans becoming unacceptable for the fresh market.



2 Bruchid bean larvae in infested broad beans

Description and life cycle

There are many species of bruchid beetles worldwide but the bean seed beetle (*B. rufimanus*) is the only species endemic in the UK. Unlike many other tropical species, it has only one generation each year and does not multiply in stored produce. The adult beetle is 3.5-4.5mm long, oval, black or dark-brown in colour with small, grey flecks along the wing cases (Figure 3). A characteristic of bruchid beetles is that the wing cases do not extend to cover the abdomen completely and the hind pair of legs appears to be longer than the other two pairs. The larvae are found inside seeds. They are white, segmented, fleshy grubs, 3-4mm long when fully grown, have a light brown head with small legs on the forward three segments.

Adults fly to beans from their overwintering sites, such as hedgerows and grass margins, during April and May and after feeding for about two weeks on pollen, eggs are laid on the surface of developing pods. Eggs are laid singly or in small groups and are virtually transparent, cigar-shaped, 0.5mm long with a flattened irregular edged "base" which fixes the egg to the pod surface (Figure 4). Egg-laying is often concentrated on pods set on the lower third of the plant. After a few days, the larvae hatch and bore through the pod wall into the developing seed.



3 An adult bruchid beetle



4 Eggs can be found fixed to the pod surface during April and May

Development continues inside the seed where the larva feeds within a circular chamber just beneath the

seed coat. In beans that are allowed to reach the mature dry stage, the larva pupates when fully grown. After

pupation, the adult then bites its way through the seed coat, leaving a circular hole in the bean (Figure 5).



5 The damage caused where broad beans are left in the field until maturity

Control in the field

Control of larvae as they hatch from the eggs is difficult because they penetrate the pod immediately beneath the egg case. A reduction of damage must be achieved by targeting the adults and reducing egg-laying. The timing of the spray is therefore critical. During flowering, crops should be examined for adults. This can be done by tapping the flowering stems into the hand or a small flat box. Currently the only chemical active ingredient available to control bruchid beetles on broad beans is Lambda-cyhalothrin. This is available as a Specific Off-Label Approval (SOLA) for the product Hallmark with Zeon Technology (2006/0753). Other products containing Lambda-cyhalothrin are also available, check the CRD website for more details: www.pesticides.gov.uk.

Temperature

A LINK research project funded by Defra and HDC (FV 322) indicated that more reliable control of the pest was achieved by combining the spray timing with maximum temperatures. The current recommendation was

established in the UK following work carried out in France (Muel, F., UNIP) to investigate triggers for egg-laying in female bruchid beetles. The French work found that temperatures of 20°C were necessary to stimulate egg-laying and this has been confirmed in the UK where activity and egg-laying were increased when the threshold temperature of 20°C was reached.

Spray nozzles

An investigation of spray application technology was carried out. The objective was to establish whether angled nozzles or increased water volume would increase spray penetration into the crop and improve control. Overall, the results of trials proved that using angled nozzles such as Syngenta Amistar nozzles, Hawk nozzles or potato nozzles, when compared to standard Lechler flat fan nozzles, gave better control of bruchids. No significant improvements were gained by increasing water volume and in some cases control was reduced due to increased spray run-off. There have been no changes to recommendations

for standard water volumes of 100 to 200 litres per hectare.

Monitoring

The development of a field trap for monitoring the presence of bruchids in crops was initiated as part of FV 322. Plant semio-chemicals were combined in a lure, releasing different ratios of the flower volatiles cinnamyl alcohol, trans-cinnamaldehyde and linalool. Releasing the three compounds in the natural ratio in which they occur in bean flowers and using a boll-weevil cone trap, proved to be the most attractive. As a result of the prototype investigation, further work has been planned following the end of FV 322 to identify an insect pheromone for use in conjunction with the flower volatiles. The development of a web-based spray forecasting tool using temperature, crop growth stage and other weather conditions, in conjunction with the traps, is being undertaken as part of a new project funded by the Technology Strategy Board.

Action points

- Apply an insecticide spray when adults are found in the crop and beans have developed the first pods on the lowest trusses but only after temperatures have reached 20°C on two consecutive days.
 - A second spray should be made 7-10 days later.
 - Apply the spray through angled nozzles or twin caps angled both ways using a medium spray quality.
 - Apply insecticides in the early morning or evening to avoid direct contact with bees.
 - Cultural control can be achieved by harvesting all broad beans before they reach the mature, dry stage.
 - Bear in mind that where beans are left in the field until maturity, bruchids are able to complete their life cycle and adult insects emerge from the dry seed. These insects will move into the overwintering sites and re-infest broad bean crops the following season.
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Useful publications

Recent HDC project reports

FV 322

Broad beans: Management and control of bruchid bean seed beetle (Sustainable Arable-LINK)

FV 369

Broad beans: Evaluation of varieties

FV 355

Broad beans: Fungicide programme for chocolate spot control

HDC publications

Pea and Bean Crop Walkers' Guide

Provides photos and descriptions of pests, diseases and disorders of peas, green beans, runner beans and broad beans

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