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Published in:
Proceedings Crop Protection in Northern Britain 2002

Print publication: 01/01/2002

Document Version
Peer reviewed version

Link to publication

Citation for pulished version (APA):
Evans, KA., & Hughes, JM. (2002). New pest problems in Scottish oilseed rape crops: a one-off or here to stay. In *Proceedings Crop Protection in Northern Britain 2002* (pp. 79-84). The Association for Crop Protection in Northern Britain.

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Download date: 27. Nov. 2026

Proceedings Crop Protection in Northern Britain 2002

NEW PEST PROBLEMS IN SCOTTISH OILSEED RAPE CROPS: A ONE-OFF OR HERE TO STAY?

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Summary: There are relatively few major insect pests of oilseed rape in Scotland, so when two new pests appear on crops, the reasons for their appearance need to be addressed. Brassica pod midge (*Dasineura brassicae*) and cabbage stem flea beetle (*Psylliodes chrysocephala*) have the potential to cause significant damage to Scottish rape crops. In the case of the pod midge, its presence over the last 10 years has not been translated into significant damage. Adult cabbage stem flea beetles suddenly appeared in 2000, but the more damaging larval stage has not been reported at all. The possible reasons for the appearance of these pests in Scotland, whether they are likely to be damaging, and whether they are here to stay is discussed.

INTRODUCTION

Oilseed rape is a relatively new crop in the UK – prior to the 1960's very little oilseed rape was grown. Establishment of the EEC and the introduction of a price support scheme for oilseed rape led to a rapid expansion of cultivation in England throughout the 1970's and early 1980's. However, in Scotland oilseed rape only really became established as a commercial crop in the early 1980's.

In the early days of rape cultivation in England, the main problems cited by growers in 1969 were pigeon control (36%), harvesting (27%) and drying and storage (23%). No growers thought that insects or disease were problems. However, a similar survey 6 years later reported insect and disease control to be the main problem cited by 43% of growers, and this rose to 62% in 1980, second only to pigeon damage (Lane 1983). Three factors led to this increase in pest problems: the area of the crop grown, its distribution throughout the country, and the length of time the crop has been grown in a particular area (Lane 1984).

The area of oilseed rape (excluding set-aside) grown in Scotland increased from 1,600 ha in 1982, peaking at almost 70,000 ha in 1994, and then dropping to 36,401 ha in 2000. Has there been a similar increase in pest problems in Scottish oilseed rape crops over the years as seen in English oilseed rape crops?

There are relatively few insect pests that specifically attack oilseed rape in Scotland. Pests such as aphids and flea beetles (*Phyllotreta* spp.) have been recorded previously on vegetable

brassicas and were already present in Scotland before oilseed rape cultivation, but what of the following pests?

- Cabbage seed weevils (*Ceutorhynchus assimilis* Payk.) were first recorded on a Scottish winter rape crop in 1978 in Perthshire. By 1981 they were seen on crops in Shetland. This pest is now ubiquitous throughout Scotland (Hughes 1998).

- Pollen beetles (*Meligethes* spp.) were recorded on rape crops in 1984 in north-east Scotland, and are now common.

- Brassica pod midge (*Dasineura brassicae* Winn.) was reported in Morayshire in the late 1980's, and more recently could be found in eastern and central Scotland, but particularly so in the Borders (Hughes 1998).

- Cabbage stem flea beetles (*Psylliodes chrysocephala* L.) were found in large numbers in south-east Scotland during the 2000 rape harvest.

Could the appearance of these pests be mirroring the situation that occurred in England in the 1970's and 1980's?

THE STATUS OF OILSEED RAPE PESTS IN SCOTLAND

Whilst the above pests are present in Scotland, how many of them can be considered to be particularly damaging to rape crops? If we look at the two most common insect pests, cabbage seed weevils and pollen beetles, only the latter can really be considered to be a major pest in Scotland, and perhaps then only on spring rape crops.

On a 'normal' winter rape crop, 15 pollen beetles per plant throughout the crop are needed at the green-yellow bud stage to justify an insecticide treatment. Records over the last 10 years from the SAC crop monitoring ("adopt-a-crop") programme, indicate that this threshold has seldom been achieved. However, crops that have suffered a degree of winter kill, or damage by pigeons and/or slugs have a reduced capacity to compensate for pest damage, and 5 pollen beetles per plant are an acceptable treatment threshold for these crops – a threshold occasionally achieved on these backward crops. At least a quarter of winter rape crops received an insecticide treatment for pollen beetle in 1998 (Snowden & Thomas 1999). It seems unlikely that all of these crops exceeded the treatment threshold of 15 beetles per plant throughout the crop, or were backward and exceeded the 5 per plant threshold.

For spring rape crops however, the threshold levels for pollen beetle are significantly lower; as little as 1 beetle per plant at green-yellow bud is enough to cause a drop in yield, and this threshold is adopted in Scotland, and is often achieved. At least two-thirds of crops received an insecticide treatment for pollen beetle in 1998 (Snowden & Thomas 1999).

Cabbage seed weevil numbers need to exceed 2 per plant throughout the crop (winter and spring sown) during flowering to warrant an insecticide treatment, a threshold only occasionally achieved in records from the SAC crop monitoring programme. Despite this,

many crops (a fifth of winter rape, but less that 5% of spring rape) received an insecticide application for cabbage seed weevil control in 1998 (Snowden & Thomas 1999).

Insecticide use for the 1999/2000 season, suggests that 48% of winter rape crops and 36% of spring rape crops received pyrethroid insecticide treatments (J P Snowden pers. comm.), presumably for pollen beetle and/or seed weevil control. Are these insecticide applications necessary?

Brassica pod midge

The pod midge is a pest of oilseed rape throughout northern Europe, but has not been reported as economically damaging in Scotland. The midge relies on damage to pods in order to gain access, as its ovipositor is relatively weak. In many countries, control of pod midge is allied to the control of cabbage seed weevil, which makes feeding or oviposition punctures in pods which the midge uses for oviposition. The midge can lay up to 60 eggs within a single pod, and on hatching the larvae feed on the inner walls of the pod, causing swelling and yellowing of the pod, which leads to premature pod shatter and loss of seed. Infested pods invariably lose their seed through pod shatter (90-95%). A detailed study of the distribution and phenology of brassica pod midge was carried out in the mid 1990's (Hughes 1998) and the results are summarised below:

- Brassica pod midge was found in rape crops in most rape-growing areas of Scotland (Fig. 1), with populations decreasing as you move north from the Borders.
- The first and second generation occur on winter rape, with second and third generations on spring rape and a possible fourth generation on wild brassicas and volunteer rape up until mid-September.
- Pod damage by capsid (lygid) bugs is suitable for pod midge oviposition and may act as an alternative pod access mechanism to seed weevils (Hughes & Evans 2001).
- The distribution of brassica pod midge is not limited by the Scottish climate.

It is likely that the distribution of pod midge within Scotland is consistent with its spreading northwards from the English border, with greater populations in the Scottish Borders being a reflection of this. However, the continued (mainly unnecessary) control of seed weevils by insecticide applications (those applied for pollen beetles will also control seed weevil to some extent), will also limit the spread of pod midge by reducing the availability of damaged pods for oviposition. Capsid bug damage to pods can compensate for this to some extent, but capsid damage to oilseed rape crops occurs later in the season than that of seed weevils, and would not provide access via feeding punctures in pods for first generation pod midge (Hughes & Evans 2001).

Reducing unnecessary insecticide applications for seed weevil and pollen beetle control, particularly on the winter crop could potentially lead to greater abundance and damage by brassica pod midge.



Fig 1. Distribution of brassica pod midge (▲) from a survey of 36 crops in 1996 (Hughes, 1998).

Cabbage stem flea beetle

Cabbage stem flea beetles are a metallic blue-black colour, 3-4.5 mm long, and have just the one generation a year. Adult beetles tend to get caught up in the harvest of winter and spring oilseed rape, and are often seen on trailers and carried back to stores with the harvested seed. This was how cabbage stem flea beetles came to the notice of growers and SAC advisers in the summer of 2000 and again in 2001. An intensive search for beetles and larvae in the mid-1990's had not found a single specimen (adult or larva) in Scotland (Hughes 1998). Cabbage stem flea beetle can damage the crop in two ways: firstly, the adult beetles feed on emerging winter rape seedlings, causing shot-holing of the leaves, similar in damage to the smaller *Phyllotreta* species of flea beetle. The beetles also mate in the crop and lay eggs near to rape seedlings, the larvae penetrating plants and mining the stem and petioles of leaves over the winter months, leading to winter kill and stunting/lodging of infested plants. In England, larval damage is more economically significant than the adult feeding damage, however, in Scotland we have yet to see or receive any reports of larval damage.

The occasional cabbage stem flea beetle has been found in insect traps in the past in Scotland (Foster 1986), but there have been no reports of the beetles attacking oilseed rape crops.
In the summer of 2000, reports of beetles in their hundreds being caught up in the harvest of winter rape were received, and the beetles were confirmed as cabbage stem flea beetles. Confirmed sightings were restricted to south-east Scotland (Fig. 2). At the time of writing, the same applies for sightings of the beetle in 2001. Damage by adult beetles was reported from several winter rape crops, but this was not translated into larval damage, as a survey carried out on behalf of SEERAD was unable to find any larvae within winter rape crops.

The appearance of cabbage stem flea beetle in Scotland coincides with the revocation of lindane (gamma-HCH) as an insecticide seed treatment for use in winter oilseed rape in July 1999. However, at least 23% of winter rape seed treated with lindane was sown in the autumn of 1999 (J P Snowden pers. comm.).



Fig. 2. Distribution of cabbage stem flea beetle (▲) in the summer of 2000.

Prior to 1999, almost every crop of winter rape received a seed treatment of some description (96-99%), with lindane being applied to at least 76% of the crop in 1997, at least 58% of the crop in 1995, and at least 85% of the crop in 1993 (Snowden & Thomas 1995, 1999; Snowden & McCreath 1997). This wide-scale use of lindane as a seed treatment, targeting *Phyllotreta* flea beetles, may well have kept cabbage stem flea beetles below detectable and damaging levels for many years, until its revocation in 1999. The majority of seed was sown without an insecticidal seed treatment in 1999, and this may have allowed cabbage stem flea beetles to build up their numbers to those seen in 2000.

PEST PROBLEMS IN THE FUTURE

The area of oilseed rape grown as a commercial crop in Scotland is declining, and if this trend continues, then the potential reservoir for insect pests of rape will fall, particularly for cabbage stem flea beetle and brassica pod midge. It is encouraging that to date, there have been no reports of cabbage stem flea beetle or brassica pod midge as serious pest problems in Scottish oilseed rape crops, but what of their future pest status?

Reducing unnecessary insecticide use on rape crops for pollen beetle and seed weevil control could allow brassica pod midge to build up their populations by exploiting the greater number of seed weevil punctures in pods that the midge needs for oviposition. Whether this will lead to damaging levels of brassica pod midge can only be speculation, but climate is not a limiting factor for establishment of this pest in Scotland (Hughes 1998).

The status of cabbage stem flea beetle as a pest in Scotland has yet to be fully assessed. Damage by adult beetles at crop emergence has been seen in 2000 and 2001, but as yet no reports of the more serious larval damage have been received. The removal of lindane as a seed treatment in the majority of Scottish winter oilseed crops probably allowed the beetle to build up its populations from a very low level. Only time will tell if the introduction in autumn 2001 of a new insecticide seed treatment for winter oilseed rape will be taken up by

the majority of Scottish growers, and send cabbage stem flea beetles back to being a curiousity.

In Scotland, it can be argued that on the winter crop particularly, insecticide use is often unnecessary as pest numbers seldom exceed the threshold for treatment. Reducing the use of insecticides on rape crops may however allow currently minor pests, such as the brassica pod midge, to become established, and close monitoring of rape crops is needed to determine whether this will occur.

ACKNOWLEDGEMENTS

We acknowledge the support of BBSRC, SEERAD, SAC advisers, oilseed rape growers and contributors to the SAC Adopt-a-Crop programme for their help in providing data for this work.

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