Anthonomus spilotus – a new pest of pears in the spring

Figure 1. Adult *Anthonomus spilotus*

Figure 2. Small holes in developing flower buds

Anthonomus spilotus Redtenbacher (Figure 1) has recently been identified in UK pear orchards for the first time. It has a life cycle similar to the apple blossom weevil (*A. pomorum*) and damages blossoms and unfurling leaves (Figure 2) in the spring. The purpose of this factsheet is to increase pear growers' awareness of the pest and to encourage spring monitoring.

Action points

- **Monitor pear orchards weekly from February by tap sampling tree branches to check for the presence of adult pear bud weevils**
- **Check for feeding holes in flower and leaf buds**
- **Continue to monitor until May**
- **Make a careful decision over the need to use control measures and the choice of product**
- **Continue to monitor for the pest after control methods have been used**

Introduction

Anthonomus spilotus is a new pest of pears in the UK. The weevil is normally found in warmer climates but is suspected to have been in the UK since at least 2015 when larvae were first identified in young leaf shoots. The weevil has also been found in other northern countries in recent years including Belgium. It is recorded in N. Africa, France, Spain, Portugal, Italy and Greece. It has established as far north as Sweden and as far east as Russia. Several factors have probably combined to give *A. spilotus* the opportunity to build up in UK orchards. The weevil could have been introduced in the compost of potted plants, as the pupae drop to ground level. Pear growers increasingly avoid spraying broad spectrum products in pear orchards to preserve natural predators for pear sucker control. In addition, a warming climate may be aiding survival in new regions.

A. spilotus should not be confused with either *Anthonomus pyri* (pear bud weevil) or *Anthonomus pomorum* (apple blossom weevil). *A. pyri,* primarily damages overwintering flower buds in pear while *A. pomorum*, a related species to *A. spilotus*, is found in apple but is reported to occasionally cause damage to pear and quince blossom.

Identification

A. spilotus is 3-3.5 mm in length (Figure 3) with an ash coloured transverse band across the wing cases (elytra). This band has whitish coloured hairs (pubescence) and is perpendicular to the midline join of the wing cases. The body of the adult weevil also has ginger hairs, which are only visible under a microscope. The transverse band is more horizontal than that of *A. pomorum* which is more V-shaped and widens to the outer edges of the wing case. All three species (*A. spilotus, A. pyri* and *A. pomorum*) have strongly bowed front legs (tibiae) with a wide, conspicuous, tooth. This characteristic should therefore not be relied upon to differentiate between the three species. The extremities of the leg segments (femur, tibia) and anterior border of the prothorax are a light iron colour.

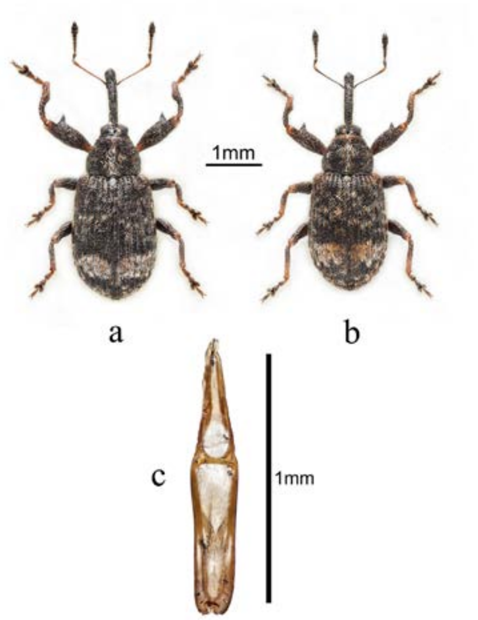

Figure 3. *Anthonomus spilotus* from pear trees in Kent, 2017; (a) Male (b) Female (c) Median lobe of male genitalia. Specimens in Natural History Museum, London. Photograph by Harry Taylor

Male and female *A. spilotus* are very similar but the male ‘nose’ (rostrum) is dull, with deep to rugose punctuation and very slightly shorter than the female (1.2× as long as the head and pronotum compared to 1.3× of the female). The female rostrum is shiny with fewer and less deep punctures. However, it should be noted that species differentiation is quite difficult. Specimens should be sent to an expert for confirmation. When trying to determine which species is present in your orchard, it is probably better to rely on lifecycle information and damage characteristics.

The eggs (Figure 4), which are laid inside the expanding buds, are yellowish-white in colour and elliptical in shape. The larva is a characteristic C-shape, is yellowish-white and has a brown head capsule (Figure 5). The pupal case is brown in colour and barrel shaped (Figure 6).

Life-cycle of the pest

Like apple blossom weevil, *A. spilotus* has one generation per year. It overwinters until early March and then begins to feed on developing flower and leaf buds of pear and less frequently on medlar (*Mespilus*), or hawthorn (*Crataegus*).

Figure 4. Eggs are yellowish-white and elliptical in shape

Figure 5. Larva are a characteristic C shape with a brown head

Figure 6. The pupal case showing pupa inside

Mating also occurs at this time of year. Data collected by NIAB EMR in 2016 suggests that the weevil may be more active at night.

The female weevil inserts her rostrum into the buds, which creates holes. Some of these holes seem to be caused simply through feeding action, especially earlier in the season.

However, later on, from mid-March (Figure 7), it is thought that egg laying begins to take place in these holes (Figure 8) although more information is needed to confirm this. When laid in flower buds the eggs are laid quite close to the anthers (Figure 9). Eggs are also found in the leaf buds. Normally one egg per bud is inserted, but sometimes two can be found. Egg laying continues until mid-April. Larvae develop inside the buds (Figures 9 and 10) into May at which point the adult numbers and feeding damage are much reduced. The aborted leaf and flower buds often drop to the ground, where the pupa (Figure 11) is thought to develop during May. Adults emerge in mid-June (Figure 12) and diapause until the following spring. *A. spilotus* never lays eggs in the autumn.

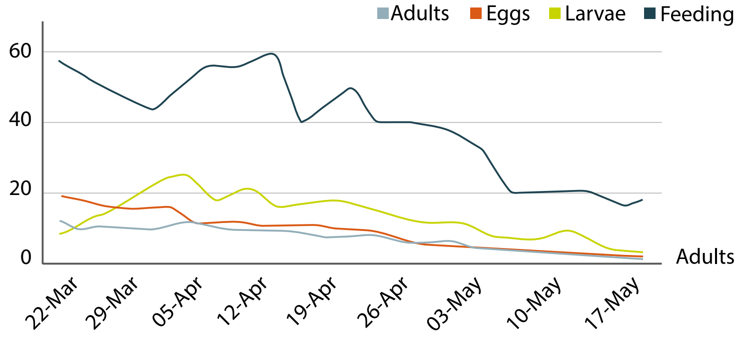

Figure 7. Abundance of *A. spilotus* adults, eggs, larvae and feeding damage between mid-March and mid-May.

Damage caused

The feeding damage caused by the adults results in small holes through the bracts of the growing leaf buds (Figures 2 – front page, 13 and 14). Holes in flower buds are also found with blackened edges (Figures 14 and 15 – overleaf) which sometimes have liquid oozing from the hole. The puncturing causes necrosis of the plant tissues.

Later the leaf or flower buds bend and develop irregularity. Flower buds are consumed by the larvae and the fruits fail to develop. On the leaves, the larvae feed on parenchyma cells causing subsequent irregular growth. The emerging young leaflets become twisted and bent and fail to unfurl or grow properly. The leaf eventually dries up and becomes black. This should not be confused with pear leaf midge damage which is characterised by the leaf sides rolling inwards and eventually becoming black. The damage is significant as abnormal bud growth continues until May.

Figure 8. Egg laid in a hole in the bud tissue

Figure 9. Eggs are laid close to the anthers in the flower bud. Here, a larva can be seen alongside the developing anthers inside the flower bud

Figure 10. Larva present in the base of a flower bud

Figure 11. Pupa which has been excised from its puparium

Figure 12. Adult weevil emerging from the puparium

Figure 13. Small holes in developing leaf buds caused by adult feeding

Figure 14. Photograph of feeding damage in a leaf bud taken through a microscope. Note the necrotic tissue around the feeding hole

Figure 15. Damage to flower bud – note the small hole beneath the sepals

Monitoring

From the end of February onwards, pear orchards should be tap-sampled at least every week, to look for adult weevils. Forty trees per orchard should be assessed using a stick and white collecting tray (Figures 16 and 17) ensuring good coverage of the orchard and returning to a different area the following week. In addition unopened leaf and flower buds should be visually inspected with a hand lens for the appearance of small black holes (Figures 14 and 15), possibly with liquid oozing out of them. These holes are easy to see without a hand lens once experience is gained. Ensure that a representative area of the orchard is sampled. Guidance on how to achieve this is available in the Apple Best Practice Guide on the AHDB Horticulture website. It is important to check every pear orchard as the pest does not seem to be present in every orchard on a farm. Monitoring should continue after spray applications to check that the treatment has been effective.

Figure 16. Orchards should be tap-sampled at least weekly from February onwards using a stick and white collecting tray

Control

Although parasitoids of *A. spilotus* have been documented, populations appear to be insufficient to gain complete control of the pest.

At present, there are no cultural or biological control methods available to pear growers, so it will be necessary to use traditional crop protection products. However, to date, no spray threshold has been developed, so it is important that growers only spray when absolutely necessary as effective products may disrupt natural enemies conserved to control pear sucker.

The optimum spray timing is likely to be required either pre- or post- petal fall, although as this is a new pest of pear in the UK, further experience of its control will need to be developed to confirm this. At this time of the season, fewer pear sucker natural enemies will be present in the orchard, which may permit the use of products which might not be used later in the season as populations of these natural enemies build up.

Growers should also consider whether the size of population present in the orchard is likely to cause economical damage. More experience and data is needed, but if the larvae are found to be consuming only small numbers of flowers within a truss, this could potentially have a thinning effect as each truss produces far more flowers than the tree can hold.
Extensive damage to leaf buds, however, could, over the long term, damage the new growth and vigour of the trees and reduce yields. Because *A. spilotus* only has one generation, it may be that one single spray in one year could reduce numbers over several years.

The final choice of control product should also be considered carefully. Most sprays will be targeted to control egg laying adults as the juvenile stages of the pest are hidden inside the leaf and flower buds. Data from AHDB Projects TF 223 and TF 220 have shown Calypso (thiacloprid) to be effective at controlling adult *A. spilotus* in the spring. In laboratory studies on sprayed *A. spilotus* adults from UK pear orchards, Calypso and Spruzit (pyrethrins) gave almost 90% kill while Hallmark (lambda-cyhalothrin), Gazelle (acetamiprid) and Exirel (cyantraniliprole) offered around 50% control of adults. It should be noted that cyantraniliprole is not currently approved for use on pear. Steward (indoxacarb) and Coragen (chlorantraniliprole), applied to the adult insects topically, were ineffective.

Ideally plant protection products should not be applied during the blossom period when pollination by bees and other insects is taking place and as a result, some products have restrictions on use during blossom. Growers should consider the persistence of agrochemicals in the crop and the harm they may cause to natural enemies which become active around this time of year, including anthocorids and earwigs.

Table 1 (see insert in back cover) lists those products currently approved for use on UK pears for controlling a range of pests. Some are known to offer full or partial control of *Anthonomus spilotus* while the efficacy of the others listed is unknown. Growers should be guided by experienced pear agronomists who are BASIS qualified before making a final choice.

Figure 17. Side view of *A. spilotus* adult knocked onto a tray

Table 1. Products currently approved for use on pear which are either known to control *Anthonomus spilotus*, provide partial control or whose activity has not yet been tested.

Active ingredient	Typical product	Approval type	Activity against	Harvest interval	Max. number of applications	Maximum rate	Risk to
Tested and effective against *Anthonomus spilotus*							
thiacloprid	Calypso/ Agrovista Reggae	EAMU	Broad range of pests	14 days	2	0.375 l/ha	Environment
pyrethrins	Spruzit	Full	Broad range of pests	None listed	4	2 litres per 100 litres of water	Environment
Tested and partially effective against *Anthonomus spilotus*							
acetamiprid	Gazelle	Full	Aphids, weevils	14 days	2	0.375kg/ha	-
lambda-cyhalothrin	Hallmark with zeon technology	Full	Broad range of pests	7 days	4	0.09 l/ha	Environment
Tested using topical application in the laboratory and ineffective against *Anthonomus spilotus*							
chlorantraniliprole	Coragen	Full	Caterpillars	14 days	2	0.175 l/ha	Environment
indoxacarb	Steward	Full	Caterpillars	7 days	3	0.25 kg/ha	Environment
Products approved on pear but whose activity has not yet been tested							
deltamethrin	Decis/Bandu	Full	Broad range of pests	7 days	None listed	0.35 l/ha	Environment
diflubenzuron	Diflox Flow/ Dimilin Flo	Full	Caterpillars	14 days	2	0.3 l/ha	Environment
fenoxycarb	Insegar WG	Full	Caterpillars	42 days	None listed	0.6 kg/ha	Bees and environment
flonicamid	Mainman	Full	Aphids	21 days	3	0.14 kg/ha	Environment
methoxyfenozide	Runner	Full	Caterpillars	14 days	3	0.6 l/ha	Bees and environment
thiamethoxam	Centric	Full	Broad range of pests	14 days	2	0.4 kg/ha	Bees and environment
spirodiclofen	Envidor	Full	Mites and suckers	14 days	1	0.6 l/ha	Bees and environment
spinosad	Tracer	Full	Broad range of pests	7 days	4	0.25 l/ha	Environment

Authors

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Further information

Two published papers are available with further information on *Anthonomus spilotus*:

Morris M.G., Howard Mendel, and (listed alphabetically) M.V.L. Barclay, R.G. Booth, Madeleine F.L. Cannon, Christina E. Conroy, Luca K. Csokay, Christina Fisher, Michelle T. Fountain and Chantelle N. Jay (2017) *Anthonomus spilotus* Redtenbacher, 1847 (Curculionidae) new to Britain, a pest in pear orchards in Southern England. The Coleopterist, 26(2): 117-122.

Balachowsky, A., Mesnil, L. (1935) Les Insectes Nuisibles aux Plantes Cultivees: Leurs moeurs Leur destruction. Traite d'Entomologie agricole concernant la France, la Corse, l'Afrique du Nord et les Regions limitrophes. Paris

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Figure 3 – Natural History Museum (Harry Taylor)

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