



Department
for Environment
Food & Rural Affairs

Plant Pest Factsheet

Pepper weevil

Anthonomus eugenii

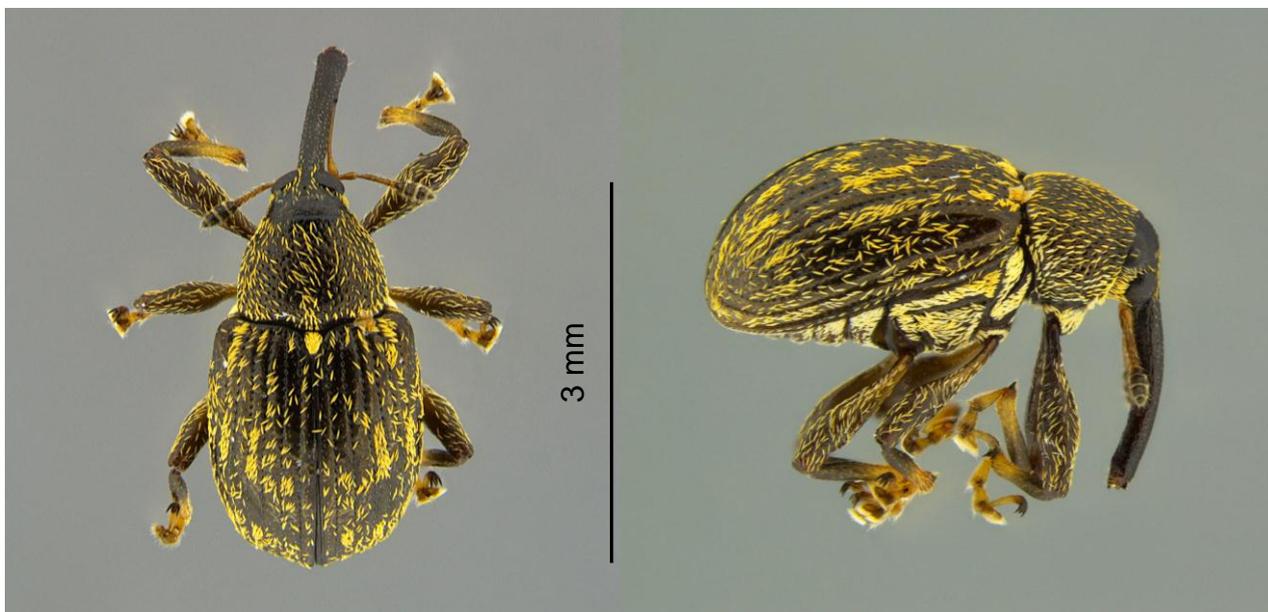


Figure 1. *Anthonomus eugenii* (Cano). Scale bar = 3 mm
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Background

In July 2012 a serious outbreak of *Anthonomus eugenii* (Cano), the pepper weevil, was reported to the European Commission. It was detected in four glasshouses growing *Capsicum* situated closely together in the Westland area of the Netherlands. Intelligence gained from the Netherlands in January 2013 indicated that the outbreak was still ongoing and was now affecting six glasshouses, but by December 2013 the outbreak had been eradicated. As a first response specialists from the Food and Environment Research Agency (Fera) produced a rapid pest risk analysis. It concluded that outbreaks in protected *Capsicum* production are likely to cause serious impacts because detection of even a serious outbreak can be difficult, there is no reliable method of control and whole crops may need to be destroyed. In November 2013 populations of *A. eugenii* were found in Italy

during official inspections in the municipalities of Fondi and Monte San Biagio (province of Latina, Lazio region) on *Capsicum annuum* crops grown under protection (0.3 ha) and in the field (0.5 ha). *Anthonomus eugenii* was added to the EC Council Directive 2000/29/EC as a IAI listed quarantine pest in 2014. In September 2014 the pepper weevil was intercepted in the UK for the first time when a single larva and two pupae were found in fresh *Capsicum frutescens* fruit (chillies) arriving by air from the Dominican Republic. In April and May 2015 single dead larvae of *A. eugenii* were found in two further consignments of chillies originating from the Dominican Republic and in July 2015 a dead adult was intercepted in chillies arriving from Mexico. More significantly, numerous live adults were found in August 2015 emerging from boxed chillies, again originating from the Dominican Republic. In all these cases the diagnosis was confirmed by DNA sequencing. In January 2016 two dead weevil larvae were intercepted, again in chillies from the Dominican Republic, however, the specimens were in such poor condition that not even DNA sequencing could aid diagnosis but the clear suspicion is that these too were *A. eugenii*. These interceptions clearly demonstrate that the trade in fresh capsicum fruit from the New World offers a pathway for the introduction of this pest.

Geographical Distribution

Anthonomus eugenii is a new world species that is thought to have originated in Mexico. It is now widely distributed in the southern states of North America, Central America, the Caribbean and Oceania (French Polynesia & Hawaii). This pest had been absent from Europe until outbreaks occurred in the Netherlands in July 2012 (eradicated) and Italy in 2013 (under eradication). There have also been outbreaks in Canadian protected pepper crops, although these have been eradicated.

Host Plants

Anthonomus eugenii is an economically damaging pest of *Capsicum annuum* (sweet pepper) and *Capsicum frutescens* (chilli peppers), but will also damage other solanaceous hosts including *Solanum melongena* (aubergine). The adults are reported to feed on a range of other Solanaceae, including potato, tomato, *Petunia*, *Nicotiana*, *Physalis*, *Datura* as well as some solanaceous weeds, but egg laying (oviposition) and development has not been observed on these hosts. However, there are reports that tomatillo, *Physalis philadelphica*, is a moderately susceptible host.

Description

The genus *Anthonomus* (Coleoptera: Curculionidae) is of great economic importance as it contains many species that are serious plant pests. It is a large and widely distributed genus with more than 180 species. Of these, about 50 species are found in the Palaearctic region and 13 occur naturally in the British Isles. All are very similar in size and shape, but vary in their colouration and host preferences.

Anthonomus eugenii (Cano)

Adult: A small dark brown to black weevil species with a body that measures approximately 3 mm in length by 1.5 - 1.8 mm in width and clothed in flattened yellow hairs that fade to white in old or dead specimens. In common with many other species of weevil, the head of *A. eugenii* is produced into an elongated snout or rostrum that terminates with the mouthparts and bears a pair of elbowed (geniculate) antennae. In *A. eugenii* the rostrum measures approximately 1.5 mm in length (Figure 1).

Larva and pupae: The larval stages are a greyish white/yellow in colour with a brown head, lack legs and are worm-like in appearance. When fully developed they measure up to 5 mm in length. The pupa resembles the adult stage in shape although the wings are not fully formed and the rostrum is inconspicuous, being held against the underside of the body. When first formed the pupa is white but becomes more yellow and develops brown eyes as it matures (Figure 2).



Figure 2. *Anthonomus eugenii* Pupae (left) and larvae
Image © Alton N. Sparks, Jr., University of Georgia, Bugwood.org

Biology

Depending on environmental conditions, the life-cycle from egg through three larval instars, pupa to adult for this warmth loving species takes 14-30 days (average 21 days) to complete, with the optimal developmental temperature being 26-28°C. Female weevils can begin to lay eggs within two days of mating and these are deposited individually in small oviposition cavities that the female chews with her mouth parts beneath the surfaces of

buds or in immature fruits and occasionally stalks. The eggs are about 0.5 mm long; white at first, becoming yellow with time. Once an egg is deposited in the oviposition cavity the female seals this over with a light brown fluid that hardens and darkens with age. Each female can produce between 340-600 eggs during their life-span (2-3 months) at a rate of 5 to 7 eggs per day. The emerging larvae are aggressive and usually only a single one will survive and develop in a bud. However, in larger fruits more than one larva can be present. When fully mature the larvae pupate within the host in a pupal cell that is created from anal secretions. In the USA it is reported that between 3 -5 (Florida) and as many as 8 (California) generations can be produced each year, but because the adults are fairly long-lived and produce overlapping generations it is difficult to determine the number of generations accurately. Adults do not go into diapause and will only overwinter if suitable plant material is available. Overwintering adults can survive for up to 10 months.

Detection and damage

The first indication of a pepper weevil infestation in a *Capsicum* crop can be the manifestation of host symptoms. Adults will feed (Figure 3) on the aerial parts of the host creating small circular or oval feeding punctures (2-5 mm across). On leaves these punctures could be mistaken for slug or caterpillar damage, and on fruits they appear as a dark speckling. The larvae develop and feed inside flower buds and fruits, consuming both the seeds and flesh. As they feed both adults and larvae can cause yellowing followed by bud and fruit drop, fruit distortion and premature ripening. Laval feeding activity within larger fruit often results in the core becoming brown (Figure 4) and mouldy. In addition punctures can allow the ingress of the fungus *Alternaria alternata* (Fr.) Keissl., resulting in further damage.



Figure 3. *Anthonomus eugenii* adult on a *Capsicum annuum* flower stalk.
Image© David Riley, University of Georgia, Bugwood.org



Figure 4. *Anthonomus eugenii* larval feeding damage and internal discolouration of *Capsicum annuum* fruit. Image © John L. Capinera, University of Florida.

Control Measures

In Canada successful eradication of *A. eugenii* was achieved by a combination of intensive hygiene measures, modification of environmental conditions and the use of chemical treatments. The glasshouse was cleared of crop residues, sprayed with hydrated lime, all standing water was removed, a temperature of 20°C or higher was maintained for at least 10 days and fumigation with a variety of products was carried out.

Of the products recommended for the control of *A. eugenii* in the USA acetamiprid (Gazelle), lambda-cyhalothrin (Hallmark with Zeon Technology) and pyrethrins (Pyrethrum 5 EC) are also approved for use on pepper crops in the UK. However, lambda-cyhalothrin is incompatible with biological control agents and acetamiprid would also be expected to have an impact on biological control agents. It is unlikely that an outbreak of *A. eugenii* could be eradicated from a UK pepper crop by chemical means alone because juvenile stages of the pest occur inside the fruit where they are difficult to target with insecticides and there are no suitable fumigants available in the UK. It is therefore likely that combining measures such as a crop break, intensive hygiene and environmental modification with the application of suitable pesticides and/or biological control agent (if available) as part of an integrated pest management strategy would be the likely approach used to eradicate the pest. *Catolaccus hunteri* Crawford (Hymenoptera: Pteromalidae) is the most common parasitoid of the pepper weevil in the United States, Mexico, and elsewhere, and was introduced to Hawaii from Guatemala for control of this pest. The introduction of this parasitoid into organic pepper crops has been shown to reduce the number of fruit infested by *A. eugenii*. However, *C. hunteri* is not currently registered for use in the UK. No

varieties of pepper are known to be resistant to *A. eugenii*. However varieties with synchronous and concentrated fruit production, which readily shed fruit infested by *A. eugenii*, suffer lower damage levels than lines that retain such fruit.

Advisory Information

Suspected outbreaks of *Anthonomus eugenii* or any other non-native plant pest should be reported to the relevant local authority:

For **England and Wales**, contact your local **APHA Plant Health and Seeds Inspector** or the **PHSI Headquarters**, Sand Hutton, York. Tel: 01904 405138

Email: planthealth.info@apha.gsi.gov.uk

For **Scotland**, contact the **Scottish Government's Horticulture and Marketing Unit**:

Tel: 0131 244 8935 Email: hort.marketing@gov.scot

For **Northern Ireland**, contact the **DARD Plant Health Inspection Branch**:

Tel: 0300 200 7847 Email: planthealth@dardni.gov.uk

For additional information on UK Plant Health please see:

<https://secure.fera.defra.gov.uk/phiw/riskRegister/>

<https://www.gov.uk/plant-health-controls>

<http://www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/PlantDiseases>

<https://www.dardni.gov.uk/>

Authors

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