EPPO Datasheet: *Anthonomus eugenii*

Last updated: 2020-11-09

IDENTITY

Preferred name: *Anthonomus eugenii*
Authority: Cano
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Curculionidae: Curculioninae
Other scientific names: *Anthonomochaeta eugenii* (Cano), *Anthonomus aeneotinctus* Champion
Common names: pepper weevil
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: ANTHEU

more photos...

Notes on taxonomy and nomenclature

The genus *Anthonomus* is a large genus (more than 180 species) and is widely distributed.

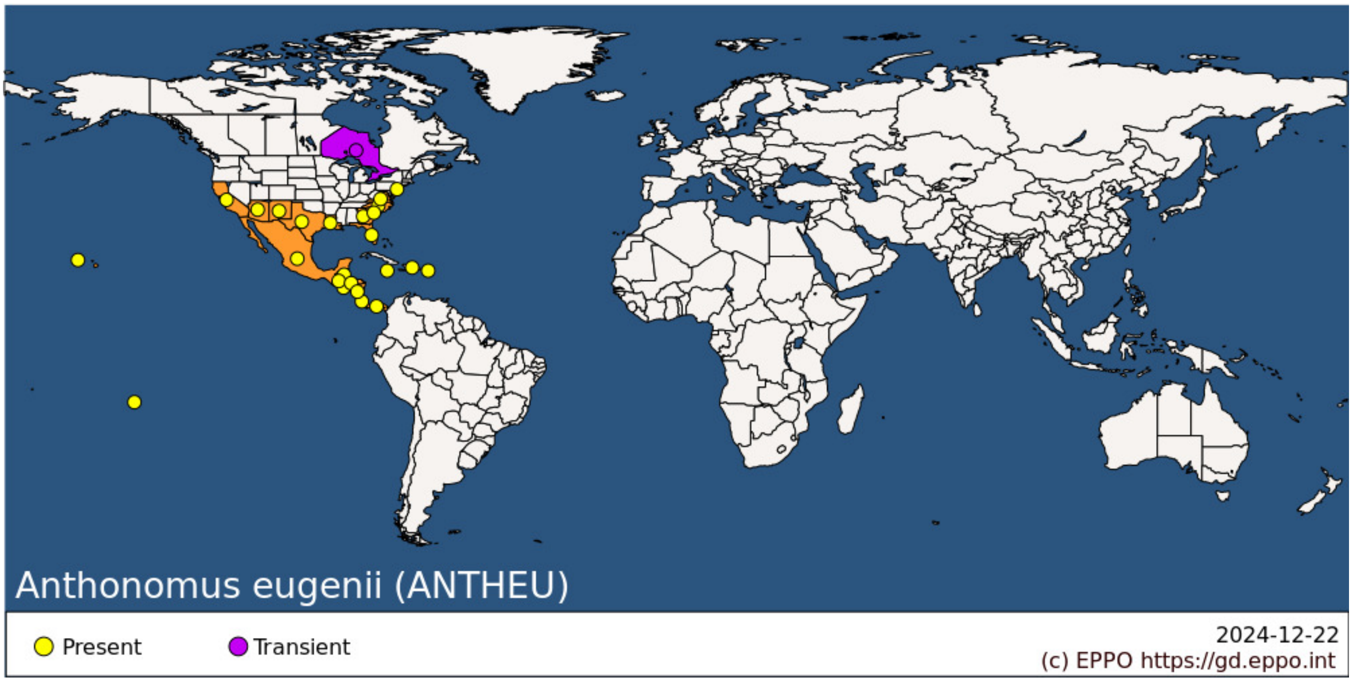
HOSTS

The main hosts of *Anthonomus eugenii* are cultivated *Capsicum* spp., including *C. annuum* and *C. frutescens* (Acosta *et al*., 1987) and some wild *Capsicum* spp. Capinera (2017) reports that tomatillo, *Physalis philadelphica*, is a moderately susceptible host. Other Solanaceae are also attacked, including aubergines (*Solanum melongena*) and many wild *Solanum* spp. (Patrock & Schuster, 1992). Oviposition and larval development appear to be restricted to *Capsicum* and *Solanum* spp. Adults may also feed on other Solanaceae such as *Datura stramonium*, *Nicotiana alata* (Patrock & Schuster, 1992), *Calibrachoa parviflora* (syn. *Petunia parviflora*), *Physalis pubescens*, tomatoes (*Solanum lycopersicum*) and a variety of other plants (Elmore *et al*., 1934; Patrock & Schuster, 1992, Seal & Martin, 2016). Adults have been reported to feed on potato (*Solanum tuberosum*), but no oviposition has been observed on potato.

Host list: *Capsicum annuum*, *Capsicum baccatum*, *Capsicum chinense*, *Capsicum frutescens*, *Capsicum*, *Datura stramonium*, *Nicotiana alata*, *Physalis ixocarpa*, *Solanum americanum*, *Solanum aviculare*, *Solanum carolinense*, *Solanum dulcamara*, *Solanum elaeagnifolium*, *Solanum glaucophyllum*, *Solanum melongena*, *Solanum nigrum*, *Solanum pseudocapsicum*, *Solanum rostratum*, *Solanum umbelliferum*, *Solanum villosum*, *Solanum*

GEOGRAPHICAL DISTRIBUTION

A. eugenii originates from Mexico from where it has spread through Central America, the Caribbean, French Polynesia and Hawaii (Defra, 2020) and southern states of the USA in the first part of the 20th century.



North America: Canada (Ontario), Mexico, United States of America (Arizona, California, Florida, Georgia, Hawaii, Louisiana, New Jersey, New Mexico, North Carolina, South Carolina, Texas, Virginia)
Central America and Caribbean: Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico
Oceania: French Polynesia

BIOLOGY

Egg to adult development time at 26-28°C was approximately 14 days in *Capsicum annuum* and *Solanum americanum* (Patrock & Schuster, 1992). In the laboratory, the egg stage took 3.6 days, the larval stage 9.5 days, the pupal stage 3.3 days and the adult stage 3.1 days (egg to adult 16.4 days) (Gordon & Armstrong, 1990). In Florida (USA), the egg takes 2.5-3 days, larva 6-12 days and pupa 3-6 days to develop. Adults are found throughout the year except for December and January. The adults usually spend the winter on weeds (wild *Solanum* species) or old pepper plants. No diapause has been observed (Elmore *et al*., 1934). Overwintering adults can live for 10 months, but adults only live for 2-3 months in the summer. Females lay approximately 5-7 eggs a day with a total of approximately 340-600 eggs in their lifetime. Eggs are deposited singly in the bud or fruit after the female has created an egg cavity with her mouthparts. She covers this cavity with a light brown anal secretion that hardens. The oviposition period is around 51 days (Toapanta, 2005). *A. eugenii* has several generations per year with the number of generations depending on the temperature (e.g. a two-week lifecycle at 27 °C, a three-week life cycle 21°C and a six-week lifecycle at 15°C). The optimum temperature for development is 30°C but declined at 33°C (Toapanta, 2005).

DETECTION AND IDENTIFICATION

Symptoms

Adults feed on leaves, blossoms, stem material and fruit. Adult feeding on the fruit causes dark specks (EFSA, 2020) and internal fruit damage (Riley and Sparks, 1995), females bore into fruits and flower buds for oviposition. Females show a preference towards the upper portion of the fruit (Seal & Martin, 2016) The created wounds facilitate the entry of the fungus *Alternaria alternata* which can develop internally and cause fruit rot (Bruton *et al*, 1989). Early signs of the presence of the weevil are small holes in immature fruits and small circular or oval holes (2-5 mm) in leaves. These can be mistaken for slug or caterpillar damage. Larvae feed on seeds and other tissue in the developing fruits (Costello & Gillespie, 1993) and this causes fruit deformation, discoloration, including browning of the core, and premature ripening and abscission of the developing fruit (Capinera, 2017).

Morphology

The adult is dark brown (light brown when newly emerged) to greyish black (Rily & Sparks ,1995), 2.0 -3.5 mm long and 1.5-1.8 mm wide (Elmore *et al*., 1934). It has an arched oval body that is covered with small white/yellow scales and has a long snout. The last larval stage is approximately 5 mm. The larva is greyish white/yellow with a pale brown head with dark mouthparts, body is c-shaped and legless. The pupa is white and becomes yellower with brown eyes when it develops. The eggs are white (later becoming yellow) and about 0.5 mm long (Defra, 2020).

Detection and inspection methods

Morphological species identification can be performed on adult beetles (not on eggs, larvae or pupae). A key to the Mexican and Central American genera of Anthonomini (Curculionidae, Curculioninae) has been published by Hernandez *et al*. (2013). A key to the *Anthonomus* species (that are associated with Solanaceae) has been published by Clark & Burke (1996). There are other weevils on the same hosts which are the same size and have the same geographical distribution. For confirmation of an identification of *Anthonomus eugenii* DNA barcoding can be used (EPPO, 2016).

PATHWAYS FOR MOVEMENT

A. eugenii can only spread naturally over limited distances, however, it is liable to be transported internationally in fruits of capsicums and possibly aubergines. This is presumably the pathway for spread that has occurred e.g. in Central America. Adults can survive prolonged cool conditions (2-5°C) for over 3 weeks and be transported as immature stages in fresh fruits (Costello & Gillespie, 1993). Fruits of wild hosts could accidentally contaminate poorly packed consignments.

PEST SIGNIFICANCE

Economic impact

The most important damage to *Capsicum* spp. is the destruction of blossom buds and immature fruits, which turn yellow and fall (Elmore *et al*., 1934). In Puerto Rico, the theoretical economic injury level was calculated at 0.01 adults per plant, and fruit abortion was the main cause of yield loss (Segarra-Carmona & Pantoja, 1988). There appears to be a direct relationship between pepper weevil damage and internal mould due to *Alternaria alternata* (Bruton *et al*., 1989). In 1926, losses of 500 000 USD to the Californian pepper crop were reported (Elmore *et al*., 1934). In the USA, the pepper weevil has caused average crop losses of 10% (Riley & King, 1994). 50 % losses are reported and the loss of whole pepper fields has occurred (Elmore, 1934). Fruit loss can reach 30% to 90% of the yield if treatment is not implemented (Riley & Sparks, 1995). Costello & Gillespie (1993) reported serious damage by *A. eugenii* to glasshouse peppers in British Columbia (Canada) in summer 1992, but the outbreak was subsequently eradicated. EPPO (2012) reports the first outbreak in the EPPO region which occurred in 2012 in the Netherlands where the pest was found in several glasshouses producing *Capsicum annuum*. This outbreak was eradicated in 2013 (EPPO, 2014).

Control

In the state of Texas (US), 8-15 different insecticide sprays are available to control infestations (Cartwright *et al.*, 1990). Oxamyl was the most effective insecticide in Puerto Rico (Armstrong, 1994). Bud cluster damage of 1-5% was found to be the best threshold for insecticide treatment. Different thresholds have been defined for low and high-input production systems (Riley *et al.,* 1992). Management is difficult and requires precise knowledge of developmental times and thresholds for maximum efficiency (insecticides only target adults). Yellow sticky traps can be used to monitor populations (Riley & Schuster, 1994). There are cultivar differences in susceptibility, mainly arising from the timing of fruit maturation (Berdegue *et al*., 1994). In Canada, successful eradication was achieved by clearing glasshouses of all crop residues, spraying with hydrated lime, removing all standing water, maintaining

20°C or over for at least 10 days and fumigating with a variety of products. The Netherlands used pesticide applications in combination with the destruction of affected crops and growing medium to eradicate *Anthonomus eugenii* glasshouse infestations. Several Hymenoptera parasitoids have been found in *A. eugenii* infested pepper fruits in Mexico and Canada. The most abundant of these larval or egg parasitoids (e.g. the larval parasitoid *Catolaccus hunteri*) are seen as potential candidates for biological control (DEFRA, 2020).

Phytosanitary risk

Because *A. eugenii* is a regulated priority European Union quarantine pest, there are specific import requirements aiming to prevent the entry of the pest via *Capsicum* fruit. It is predominantly a pest of *Capsicum* spp. in tropical or subtropical climates. It has spread from its origin in Mexico to other countries, both some time ago (southern USA) and more recently (Puerto Rico) (Abreu & Cruz, 1985). It could probably be a pest of outdoor crops, and survive outdoors, in southern Europe. *A. eugenii* was observed for the first time in the EPPO region in the field in Italy in 2013 (Speranza, 2014), eradication was completed in 2020 (EPPO, 2020). Experience in Canada and the Netherlands shows that it also has the potential to be a serious pest of glasshouse crops in colder countries, although it would not survive outdoors. It has, however, proved possible to eradicate such glasshouse infestations.

PHYTOSANITARY MEASURES

Fruits of capsicum should come from an area where *A. eugenii* does not occur or from places of production found free from the pest during the growing season. Within infested countries, *Capsicum* planting material should not come from areas where the pest is present and causing damage and should be free of blossoms and fruit (which may carry the pest). Where overwintering is possible capsicum fields should be destroyed, early and thoroughly, in order to prevent survival (Sorensen & Baker, 1994).

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Datasheet history

This datasheet was first published in 1997 in the second edition of 'Quarantine Pests for Europe' and revised in 2020. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1997) *Quarantine Pests for Europe (2nd edition).* CABI, Wallingford (GB).

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