



Atherigona orientalis (Schiner, 1868)

Identity

Preferred scientific name: *Atherigona orientalis* (Schiner, 1868)

Preferred common name: Pepper fruit fly or Tomato fruit fly

Other scientific names: *Acritochaeta excise*, *Acritochaeta orientalis* (Schiner), *Acritochaeta pulvinata* (Grimshaw), *Atherigona excisa* var. *flavipennis* (Malloch), *Atherigona magnipalpis* (Stein), *Atherigona trilineata* (Stein), *Coenosia excisa* (Thomson)



Adult Pepper fruit fly

Taxonomic Position: Class: Insecta, Order: Diptera, Family: Muscidae

Hosts/species affected

Major plant hosts: cabbage and cauliflower (*Brassica oleraceae*), bell pepper (*Capsicum annuum*), orange (*Citrus sinensis*), melon (*Cucurbita melo*), *Solanum lycopersicum* (tomato), beans (*Phaseolus* spp.) and sorghum (*Sorghum bicolor*) (Ogbalu et al., 2005; CABI, 2016).

Minor plant hosts: onion (*Allium cepa*), cucumber (*Cucumis sativus*), carrot (*Daucus carota*), peach (*Prunus persica*), aubergine (*Solanum melongena*), wheat (*Triticum aestivum*) and maize (*Zea mays*).

Other economically important hosts are: *Abelmoschus esculentus* (okra), *Ananas comosus* (pineapple), *Annona muricata* (soursop), *Cajanus cajan* (pigeon pea), *Capsicum frutescens* (chilli), *Carica papaya* (pawpaw), *Cocos nucifera* (coconut), *Cucurbita pepo* (ornamental gourd), *Echinochloa colona* (jungle rice), *Elaeis guineensis* (African oil palm), *Glycine max* (soyabean), *Gossypium hirsutum* (Bourbon cotton), *Helianthus annuus* (sunflower), *Mangifera indica* (mango), *Manihot esculenta* (cassava), *Momordica* spp, *Musa x paradisiaca* (plantain), *Nicotiana tabacum* (tobacco), *Oryza sativa* (rice), *Pennisetum glaucum* (pearl millet), *Persea americana* (avocado), *Phaseolus vulgaris* (common bean), *Prunus persica* (peach), *Punica granatum* (pomegranate), *Saccharum officinarum* (sugarcane), *Solanum tuberosum* (potato), *Zingiber officinale* (ginger)

Growth stages affected

- Flowering stage,
- Fruiting stage,
- Post-harvest,
- Pre-emergence,
- Seedling stage,
- Vegetative growing stage

Biology and Ecology

Egg

Eggs are laid in cracks of splitting ripe to rotting fruit, in oviposition sites of other insects and even in carrion or faeces, as females do not possess a sharp, strong ovipositor able to puncture hard tissues. The eggs are about 0.9 mm in length. The adult is known to lay eggs in oviposition sites of other insects.

Larvae

Under laboratory conditions at a mean temperature of 28°C and 63% RH, the egg stage, first-, second- and third-instar larva, and pupariation takes 1, 0.5-1, 1-2, 9-11 and 12-15 days, respectively (Couri and Aroujo, 1992). The first and second instar larvae are small and undescribed, but the 3rd and final instar grows to a length of 4-6 mm (Skidmore 1985). Larvae feed and develop on live and decaying plant material and even the live larvae of other insects. According to Iheagwam and Nwankiti (1980), the larvae penetrates capsicum fruits of all ages and feed on the ovules, seeds, placenta and mesocarp and makes them susceptible to secondary infection by rot-producing microorganisms.



Figure 1. Pepper Fruit Fly (*Atherigona orientalis*) larvae-Source-MAF Plant Health & Environment Laboratory (2011) Updated on 5/8/2014

Pupae:

Pupae are unusually short and broad for this group of flies; dark orange to dark red in color and enclosed in cocoons. The pupal stage lasts about 6 days at 85°F (Skidmore 1985). The pupa is shiny brown, about 16 mm long, with smooth surface, with two short parallel spines at the posterior tip of the body. Pupation takes place in the soil.

Adults:

Adults are small yellowish-gray flies with a body length of about 4 mm (Olsen 1996). Wing length is 2.5 to 3 mm. The head profile is almost square.

Adult *Atherigona* spp. can usually be separated from other Muscidae by a combination of their small size (wing length of *A. orientalis* 2.5-3.0mm), yellow-brown coloration and very distinctive head profile.



Figure 2. Adult *Atherigona orientalis* Photo by Gary Steck, Florida Department of Agriculture and Consumer Services, Division of Plant Industry)

Symptoms

A. orientalis usually causes the following:-

- Fruit-extensive mould, internal feeding obvious exit hole
- Growing point and stems-dead heart, boring and internal feeding
- Leaves and roots-internal feeding
- Vegetative parts-internal feeding and soft rotting
- Whole plant-dead heart, internal feeding and seedling blight

Means of movement and dispersal

Adults can migrate over long distances, borne by wind. Movement in international trade is mainly on horticulture crops like capsicum, tomatoes, oranges, melon and cucumber.

Movement in trade

Movement in international trade is mainly on horticulture crops like capsicum, tomatoes, oranges, melon and cucumber.

Impact

A. orientalis is highly polyphagous. It is reported to cause 25-85% infestation of melon fruits causing huge losses (Chughtai et al, 1985). The pest is reported to be the major fruit fly that has been found damaging peppers, tomatoes, soursops, local apples, guava, melons in Nigeria (Ogbalu et al., 2014). The impact of their feeding activities affected the germinability of pepper seeds (Ogbalu, 1986) with pepper fruit loss up to 73.7% especially in *Capsicum annum* var Nsukka Yellow (Ogbalu, 2014) which sustained the highest larval population of *A. orientalis*.

Phytosanitary significance

A. orientalis was recently identified in the EPPO tomato study as a potential pest of tomato in the EPPO region. However, it is regarded as a serious quarantine threat to New Zealand who place restrictions on the importation of cucurbits from Australia (Cahill, 1992). It is included in Risk Group 1 pests by New Zealand, i.e. pests which could cause unacceptable economic impacts if introduced (R. Frampton, New Zealand Ministry of Agriculture, personal communication, 1998).

Detection and inspection

Fruits should be examined for signs of rot and exit holes. The stems of graminaceous crops should be inspected during harvesting since they also form the breeding media for *A.orientalis*.

Management

Cultural Control

Iheagwam and Nwankiti (1980) noted that incidence of *A. orientalis* in *Capsicum* sp. was especially high when chicken dung or compost were used as manure, as that attracted the flies. They therefore recommended the use of chemical fertilizers as a control measure.

Chemical Control

Where *A. orientalis* is suspected as causing primary damage as a stem borer, then treatments normally applied for the control of stem-borers may be used, for example, granules of systemic insecticide may be applied at drilling.

References

- CABI. (2016). Crop Protection Compendium, 2016 Edition. © CAB International Publishing. Wallingford, UK. www.cabi.org. Retrieved on 23th April 2016
- Cahill M. (1992). Eco-climatic assessment of *Atherigona orientalis* (Diptera): pest potential in New Zealand. Information Paper - Bureau of Rural Resources (Canberra), No. IP/1/92: IV + 65 pp.; 23 ref.
- Couri M.S. & Araujo P.F. (1992). The immature stages of *Atherigona orientalis* Schiner (Diptera: Muscidae). *Proceedings of the Biological Society of Washington*, 105(3):490-493.
- Chughtai G.H. & Khan S. & Baloch U.K. (1985). A new record of infestation of melon fruits by an anthomyiid fly in Indus River Beach areas of D.I. Khan. *Pakistan Journal of Zoology*, 17(2):165-168.
- Olsen A.R. (1996). Fundamentals of Micro analytical Entomology. 2000. CRC Press, Inc. Boca Raton, Florida
- Ogbalu O.K., Emelike N.J.T., Amachree E.I., Uche F. & Thomas C.N. (2005). Characterization and preferred oviposition sites of *Atherigona orientalis* (Schiner) on Nigerian pepper fruits. *Journal of Applied Sciences and Environmental Management* 9: 19-23.



- Ogbalu, O.K. (2014). Assessment of Pepper Fruits Loss in Backyard Gardens by *Atherigona orientalis* (Schiner) in the Niger Delta. Niger Delta Biologia, Vol. 13 (1): 20-29.
- Iheagwam E.U., Nwankiti O.C., (1980). Dipterous insect pests of pepper, *Capsicum* spp., in the eastern states of Nigeria. Revue de Zoologie Africaine, 94(4):936-939.
- Skidmore P. (1985). The Biology of the Muscidae of the World, 29, 6-9

