

Data Sheets on Quarantine Pests

*Bactrocera minax***IDENTITY****Name:** *Bactrocera minax* (Enderlein)**Synonyms:** *Polistomimetes minax* Enderlein*Callantra minax* (Enderlein)*Bactrocera citri* (Chen)*Mellessis citri* Chen*Dacus citri* (Chen)*Tetradacus citri* (Chen)**Taxonomic position:** Insecta: Diptera: Tephritidae**Common names:** Chinese citrus fly (English)**Notes on taxonomy and nomenclature:** *B. minax* has erroneously been considered synonymous with *B. tsuneonis* (OEPP/EPPO, 1996).**Bayer computer code:** DACUCT**EPPO A1 list:** No. 234**EU Annex designation:** I/A1**HOSTS**

B. minax is found exclusively on *Citrus*, especially oranges (*C. sinensis*), sour oranges (*C. aurantium*) and *C. maxima*.

GEOGRAPHICAL DISTRIBUTION**EPPO region:** Absent.**Asia:** Bhutan, China (Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan; under eradication in several counties of Sichuan; Zhang, 1989), India (Sikkim, West Bengal).**EU:** Absent.**Distribution map:** See IIE (1991, No. 526).**BIOLOGY**

Specific details of the biology of *B. minax* are not available, but this species is probably very similar to *B. tsuneonis* (EPPO/CABI, 1996). The following general account of the biology of *Bactrocera* spp. is broadly applicable. Eggs are laid below the skin of the host fruit. These hatch within 1-3 days and the larvae feed for another 4-35 days. Pupariation is in the soil under the host plant and adults emerge after 1-2 weeks (longer in cool conditions). In China, *B. minax* is reported to have a single generation a year and overwinter as the pupa (Zhang, 1989). According to Fan *et al.* (1994), larvae and pupae are moderately resistant to cold. *B. minax* would probably survive the winter in the south of the EPPO region.

DETECTION AND IDENTIFICATION

Symptoms

Attacked fruit will usually show signs of oviposition punctures.

Morphology

Larva

Described by White & Elson-Harris (1992).

Adult

Similar to *B. tsuneonis* (EPPO/CABI, 1996), but lacking anterior supra-alar setae. It also has a longer ovipositor (aculeus 3.7-5.0 mm long). Full details of the separation of these species were given by White & Wang (1992).

Detection and inspection methods

Though most *Bactrocera* spp. can be monitored by traps baited with male lures, *B. minax* is not known to be attracted to any male lure.

MEANS OF MOVEMENT AND DISPERSAL

Adult flight and the transport of infested fruits are the main means of movement and dispersal to previously uninfested areas. Many *Bactrocera* spp. can fly 50-100 km (Fletcher, 1989).

PEST SIGNIFICANCE

Economic impact

B. minax is stenophagous, only attacking citrus fruits. It is a serious pest of citrus in parts of China (Zhang, 1989).

Control

The following general control measures for control of *Bactrocera* spp. broadly apply to *B. minax*. When detected, it is important to gather all fallen and infested host fruits, and destroy them. Insecticidal protection is possible by using a cover spray or a bait spray. Malathion is the usual choice of insecticide for fruit fly control and this is usually combined with protein hydrolysate to form a bait spray (Roessler, 1989); practical details are given by Bateman (1982). Bait sprays work on the principle that both male and female tephritids are strongly attracted to a protein source from which ammonia emanates. Bait sprays have the advantage over cover sprays in that they can be applied as a spot treatment so that the flies are attracted to the insecticide and there is minimal impact on natural enemies. Attempts have been made in China to control *B. minax* by the sterile male technique (Wang *et al.*, 1990).

Phytosanitary risk

Although EPPO did not list *B. minax* as an A1 quarantine pest (OEPP/EPPO, 1983) within the broad category "non-European Trypetidae", it did list *B. tsuneonis*, at a time when the two species were considered synonymous. In a recent review, EPPO confirmed the individual importance of *B. minax* as a pest specifically of citrus. Other regional plant protection organizations have similarly classed *B. tsuneonis* as a quarantine pest (EPPO/CABI, 1996), without yet addressing the specific situation of *B. minax*. *B. minax* is indigenous only to Asia; although many *Bactrocera* spp. are known by experience to have the potential to establish adventive populations in various other tropical areas, this does not seem to have been the case for *B. minax*. The direct risk of establishment of *B. minax* in most of the EPPO region is minimal, though populations might enter and multiply during

the summer months. In southern areas, such populations could probably survive one or several winters, and there is a certain risk of direct losses to citrus. Nevertheless, the major risk for EPPO countries arises from the probable imposition of much stricter phytosanitary restrictions on exported fruits (particularly to America) if *B. minax* enters and multiplies, even temporarily.

PHYTOSANITARY MEASURES

Consignments of fruits of *Citrus* and *Fortunella* from countries where *B. minax* occurs should be inspected for symptoms of infestation and those suspected should be cut open in order to look for larvae. EPPO recommends that such fruits should come from an area where *B. minax* does not occur, or from a place of production found free from the pest by regular inspection for 3 months before harvest. Fruits may also be treated, but specific treatment schedules have mostly not been developed for the Asiatic citrus fruit flies, since citrus is not much exported from the countries where they occur. Schedules developed for *Ceratitis capitata* on citrus will probably be adequate, e. g. treatment in transit by cold (e.g. 11, 12 or 14 days at 0.5, 1 or 1.5°C, respectively; USDA, 1994). Ethylene dibromide was previously widely used as a fumigant but is now generally withdrawn because of its carcinogenicity; methyl bromide is less satisfactory, damaging many fruits and reducing their shelf life, but treatment schedules are available (e.g. 32 g/m³ for 2 h at 21-29.5°C, followed by refrigeration at 0.5-3°C for 4 days; USDA, 1994).

Plants of citrus transported with roots from countries where *B. minax* occurs should be free from soil, or the soil should be treated against puparia. The plants should not carry fruits. Citrus plants are in any case prohibited importation in many countries because of other quarantine pests.

BIBLIOGRAPHY

- Bateman, M.A. (1982) Chemical methods for suppression or eradication of fruit fly populations. In: *Economic fruit flies of the South Pacific Region* (Ed. by Drew, R.A.I.; Hooper, G.H.S.; Bateman, M.A.) (2nd edition), pp. 115-128. Queensland Department of Primary Industries, Brisbane, Australia.
- EPPO/CABI (1996) *Bactrocera tsuneonis*. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford, UK.
- Fan, J.A.; Zhao, X.Q.; Zhu, J. (1994) [A study on cold-tolerance and diapause in *Tetradacus citri*]. *Journal of Southwest Agricultural University* **16**, 532-534.
- Fletcher, B.S. (1989) Ecology; movements of tephritid fruit flies. In: *World Crop Pests 3(B). Fruit flies; their biology, natural enemies and control* (Ed. by Robinson, A.S.; Hooper, G.), pp. 209-219. Elsevier, Amsterdam, Netherlands.
- IIE (1991) *Distribution Maps of Pests, Series A* No. 526. CAB International, Wallingford, UK.
- OEPP/EPPO (1983) Data sheets on quarantine organisms No. 41, Trypetidae (non-European). *Bulletin OEPP/EPPO Bulletin* **13** (1).
- Roessler, Y. (1989) Control; insecticides; insecticidal bait and cover sprays. In: *World Crop Pests 3(B). Fruit flies; their biology, natural enemies and control* (Ed. by Robinson, A.S.; Hooper, G.), pp. 329-336. Elsevier, Amsterdam, Netherlands.
- USDA (1994) *Treatment manual*. USDA/APHIS, Frederick, USA.
- Wang, H.S.; Zhao, C.D.; Li, H.X.; Lou, H.Z.; Liu, Q.R.; Kang, W.; Hu, J.G.; Zhang, H.Q.; Chu, J.M.; Xia, D.R.; Yang, R.X. (1990) [Control of *Dacus citri* by the irradiated male sterile technique]. *Acta Agriculturae Nucleatae Sinicae* **4**, 135-138.
- White, I.M.; Elson-Harris, M.M. (1992) *Fruit flies of economic significance; their identification and bionomics*. CAB International, Wallingford, UK.
- White, I.M.; Wang, X.J. (1992) Taxonomic notes on some dacine (Diptera: Tephritidae) fruit flies associated with citrus, olives and cucurbits. *Bulletin of Entomological Research* **82**, 275-280.

Zhang, Y. (1989) Citrus fruit flies of Sichuan Province (China). *Bulletin OEPP/EPPO Bulletin* **19**, 649-654.