Prepared by CABI and EPPO for the EU under Contract 90/399003

Data Sheets on Quarantine Pests

Anthonomus bisignifer

IDENTITY

Name: *Anthonomus bisignifer* Schenkling
Synonyms: *Anthonomus bisignatus* Roelofs
Anthonomus signatus Kinoshita & Shinkai
Minyrus japonicus Matsumara (*nec* Roelofs)
Minyrus albopilosus Matsumara
Taxonomic position: Insecta: Coleoptera: Curculionidae
Common names: Strawberry weevil, strawberry blossom weevil (English)
Bayer computer code: ANTHBI
EPPO A1 list: No. 189
EU Annex designation: II/A1

HOSTS

Strawberries are the main economic host crop. *A. bisignifer* has also been recorded on *Rubus* and on wild roses. Within the EPPO region, strawberries, which are widely grown throughout, would be the principal crop at risk.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Russia (Far East: Sakhalin, Kurile Islands).
Asia: Japan, Russia (Far East: Sakhalin, Kurile Islands).
EU: Absent.

BIOLOGY

In Sendai, Japan, *A. bisignifer* emerges from hibernation in late April, mates and begins egg laying (Katô, 1936). The female lays eggs in holes excavated in the flower buds of strawberries. She then bites through the stalk a few millimetres below the bud. Most of the flower buds fall off, but a few remain hanging on the plants. The eggs are laid, mostly during the day, and egg laying reaches a peak in mid- to late-May in Sendai. The number of eggs laid increases with air and soil surface temperature and hours of sunshine, being highest when sunshine approaches 12 h and the temperature is above 20°C, but many eggs are laid even when the temperature is around 12°C (Katô, 1936; 1937). About 77 eggs are laid per female (Kinoshita & Shinkai, 1926). The durations of the immature stages are: egg 4-9 days, larva 10-50 days, pupa 4-9 days (Kinoshita & Shinkai, 1926). The adults do not mate before hibernation (Kinoshita & Shinkai, 1926).

The weevils usually rest at night and under cool cloudy conditions by day, but start to crawl in the field at an air temperature of 7.2°C, combined with a black bulb temperature of 8.4°C. In the laboratory under low radiation conditions, the low temperature limit is around 10°C. Flight begins at around 23°C in the laboratory and in the field at 18°C, combined with a black bulb temperature of about 23°C (Katô, 1938a, b).

DETECTION AND IDENTIFICATION

Symptoms

The most obvious symptoms of damage are partially severed buds hanging from the plants and severed buds on the ground (Katô, 1936).

Morphology

Eggs

0.59 mm long, 0.41 mm wide (Iwata, 1966).

Larva

Apparently the larva is undescribed but is probably similar to that of *Anthonomus rubi* Herbst described by Scherf (1964). Lee & Morimoto (1988) gave a generic key to the weevil larvae of Japan including *Anthonomus*.

Pupa

Apparently the pupa is undescribed but is probably similar to that of *A. rubi* figured by Scherf (1964).

Adult

Length 2.5-4.0 mm; rostrum with very fine dorsal median keel; head and pronotum dark-brown or black; pronotum narrowed anteriorly, usually with median and two lateral bands of whitish elongate scales, remainder sparsely covered with similarly shaped brownish scales; scutellum small, densely covered with whitish scales; elytra pale-brown to dark red-brown, darker, triangular, lateral area demarcated by margin of dense whitish elongate scales, this triangle-shaped area extending from stria 2 to elytral margin in posterior half of elytra and extending forwards as broad margin to elytral base; entire surface with sparse whitish elongate scales; legs pale-brown, sometimes apical half to two-thirds of femora dark-brown; anterior femora bearing single small tooth, much shorter than width of femur; tibiae slender; ventrally entirely dark-brown or black, moderately densely covered with elongate whitish scales. Kôno (1939) gave a key to the *Anthonomus* species of Japan. Katô (1938c) described the local variation in morphometrics of the adults. For a colour figure of the adult, see Hayashi *et al.* (1984).

MEANS OF MOVEMENT AND DISPERSAL

A. bisignifer is most likely to be transported as a casual contaminant of planting material or fresh fruit.

PEST SIGNIFICANCE

Economic impact

A. bisignifer has been included in lists of the important pests of agricultural crops in Japan (Shiraki, 1952; Anon., 1968), but the complete lack of publications on any aspect of pest status within the past decade suggests that it is of little present concern.

Control

Apparently nothing has been published on the control of this weevil. However, insecticides successfully used against *A. rubi* in Europe would probably be effective. Martin (1965) recommended the use of the chlorinated hydrocarbon, tetrachlorodiphenylethane as a spray, applied as soon as the first damage is seen. Scopes & Stables (1989) recommended the application of carbaryl or gamma-HCH. Pokozii & Gadzalo (1988) found that the most effective pyrethroids against *A. rubi* were permethrin, cypermethrin, fenvalerate and deltamethrin.

Little is known regarding natural control agents. Yasumatsu & Watanabe (1964) listed *Catolaccus endonis* (Hymenoptera: Pteromalidae) as a parasite of this beetle in Hokkaido, Japan.

Phytosanitary risk

A. bisignifer was recently added to the EPPO A1 list of quarantine pests, but is not listed as a quarantine pest by any other regional plant protection organization. Originally, EPPO rejected it on the grounds that too little was known about it to make a realistic risk assessment. The pest has now been more fully documented, but its potential economic impact still remains uncertain. The addition to the EPPO list harmonizes it with EU Directive Annex II/A1.

PHYTOSANITARY MEASURES

For plants for planting of strawberries, *Rubus* or rose from countries where *A. bisignifer* occurs, it would be sufficient to require that they must have been grown in an area where *A. bisignifer* does not occur and must be derived from plants found free from the pest during the previous growing season.

BIBLIOGRAPHY

Anon. (1968) List of important diseases and pests of economic plants in Japan. *Japan Plant Protection*
Society, 591 pp. Seizo, Tokyo, Japan.

Hayashi, M.; Morimoto, K.; Kimoto, S. (editors) (1984) [*The Coleoptera of Japan in colour. Volume IV*]. Hoikusha Publishing Co. Ltd, Osaka, Japan.

Iwata, K. (1966) Large-sized eggs in Curculionoidea (Coleoptera). *Science Report of the Hyogo University of Agriculture* **7**, 43-47.

Katô, M. (1936) On the activity of oviposition of the strawberry weevil, *Anthonomus bisignatus* Roelofs. *Science Reports of the Tôhoku Imperial University 4th Series (Biology)* **10**, 697-708.

Katô, M. (1937) A statistical investigation of the correlation between climatic conditions and the egg-laying activity of the strawberry weevil, *Anthonomus bisignifer* Schenkling. *Science Reports of the Tôhoku Imperial University 4th Series (Biology)* **11**, 307-321.

Katô, M. (1938a) The temperature limit of activity of the strawberry weevil, *Anthonomus bisignifer* Schenkling. *Science Reports of the Tôhoku Imperial University 4th Series (Biology)* **12**, 501-510.

Katô, M. (1938b) The diurnal activity of the strawberry weevil, *Anthonomus bisignifer* Schenkling, with a note on the ecological meaning of the solar radiant energy. *Science Reports of the Tôhoku Imperial University 4th Series (Biology)* **12**, 511-530.

Katô, M. (1938c) [Local variation of bodily dimensions in the strawberry weevil, *Anthonomus bisignatus* Schenkling]. *Ecological Review* **4**, 332- 344.

Kinoshita, S.; Shinkai, S. (1926) [On *Anthonomus signatus* Roelofs (Curculionidae)]. *Agriculture & Horticulture* **1**, 3-12. (Abstract in *Review of Applied Entomology, Series A* **14**, 560).

Kôno, H. (1939) [New and little known beetles of Japan. VI The genus *Anthonomus* (Col. Curc.)]. *Insecta Matsumarana* **13**, 76-80.

Lee, C. Y.; Morimoto, K. (1988) Larvae of the weevil family Curculionidae of Japan Part 1. Key to genera and the short-nosed group (Insecta: Coleoptera). *Journal of the Faculty of Agriculture, Kyushu University* **33**, 109-130.

Martin, H. (editor) (1965) *Insecticide and fungicide handbook for crop protection*. Blackwell Scientific Publications, Oxford, UK.

Pokozii, I.T.; Gadzalo, Y. M. (1988) [Pyrethroids against pests of raspberry]. *Zashchita Rastenii* **3**, 35-36.

Scherf, H. (1964) [The developmental stages of the Curculionidae of Central Europe (Morphology, Bionomics, Ecology)]. *Abhandlungen herausgegeben von der Senckenbergischen Naturforschenden Gesellschaft* **506**, 1-335.

Scopes, N.; Stables, L. (editors) (1989) *Pest and disease control handbook*, 3rd edition. British Crop Protection Council, Thornton Heath, UK.

Shiraki, T. (1952) *Catalogue of injurious insects in Japan. Natural Resources Division, G.H.Q. Allied Powers, Preliminary Study*, No. 71.

Yasumatsu, K.; Watanabe, C. (1964) *A tentative catalogue of insect natural enemies of injurious insects in Japan. Part 1. Parasite-predator host catalogue*. Entomology Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan.