

Data sheets on quarantine pests¹
Fiches informatives sur les organismes de quarantaine

Dryocosmus kuriphilus

Identity

Name: *Dryocosmus kuriphilus* Yasumatsu

Taxonomic position: *Insecta: Hymenoptera: Cynipidae*

Common name: oriental chestnut gall wasp (English), japanische Esskastanien-Gallwespe (German), chalcide du châtaignier (French), kuri-tamabati (Japanese)

Special notes on taxonomy or nomenclature: this species was earlier known as an unnamed *Biorhiza* sp. The valid scientific name, *D. kuriphilus*, and the description of the wasp was given by Yasumatsu only in 1951

EPPO code: DRYCKU

Phytosanitary categorization: EPPO A2 action list no. 317

Hosts

D. kuriphilus attacks *Castanea crenata* (Japanese chestnut), *Castanea dentata* (American chestnut), *Castanea mollissima* (Chinese chestnut) and *Castanea sativa* (European chestnut) and their hybrids. It infests also *Castanea seguinii* in China, but is not known to attack the wild North American species *Castanea pumila* and *Castanea alnifolia*, which are very often grown adjacent to infested chestnuts.

Geographical distribution

EPPO region: Italy (Piemonte region, South of Cuneo province)

Asia: China, Japan, Korea

America: USA (south-east: Georgia, Alabama, North Carolina and Tennessee)

EU: present

Biology

D. kuriphilus is a univoltine species, reproducing parthenogenetically. Early instar larvae overwinter inside chestnut buds. At the time of bud burst in spring, the adults emerge to induce

the formation of 5–20 mm diameter green or rose-coloured galls, which develop in mid-April on new shoots. The larvae feed 20–30 days within the galls before pupating. Depending on locality (altitude, exposure) and chestnut cultivar, pupation occurs from mid-May until mid-July and adults emerge from galls from the end of May until the end of July. They are all females (males of this species have never been collected). The females lay 3–5 eggs per cluster inside buds. Each female can lay over 100 eggs. Some buds contain 20–30 eggs. The female lifetime is short (about 10 days, some of which is spent boring a tunnel to emerge from the gall). The eggs hatch in 30–40 days. Larval growth then proceeds very slow through the autumn and winter.

Detection and identification

Symptoms

Galls are unilocular or multilocular, 5–20 mm in diameter, green or rose-coloured, often containing portions of developing leaves, stems and petioles. They develop on young twigs, on leaf petioles or on the midrib of the leaves (Web Figs 1 and 2). After adult emergence, the gall dries, becomes wood-like, and remains attached to the tree for up to two years. While galls are readily detected on plants or parts of plants, eggs or first instar larvae inside the buds cannot be detected by simple visual inspections.

Morphology

Eggs

D. kuriphilus eggs (Web Fig. 3) are deposited by females into the buds of current shoots in June and July. Eggs are oval, milky white, 0.1–0.2 mm long, with a long stalk.

Larva

The larva of *D. kuriphilus* (Web Figs 4 and 5) is 2.5 mm long when fully grown, milky white, without eyes and legs.

Pupa

The pupa of *D. kuriphilus* (Web Fig. 6) is 2.5 mm long, black or dark brown.

¹The Figures in this data sheet marked 'Web Fig.' are published on the EPPO website www.eppo.org.

Adult

The adult female of *D. kuriphilus* (Web Fig. 7) is 2.5–3 mm long on average, body is black; legs, scapus and pedicels of antennae, apex of clypeus and mandibles are yellow brown; head is finely sculptured; scutum, mesopleuron and gaster are highly polished, smooth; propodeum with 3 distinct longitudinal carinae; propodeum, pronotum (especially above) strongly sculptured; scutum with 2 uniformly impressed and pitted grooves (notaulices) that converge posteriorly; radial cell of forewing opened; antennae 14-segmented with apical segments not expanded into a club.

The adult female most closely resembles the European oak cynipid wasp, *Dryocosmus cerriphilus* Giraud, known to induce galls on *Quercus cerris* only. However, the last has the vertex with large yellowish-red markings, the antennae are 15-segmented, the propodeum without median longitudinal carina, while in *D. kuriphilus* the vertex is black, antennae 14-segmented and propodeum with distinct median longitudinal carina.

Pathways for movement

Spread of *D. kuriphilus* into new countries occurs by introduction of infested twigs or shoots. Local spread occurs through the movement of infested twigs and young plants, or by flight of the adult females during the period (end of May to the end of July) when they are present.

Pest significance

Economic impact

By attacking the vegetative buds and forming a gall, *D. kuriphilus* disrupts twig growth and reduces fruiting. Commercial growers may expect yield reductions of 50–70%. Severe infestations may result in the decline and death of chestnut trees. *D. kuriphilus* is the most severe insect pest worldwide on chestnuts and can eliminate nut production and even kill trees (Dixon *et al.*, 1986). Where chestnut is planted in Europe for timber and to stabilize slopes, *D. kuriphilus* could cause serious decline.

Control

Infestations in small chestnut orchards may be reduced by pruning and destroying the infested shoots, but commercial growers cannot rely on this strategy because of the cost. Persistent insecticides may prove effective against females and young larvae, but side-effects on the environment could be serious. At present, there are no efficient plant protection products for control of this pest. After the Second World War, Japanese breeders selected chestnut cultivars with some resistance to the insect, but the pest developed a new strain overcoming that resistance. There are now new Japanese and Korean chestnut cultivars resistant to the pest (Anagnostakis, 1999).

In its native range in China, *D. kuriphilus* can be effectively controlled by natural enemies, particularly hymenopteran

parasitoids. Several new chalcid parasitoids reared from galls of *D. kuriphilus* have recently been described from China, Korea and Japan, e.g. *Torymus sinensis*, *Torymus beneficus*, *Megastigmus maculipennis*, *Megastigmus nipponicus* (*Chalcidoidea: Torymidae*), *Ormyrus flavitibialis* (*Ormyridae*) and others (Yasumatsu & Kamijo, 1979). Some of these parasitoids appeared to be very effective. *T. sinensis* has already been introduced as a biological control agent in Japan and Korea and appears to be very effective in mass-release programmes (Moriya *et al.*, 2002).

Some transpalaeartic species of parasitoids, e.g. *Torymus geranii*, *Ormyrus pomaceus*, *Eurytoma brunniventris* and others, which are also effective parasitoids of *D. kuriphilus* in Japan (Yasumatsu & Kamijo, 1979) are very common and widespread in oak cynipid galls in Europe and will probably easily move onto *D. kuriphilus*. *O. pomaceus* has already been reared from galls of *D. kuriphilus* by authors in Piemonte (IT). A host shift of native Western Palaearctic parasitoid species onto *D. kuriphilus* can be expected. This already happened in Georgia (US), where native parasitoid species, *Torymus tubicola* and *T. advenus* were reared from galls of the introduced *D. kuriphilus*. However, native parasitoids in Japan and USA (and very likely in Europe) will probably not provide good control of this introduced gall wasp, since they are not specific or well synchronized with the life cycle of the pest.

Phytosanitary risk

D. kuriphilus is considered the most serious pest of chestnut worldwide. It is very likely to be able to establish in many EPPO countries particularly in the centre and south where cultivated or wild chestnuts grow. Spread of the pest from the infested area in south Piemonte (IT) is very likely by females flying and movement of infested young chestnut plants and grafts (Brussino *et al.*, 2002). Transfer of the pest from infested areas in Asia and America to EPPO countries may occur, on a limited scale, by introduction of infested grafting materials with eggs or first instar larvae inside the buds.

Phytosanitary measures

D. kuriphilus was added in 2003 to the EPPO A2 action list, and EPPO member countries are thus recommended to regulate it as a quarantine pest. Introduction of *D. kuriphilus* from Asia and America is effectively prevented by the fact that import of all plants of *Castanea* (except fruits and seeds) from non-European countries is in fact prohibited by most EPPO countries on account of other pests. Within the EPPO region, plants for planting of *Castanea* (young plants or shoots for grafting) from infested areas should be produced in a place of production kept free from *D. kuriphilus* by appropriate systemic insecticide treatment.

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References

- Anagnostakis SL (1999) Chestnut research in Connecticut: breeding and biological control. *Acta Horticulturae* no. 494, 391–394.
- Brussino G, Bosio G, Baudino M, Giordano R, Ramello F & Melika G (2002) [The cynipid gall wasp *Dryocosmus kuriphilus*: a dangerous exotic insect for chestnut in Europe.] *Informatore Agrario* **37**, 59–61 (in Italian).
- Dixon WN, Burns RE & Stange LA (1986) Oriental chestnut gall wasp. *Dryocosmus Kuriphilus*. Entomology Circular no. 287, 1–2. Division of Plant Industry, Florida Department of Agriculture & Consumer Services, Gainesville (US).
- Moriya S, Shiga M & Adachi I (2002) Classical biological control of the chestnut gall wasp in Japan. *Proceedings of the 1st International Symposium on Biological Control of Arthropods*. University of Hawaii, Waikiki (US).
- Yasumatsu K (1951) A new *Dryocosmus* injurious to chestnut trees in Japan. *Mushi* **22**, 89–92.
- Yasumatsu K & Kamijo K (1979) Chalcidoid parasites of *Dryocosmus kuriphilus*. Japan, with descriptions of five new species (Hymenoptera). *Esakia* **14**, 93–111.