EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION
ЕВРОПЕЙСКАЯ И СРЕДИЗЕМНОМОРСКАЯ ОРГАНИЗАЦИЯ ПО КАРАНТИНУ И ЗАЩИТЕ РАСТЕНИЙ
ORGANIZATION EUROPEENNE ET MEDITERRANEENNE POUR LA PROTECTION DES PLANTES

Data Sheets on Forest Pests

Strobilomyia luteoforceps

IDENTITY

Name: *S. luteoforceps* (Fan & Fang)
Synonyms: *Lasiomma jurtschenkoi* Elberg*; Lasiomma luteoforceps* Fan & Fang
Taxonomic position: Insecta: Diptera: Anthomyidae
Common name: Mandchurian larch cone fly; Лиственничная далъневосточная муха (Russian)
Bayer computer code: STRMLU

HOSTS

S. luteoforceps attacks cones of larch species: *Larix gmelini*, *L. olgensis*, and *L. cajanderi* (Roques *et al*. 2003).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Russia (South Far East)
Asia: Northeastern China (Xiao Khinggan Mountains of Heilongjiang; Fan, 1988; Fan and Fang, 1981; Fan *et al.*, 1982; Fang *et al.*, 1980, 1989; Roques *et al*., 1996, 2003; Yao *et al.*, 1991, 1993), Russia: Primorie and Amur regions, Sakhalin (Stadnickii et al., 1978)
EU: Absent.

BIOLOGY

There is a close synchrony between larch cone development and the oviposition of the four to six species of cone fly developing in larch cones in the Far East (Roques et al, 2003). Among these species, that follows one another in a given order, *S. luteoforceps* is the latest species to attack (Fig. 1). Adults emerge from mid- May to early June depending on location but they need at least 2 weeks to mature before mating and oviposition begins (Yao et al., 1991; Skhuravá and Roques, 2000). Females lay eggs at the end of the cone growth period when cone scales are quite full-sized (Fig. 1; Skhuravá and Roques, 2000; Roques et al., 2003). The eggs are laid on the inner side of cone scales and are not externally visible (Stadnickii et al., 1978). The larvae pass through 3 instars but only two are free-living, the 1st instar larva remaining within the eggshell. The 2nd -instar larva enters the cone tissues at the place where the egg was laid. It tunnels down the corresponding scale, reaches the scale base and destroys the basal seeds. Then, the larva spirals round the cone axis, feeding on seeds during its course. The second instar lasts about 10-15 days. The 3rd instar larva generally develops in a similar way, and makes larger galleries tunnelling round the axis but never entering axis (Skhuravá and Roques, 2000). The full-grown larvae finally bore a hole and drop to the ground, generally during days of rainfall. Larvae vacate the cones from late June to mid-July, depending on latitude and weather conditions. When on the ground, larvae build a puparium in the upper soil layer where they overwinter. Some adults may emerge the following year but a variable part of the population extend the winter diapause for an additional 1-4 year period (Skhuravá and Roques, 2000). In Primorie, the overall development of *S. luteoforceps* lasts 2 years at least in relation with the periodicity of larch cone crops (Stadnitckii et al., 1978).

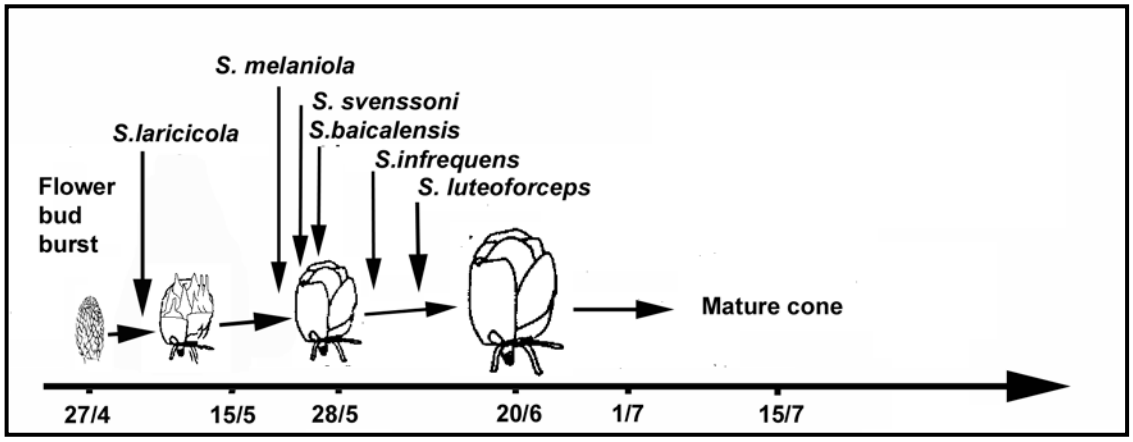

Fig. 1. Phenological relationships between cone development of *Larix gmelini* and attack by *Strobilomyia luteoforceps* and other larch cone flies in the Xiao Khinggan Mountains of Heilongjiang (modified from Yao *et al.*, 1991).

DETECTION AND IDENTIFICATION

Symptoms

No damage is visible externally. When cones are sliced, larval damage is indicated by galleries spiralling around the cone axis, which usually begin in the middle part of the cone, but it is often difficult to distinguish damage from that of other cone fly species especially in case of multiple occupancy of cones (Skhuravá and Roques, 2000).

Morphology

Eggs

The egg of *S. luteoforceps* is oval, 0.8 mm long, and about 2.5 times as long as wide. Colour is creamy white, and the chorion is marked by longitudinal lines of rasp-like prominences from which faint linear processes develop transversally (Sun et al., 1996a).

Larva

No specific information is available. The larva resembles that of other larch cone flies with an elongated, legless body, showing a sclerified cephalopharyngial skeleton at the anterior extremity and 2 large spiracular tubercles surrounded by a circle of papillae at the anal extremity (Fig. 2; Skhuravá and Roques, 2000)

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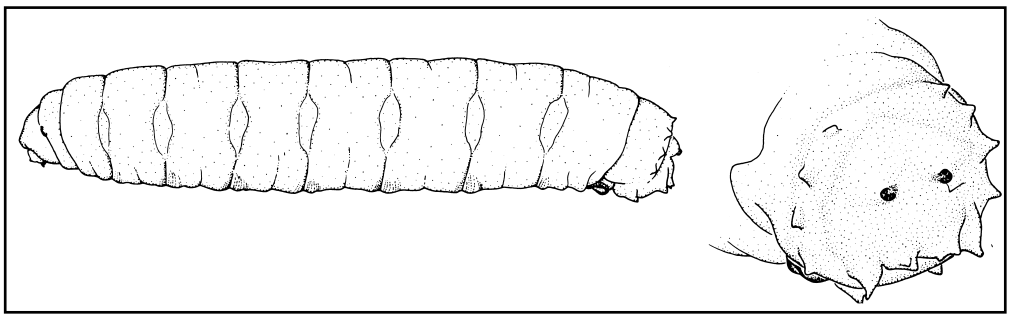

Fig. 2. Typical larva of larch cone fly (*Strobilomyia* spp.) with enlarged view of hind end on right (from Hedlin et al., 1980, modified)

Pupa

Puparium reddish-brown, nearly ovoid, 3.5- 6.0 mm by 1.3-1.5 mm.

Adult

Adults are typical, medium-sized anthomyiid flies of blackish colour. Wing length ranges 3.5-4.6 mm. A sexual dimorphism is noticeable, male being easily identified by the adjacent eyes whereas female eyes are separated by a broad stripe. The ground colour of body is blackish with bluish grey pruinosity. The base of wings is yellowish- brown. The species is difficult to separate from other cone flies by external examination of adults, and genitalia dissection must be systematically used for accurate identification, especially of trapped flies. Male genitalia largely differs by the presence of 2 pairs of strong apical bristles on the cercal plate (Fig. 3; Fan and Fang, 1981; Michelsen, 1988; Roques et al., 1996, 2003). Female has a rather long ovipositor (2.8 mm long on the average) with characteristic sclerified pieces on sternites (Fig. 4; Roques et al., 1996, 2003; Sun et al., 1996b).

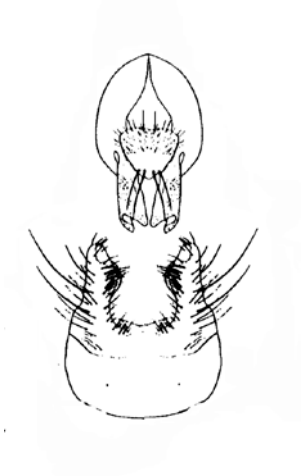

Fig. 3. Male genitalia of *Strobilomyia luteoforceps* (lower part: sternite V; upper part: epandrium, surstylus and cercal plate) (from Michelsen 1988, modified)

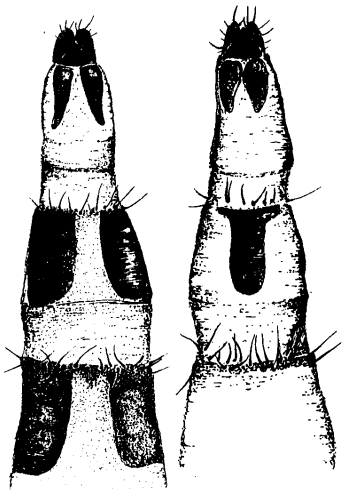

Fig. 4. Ovipositor (left: tergites VII-IX; right: sternites VII-IX) of *Strobilomyia luteoforceps* (from Roques et al., 1996, modified).

MEANS OF MOVEMENT AND DISPERSAL

Adults can fly over rather long distances to colonize new stands. Eggs and larvae are unlikely to be disseminated because they occur on immature cones. However, pupae can be disseminated with soil of potted larch seedlings.

PEST SIGNIFICANCE

Economic Impact

Only a few data exist about specific damage by *Strobilomyia luteoforceps* because of diificulties in larvae identification. It was shown to be a major problem in Primorié where the specific percentage of damaged cones varies from 50% during years of large cone crops to 95-100 % during years of light crops (Stadnickii *et al.* 1978). A larva destroys up to 20 seeds per cone, i.e. 60 to 100% of the seed yield depending on the cone size. As soon as 2–3 larvae, possibly belonging to different species, are observed in a cone, the whole seed content is destroyed (Roques et al., 2003). Light stands located on southern slopes seem preferred by *S. luteoforceps*. In Northeastern China, the species was the most important cone fly pest on Dahurian larch in the Wu-ying district of the Xiao Khinggan Mountains during the early 80s (Fang et al., 1980). However, it was less frequent during later surveys, representing only 5% of the cone flies emerging in this mountainous range (Yao et al., 1991).

Environmental Impact

Seed damage due to larch cone flies largely limit the potential of natural regeneration of larch forests in the Far-East.

Control

In Northeastern China, monitoring is effective using visual traps coloured in yellow with or without purple stripes, which captured essentially males (Yao et al., 1991). Vinegar- sugar baits are also known to trap males (Fan and Fang, 1981). No specific information is yet available about natural enemies.

Phytosanitary risk

S. luteoforceps is not declared a quarantine pest by any regional plant protection organization. It is considered as a serious larch pest all over north-eastern Asia. Because most *Strobilomyia* cone flies are known to be capable of shifting on new hosts congeneric to the original one, it is very likely that *S. luteoforceps* can establish in all the EPPO countries where larch species grow naturally or are used as ornamental trees.

PHYTOSANITARY MEASURES

To prevent introduction of *S. luteoforceps* to other countries, the effective measure would be to survey the presence of cone fly puparia in the soil of containers used for importing larch seedlings from the Far East.

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