European and Mediterranean Plant Protection Organization
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

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

Lymantria mathura

Identity

Name: *Lymantria mathura* Moore
Synonyms: *Porthetria mathura* (Moore), *Ocneria mathura* (Moore), *Lymantria aurora* Butler, *Lymantria fusca* Leech, *Lymantria mathura aurora* Butler
Taxonomic position: *Insecta*: *Lepidoptera*: *Lymantriidae*
Common names: rosy gypsy moth, pink gypsy moth (English), розовый непарный шелкопряд (Russian)
EPPO code: LYMAMA
Phytosanitary categorization: EPPO A2 action list no. 331

Hosts

L. mathura attacks many species of *Betula*, *Castanea*, *Juglans*, *Malus*, *Quercus*, *Salix*, *Tilia*, *Ulmus* and other deciduous trees. Its preferred hosts in the Russian Far East are: *Juglans mandshurica*, *Malus mandshurica*, *Quercus mongolica* and *Quercus dentata* (Kozhanchikov, 1950; Pavlovskii & Shtakelberg, 1955; Chelysheva & Orlov, 1986; Epova & Pleshanov, 1995; Lee & Lee, 1996; Dey & Tiwari, 1997).

A study of the suitability of North American, Asian, and European tree species (24 broad-leaved and conifer species) for the development of *L. mathura* showed that the pest develops well on most hosts of the family *Fagaceae* regardless of the species' origin. Survival and rate of development on the European species *Fagus sylvatica* and the American species *Fagus grandifolia* were equivalent to those on the Asian species *Quercus variabilis*. These characteristics were also high on the American species *Quercus alba* and *Quercus prinus*. Other American oaks, such as *Quercus rubra*, *Quercus velutina* and *Quercus palustris* gave moderate survival, but supported further development of only a small proportion of larvae. The Asian *Juglans mandshurica*, the American *Juglans cinerea* and the American *Carpinus caroliniana* were similar. Survival was poor, and further development nil, on the other trees investigated (the American *Juglans nigra*, the European *Alnus glutinosa*, two American *Fraxinus* spp., and various conifers (Zlotina *et al*., 1998).

Geographical distribution

EPPO region: Russia (southern Far East)
Asia: China (at least Hebei, Heilongjiang, Jilin; also in west), India (Northern), Nepal, Japan (Hokkaido, Honshu, Kyushu), Republic of Korea, Democratic People's Republic of Korea, Russia (southern Far East) (Kozhanchikov, 1950; Pavlovskii & Shtakelberg, 1955; Munson *et al*., 1995; Lee & Lee, 1996; Dey & Tiwari, 1997)
EU: absent

Biology

Outbreaks of *L. mathura* usually occur once in 4 years, a little earlier than or together with outbreaks of *Lymantria dispar*. The behaviour and the life cycle of *L. mathura* are similar to those of *L. dispar*, and in particular to those of the local geographical form (with flying females). Eggs with almost completely developed larvae overwinter under bark scales. Neonate caterpillars usually appear in the first half of May and continue to hatch for around 20 days. For the first 4–5 days, they neither spread nor feed. The feeding period covers May, June and July. Caterpillars feed first on buds, then on leaves, preferring to stay on leaves and not on branches. The most active feeding is observed in the evening. During outbreaks, the pest population level may reach more than 1000 caterpillars per tree. The possibilities for wind dispersal of *L. mathura* neonate caterpillars are greater than those of *L. dispar* because of smaller weight. Male caterpillars usually have 5, female 6 instars. Larval development lasts 50–60 days. Pupation of *L. mathura* occurs on leaves and branches in crumbly cocoons or almost without cocoons in July, usually 5–7 days later than pupation of *L. dispar*. Pupal development lasts 12–18 days. Flights occur at the end of July and in August. Males and females are strong fliers, active at night and attracted to lights. During outbreaks, the pest population level may reach up to 320 moths (males and females) caught in 5 min in a light trap. Males are less active whereas females are more active than those of *L. dispar*. Males are not strongly attracted to disparlure and population monitoring schemes using pheromone traps

have yet to be developed. Females lay eggs in small multiple masses that are well hidden under bark scales on trunks (not only of host plants, e.g. on *Picea*) usually close to the soil or in crevasses on other objects making them difficult to detect. Several times, egg masses of the pest have been found on ships by Canadian and American phytosanitary inspectors. Eggs are covered with female spume-like transparent secretions. One female may lay 150–600 eggs. The flight of *L. mathura* to lights and caterpillars of the pest have been observed under the Russian Far East Lymantriid Monitoring Project in the South of Primor'e territory (Kurentsov, 1939, 1941; Kozhanchikov, 1950; Chelysheva & Orlov, 1986; Maslov, 1988; Orlinskii, 1993; Epova & Pleshanov, 1995; Munson *et al*., 1995; Savotikov *et al*., 1995; Lee & Lee, 1996; Oliver *et al*., 1999; Zlotina *et al*., 1999; Gninenko & Gninenko 2002; Gninenko & Orlinskii, 2003).

L. mathura is attacked by many natural enemies: hymenopteran egg parasitoids, hymenopteran (mainly *Apanteles* spp.) and dipteran (mainly *Tachinidae*) larval parasitoids, dipteran pupal parasitoids (mainly *Tachinidae* and *Sarcophagidae*). Caterpillars are often infested by nematodes and nuclear polyhedrosis viruses. Natural enemies play a very important role in pest suppression (Lewis *et al*., 1984; Chelysheva & Orlov, 1986; Lee & Lee, 1996).

Detection and identification

Symptoms

Defoliation of host trees is usually very spectacular. The presence of caterpillars is easily detected. The caterpillars and adults have characteristics which permit entomologists to distinguish the species from other species of moths. Adult males can be captured using light traps (pheromones are under study).

Morphology

Eggs
Similar to eggs of *L. dispar* but egg masses covered by female spume-like transparent secretions and not by female hairs.

Larva
No information.

Pupa
No information, except similar to *L. dispar* (Kurentsov, 1939).

Adult
Adults of *L. mathura* (Fig. 1) are clearly sexually dimorphic. Males: antennae strongly pectinate, yellow-grey with black segments; head and thorax yellow-grey with grey strokes; abdomen yellow with bundles of grey hairs on tergites; ventral side of abdomen and thorax yellow; fore wings yellow-grey with many grey and white transversal stripes, yellow veins and yellow-grey fringe; hind wings dull, grey-yellow, with light yellow fringe; upper side yellow, uncoloured, sometimes slightly pinkish. Females: white-pink; hind wings, abdomen, base of antennae, legs and tops of veins on front wings bright pink; other parts of the body pinkish; fore wings pink with white longitudinal strokes along veins; wing pattern similar to that of *L. dispar;* head and notum with light strokes (white and grey); valva with three appendixes and acute distal top (Fig. 2); 9th segment with subunci. Male wingspan 40–50 mm, female wingspan 70–90 mm (Kozhanchikov, 1950).

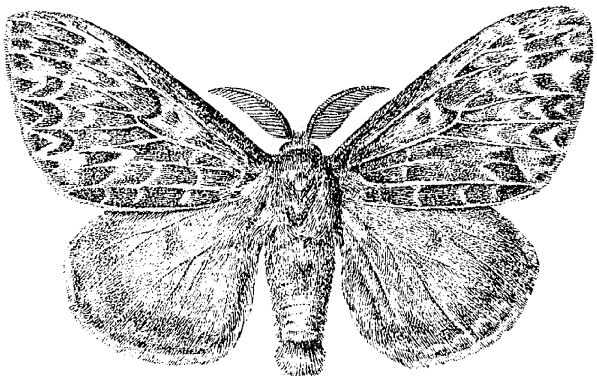

Fig. 1 Male of *Lymantria mathura* (Kozhanchikov, 1950).

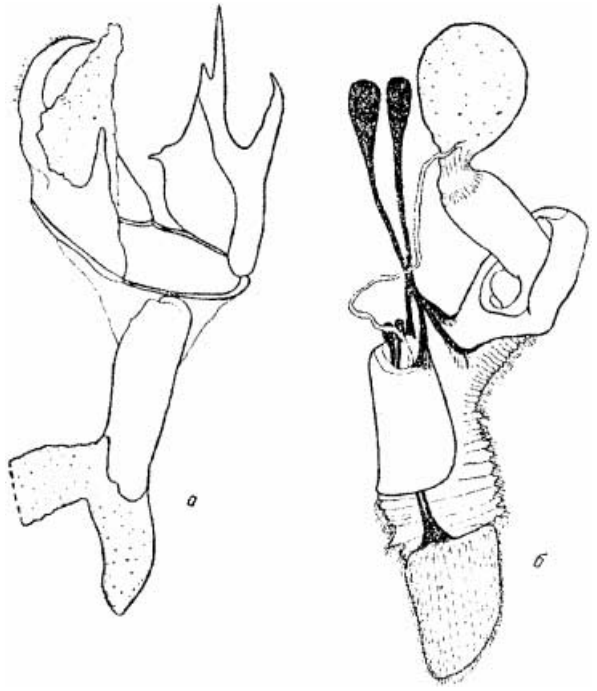

Fig. 2 Genitalia of *Lymantria mathura*: a, Male; b, female (Kozhanchikov, 1950).

Pathways for movement

L. mathura can spread naturally by flight of adult moths. All stages of the life cycle can be transported on plants moving in

trade, particularly plants for planting and cut branches. Eggs may be associated with wood with bark of different trees (not only of host species) or in crevasses on other articles (packaging, conveyances, containers, etc.). Egg masses are small and well hidden, which makes them difficult to detect. During outbreaks especially, larvae may be associated with bark or contaminate other commodities.

Pest significance

Economic impact

L. mathura is one of the most important defoliators of deciduous trees (especially *Quercus*) in the area of its present distribution. Its outbreaks usually occur over large areas and often result in complete defoliation of forests. For example, an outbreak in 1998 in the south of Primor'e territory (Far East of Russia) covered 200 000 ha. Pest damage does not usually kill trees but lead to significant loss of vigour. During outbreaks, pest populations may reach more than 1000 caterpillars per tree. Furthermore, outbreaks of *L. mathura* are also very often followed by outbreaks of wood borers (*Scolytidae*, *Cerambycidae* and others). These pests are able to kill trees which are heavily stressed by *L. mathura*. *L. mathura* attack thus leaves forests susceptible to pest outbreaks and predisposes them to forest fires. The reforestation of these areas is often complicated and takes much time. This can result in serious changes in the environment over large areas.

Important damage also occurs in orchards, e.g. of apple, leading to loss of fruit yield. Outbreaks of *L. mathura* have often been reported at the same time as those of *L. dispar*, increasing the impact of the latter. Most authors believe, nevertheless, that *L. mathura* is not as important as *L. dispar* (which is present in Europe) (Kurentsov, 1941; Kozhanchikov, 1950; Chelysheva & Orlov, 1986; Maslov, 1988; Epova & Pleshanov, 1995; Munson *et al*., 1995; Matussevich, 1999; Gninenko & Gninenko, 2002).

Control

Significant control efforts (mainly treatments with chemical, bacterial and viral preparations) against *L. mathura* are undertaken during years of outbreaks in Russia. Usually, the same control measures are used as against *L. dispar*. Forecasting of population development is possible by trapping *L. mathura* adults in light traps and analysing weather conditions. New pheromones are now being developed for monitoring and control purposes (Chelysheva & Orlov, 1986; Maslov, 1988; Zheng *et al*., 1994; Oliver *et al*., 1999; Gries *et al*., 1999).

Phytosanitary risk

L. mathura is considered as an important defoliator of deciduous forests and orchards in countries where it occurs. It is very likely to be able to establish in many EPPO countries, particularly those in the centre of the region. Its major host species (*Fagaceae*) include several keynote species in Europe. The related *L. dispar* is present in Europe, and also causes damaging outbreaks, but evidence from the Far East suggests that *L. mathura* can enhance *L. dispar* outbreaks. Particularly on account of *L. dispar*, most *Lymantria* spp. are regarded as potentially dangerous in continents where they do not occur, and their presence in Europe could cause additional problems with export trade.

Phytosanitary measures

L. mathura is regulated by Canada and USA, on a basis similar to that of the so-called Asian form of *L. dispar*. It was added in 2005 to the EPPO A2 action list, and endangered EPPO member countries are thus recommended to regulate it as a quarantine pest. Because of its potential for natural spread, phytosanitary measures may have little effect in countries bordering the present range. Surveys may be conducted in the border areas, using light traps to detect entry of the pest which would be followed by eradication campaigns. Control measures can also be applied in adjoining infested areas, especially during outbreaks, to limit spread. To prevent introduction, plants for planting and cut branches of host plants from the infested areas should be free from soil, according to OEPP/EPPO (1994). Alternatively, such commodities should originate in a pest-free area, or be produced in protected houses, or fumigated or imported during winter. Wood should be debarked or heat-treated or originate in a pest-free area, or be imported during winter, and isolated bark should be treated against contaminating insects.

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