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

Data Sheets on Forest Pests

Euproctis kargalika

IDENTITY

Name: *Euproctis kargalika* Moore
Synonyms: *Porthesia kargalika* Moore
Euproctis karghalica Moore
Porthesia karghalika Strand
Euproctis kargalica Grum-Grzhimailo
Porthesia flavosulphurea Grum-Grzhimailo
Taxonomic position: Insecta: Lepidoptera: Lymantriidae
Common name: Turkestan brown-tail moth (English); туркестанская златогузка (Russian).
Bayer computer code: EUPRKA

HOSTS

E. kargalika is extremely polyphagous and damages many different species of deciduous trees and shrubs belonging to many families: *Acer campestre, Acer regelii, Acer tataricum, Acer turkestanicum, Alhagi* sp., *Amygdalus bucharica (= Prunus bucharica), Amygdalus communis (= Prunus dulcis = Amygdalus dulcis), Atraphaxis pyrifolia, Betula pendula (= Betula verrucosa), Betula pubescens, Caragana arborescens, Cerasus verrucosa, [Cotoneaster acutiuscula]1, Cotoneaster insignis, Cotoneaster suavis, Crataegus turcestanica, Cydonia oblonga, Elaeagnus angustifolia, Fragaria* sp., *Hippophae rhamnoides, Irga* sp., *Malus domestica, Malus sieversii (= Malus hissarica), Pistacia vera, Prunus (= Cerasus) mahaleb, Prunus armeniaca, Prunus avium, Prunus cerasus (= Cerasus vulgaris), Prunus divaricata, Prunus dulcis (= Prunus communis), Prunus persica, Punica granatum, Pyrus bucharica, Pyrus communis, Quercus* sp., *Rhucs coriaria, Ribes nigrum, Ribes rubrum, Robinia pseudoacacia, Rosa canina, Rosa corymbifera, Rosa kokanica, Rosa maracandica, Rubus caesius, Rubus idaeus, Rumex sp., Salix excelsa (= Salix australior), Salix tenuijulis, Spirea hypericifolia, Ulmus effusa, Ulmus foliacea* var. *campestris.* Other plants are damaged occasionally (Pavlovskii & Shtakelberg, 1955; Grechkin, 1956; Degtyareva, 1964; Makhnovskii, 1966; Abai, 1975; Litvinchuk, 1977; Romanenko, 1981; Maslov, 1988).

GEOGRAPHICAL DISTRIBUTION

E. kargalika was first recorded from Iran (near Tehran) in 1972 and was probably introduced there (Abai, 1975). In Central Asia, outbreaks of *E. kargalika* occur in valley and mountain forests and orchards up to an altitude of 1600 m. The species can survive up to 2500 m.
EPPO region: Kyrgyzstan, Russia (Southern Siberia – Altai Kray).
Asia: Iran, China (north-west), Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan.
EU: Absent

BIOLOGY

The mass flight of *E. kargalika* is very long and usually occurs from the beginning of June until the middle of September. Its beginning and end depend on the altitude in the mountains. Each evening, the flight begins in the twilight and lasts throughout the night. The rest of the day, the moths sit on trunks, branches and leaves. Copulation usually begins the day after hatching of the adults from the pupal stage, and oviposition occurs on the third or fourth day. Eggs are usually laid on the underside of leaves, but sometimes on branches and trunks

1 the name used in Soviet literature and not found in European databases is placed in square brackets

mainly in the top of crowns of trees and bushes. Egg masses, containing from 50 to 500 eggs, are covered by a thick layer of golden-brown hairs from the tail of the female. Each female usually lays only one egg mass and dies soon after egg-laying (Degtyareva, 1964; Litvinchuk, 1977).

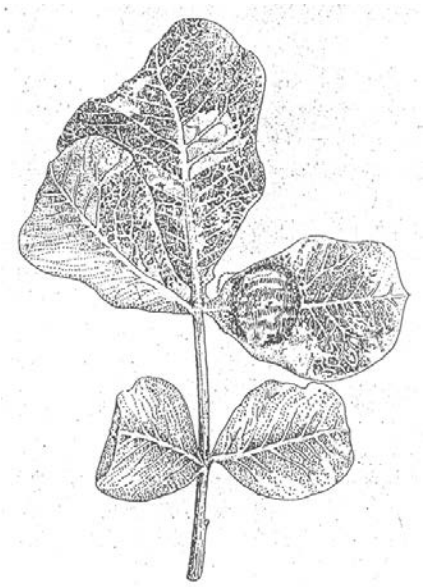

Fig. 1. Egg masses of *Euproctis kargalika* on pistachio leaves (Degtyareva, 1964)

Embryonic development usually takes from 18 to 25 days. Hatching of neonate caterpillars usually occurs from the middle of July to the beginning of September. Caterpillars stay together for some time at the site of the former egg mass, and then make small nests of one or several leaves. They live inside these nests, where their feeding skeletonizes the leaves, and moult once or twice before overwintering. Caterpillars overwinter when they are from 3 to 8 mm in length; this is usually in the second instar stage, but sometimes the first or third instars. They construct special overwintering nests and make white cocoons inside these nests.

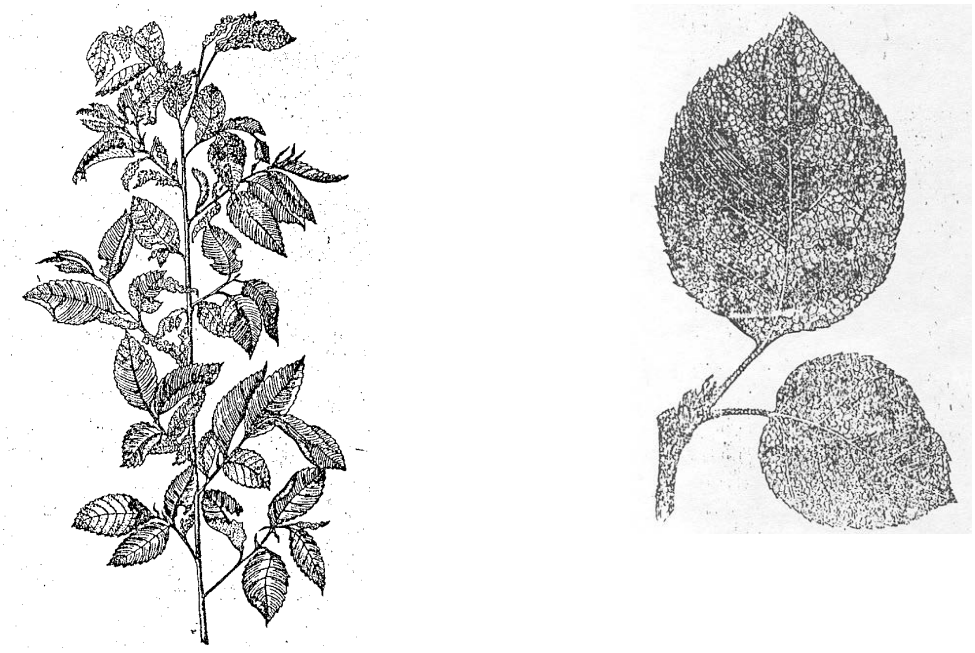

Fig. 2. Elm branch (left) and apple leaves (right) damaged by young caterpillars of *Euproctis kargalika* (Degtyareva, 1964)

In spring, caterpillars leave their overwintering nests from the end of March to the beginning of May and begin to feed on buds, and then on leaves. They then construct web nests on branches. These nests are not very large,

measuring usually 6x3x2 cm or 7x4x2,5 cm but several hundred caterpillars may live in one nest. They moult three or four times before pupation. They leave the nests at the fifth or sixth instar stage and then live individually, eating complete leaves. Hairs of caterpillars (similar to other *Euproctis* species) are toxic and direct larval contact and wind-dispersed hairs cause 'caterpillar dermatitis', a form of papular urticaria to humans.
The pupation period is very long – from the end of April to the end of July. Caterpillars come down to the soil where they pupate under leaves. Sometimes, the pupation takes place under the bark, in cracks of trunks or in other places. Before pupation, a caterpillar makes a brown-grey cocoon with toxic hairs. The development of the pupa takes around 15 days. The full life cycle takes one year (Degtyareva, 1964; Litvinchuk, 1977).

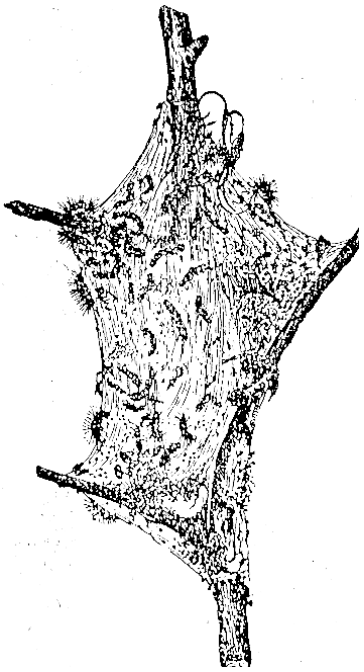

Fig. 3. Nest of caterpillars of *Euproctis kargalika* on a branch (Degtyareva, 1964)

DETECTION AND IDENTIFICATION

Symptoms

Defoliation of host plants is usually very spectacular. The presence of egg masses, nests and individual caterpillars is easily detected. Moths are attracted by sources of light.

Morphology

Eggs

The egg is umber-yellow after it is laid, and then turns brown-yellow; it is almost round, from about 0.3 – 0.4 mm (Kozhanchikov, 1950) to 0.5 – 0.75 mm (Litvinchuk, 1977) in diameter, slightly flattened in dorso-ventrally. In the egg mass, eggs are situated close to each other and are covered by a thick layer of golden-brown female hairs.

Larva

Just before pupation, the caterpillar is 35 – 37 mm long, whitish-grey with black stripes and a brown-orange pattern. Hairs, concentrated on warts, are whitish-yellow and light grey. The dorsal side of the thoracic segments is yellow-ochre with thin transverse stripes. The dorsal side of the first two abdominal segments is black with orange warts. The next five abdominal segments are ochre on the dorsal side and have black transverse stripes and one central longitudinal black stripe. Tergites of the eighth and anal segments are black with faint ochre stripes. Wide grey longitudinal stripes continue along the lateral sides. Under these stripes, there are lines of dark warts; the lateral sides are yellow-grey. Stigmata are black. The ventral side of the body is yellow-grey, rarely with black transverse lines. The abdominal legs are yellow-grey, and the thoracic legs are yellowish. The head is light yellow and more pigmented at the vertex and mandibles.

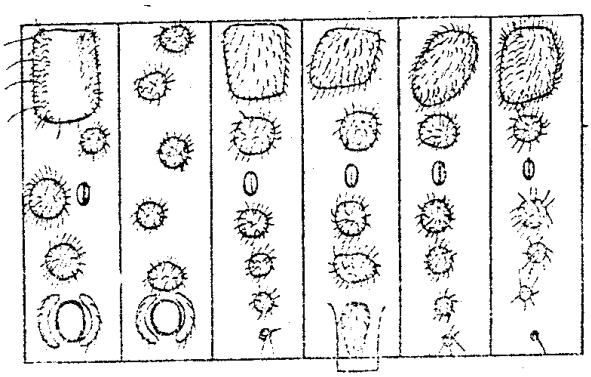

Fig. 4. Chaetotaxy of prothorax, mesothorax, and I, VI, VII and VIII abdominal segments of a first instar caterpillar of *Euproctis kargalika* (Kozhanchikov, 1950)

Pupa

The pupa is dark brown.

Adult

The male wingspan is 30 – 35 mm. The female wingspan is 35 – 40 mm. Thorax and wings are clean silvery-white. At the discoidal nerve of the front wings, there is a round ochre and black spot. In the terminal part of the front wings there are eight ochre and black spots. The front wings are covered by small white hairs. The back wings are clean white without spots. The underside of the wings is also clean white except the costal border of the front wings, which is dark, especially in the case of males. The head is white with brown-ochre hairs around the eyes and at the edges of the frons. The eyes are big and black. Labial palpi are brown-ochre at the base (first two segments) and white at the top. The legs of the females are all white. The tibias of the front legs of males are ochre, whereas the femora and tarsi are white. Other legs of the males are white. The first three abdominal segments are white. Distal segments of the abdomen are orange-brown except the ventral side, which is very light, almost white in the case of females. The three last segments are especially brightly coloured and are covered, in the case of females, by a thick layer of ochre hairs. Male antennae are strongly pectinated with white segments and yellow appendices.

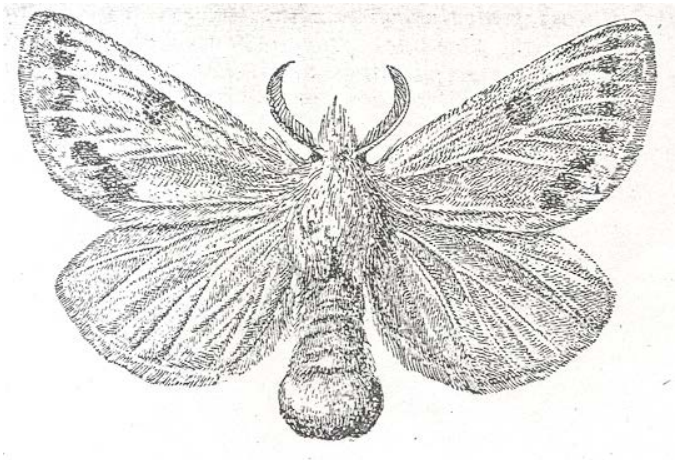

Fig. 4. Female of *Euproctis kargalika* (Kozhanchikov, 1950)

The morphology of genitalia of *E. kargalika* (fig. 5) is described by I. V. Kozhanchikov (1950).

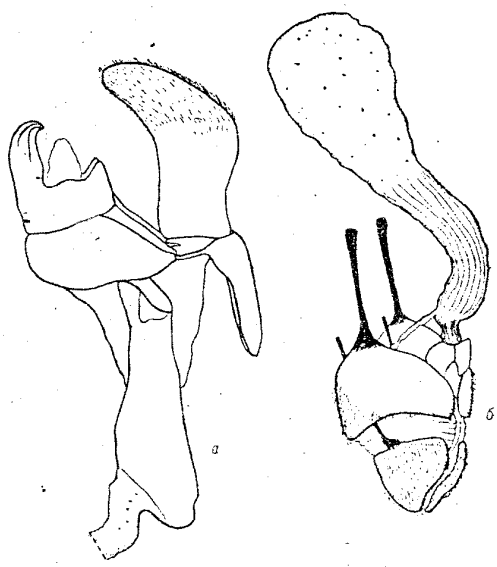

Fig. 5. Genitalia of (a) male and (b) females of *Euproctis kargalika* (Kozhanchikov, 1950)

MEANS OF MOVEMENT AND DISPERSAL

E. kargalika can spread with the flight of the adult moths. All stages of the life cycle can be transported on host plants moving in trade, particularly plants for planting and cut branches. Eggs, larvae and pupae (cocoons) may be associated with wood containing bark and may be hitchhikers on other products.

PEST SIGNIFICANCE

Economic Impact

E. kargalika is an important defoliator of many deciduous trees in the countries that were the Asian Republics of the former USSR, Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan. Its outbreaks occur periodically and may last for two consecutive years. The periodicity of outbreaks is not well studied. It is irregular and seems to be due to fluctuations of survival of overwintering caterpillars and the influence of natural enemies. It was especially noted as a very dangerous pest of forests and orchards in the mountains of Central Asia (Pavlovskii & Shtakelberg, 1955; Makhnovskii, 1955, 1966; Degtyareva, 1964; Litvinchuk, 1977; Romanenko, 1981; Maslov, 1988). The main damage is caused in spring when caterpillars feed on buds and leaves. The main outbreaks of *E. kargalika* occur in mountain forests at an altitude of 900 – 1600 m where the pest finds optimal conditions for its development, but the pest also periodically causes major losses in forests and orchards on the plain and even in forest shelter-belts protecting fields in the steppes of Southern Siberia (Litvinchuk, 1977). It attacks both stressed and healthy trees of different ages. Its outbreaks occur throughout large areas, often resulting in 100% defoliation and sometimes leading to the death of trees and forests, either alone or in association with *Yponomeuta padellus*, *Malacosoma parallela*, *Erschoviella musculana*, *Lymantria dispar* and/or other defoliators.

Environmental Impact

E. kargalika sometimes causes the death of forest and fruit trees in mountains and valleys. The reforestation of these areas is often very complicated and takes much time. This results in serious changes of environment over large areas including problems of erosion of mountains.

Social Impact

In addition to defoliation of city plantations, forests and orchards, which cause social damage connected to tourism and the leisure of local people, *E. kargalika* causes some medical problems. In woodland areas, the pest is responsible for the production of a contact dermatitis known as erucism, which can affect both casual visitors and forest workers. Hairs of caterpillars (similar to other *Euproctis* species) are toxic, and direct larval contact and wind-dispersed hairs cause 'caterpillar dermatitis', a form of papular urticaria. The presence of histamine in caterpillar hairs is one of the inflammatory mediators responsible for the pruritic skin rashes. Following defoliation of trees, caterpillars migrate in search of food and cause widespread discomfort to people. Urticating hairs produced by *E. kargalika* caterpillars can be collected a long distance from their original sites of emission, and this phenomenon is dependent on prevailing meteorological conditions. Many persons develop allergic

dermatitis due to the urticating hairs of this lymantriid. The attraction of the moths for artificial light in urban areas increases this problem (Degtyareva, 1964; Litvinchuk, 1977).

Control

Significant control efforts (mainly manual destruction of egg masses and overwintering nests by collecting and burning, light trapping of adult moths, but also aviation treatments with chemical and bacterial preparations) against *E. kargalika* are undertaken during years of outbreaks (Degtyareva, 1964) throughout the range of the pest. Pheromones may possibly be used for pest control and limiting its spread (Minyailo, Minyailo, 1972).
The natural enemies of *E. kargalika* play an important role in regulation of its populations (Degtyareva, 1964; Makhnovskii, 1966; Kal'vish, 1976; Romanenko, 1981; Dbar & Saparmamedova, 1988). The most important of these is the larval parasitoid *Rhogas nocturnus (Braconidae)*, but other natural enemies also play a role, e.g. the larval parasitoids *Apanteles lacteicolor* and *Pteromalus nidulins*, the carabid predator *Calasoma sycophanta*, and fungal pathogens *Beauveria bassiana* and *Paecilomyces farinosus*.

Phytosanitary risk

E. kargalika is not declared a quarantine pest by any regional plant protection organization. It is considered as a serious defoliator of deciduous trees in many southern countries of the former USSR. It is very likely to be able to establish in many EPPO countries particularly those in the south and east of the European part of the EPPO region where its host plants species are important forest, ornamental and fruit trees.

PHYTOSANITARY MEASURES

To prevent introduction of *E. kargalika* to other countries, the effective measure would be to prohibit import of plants for planting and cut branches of its host plants from the infested areas. Inspection of wood products and other commodities can detect egg masses, overwintering nests, pupae in cocoons as well as hitchhiking larvae and adults.

DECISION OF THE EPPO PANEL ON QUARANTINE PESTS FOR FORESTRY

The EPPO Panel on Quarantine Pests for Forestry provided the Pest Risk Assessment for *Euproctis kargalika* at the meeting in Vilnius, (LT, 2002-03-12/14). The general opinion of the Panel was that the risk from this pest is not very high, especially because a similar species, *Euproctis chrysorrhoea*, is already present in forests of Europe. The conclusion of the Panel was that *E. chrysorrhoea* already occupied the existing ecological niche needed by *E. kargalica* and it was decided not to propose *E. kargalica* as a quarantine pest for forestry although noted that it may present a risk for orchards, for trees along roads and in cities, and for human health on the European and Mediterranean part of the EPPO region and that the PRA should be provided for these plants.

BIBLIOGRAPHY

Abai M. (1975) *Euproctis (= Porthesia) karghalica* Moore in Iran. Journal of Entomological society of Iran, 2, N° 2, p. 77 – 84 (in Persian).

Dbar R. S. & Saparmamedova N. K. (1988) A new species of ichneumonid of the genus *Eriborus* (Hymenoptera, Ichneumonidae) – a parasitoid of the Turkmenian lymantriid *Porthesia cargalica* in the central Kopetdag. "Izvestiya Akademii Nauk Turkmenskoi SSR", N° 6, p. 62 – 64 (in Russian).

Degtyareva V. I. (1964) The main lepidopterous pests of trees and shrubs of the central part of Gissar mountain ridge and Gissar valley. Dushanbe, Edition of Academy of sciences of the Tajik SSR, p. 241 (in Russian).

Grechkin V. P. (1956) Some most important species of pests of mountain forests of Tajikistan. "Zoologicheskii zhournal", 35, N° 10, p. 1476 – 1492 (in Russian).

International Organization for Plant Information. Internet site "Provisional Global Plant Checklist", 1996 – 1998, www.bgbm.fu-berlin.de/IOPI/GPC/query.htm.

Kal'vish T. K. (1976) Entomophilous fungi of pests of forest shelter belts in the Kulunda steppe. "Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR", N° 10(2), p. 85 – 89 (in Russian).

Kozhanchikov I. V. (1950) *Euproctis karghalica* Moore. In: Lepidopterous insects. Orgyidae. Moscow – Leningrad, Edition of the Academy of Sciences of the USSR, V. XII, p. 327- 330 (in Russian).

Litvinchuk L. N. (1977) Turkestan brown-tail moth *Euproctis karghalica* Moore (Orgyidae, Lepidoptera) – mass pest of field-protecting forest shelter belts in Western Siberia. In: Study of forests of Western Siberia. Krasnoyarsk, Edition of Siberian Department of the Academy of Sciences of the USSR, p. 104 – 111 (in Russian).

Makhnovskii I. K. (1955) Pests of protective forest plantations in Central Asia and their control. Tashkent, State Editing Office of Uzbek SSR, 195 p. (in Russian).

Makhnovskii I. K. (1966) Turkestan brown-tail moth *Euproctis karghalica* Moore. In: Pests of mountain forests and their control. Moscow, "Lesnaïya Promyshlennost'", p. 72 – 73 (in Russian).

Maslov A. D. (1988) Guide on Forest Protection against Pests and Diseases. Moscow, "Agropromizdat", 414 p. (in Russian).
Minyailo V. A. & Minyailo A. K. (1972) Female sex pheromones as a means of reproductive isolation in three species of the genus *Euproctis* (Lepidoptera, Orgyidae). “Zoologicheskii zhournal”, 51, N° 8, p. 1247 – 1248 (in Russian).
Pavlovskii E. N. & Shtakelberg A. A.(Eds.) (1955) Forest pests. Guide. Moscow – Leningrad, Edition of Academy of sciences of the USSR, V. 1, 421 p. (in Russian).
Romanenko K. E. (1981) Pests of field protecting forest plantations in Kirgizia. Frunze, "Ilim", 225 p. (in Russian).
Romanenko K. E. (1981) Turkestan brown-tail moth (*Euproctis karghalica* Moore) – a pest of forest fruit treed in Kirgizia. In: Entomological studies in Kirgizia. Frunze, "Ilim", V. XIV, p. 110 - 115 (in Russian).
Vascular Plants of Russia and Adjacent Countries as on 26.10.1996, in: International Organization for Plant Information. Internet site “Provisional Global Plant Checklist”, 1996 – 1998. www.bgbm.fu-berlin.de/IOPI/GPC/query.htm.