Data Sheets on Quarantine Pests

Cacoecimorpha pronubana

IDENTITY

Name: *Cacoecimorpha pronubana* Hübner
Synonyms: *Tortrix pronubana* Hübner
Cacoecia pronubana Hübner
Cacoecimorpha ambustana Hübner
Cacoecimorpha hermineana Duponchel
Cacoecimorpha insolatana Lucas
Taxonomic position: Insecta: Lepidoptera: Tortricidae
Common names: Mediterranean carnation leafroller or tortrix (English)
Tordeuse méditerranéenne de l'oeillet (French)
Mittelmeernelkenwickler (German)
Minador (gusano) del clavel (Spanish)
Tortrice dei garofani (Italian)
Nellikevikler (Danish)
Nellikvikler (Norwegian)
Nejlikvecklare (Swedish)
Bayer computer code: TORTPR
EPPO A2 list: No. 104

HOSTS

The principal host is carnations. Other ornamental hosts include: *Acacia*, *Acer*, *Chrysanthemum*, *Coriaria*, *Coronilla*, *Euphorbia*, *Ilex*, *Jasminum*, *Laurus*, *Mahonia*, *Pelargonium*, *Populus*, *Rhododendron*, *Rosa*, *Syringa*. Fruit crop hosts include: *Citrus*, *Malus*, *Olea*, *Prunus*, *Rubus*. Vegetable hosts include: *Brassica* spp., carrots, peas, potatoes, tomatoes, *Trifolium* and *Vicia*.

GEOGRAPHICAL DISTRIBUTION

C. pronubana is indigenous to the Mediterranean region.
EPPO region: Albania, Algeria, France, Germany (intercepted only), Greece, Ireland, Italy, Libya, Luxembourg, Malta, Morocco, Netherlands, Poland (unconfirmed), Portugal, Slovenia, Spain, Switzerland, Tunisia, UK (including Guernsey and Jersey), Yugoslavia.
Africa: Algeria, Libya, Morocco, Tunisia and South Africa (few records).
North America: USA (Oregon only).
EU: Present.
Distribution map: See CIE (1975, No. 340).

BIOLOGY

In northern areas of its distribution (England), *C. pronubana* overwinters as first or mainly second generation larvae, on plants in the glasshouse or open air. Mortality among these

larvae may be as high as 70-90% in winter, since they cannot survive low temperatures and are injured by rain. These larvae mature from the end of March to May, the pupal stage lasting 10-45 days, and adults emerge in April; they fly and deposit eggs until June. First generation larvae emerge and feed from April to August. Pupation takes 15-17 days and second generation imagoes appear from mid-August and fly until the end of September or beginning of October, some individuals hatching up until November if conditions (food and temperature) are favourable. Following a very warm season, a third generation may develop in the autumn on evergreen plants.

In southern areas (France, Italy), four generations are the rule; third and fourth generation larvae overwinter, those in glasshouses (with minimum temperature 8°C, e.g. for carnations) emerging around April, about 15 days earlier than those on crops in the open air. In North Africa, on citrus, there are at least five, and probably six, generations annually.

In glasshouses (with minimum temperature 15°C, e.g. for roses), more than five generations may develop each year, and all stages of the insect may be found between spring and autumn, although in the south of France the periods of egg laying and appearance of first generation adults never overlap.

Imagoes usually hatch at night and copulation, lasting 1-2 h, takes place immediately. The large-bodied females cannot fly easily and only males are normally active. Egg laying occurs in batches, beginning 3-4 h after copulation, and is spaced out over several days. Eggs are laid on smooth surfaces, especially glass, the first batch, usually of 150-250 eggs, being the most important. Each female can lay up to 700 eggs (average 430).

Eggs hatch after 8-51 days. The larvae emerge within a few seconds and, being positively phototactic, quickly move or are carried in wind to the young growing points or flowers. Here, they spin silk around two to three terminal leaves or petals, and feed on the upper surface, so making numerous holes; the parenchyma may be mined. By the end of the third larval instar, the whole leaf is attacked and surrounded by a dense silken mass.

Hatching to pupation (seven larval instars) takes 19-70 days, and pupation itself 10-15 days. Longevity of imagoes is about 11-12 days for females and 14-18 for males; males, in particular, are strongly attracted to light. Temperature thresholds for copulation, egg laying and hatching are 10.5, 12-13 and 14°C, respectively. Pupae cannot survive 2 h at -4°C, and are therefore of no importance in overwintering. At average temperatures of 15 and 30°C, the complete life cycle takes 123-147 and 28-44 days, respectively. Humidity is an important factor; larvae can develop at 10-15% RH; 40-70% RH is optimum but, above 90% RH, larval and pupal mortality is increased. For more information, see Fisher (1924), Bestango (1955), Balachowsky (1966).

DETECTION AND IDENTIFICATION

Symptoms

On carnation cuttings

Terminal and axial leaves and buds are enclosed in silk and eaten, becoming typically crooked; this is usually more serious in spring.

On carnation flowers

The buds are penetrated by the larvae; petals may be joined by larval silk, thus hampering opening and giving flowers a characteristic swollen appearance. In some cases, it may not be apparent that flowers are infested.

On citrus

Foliage attack is similar to that described for carnations above, with typical crooked growth (Delucchi & Merle, 1962). Young stems may be mined. On fruit, there are two types of damage. In April to July, the larvae penetrate the young developing fruit, feeding

superficially on the skin at the peduncle base. The larvae then move up the fruit and continue to consume the skin while protected by leaves which they have spun together with silk. The pulp is never attacked and the damaged mesocarp quickly suberizes. This results in light-brown to blackish patches on the fruit surface, reducing marketability. The second type of damage is that on ripe fruit, attacked in October to November; the calyx end is not usually affected, and damaged areas do not suberize, so favouring the development of rots.

For more information, see Targe & Deportes (1961), Balachowsky (1966).

Morphology

Eggs

Laid in groups of 10-200, initially light-green, becoming yellow; oval to round, flattened and scale-like, 1 mm x 0.6 mm, with a reticulate chorion.

Larva

Initially yellow with a black head which becomes brown in the 2nd instar. In the last (7th) instar, which attains 20 mm in length, the head is brownish-yellow with variable dark spots. The prothorax is a greenish-yellow with four dark spots on the posterior margin. The abdomen is yellow, olive green or grey-brown, depending on diet.

Pupa

Initially brown, becoming almost black. The cremaster has four pairs of hooks. In addition to two rows of dorsal spines, the abdominal segments possess numerous yellow bristles.

Adult

Wingspan 15-17 mm in males, 18-24 mm in females, forewings rectangular, yellowish-brown to purplish-brown in colour with two (in males, one in females) narrow, darker, obliquely transverse bands. Hindwings orange with dark-brown edges. Colour tones vary widely between individuals, females being generally lighter than males.

It may be difficult to differentiate *C. pronubana* eggs and larvae from those of *Epichoristodes acerbella* (EPPO/CABI, 1996), but adults of the latter have distinctive greyish-white hindwings.

MEANS OF MOVEMENT AND DISPERSAL

The adults can disperse themselves locally. In international trade, *C. pronubana* may be carried on plants for planting or cut flowers of carnations, chrysanthemums, pelargoniums, roses and other host plants.

PEST SIGNIFICANCE

Economic impact

In spite of the polyphagous nature of this insect, serious damage is confined mainly to carnation crops in the Mediterranean area, where losses have been reported since the 1920s. In France, around Nice, 25-35% of carnations were affected in 1972-1973, and losses in consignments for export were valued at about 100 000 F. In Morocco, *C. pronubana* was first found in 1933, on citrus, but it was not until 20 years later that it developed into a widespread pest on this crop, the larvae destroying foliage and damaging fruit. In Algeria, it is found mainly on lemons, but is not considered a serious pest. In Italy (Sicily) surveys reported *C. pronubana* mainly on olives, weeds and roses but not on lemons (Inserra *et al.*, 1987; Siscaro *et al.*, 1988). In northern countries (e.g. Poland), *C. pronubana* is important in glasshouses.

Control

Control of *C. pronubana* can be achieved by using pyrethroids such as deltamethrin and fenvalerate (Pandolfo & Zagami, 1983; Inserra *et al.*, 1987). Control of *C. pronubana* by

biological means has not been fully investigated. Monitoring of *C. pronubana* populations is carried out by sex pheromone traps, but their use as a direct control agent by means of mating disruption is still being questioned (Guda & Capizzi, 1988).

Phytosanitary risk

C. pronubana is an A2 quarantine pest for EPPO (OEPP/EPPO, 1980) and is also of quarantine significance for JUNAC. Experiments in Germany indicate that the insect is unlikely, if introduced, to become established in the field in countries to the east and north of the January +2°C isotherm (Herfs, 1963). This means practically that the insect has reached the limits of its natural range. However, *C. pronubana* is a threat to glasshouse crops, especially carnations and other flowers and ornamental plants. For more information, see Balachowsky (1966).

PHYTOSANITARY MEASURES

EPPO recommends (OEPP/EPPO, 1990) that, in countries where *C. pronubana* occurs, nursery inspections should be carried out during the growing season prior to dispatch.

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