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Data Sheets on Quarantine Pests

Conotrachelus nenuphar

IDENTITY

Name: *Conotrachelus nenuphar* (Herbst)
Taxonomic position: Insecta: Coleoptera: Curculionidae
Common Names: Plum curculio, plum weevil (English)
Charançon américain du prunier (French)
Nordamerikanischer Pflaumenrüssler(German)
Bayer computer code: CONHNE
EPPO A1 list: No. 35
EU Annex designation: I/A1

HOSTS

C. nenuphar, a native weevil of North America, was originally a pest of native rosaceous plants. However, the introduction of exotic rosaceous plants into North America widened the host range of *C. nenuphar* and demonstrated its adaptability to new hosts (Maier, 1990).

Its main hosts are: Amelanchier arborea, A.canadensis, cherries (*Prunus avium* and *P. cerasus*), *Crataegus* spp., *Malus domestica*, *Malus* spp., peaches, pears, plums, *Prunus alleghaniensis*, *P. americana*, *P. maritima*, *P. pensylvanica*, *P. pumila*, *P. salicina*, *P. serotina*, *P. virginiana* and *Sorbus aucuparia*. Besides its rosaceous main hosts, *C. nenuphar* can also be found on *Ribes* spp. and *Vaccinium* spp. (Maier, 1990).

The host range within the EPPO region would be similar. *Prunus*, *Pyrus* and *Malus* spp. are widely cultivated throughout the Euro-Mediterranean region. The adaptability of the species to new hosts would probably result in an extended host range.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
North America: Canada (eastern provinces to Manitoba) and USA (east of the Rocky Mountain range to the Atlantic Ocean; from latitude 28°N to approximately latitude 50°N).
EU: Absent.
Distribution map: See CIE (1954, No. 47).

BIOLOGY

C. nenuphar has one generation per year in the northern part of its range, a partial second generation in the central part (Delaware to Virginia) and two generations from Virginia southwards. The number of generations per year depends on climate and availability of hosts.

In Missouri, the overwintered adults are first observed in the field at the end of April, about 15 days after petal-fall of the peach crop. Oviposition occurs in fruits primarily in May, and eggs hatch in 5-10 days. By the end of May, adult populations decline. The larvae develop in fallen and rotting fruits and, when mature 3-5 weeks later, usually at the

beginning of June, eat their way out into the soil where they pupate at a depth of 10-15 cm. Larvae cannot survive in dry soil. First-generation adults emerge from the beginning of July to August; they feed until mid-August and oviposit only infrequently, usually in peaches affected by brown rot.

Recent studies indicate that *C. nenuphar* migrates in autumn to nearby woods where it overwinters in thick litter layers (Lafleur *et al.*, 1987). In spring the pest migrates in the reverse direction and reinfests orchards or seeks new feeding sites (Lafleur & Hill, 1987).

In North Carolina, where the weevil infests blueberry, eggs hatch in 2-11 days and adults emerge about 55 days after oviposition. The first-generation adults reach a peak in numbers in June-July, and 40-42% of them enter diapause. A second generation occurs if the host plant is available in the field for longer than usual (Mampe & Neunzig, 1967).

In cage experiments in New York State, 33-62% of adults emerged on a single day, but it is not known if this phenomenon occurs naturally; high temperatures and humidity favoured emergence (Schoof, 1942). Peak emergence, in Quebec, occurred when mean daily air temperatures were 16°C and the soil temperature at 2.5 cm depth was 14.5°C (Paradis, 1956; 1957). Larvae hatched in 3-12 days at 18-25°C, and adults lived for 5-24 months (17 months in Ontario) (Armstrong, 1958). In Missouri, by the end of July, eggs and larvae of the second generation may be found in mummified peaches; a few adults emerge from late September to mid-October and then enter winter diapause.

In Kansas, larvae were found developing in leaf curl galls and pockets in plum fruits caused by the fungus *Taphrina communis*: adults from galls readily oviposited in peaches and apples (Wylie, 1954). Thus, leaf galls on wild plum trees may be an important means for survival. Black knot excrescences caused by *Apiosporina morbosa* are also satisfactory larval foods. For additional information see Quaintance & Jenne (1912), Snapp (1923), Whitecombe (1929), Chapman (1938), Bobb (1952), Mathys & Stahl (1964), Smith & Flessel (1968), Sarai (1969).

DETECTION AND IDENTIFICATION

Symptoms

Adults feed on flowers, leaves and young fruits. In the latter, crescent-shaped, rather than circular, oviposition marks can be observed. Small exit holes are common on the under-surface of fallen fruit abandoned by the larvae. Fruits, except cherries, drop prematurely. For more information see Mathys & Stahl (1964).

Morphology

Larva

Cylindrical, whitish and legless, usually bent in a semi-circle, and possessing a small brown head.

Pupa

Yellowish-white, with dark spots in the position of the eyes.

Adult

The adult is 0.7 cm long with a typical rostrum. The postmedian band of the elytra consists of reddish-brown or reddish-yellow and white recumbent setae; small areas of the elytra are intensely black with humps. There are two femoral teeth, rarely one absent. When disturbed, adults feign death and drop to the ground.

MEANS OF MOVEMENT AND DISPERSAL

The most likely means of long-distance dispersal is as pupae in soil or as the adult in packing material. The entry of larvae in fruit is most unlikely as infested fruit drops prematurely.

PEST SIGNIFICANCE

Economic impact

C. nenuphar is a serious pest of stone and pome fruits including peaches, plums, nectarines, apples and cherries, and also *Vaccinium*. Damage arises from two causes. The surface of fruit may be scarred or distorted by the feeding and egg-laying punctures of the adult weevils and the whole fruit may effectively be destroyed by the boring of the larvae. Most infested fruits drop prematurely, but this effect may partially be masked by the normal early drop from physiological causes. Cherries may rot on the trees. Damage from feeding on leaves and on blossom is usually not important. In addition, damage predisposes fruit to infection by brown rot.

In 1943-1944, losses to peach growers east of the Rocky Mountains, combined with control costs, were estimated at nearly US$ 8 million annually. In Quebec in 1957, 70 and 57% of fruit in heavily and lightly infested trees, respectively, dropped prematurely.

Control

Control of *C. nenuphar* can be achieved by insecticides. Alpha-cypermethrin (Bostanian *et al*., 1989), cypermethrin, fenvalerate and permethrin have been reported to be effective (Rivard & Clément, 1980). The possibilities for biological control are still in doubt (Driesche *et al.*, 1987). However, the entomogenous fungi *Beauveria bassiana* and *Metarhizium anisopliae* have been reported to induce a high mortality rate in larvae of *C. nenuphar* (Tedders *et al.*, 1982) and other *Conotrachelus* spp. (Bastos *et al.*, 1988).

Another means of avoiding losses due to *C. nenuphar* is the utilization of resistant *Malus* spp. and cultivars. Several apple cultivars have been reported to be resistant (Goonewardene & Povish, 1988).

Phytosanitary risk

C. nenuphar is an A1 quarantine organism for EPPO (OEPP/EPPO, 1980) and is also of quarantine significance for COSAVE and OIRSA. Judging from its distribution in North America, *C. nenuphar* would appear to be capable of surviving throughout a large part of the EPPO region. The intensive cultivation of *C. nenuphar* host plants throughout the region could provide a basis of rapid multiplication of the pest and could possibly lead to immense losses and additional costs of control measures.

PHYTOSANITARY MEASURES

Plants of *Prunus*, *Pyrus* and *Malus* with roots from countries where *C. nenuphar* occurs must have been planted in an inorganic growing medium or in a growing medium tested or treated by an EPPO-approved procedure. These plants should either be kept under conditions which prevent reinfestation or should be freed from their original growing medium and kept bare-rooted or be replanted in an EPPO-approved tested or treated growing medium (OEPP/EPPO, 1990).

Larvae are reported to be susceptible to methyl bromide, ethylene dibromide or a 3:1 mixture of these two. At 25°C, pupae and adults were more susceptible than larvae (Richardson & Roth, 1966). Some apple and pear varieties were adversely affected by fumigation, but peaches, plums and grapes remained unharmed.

Larvae in apples were killed after storage for 33 days at 0-3°C (and in less than 33 days at 0°C) in an atmosphere containing 3% O_2 and 2-8% CO_2 (Glass *et al*., 1961).

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