

Data Sheets on Quarantine Pests

*Epitrix tuberis***IDENTITY**

Name: *Epitrix tuberis* Gentner

Taxonomic position: Insecta: Coleoptera: Chrysomelidae

Common names: Tuber flea beetle (English)

Altise des tubercules (French)

Notes on taxonomy and nomenclature: *E. tuberis*, is one of a group of five flea beetles of the genus *Epitrix* reported to feed on potatoes in North America (Gentner, 1944). This data sheet mainly refers to *E. tuberis*, since it is the most destructive, but refers incidentally also to *E. cucumeris* (Harris), the potato flea beetle, which is also a pest. The others (e.g. *E. subcrinita* (Lec.), the western potato flea beetle) cause no significant damage.

Bayer computer code: EPIXTU

EPPQ A1 list: No. 165

HOSTS

The main significant host of *E. tuberis* is potatoes. Although tomatoes and tobacco are also reported to be attacked, damage is unimportant and only leaves are affected. In general, *Epitrix* spp. are associated with Solanaceae, the adults feeding on the foliage and the larvae on the roots. *E. tuberis* and *E. cucumeris* are known to prefer potatoes, feeding on other hosts only when potatoes are not available (e.g. after lifting of an early crop). At this stage, the beetles may feed on a great variety of hosts, even non-solanaceous (cabbages, cucumbers, *Beta*, lettuces, *Phaseolus*, various weeds).

GEOGRAPHICAL DISTRIBUTION

E. tuberis is believed to be native to Colorado (USA), from which it spread to California, Nebraska, New Mexico, Oregon, South Dakota, Washington and Wyoming (USA), and to British Columbia and Alberta (Canada), during the course of the 20th century. The species is still spreading. *E. cucumeris* is more widely distributed, occurring in all provinces of Canada and most of the USA; it has also been recorded in the Dominican Republic, Jamaica and Puerto Rico.

EPPQ region: Absent.

North America: Canada, USA.

South America: Ecuador.

EU: Absent.

BIOLOGY

E. tuberis normally has two generations per year (Fulton & Banham, 1962), depending on food availability for the larvae and on the date of adult emergence in spring. *E. cucumeris* only has one generation per year. Overwintering adult beetles emerge in May to early July from the soil. Survival depends on the depth and quality of the soil. *E. tuberis* is favoured

by a soil depth of 20-30 cm (Davis & Landis, 1947). The beetles will fly considerable distances to find a host plant. After a pre-oviposition period of 5-6 days, eggs are laid over a period of 35-55 days. On average, each female lays 187 eggs, deposited in batches of 11-15 in the soil, near the base of a host plant. After incubation for 3-14 days, the eggs hatch and the larvae feed on roots (and tubers in the case of *E. tuberis*) for 2-4 weeks. Pupation takes place in the soil, and lasts 4-10 days.

First-generation adults of *E. tuberis* emerge between early July and early September, and feed on leaves. The second generation develops in 35-85 days, compared with 27-50 for the first. Second pupation starts at the beginning of August and may continue until the beginning of November. The adults then emerge, and later enter diapause to overwinter in the soil.

DETECTION AND IDENTIFICATION

Symptoms

Adult beetles cut characteristic shot-like holes (1.0-1.5 mm diameter) in potato leaves. Larvae burrow over and into the surface of tubers, leaving roughened trails or tiny tunnels extending as far as 1.5 cm into the tuber. The tunnels may result in deep cracks, rough and pimply skin and sometimes distortion of the tuber. Long threads of corky brown tissue run through the flesh of the tubers.

Morphology

Eggs

Minute, whitish, spherical.

Larva

Whitish, slender, cylindrical, 12 mm long with a brown head.

Adult

Small black beetles, 1.5-2.0 mm long, jumping like fleas (hence name), with yellow antennae.

Identification to species is a task for a specialist.

MEANS OF MOVEMENT AND DISPERSAL

Adult beetles can actively fly to potato fields, but this results in local rather than international dispersal. Other stages are sedentary.

While adult beetles could theoretically be carried on rooted host plants, this possibility hardly arises in practice. Larvae could be present in potato tubers, or in soil adhering to tubers. However, it seems that the larvae are active and leave tubers immediately after they are lifted (Fulton & Banham, 1962). The most probable means of international spread would be pupae or diapausing adults in soil. It may be noted that *Epitrix* spp. have not so far been detected in consignments, either national or international.

PEST SIGNIFICANCE

Economic impact

The main damage is due to the larvae of *E. tuberis*, which feed on potato tubers and roots, and damage the skin and surface layers of the tubers. The potatoes are downgraded in consequence. One or two larvae can cause enough damage for a tuber to be rejected. This type of damage is almost exclusively due to *E. tuberis*, and not to *E. cucumeris*, whose larvae feed on potato roots rather than tubers (Hill & Tate, 1942; Wallis, 1957).

The adult beetles eat characteristic shot-like holes in potato leaves. Significant negative correlation has been demonstrated between yield and beetle numbers, and between yield

and numbers of leaf holes (Granovsky & Peterson, 1954); therefore, adult feeding can be economically significant. Indeed, the second-generation adults can cause heavy defoliation in medium- to late-planted potato crops, which require extra insecticide sprays. This type of damage is caused by both *E. tuberis* and *E. cucumeris*, but is much less important than the tuber damage caused by *E. tuberis*.

Damage is greatest in Canada and the USA in conditions when populations of *Leptinotarsa decemlineata* (Colorado beetle) (EPPO/CABI, 1996) remain low, especially during hot dry summers. It is also high in regions where early, as well as medium to late, potato cultivars are grown.

Control

Epitrix spp. can be well controlled with insecticides (Vernon & Mackenzie, 1991a; 1991b). Soil treatments with granular formulations can be applied against the larvae, but these are relatively costly. Spray treatments against the adults need to be applied as soon as the first beetles appear in potato fields, and continued through the season. The regular insecticide spray programmes applied to potato in North America, effectively for control of aphids on seed potatoes, readily limit populations of adult *E. tuberis* and *E. cucumeris* and prevent damage due to adult feeding. *E. cucumeris*, which only causes this kind of damage, is therefore easily controlled. Control of *E. tuberis* presents greater difficulty, since the larvae must be controlled in the soil. However, it is considered that any good commercial potato grower can control the pest. DDT resistance appeared rapidly in the USA after 5-6 generations (Kring, 1958), so similar problems may arise with the more modern insecticides.

Phytosanitary risk

EPPO has listed *E. tuberis* as an A1 quarantine pest (OEPP/EPPO, 1989) The very wide distribution of *Epitrix* spp. in North America indicates that they could readily find suitable climatic conditions in the EPPO region. One could expect them to develop one or two generations in many of the potato-growing areas of central and northern Europe. While they could be controlled chemically, their presence could lead to a generalized use of insecticides on potato, rather than occasional targeted use against *L. decemlineata*, as at present. The problem would arise even more acutely in countries where *L. decemlineata* has not been introduced.

PHYTOSANITARY MEASURES

The importation of soil, or plants with soil, from countries where *E. tuberis* occurs should be prohibited or restricted. Appropriate precautions should be taken for potato tubers imported from these countries (OEPP/EPPO, 1990).

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