

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

Tecia solanivora

Identity

Name: *Tecia solanivora* (Povolny)

Synonyms: *Scrobipalopsis solanivora* Povolny

Taxonomic position: *Insecta: Lepidoptera: Gelechiidae*

Common names: Guatemalan potato moth (English), teigne guatémaltèque de la pomme de terre (French), polilla guatemalteca de la papa, polilla gigante de la papa, polilla centroamericana, palomilla de la papa, polilla de Guatemala (Spanish). *T. solanivora* is sometimes called ‘polilla de la papa’, but this is a generic name which applies also to other potato tuber moths and more specifically to *Phthorimaea operculella*

EPPO code: TECASO

Phytosanitary categorization: EPPO A2 action list no. 310

Hosts

Potato is the only host identified so far.

Geographical distribution

T. solanivora has, since the 1970s, spread southwards from Guatemala, through Central America to South America.

EPPO region: Spain (only Islas Canarias: north of Tenerife both in the field and in stores – found only in potato stores in La Gomera, Gran Canaria, Lanzarote). The pest was first observed in Tenerife in 1999-06, but was only identified as *T. solanivora* in 2000-03. It is thought that it was introduced illegally with potatoes from Venezuela, Colombia or Ecuador

Central America and Caribbean: Costa Rica (1971), El Salvador, Guatemala, Honduras, Nicaragua, Panama (1973)

South America: Colombia (1985) (Boyaca, Cundinamarca, Santander, Caldas y el Valle, Efe; all potato-growing provinces), Ecuador (1996) (the north is the most heavily infested area), Venezuela (1983) (Tachira, Merida, Trujillo, Ara), Peru (still absent according to the Peruvian NPPO, but *T. solanivora* has now spread to the extreme south of Ecuador and is commonly found in stores at Huaquillas, not far from the Peruvian border, a town which is reported as a centre of active potato trade with Peru)

EU: present

Biology

T. solanivora attacks potato both in the field and in store. Adults are nocturnal and fly short distances. In the field, they lay eggs on the ground or on uncovered tubers, but few eggs are laid on leaves and stems. Emerging larvae enter tubers and feed on them. They build galleries which may completely destroy the tuber. After completing their development (four instars), larvae leave the tubers, by a circular exit hole 2–3 mm, to pupate. In store, eggs are laid on tubers. The pupal stage may take place on the ground, on the walls of storerooms, in bags or, occasionally, within the tuber.

In Costa Rica, potato cultivation areas where attacks take place are located between 1300 and 2300 m, with annual temperatures of 23°C to 19°C, respectively. In Ecuador, potato is grown between 2000 and 3000 m. In Islas Canarias, highest damage occur between 500 and 600 m. In regions above 2600 m, where temperatures decrease from 19.4°C to 8.6°C, infestations are less important (Povolny, 1973). Heavy rain may be a limiting factor. Low temperature (15°C) is thought to favour egg laying. However, temperature increases the number of generations per year, i.e. from 2 at 10°C to 10 at 25°C. At 20°C, the life cycle lasts 57 days for females and 54 days for males. At 25°C, the life cycle lasts 42 days for females and 41 days for males (Torres *et al.*, 1997). Under laboratory conditions (15.5°C, RH 65.6%), the life cycle lasted 95 days for females and 91 days for males. The mean duration of developmental stages was, eggs 15 days, larvae 29 days, pre-pupae 5 days and pupae 26 days. Adult males live for 16 days, while adult females live for about 20 days, during which time they lay around 200 eggs (Torres *et al.*, 1997).

T. solanivora can develop in store, either from larvae present in stored tubers at harvest, or from incoming flying adults; there may be generations at 4- to 5-week intervals.

Detection and identification

Symptoms

Damage is similar to that of other potato tuber moths. Larvae bore galleries containing residues of food, frass and larval exuviae. The entry hole may remain inconspicuous but 2–3 mm

circular exit holes are visible when the larvae leave tubers. Secondary rotting may occur.

Morphology

Eggs

Ovoid, 0.53×0.41 mm, pearly white at laying, yellow at incubation and dark brown at hatching.

Larvae

Eruciform, 3 pairs of true legs and 5 pairs of pseudolegs (four abdominal and one anal). 1.2–1.4 mm long (first instar) to 12–15 mm long (final instar). Transparent white with the head and prothoracic shield dark brown (first instar), becoming cream with darker coffee-coloured spots (second instar), then yellow-green with more visible spots along the body and head, and prothoracic shield dark brown (third instar) and finally purple on the dorsal face and green ventrally.

Pupae

Fusiform, 7.3–9.0 mm. Pale coffee colour later darkening.

Adult

Rather stout with lanceolate front wings and larger rear wings with many fringes. Sexual dimorphism (size and coloration). Female: bright brown, with three marks and bright brown longitudinal lines on the first pair of wings; approximately 13 mm. Male: dark brown with two marks on the first pair of wings and scarcely visible longitudinal lines; approximately 9–10 mm. See also the EPPO diagnostic protocol for this species (OEPP/EPPO, 2006).

Pathways for movement

On a local scale, flying adults may infect stores or fields, but international spread is associated with movement of potato tubers. The following commodities are liable to carry the pest: potato plants (some eggs are occasionally laid on leaves and stems), seed and ware potatoes, re-used potato bags (which may carry eggs and pupae), infested soil (which may carry eggs or pupae). Spread of the pest in Central and South America has been quite rapid in recent years, partly due to the use of infected seed potatoes, ware potatoes or farmer-produced seed potatoes in the field (Colombia in 1995, Ecuador in 1997, threatening Peru). Introduction into the Islas Canarias in Tenerife is attributed to the illegal import of one bag of infested potatoes from Venezuela, Ecuador or Colombia.

Pest significance

Economic impact

Larvae feed exclusively on potato tubers, in the field and in store. Tuber quality is much reduced and heavily infested tubers can no longer be used for human or animal consumption. Stocks can be totally destroyed in less than 3 months. The

temperature at which potatoes are stored influences the development of the pest population and subsequent damage. More damage occurs as the store temperature increases, allowing faster population growth and more generations. Damage up to 95% is commonly reported in America. In Ecuador, a crop may be destroyed in 2–3 months. Damage can reach 40% of the yield of a field in Central America. In 1994, Colombia attributed losses of 276 323 t to *T. solanivora*. In Colombia during 1995 there was 4.4% damage to field potatoes and 11.3% damage to potatoes in store (Arias *et al.*, 1996). In Costa Rica, *T. solanivora* is so important that 12–24 insecticide applications against it each year are justified, raising the likelihood that resistance may appear (Hilje, 1994).

Spanish local newspapers reported that, in 2001, potato production was reduced by 50% in the north of Tenerife because of *T. solanivora* and a severe drought, leading to economic losses of 900 000 EUR. The situation is considered serious and discussions are reported in the newspapers about financial compensation for growers.

Control

Integrated control measures, both in the field and in store, are applied where the pest occurs (Inoue *et al.*, 1994). In the field, pheromone traps are used to control or monitor populations, although they are not effective when populations are too high. Promising results have been obtained in Central and South America with a *Baculovirus*, which seems to be the main direction of current research. Parasites (*Copidosoma* spp.) are also being investigated, including the local species attacking *Phthorimaea operculella*, the local potato tuber moth species. Seed potatoes should be free from the pest. Chemical control is in any case not or poorly effective once larvae are inside the tuber. Some plant protection products are used as protectants in the field or in store. Cultural practices may be used in the field, such as ensuring that tubers are covered with soil or planted deeply (to hamper egg laying and larval access), crop rotation or destruction of potato crop residues, appropriate timing of harvest.

Stores should be cleaned and disinfested (e.g. space treatment with an insecticide). Potatoes should be stored on the day of harvest. Potatoes should be selected so that only uninfested potatoes are stored. They may be treated with a *Baculovirus*. Indirect light and aeration are preferable (rather than storage in the dark), to hamper the development of *T. solanivora*. Pheromone traps can be used for detection and control. Packing material should not be re-used where the pest occurs. Use of packing material which is less favourable is also being studied, for example thin polyethylene bags allowing entry of light between the tubers, thus reducing infestation by comparison with 'traditional' potato bags.

In Islas Canarias, to avoid any further spread of *T. solanivora*, information campaigns for growers describing pest and control methods are being carried out, surveys are being intensified in potato fields and stores with pheromone traps, a prohibition to use ware potato tubers from infested areas as seed potatoes is being enforced.

Phytosanitary risk

T. solanivora is reported as a serious pest on potato crops and stocks in countries where it is present. It has been introduced into countries by international movement of (seed) potatoes. Its spread in Central and South America has been quite rapid in recent years, due to trade in infested seed and ware potatoes, and to use of farmer-saved seed potatoes. It now occurs in Spain (Islas Canarias), where damage and rising concern has been reported. Potato is a very important crop in all parts of the EPPO region. According to an EPPO PRA, *T. solanivora* presents a high risk of establishment and damage in the southern countries.

Phytosanitary measures

T. solanivora is a quarantine pest for the CPPC and also for Peru that is trying to avoid introduction of the pest. *T. solanivora* has also been identified as an 'Alert pest' by NAPPO. In 2002, it was added to the EPPO A2 action list, and endangered EPPO member countries are thus recommended to regulate it as a quarantine pest. Import of potatoes should be prohibited from countries where the pest is present, and absence of the pest from other countries should be demonstrated by detection survey. Under EPPO Standard PM 8/1 Commodity-specific Phytosanitary Measures for potato (OEPP/EPPO, 2004), other measures could be considered under transitional arrangements. Tubers should be: 'practically free from soil' (0.1% and 1% tolerance for seed and ware potatoes, respectively); packed in containers which are new, or cleaned and disinfected; free from larvae, pupae or adults of insects by visual inspection. It should

be noted that there seems to be very few potato-producing areas which are free from *T. solanivora* in Central and South American countries where it occurs, so pest-free areas do not appear to be a practical option.

Acknowledgements

This data sheet was originally drafted by A. MacLeod, Central Science Laboratory, York (GB).

References

- Arias RJH, Pelaez JAJ, Penaranda EA, Rocha MNR & Munoz GL (1996) [Evaluation of the incidence and severity of damage of the large potato moth *Tecia solanivora* in Antioquia Department.] *Actualidades Corpoica* **10**, 19–20 (in Spanish).
- Hilje L (1994) [Characterization of the damage by the potato moths *Tecia solanivora* and *Phthorimaea operculella* in Cartago, Costa Rica.] *Manejo Integrado de Plagas* **31**, 43–46 (in Spanish).
- Inoue H, Leal H, Gonzalez M & Estrado R (1994) Behavior of adult of the potato tuber moth (*Scrobipalopsis solanivora*) on potatoes and chemical control in Guatemala. *JARQ-Japan Agricultural Research Quarterly* **28**, 20–25.
- OEPP/EPPO (2004) EPPO Standard PM 8/1 – Commodity-specific phytosanitary measures for potato. *Bulletin OEPP/EPPO Bulletin* **34**, 463–478.
- OEPP/EPPO (2006) EPPO Standards PM 7/72 *Tecia solanivora*. *Bulletin OEPP/EPPO Bulletin* **36**(1) (in press).
- Povolny D (1973) *Scrobipalopsis solanivora* sp.n. – a new pest of potato (*Solanum tuberosum*) from Central America. *Acta Universitatis Agriculturae, Facultas Agronomica, Brno* **21**, 133–146.
- Torres WF, Notz A & Valencia L (1997) [Life cycle and other aspects of the biology of *Tecia solanivora* in Tachira state, Venezuela.] *Boletín de Entomología Venezolana* **12**, 95–106 (in Spanish).