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Data Sheets on Quarantine Pests

Nacobbus aberrans

IDENTITY

Name:*Nacobbus aberrans* (Thorne) Thorne & Allen (*sensu lato*)
Synonyms: *Anguillulina aberrans* Thorne
Nacobbus batatiformis Thorne & Schuster
Nacobbus serendipiticus Franklin
Nacobbus serendipiticus bolivianus Lordello, Zamith & Boock
Taxonomic position: Nematoda: Pratylenchidae
Common names: False root-knot nematode
Notes on taxonomy and nomenclature: The genus *Nacobbus* is in need of revision (Sher, 1970) and species differences are not fully resolved. *N. aberrans* is here considered *sensu lato*, and thus includes *N. batatiformis* from North America and *N. serendipiticus*, besides *N. aberrans sensu stricto* from South America. See also Stone & Burrows (1985a).
Bayer computer code: NACOBA
EPPO A1 list: No. 144
EU Annex designation: I/A1

HOSTS

Potatoes are the most significant host, but the following crop plants are also attacked: *Brassica oleracea*, *Capsicum*, carrots, cucumbers, lettuces, *Opuntia* spp. and other Cactaceae, sugarbeet, tomatoes. *N. aberrans sensu lato* has a very wide host range including plants in most families other than Poaceae. Several weeds are susceptible and can function as a permanent source of inoculum in cultivated crops (Inserra *et al.*, 1984). However, Jatala (1979) views it as a species complex involving two or more forms. That there are at least pathotype differences is borne out by the fact that the type population of *N. batatiformis* did not develop on tested potato cultivars (Thorne, 1961); sugar beet is the principal economic host of this form. Extensive studies of taxonomy and host range of the populations attacking potatoes are in progress at the CIP (International Potato Center) at Lima, Peru.

GEOGRAPHICAL DISTRIBUTION

The pest is indigenous to the Americas.
EPPO region: Absent in the field. It has been found in glasshouses, once in the UK (England; now eradicated) and once in the Netherlands.
Asia: India (probably only in glasshouses; unconfirmed) (Jatala, 1978).
North America: Mexico, USA (California, Colorado, Nebraska, Utah, Wyoming; Sher, 1970).
South America: Argentina, Bolivia, Chile, Ecuador, Peru.
EU: Absent (in the field).

BIOLOGY

The life-cycle resembles that of root-knot nematodes (*Meloidogyne* spp.): 2nd-stage juveniles (larvae) hatch from the eggs, invade host roots and develop within them to produce saccate females and worm-like males, however 2nd, 3rd, 4th and immature female stages are all migratory. Feeding and development is accompanied by histological changes and gall formation by the roots, and eggs are laid in a gelatinous matrix which protrudes from the root surface into the soil. Two or more generations are completed according to the growing period of the host (Thorne, 1961). Detailed information concerning the life-cycle on potatoes is not yet to hand. It appears that 2nd-stage larvae invade secondary roots, whereas 3rd-stage and immature females may at first penetrate very small rootlets which they later leave to reinfest the larger roots. In the Bolivian and Peruvian highlands, the average temperature during the potato growing season ranges from 14 to 17°C but often falls much lower at night: in Ecuador, *N. aberrans* occurs in an area where average growing temperatures are higher (22-24°C) (Jatala, 1979). The soil in these areas is regularly subjected to both freezing and drying. In laboratory tests, Jatala & Kaltenbach (1979) showed that *N. aberrans* survived after 4 months in infested roots and soil at -13°C, and 8 months in air-dried soil (7-9% RH). More recent results extend these periods to 12 months and 2 years, respectively.

DETECTION AND IDENTIFICATION

Symptoms

The galls are superficially similar to those caused by *Meloigodyne* spp. but tend to be more discrete and rounded, giving a beaded appearance, whereas *Meloidogyne* galls frequently coalesce to form elongated swellings along the root.

Morphology

The genus *Nacobbus* is characterized by the females having a single ovary (two in *Meloidogyne*) and males having a distinct though small bursa. The immature female is vermiform and migratory and is found in roots and in soil. The tail of these immature females and that of juveniles is rounded whereas *Meloidogyne* juveniles have tapered tails. Mature females in the root galls are fusiform with tapered posterior position contrasting with the rounded posterior end of the fully mature females of *Meloidogyne*. See also Stone & Burrows (1985a).

MEANS OF MOVEMENT AND DISPERSAL

N. aberrans can be carried in potato tubers and soil (Jatala, 1979) as well as roots of other host plants.

PEST SIGNIFICANCE

Economic impact

N. aberrans is ranked as one of the "top three" nematode pests of potato in the Andean regions of Peru and Bolivia (Anon., 1973), along with the potato cyst nematodes *Globodera rostochiensis* and *G. pallida* (EPPO/CABI, 1996) and root-knot nematodes (*Meloidogyne* spp.); in some areas, e.g. Puno Department of southern Peru, it is the most important. Most potato fields in southern Peru and Bolivia are heavily infested (Jatala, 1979).

The populations in the western states of the USA, formerly referred to the species *N. batatiformis*, are damaging pests of sugarbeet, originally confused with *Heterodera schachtii* (Thorne, 1961). Since, as mentioned under Hosts, this form does not appear to

attack potatoes, it seems to be distinct at pathotype if not species level. Populations attacking tomatoes under glass in Europe (Franklin, 1959; De Bruijn & Stemerding, 1968) have occurred only rarely and have not assumed economic importance, but they appeared capable of causing damage to this crop comparable with that of root-knot nematodes.

Control

Populations of *N. aberrans* can be decreased by nematicides and fumigants (Stone & Burrows, 1985b). Cultural control is mainly practised through a crop rotation of 4-6 years (Stone & Burrows, 1985b). However, recent studies indicate that there are possibilities for biological control, especially through antagonistic fungi and bacteria (Zuckerman *et al.*, 1989), also co-cultivation with leguminous crops which reduce the root-knot galling caused by nematodes (Marban-Mendoza *et al*., 1989).

Breeding for resistance has shown some promising preliminary results (Finetti Sialer, 1990), but resistant potato cultivars are not yet available.

Phytosanitary risk

N. aberrans is considered to be an A1 quarantine organism for the EPPO region (OEPP/EPPO, 1984). All the evidence points to the likelihood of the Andean populations being able to survive in north European and other temperate potato-growing areas (Jatala, 1979; Jatala & Kaltenbach, 1979). The wide host range suggests that a number of other temperate crops could be threatened. Thus, sugarbeet-infesting populations from USA may also be of potential importance in the EPPO region but perhaps mainly in southern, warmer areas.

PHYTOSANITARY MEASURES

N. aberrans belongs to the group of South American pests of potato which justifies post-entry quarantine procedures in the EPPO region, together with equivalent checks before export (OEPP/EPPO, 1990). Only material for scientific purposes should normally be imported from South America. From other countries where *N. aberrans* is known to occur, the simplest practical measure is to restrict the importation of soil (as such or accompanying plants). Jatala (1979) considers that the occurrence of *N. aberrans* usually on or near the surface of tubers may facilitate control by chemical dips or hot-water treatment, but this remains to be confirmed.

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