EPPO DATA SHEETS ON QUARANTINE PESTS

Heteronychus arator

IDENTITY

Name: *Heteronychus arator* Fabricius
Synonyms: *Scarabaeus arator* Fabricius
Heteronychus sanctaehelenae Blanchard
Taxonomic position: Insecta: Coleoptera: Scarabaeidae
Common names: black maize beetle (English, South Africa)
African black beetle (English, Australia)
black beetle (English, New Zealand)
Kaefer, Schwarzer Mais- (German)
Bayer computer code: HETRAR
EPPO A1 list: no. 297

HOSTS

Adults and larvae prefer to feed on the roots of pasture or amenity grasses. However, *H. arator* is polyphagous, and potato (*Solanum tuberosum*) is the most important economic host. Other hosts include maize (*Zea mays*), grapevine (*Vitis vinifera*), pineapple (*Ananas comosus*), vegetables such as *Brassica napus* (turnip), *B. oleracea* (cabbage, cauliflower), *Cucurbita* spp., *Daucus carota* (carrot), *Lactuca sativa* (lettuce), *Pisum sativum* (pea), and also *Fragaria* x *ananassa* (strawberry), *Lycopersicon esculentum* (tomato) and *Rheum rhabarbarum* (rhubarb), as well as some ornamentals such as *Begonia*, *Calendula*, *Petunia* and *Phlox*.

GEOGRAPHICAL DISTRIBUTION

EPPO region: absent.
Africa: Angola, Botswana, Comores, Congo, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, South Africa, St Helena, Tanzania, Zaire, Zambia, Zimbabwe.
South America: Brazil (specimens described from Santa Catarina and Rio de Janeiro states, as subsp. *occidentalis*, by Endrödi, 1961; no more recent information).
Oceania: Australia (throughout the coastal region of New South Wales; widespread in pastures of south-western Western Australia, also in coastal South Australia), New Zealand (North Island - Northland, coastal Auckland, Bay of Plenty, Gisborne, northern Waikato and northern Taranaki) (Scott, 1984).
EU: absent.
Distribution map: see CIE (1963; no. 163).

BIOLOGY

All life stages are subterranean, although adults can fly. There is one generation per year. Adults generally overwinter in free-draining soil. Asynchrony within a population is common, e.g. 20% of the overwintering population can be third-instar larvae. Adults begin to feed in spring, mate, then lay eggs singly in soil at a depth of about 10 mm. Egg-laying continues until early summer. Depending upon soil temperature, eggs hatch within 6 weeks. Young larvae feed on soil organic matter, while more mature larvae attack plant roots. There are three larval instars. The final instar burrows to a depth of 100 mm to pupate. In Australia, development from egg-laying to adult emergence takes about three months. Temperatures above 15°C are most favourable for development and survival of *H. arator*, with optimum larval development occurring at 20-25°C (King *et al*., 1981a).

Further details on the biology and ecology of *H. arator* in New Zealand are available in King *et al.* (1981a, b, c, d, e). In the North Island of New Zealand, *H. arator* is found in regions where the mean annual surface air temperature is above 13°C (Scott, 1984). Damaging outbreaks of *H. arator* in New Zealand are closely associated with above-average spring temperatures. The maritime temperate conditions of North Island are thought to represent the ecological limits within which *H. arator* can survive (Watson, 1979).

DETECTION AND IDENTIFICATION

Symptoms

As *H. arator* is primarily a pest of grassland and pasture, attacked plants are generally close to pasture or cultivated on land that has recently been under pasture. The stems of attacked plants usually have a ragged, teased-out, appearance. Maize plants that are attacked are stunted or have multiple tillers. High densities of *H. arator* in pasture lead to clover becoming dominant over grasses.

Morphology

Egg

Greyish white, oval, about 2 mm long.

Larva

White or bluish-white with a brown head capsule and orange spiracles along the sides of the thorax and abdomen. Fully developed larvae are 25 mm long and 6 mm in diameter. Smith *et al*. (1995) provided detailed illustrated descriptions and a laboratory and field key to third-instar larvae.

Pupa

Pale yellow to light brown turning reddish-brown before adult emergence; 12-15 mm long.

Adult

12-15 mm long, approximately oval in shape and shiny black. Males have a thickened tarsus on each foreleg.

MEANS OF MOVEMENT AND DISPERSAL

Adults can crawl into a crop or, in spring and autumn, they can fly in large numbers forming swarms (Watson, 1979). Autumn dispersal flights cease when the soil temperature at dusk falls below 17-18°C (King, & Watson, 1982). In international trade, all development stages may be carried with soil accompanying plants, or possibly in root or tuber crops like potatoes.

PEST SIGNIFICANCE

Economic impact

H. arator is a polyphagous pest, most characteristically found in pastures. In New Zealand, larvae can cause severe damage to pastures on light or sandy soils e.g. in a *Lolium perenne* pasture, the *L. perenne* component was reduced by 36% leading to an increase in weeds of 77% (King *et al*., 1981a). In southern Australia, *H. arator* is also widespread in pastures (Matthiesen *et al*., 1997), but it is not considered a serious pest because the period when the damaging final-instar larvae are most abundant coincides with the period of annual grass pasture senescence (Matthiessen & Ridsdill-Smith, 1991). In contrast, *H. arator* is a serious pest of potatoes in Australia, and small populations can be highly damaging (Matthiessen & Learmouth, 1998). Destruction of stems reduces tuber yield. Adults burrow into tubers and make holes about 10 mm in diameter. Individual beetles can damage several tubers. Winter crops are especially damaged (Matthiessen & Learmouth, 1995). *H. arator* is also a minor pest of pineapple in Queensland (Sinclair *et al*., 1997).

In South Africa (its country of origin), *H. arator* is also a potato pest. In a survey on a South African farm, 8.6% of the potato crop was lost because of beetle damage (Venter & Louw, 1978). Adults can also be damaging to maize seedlings, to which they migrate from grassland (Toit *et al*., 1997). If stems are attacked, plants wilt, collapse and can subsequently die. Pineapple is also damaged (Smith *et al.*, 1995).

Control

Conventional soil drenches can be applied to contaminated land and targeted against larvae during the summer. If high adult surface activity is detected during the spring, treatments can be applied to reduce the build-up of the following generation (Matthiessen & Learmouth, 1998). Seed treatments are used for maize in South Africa (Drinkwater & Groenewald, 1994).

Phytosanitary risk

H. arator has already spread from its native South Africa to Australia and New Zealand. In countries where it has been introduced, *H. arator* has become a pest. Given the current distribution of *H. arator*, much of the southern EPPO region appears to be climatically suitable for establishment. Potatoes are at particular risk, but other hosts could also be affected.

PHYTOSANITARY MEASURES

No specific measures have yet been recommended at the European level, but the general measures recommended for soil-borne pests should apply. Plants of host species with roots from countries where *H. arator* occurs should be grown according to EPPO Standard PM 3/54 (OEPP/EPPO, 1994).

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