Beetles and their grubs that damage potato tubers

Artikel: Diedrich Visser, ARC-Roodeplaat.

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The term “grub” usually refers to any soft, thick wormlike larva of an insect. It is commonly used to describe beetle larvae and the term “white grub” is used more specifically for any soil-living larva of beetles belonging to the family Scarabaeidae. However, larvae of other non-related beetles (also sometimes called grubs) may also be found in soils where they damage plants. Beetles and their grubs that damage potatoes include the black maize beetle, various white grubs and three snout beetles. Other beetle larvae that damage potato tubers but which is not considered as “white grubs” include wire worms and false wire worms. Larvae of various moth pests, e.g. the cutworms are sometimes incorrectly called white grubs.

Black maize beetle

Background
The black maize beetle is an indigenous African pest, in South Africa occurring mainly in the eastern grassland areas and along the coast in the Eastern and Western Cape Provinces. It is a soil-dwelling pest, with all life stages occurring in the soil, except when the adults fly out to swarm. As its name indicates, the beetle is primarily a pest of maize, but it also attacks potato, pineapple, sugar cane, sorghum, and other plants.

Description
The larvae live and pupate in soil, after which the emerging adults may move to new feeding sites. Adults are present year-round in low numbers, but peaks are found in October-December and then again in March-April. It is during these months that damage to potatoes can be expected. Larvae characteristically curl up in a C-shape when disturbed. Usually only one generation per year is produced, but in some parts of the country a second generation may be encountered.

Damage
Strictly speaking the larvae of the black maize beetle is also a white grub. However, it is not the grubs that attack or damage potatoes - the grubs only feed on organic material in the soil. Damage is inflicted by the adult black maize beetles chewing holes into tubers and roots. Because there is usually only one generation per year, build-up of numbers within fields does not occur. The beetles usually fly in from surrounding areas. When potatoes are planted close to maize fields, or when potatoes follow maize in the same field, damage to potatoes can be expected, especially in the eastern Free State and Mpumalanga.

Control
Soil insecticides are available. Potatoes should never follow maize as a rotational crop because the larvae may survive in harvested maize fields for months. Reworking soils kills many pupae by exposing them to the elements.

White grubs

Background
White grubs are soil-living larvae of various species of beetles belonging to the family Scarabaeidae. Only three white grub species are known to damage potato tubers, namely: Anomala

A black maize beetle adult next to a feeding hole.
cf. transvaalensis, Hypopholis sommeri, and Temnorhynchus re-
tusus. Of the three species encountered in potato fields, it is only
the large wattle chafer, Hypopholis sommeri, that is of economic
importance.

Large wattle chafer

Hypopholis sommeri is a stocky beetle, 18–20 mm in length with
pale-brown elytra and a dark brown thorax. It is also commonly
known as the large wattle chafer or rose chafer. The adult beetles
are known pests of wattle, sugarcane, pine trees and roses. The
adults feed at night and hide in leaf litter or soil during the day.
However, the larval stage of this pest causes serious damage to
potatoes. The body of the larva is cream-coloured with variable
black or darker areas towards the end of the abdomen. Orange
legs and head, with large ferocious black jaws, are character-
istic. Fully-grown larvae can reach lengths of between 25 and
30 mm. Total yield losses due to the feeding of larvae in potato
fields have been reported. The life cycle of this beetle is relatively
long, taking almost two years from egg to adult. Damage usually
occurs when potatoes are planted in infested soils, e.g. previ-
ous pasture or grazing fields. Potato plantings near wattle trees
are also known to have suffered major losses. This species has
only been reported to damage potatoes in KwaZulu-Natal. [The
status of the other two “lesser” white grubs is uncertain because
serious damage to vegetable crops has not yet been reported (in
contrast to the large wattle chafer). More white grub species may
be identified as important potato pests in the future.]

General white grub damage

Young white grubs feed on soil rich in organic matter, while
older individuals may also feed on roots and tubers. The roots of
grasses are sometimes a preferred food source for some spe-
cies. White grubs have limited mobility – they do not search for
suitable host plants but rather consume plant material (roots and
soil) wherever they find themselves. Their distribution is therefore
a function of the adult beetle’s choice of oviposition sites. White
grubs may therefore be incidental or secondary pests under most
circumstances, but may become serious pests on occasion. When
severe damage is experienced due to white grubs, it is usually
when crops were planted in fields in which grasses were grow-
ing. The larvae then have little choice but to feed on roots or tu-
bbers. It is especially the third instar that is responsible for most of
the damage to a potato crop, chewing large, irregular holes into
potato tubers underground. They do not burrow deep into tubers
and when potatoes are harvested, the larvae usually fall out.

Control

No insecticides are available to control white grubs in potato.
Planting in fields in which grasses were growing must be avoided.
Ploughing or reworking of soils will kill many white grubs. No-
tillage or reduced tillage enhances white grub populations.

Snout beetles

Background and Description

At least three weevils (snout beetles) species are known to attack
potatoes in South Africa. The potato snout beetle (Sciobius horni)
is endemic to Southern Africa and was first noticed to damage potato in 1977 in the Free State province. Today it is known mainly from the eastern Free State province, but also from the KwaZulu-Natal Midlands and the Eastern Cape Province, and present in Gauteng, Lesotho and probably Mpumalanga. The potato snout beetle is dull to dark brown, 6–10 mm long and 3–4 mm wide. The beetles hide under plants when not feeding. The larvae are typical snout beetle grubs – white, legless and usually curling into a C-shape when disturbed. The head is pale yellow to orange and the chewing mouthparts black. They grow up to approximately 10 mm in length and then leave the feeding area to pupate nearby in a cell constructed from soil. The pupa is whitish and remains in the protective cell until the adult beetle emerges. In areas where this pest has been troublesome, it was often found that, at harvest, the larvae had already left the tubers, making identification of the “culprit” difficult. The life cycle of this beetle has not been studied.

**Damage**

Only the larvae damage potatoes. Shallow holes of up to 5 mm in depth and approximately 3–5 mm in diameter are eaten into tubers. The larvae may also damage crucifer roots and asparagus spears. Because these beetles cannot fly, damage usually occurs when crops are planted in infested soils (as with white grubs). They can therefore not spread from one area to another on their own, rendering them a localized pest. Alternative host plants have not been identified, but these beetles presumably survive on weeds when crops are not available. The adults are known to nibble on foliage, but significant damage by them is unlikely. Serious damage by this beetle to commercially produced potatoes is uncommon, but significant flare-ups of economic damage do occur.

**Control**

No insecticides are available to control snout beetles in potato. Rotation, clean cultivation and ploughing during off-seasons will greatly reduce potential damage by killing or exposing larvae hiding in soils. It is possible that these beetles may walk from an infested area to an adjacent newly planted field. In such cases furrows with poison or bait may be drawn between the two fields in an attempt to prevent the beetles from reaching the new crop.

**Other snout beetles**

Two other snout beetles are known to damage potato in South Africa. They are the whitefringed snout beetle (Naupactus leucoloma) and the vegetable weevil, Listroderes costirostris. Both originated from South America and currently occur in many other countries worldwide. Although they were reported to damage potato, serious losses due to these two species has not been reported in South Africa. Damage symptoms caused by the whitefringed snout beetle larvae is similar to that of the potato snout beetle while the damage potential of the vegetable weevil is uncertain. Both beetles are more common in the Western Cape than in other provinces.

**Potential of grubs to spread with seed potatoes**

**Black maize beetle and white grubs**

The black maize beetle and white grubs make large irregular feeding holes in tubers. At harvest beetles and grubs nearly always fall out before reaching the potato stores. Even if some beetles or white grubs are concealed inside such holes, damaged tubers will nearly always be sorted out before marketing. The beetles lay their eggs in the soil and not on tubers. The potential for “contaminated” seed tubers are therefore extremely unlikely.

**Snout beetles**

Snout beetles and their larvae are much smaller than the black maize beetle and white grubs. The snout beetles only consume foliage, but their larvae chew small, shallow holes into tubers. Usually, as with the black maize beetle and white grubs, the larvae have left the tubers to pupate in the soil at harvest time. However, depending on the development stage, some larvae may be found protruding from small holes at harvest time. Because the larvae usually do not tunnel deep into tubers, they then nearly always crawl out of their shallow feeding holes and fall to the ground. The detailed ecology and life cycle of the potato snout beetle has not been studied. It is therefore unknown whether exceptions do occur where larvae may be found deeper into tubers and whether eggs are laid on tubers. Most soil-living beetles lay their eggs in soils after which the larvae find their way to the host plant’s roots or tubers. It is therefore unlikely that seed tubers may be “contaminated” by snout beetles. However, although the issue of contaminated seed is always a serious concern for potato farmers, a final or definite conclusion on this aspect can currently not be given. It may, in any event, be a good sanitation practice to sort out all seed tubers that show any sign of surface damage, being it insect damage or otherwise, before planting.