

## Poster paper

# Sugarcane grubs in the Lautoka and Rarawai Mill areas, Fiji

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**Abstract** Sugarcane grubs (larvae of Scarabaeidae) have been long-standing but non-significant pests in the Fijian sugar industry with limited research done in the past, the last being nearly a century ago. A preliminary survey was conducted in the two mill regions in Fiji, Lautoka and Rarawai, to investigate the incidence of the pest. Fifteen farms were randomly selected from every sugar-producing district in the larger island of Fiji (Viti Levu). Only a few farms had significant infestations. Species encountered were the melolonthines *Xenotrogus subnitida* (Arrow) and *X. vestita* (Arrow) and the ruteline *Adoretus versutus* Harold.

**Key words** Sugarcane grubs, infestation, survey, Lautoka, Rarawai, Fiji.

Sugarcane grubs (larvae of Scarabaeidae) have been long-standing but non-significant pests in the Fijian sugar industry with limited research done in the past, the last being nearly a century ago. More recently, cane grubs were found on a farm in Lomolomo, Drasa, causing drying of stools in patches in young cane. Later in the year, a general survey was carried out in 26 sectors of the two mill areas in Viti Levu to determine which species were present and their distributions.

The grubs are “C” shaped, soft bodied, with a dark brown sclerotized head, whitish body, greyish back with three pairs of legs. The species have four developmental stages: eggs, larva (grub), pupa and adult (beetle). The larval stage has three phases: 1st, 2nd and 3rd instars, of which the 3rd instar causes significant damage to cane. The grub burrows into the soil and lives at 30-40 cm depth. The 3rd instar feeds on the roots of sugarcane plants leaving characteristic symptoms; patches in the fields, as well as yellowing of leaves and dried stools that look like a parched field. The grubs destroy the root system resulting in a chain reaction: damage of vascular bundles causes the plants to disrupt the uptake of moisture from the soil, leading to stunted growth or death of stools. The affected plant roots turn black and the spindle wilts. The affected clumps are easily pulled out.

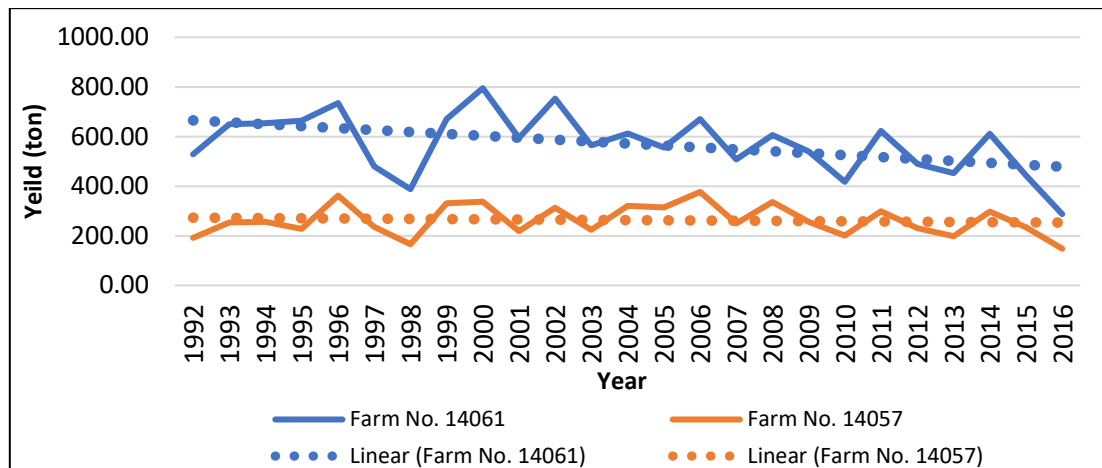
The adults are not strong flyers and can be found underground, as well as on trees feeding on leaves. They lay eggs, which are white in colour at 20 to 40 cm soil depths. Past observations by the Colonial Sugar Refinery (Colonial Sugar Refinery 1924) showed that trash conservation is a deterrent for oviposition. Sugarcane grubs are known from many sugar-producing countries, particularly Australia (Sallam 2010), Réunion (CIRAD 2016), some and African nations as well as Indian Ocean Islands (Conlong & Ganeshan 2016).

We surveyed fields in 26 sectors of the two sugarcane mill regions in Viti Levu; Lautoka (excluding the Qeleloa sector) and Ba (Rarawai) (excluding the Yaladro, Malau and Nanuku sectors). Fifteen farms were randomly selected from each sector, except in the Drasa Sector where we chose a few farms with the history of grub damage. In each field, we dug soil to 30-40 cm deep from 10 quadrats, 1 m x1 m, randomly placed in the field around a stool. Soil and roots were inspected for eggs, larvae, pupae and adult beetles.

Grubs were placed in a plastic container with soil from the surrounding area and brought to the laboratory and mixed with peat moss. These were reared in the laboratory for further studies. Many of the grubs shrivelled and died. It was observed that the grubs were susceptible to mites. Those that were able to develop normally were studied and some sent for species identification to Mauritius (MSIRI) and Australia (SRA).

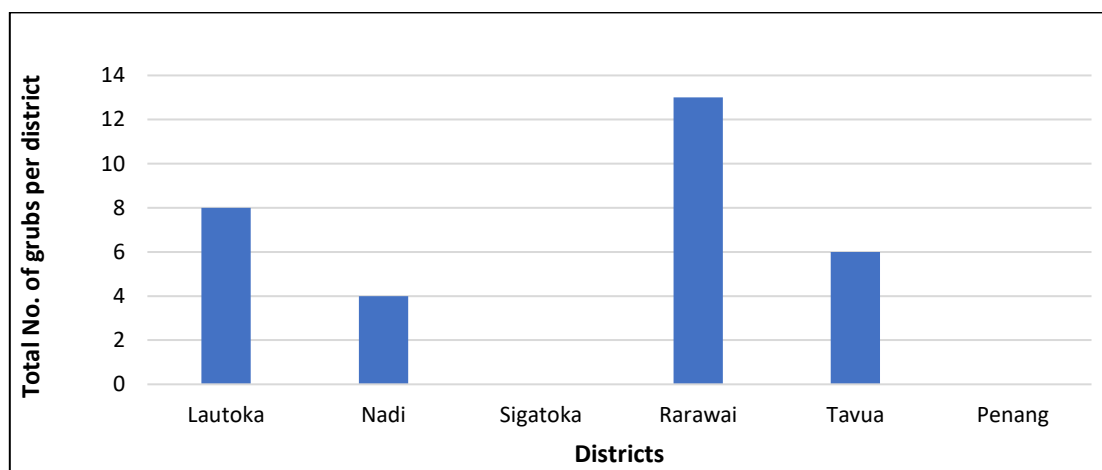
The cane grubs were identified as the endemic *Xenotrogus vestita* (Arrow), *Xenotrogus subnitida* (Arrow) (Melolonthini, formerly placed in the genus *Rhopaea*) and the introduced *Adoretus versutus* Harold (Rutelinae).

The cane grubs did not cause extensive damage in the sugarcane fields, with the exception of two farms in Drasa, where cane production was reduced due to non-germination and drying of young stools due to grub feeding (Figure 1).



**Figure 1.** Production data of the two farms with a history of cane grubs.

Of the Lautoka fields, 5% were infested, whilst 10% of fields in the Rarawai area were infested. Population densities were highest in Rarawai (Figure 2). Unlike in Veitch's reports in the 1920s (Veitch 1922), there was no infestation of cane grubs in Sigatoka. This may be due to the much-reduced extent of farming as well as a shift from sugarcane to other cash crops and tobacco farming.



**Figure 2.** Levels of infestations in each district in the two mill regions.

As mentioned by (Veitch 1922), frequently a species is either so scarce or so little given to attacking living plant tissue that its presence exercises practically no effect on the crops, and indeed such a species is usually noticed by entomological investigators only; on the other hand, certain species sometimes occur in such numbers and are so destructive to the underground portion of the plant that they are included among the most serious enemies of the agriculturist.

We found that the overall populations of cane grubs were low, but a sudden outbreak in the coming years is possible due to their life cycle and favourable conditions. More research will be done, such as frequent ploughing of infested fields to expose many of the grubs to predation by common mynahs (*Acridotheres tristis*) (Veitch 1919), to minimize the losses incurred in the highly infested fields and to study the species of grubs found in different localities. Plans are in place to survey the infested farms again to ascertain the seasonal population fluctuations of the grubs and any possibility of their spread to neighbouring farms.

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