



SCIRPOPHAGA EXCERPTALIS (WALKER) (LEPIDOPTERA: PYRALIDAE)

BSES RESEARCHER NADER SALLAM BASED AT GORDONVALE, AND ETIK ACHADIAN FROM THE INDONESIAN SUGAR RESEARCH INSTITUTE GIVE US THE INS AND OUTS OF SUGARCANE TOP BORER.

biosecurity feature

COMMON AND ZOOLOGICAL NAME

Scirpophaga excerptalis is commonly known as the sugarcane top borer (Figures 1a and 1b). This species has been incorrectly referred to as *Scirpophaga nivella* in several publications. It is now confirmed that *S. excerptalis* and *S. nivella* are two different species, with *S. nivella* being strictly a pest of rice and not occurring in cane (Lewvanich 1981).

GENERAL DESCRIPTION

Scirpophaga excerptalis is a major pest of sugarcane in many parts of Asia. Reductions in yield of up to 70%, and in sugar content of 2 units were recorded in Indian cane fields (Pandey *et al.* 1997; Madan *et al.* 1999). Heavy infestations may result in total destruction of crops.

DISTRIBUTION

This species is found in Bangladesh, Bhutan, China, India, Indonesia, Japan, Malaysia, Nepal, Pakistan, Philippines, Papua New Guinea, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam (Arora 2000) see Figure 2.

SYMPTOMS

Common symptoms of infestation are the appearance of parallel rows of 'shot holes' on leaves, a red streak caused by mining inside the midrib, deadhearts and a bunched top appearance of shoots (Arora 2000) see Figures 5 and 6.

BIOLOGY AND ECOLOGY

Adult females of *S. excerptalis* lay their eggs in masses on the lower surface of the leaves. Their egg masses are covered in scales (Figure 3) hence the

eggs are protected and difficult to access by egg parasitoids. First-instar larvae usually enter the midrib of the first leaf via the lower surface. They tunnel in the midrib for 24–48 hours then emerge through the upper surface.

Two or three 1st, 2nd or rarely 3rd instar larvae may be found in the spindle, however, due to competition, only one larva ultimately survives near the growing point of the stem (Figure 4). The surviving larva then makes its way down towards the growing point. Feeding leads to killing of the growing point, causing a dead heart and side shooting (Figures 5 and 6).

Studies in India showed that *S. excerptalis* has five broods (generations) during the cane growing season. Reports from the states of Punjab and Haryana reveal that the third brood in particular is the most damaging (Duhra and Sharma 1993).



FIGURE 1 (Opposite Page) | Adult female (1a) and male (1b) *Scirpophaga excerptalis*.

FIGURE 2 | Distribution map. FIGURE 3 | Top borer egg mass. FIGURE 4 | Top borer larva.

HOST PLANTS

S. excerptalis is mainly a pest of sugarcane. Other hosts include *Chloris barbata*, *Echinochloa colona*, *Erianthus arundinaceum*, *E. munja*, *E. ravennae*, *Naranga prophyrocoma*, *Panicum* sp., *Pennisetum purpureum*, *Saccharum spontaneum*, *Sclerostachya fusca*, *Sorghum bicolor* and *Sorghum halepense* (Arora 2000).

MANAGEMENT

Chemical control

Several insecticides are used in South East Asia to combat this species – such as the highly toxic systemic organophosphorus insecticides phosphamidon and phorate. However, studies showed that plant extracts of *Eucalyptus rostrata* can reduce

borer infestation (Pandey and Singh 1998). Similarly, treatment with 2.0% Multineem or Nimbicidine (neem oil based products) resulted in the lowest top borer incidence (Tewari 2001).

Biological control

Some natural enemies attack the egg, larval and pupal stages of this pest – such as *Elasmus zehntneri* (Hymenoptera: Elasmidae) (Figures 7 and 8), *Isotima javensis* (Hymenoptera: Ichneumonidae), *Rhaconotus scirpophagae* (Hymenoptera: Braconidae), *Stenobracon deesae* (Hymenoptera: Braconidae), *Telenomus beneficiens* (Ceraphron) (Hymenoptera: Scelionidae), *Trichogramma* spp. (Hymenoptera: Trichogrammatidae) and *Xanthopimpla pedator* (Hymenoptera: Ichneumonidae).

Host resistance

Studies showed a positive correlation between top borer infestation and the moisture contents of leaf blades, midribs and growing points. Conversely, a negative correlation was detected between the dry matter content of these plant parts and borer incidence. Other studies showed that the presence of lignin in midribs of genotypes had a significant negative correlation with borer incidence. In a tolerant host, the larval period was shortened and the larval and pupal weights were reduced. This was attributed to shortage of food supply due to the short spindle and thin stalk diameter. It was also shown that varieties with longer leaf spindles suffered less damage (Singla *et al.* 1988).

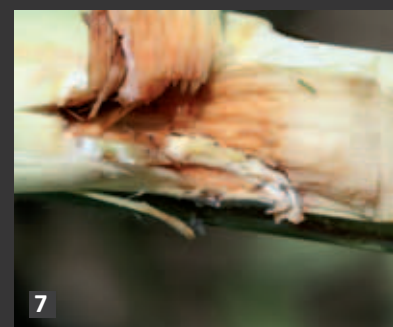


FIGURE 5 | Formation of dead heart due to feeding by early larval stages.

FIGURE 6 | Bunchy top appearance due to killing of the growing point leading to side shooting.

FIGURE 7 | Larvae of the parasitoid *Elasmus* sp. emerging from a top borer larva after killing it.

FIGURE 8 | *Elasmus* sp. adult wasp.

Intercropping

In the Indian Punjab, autumn-planted cane intercropped with radishes and turnips had the lowest incidence of the first generation of *S. excerptalis*. Similar results were obtained in sugarcane intercropped with sunflower and gobhi sarson (*Brassica campestris* var. *sarson*) (Singla *et al.* 1994). Intercropping cane with coriander (*Coriandrum sativum*), ajowan (*Carum copticum*), onions, garlic, fenugreek, fennel and black cumin (*Nigella sativa*) reduced incidence of the top borer, with ajowan as an intercrop giving the lowest incidence (Varun *et al.* 1990).

Farming practices

In the Indian Punjab, an irrigation interval of 12–14 days or above in the spring, a higher plant density (24,000 three-budded setts), and irrigation at a rate equivalent to the soil water content during the monsoon season resulted in a lower incidence of *S. excerptalis* (Singla and Duhra 1990). It was also found that early-maturing cultivars were more susceptible to borer infestation than late-maturing cultivars.

MEANS OF MOVEMENT

The only method by which *Scirpophaga excerptalis* may enter Australia would be through the introduction of plant material. This species has the potential to rapidly colonise north and central Queensland. Early detection of symptoms is vital to quickly eradicate or contain incursion.

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FIGURE 9 | *Scirpophaga excerptalis* adult female (photo taken by Etik Achadian).