Information Sheet

8.4 Leaf eaters

Trash caterpillars

Identification

Trash caterpillars (or trashworms) are the larval stage of various inconspicuous moths. At least seven species are involved, although some eat only the dry trash. One species in particular *Mythimna phaea* damages young ratoons (Figure 1). They cause damage only where there is a trash blanket (or other debris, e.g. after floods) in the vicinity of young rations, and they do not damage mature cane. They seldom occur in burnt fields, but may do so where there is sufficient debris to afford cover for the caterpillar e.g. where the tops have been windrowed or from scattered tops.

Damage to leaves of young ratoons may be conspicuous, although the caterpillars, which feed only at night, may not be apparent unless the trash is lifted, when they will be seen curled beneath it on the soil surface.

They may occur anywhere that trashing is practiced and are usually first noted in April. They are very seldom seen after the early summer rains begin in November and conditions become humid. Within the winter period two 'waves' of damage may be detected: the first in July and the second in October. Light trap figures of moths caught have confirmed the occurrence of such waves.

▲ Figure 1. The trash caterpillar *Mythimna* spp. feeding on a leaf.

Damage

During daylight, the caterpillars remain inactive beneath the trash blanket. Shortly after nightfall they start feeding on leaves of ratooning cane and continue feeling until shortly before daybreak, when they return to the trash blanket. They may strip the leaves completely, leaving only spiky midribs.

Crop loss

Results of field experiments in which ratooning cane was artificially defoliated in a manner simulating trash caterpillar attack, showed that a severe infestation could cause a yield loss of 18 tons per hectare. Typical infestations are less damaging and do not normally affect the whole field. Under good growing conditions, recovery is rapid and crop loss less severe. However, a setback may occur in the form of a loss of several weeks' growth.

Control

Opinions vary regarding the merits of applied control measures. By the time infestations are spotted, most damage has been done and caterpillar populations are waning, having been brought under control by natural enemies.

Natural enemies: Experiments have shown that about 85% of caterpillars fall victim to natural enemies, which include parasitic flies, wasps, fungi and viruses. Such agents are present in all cane fields, and their numbers build-up rapidly when an outbreak of a suitable host insect (such as the trash caterpillar) occurs. If such agents were not present, the trash caterpillar would be a far more serious pest than it is.

Insecticide: Early stages of infestation are difficult to spot and by the time heavy damage is noted, insecticide applications may do more harm than good. Insecticides will kill those caterpillars that encounter it, but it will also kill predatory and parasitic insects. Trash caterpillar is a difficult target. By day it is well protected by the trash blanket, and the application of insecticide by night, although possibly effective, is inconvenient to implement. No insecticide is registered for trash caterpillar control and insecticide applications are not recommended for fear of exacerbating the problem by killing natural enemies. Although of common and regular recurrence, trash caterpillar is rarely a serious pest. The agronomic benefits of trashing generally outweigh the caterpillar hazard which may result.

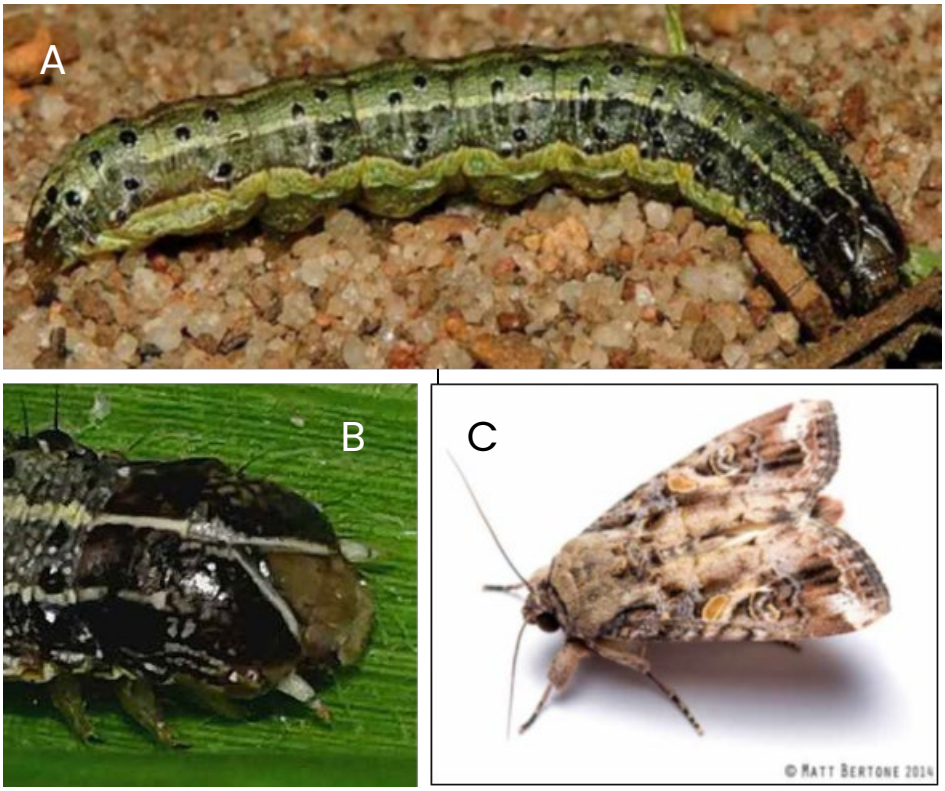
Armyworm

Fall Armyworm *(Spodoptera frugiperda)*

Fall armyworm (FAW), is a lepidopteran species that originates from the tropical regions of South America. There are more than 80 different plant species that are known to be attacked by FAW and sugarcane is amongst these. The main crop hosts of the pest are maize, sorghum, groundnuts, cotton and soybean. This pest has not yet become a problem on sugarcane, despite being recorded on maize in the cane belt of Mpumalanga, Pongola and the south coast of KwaZulu-Natal. The sugar industry is a part of the national FAW action group that under the auspices of the DAFF (Department of Agriculture, Forestry and Fisheries) provides updates on prevalence, recommended monitoring and control options.

Identification

Larvae develop through six instars from egg to moth stage. Young larvae are difficult to identify morphologically as the early instars resemble those of several other noctuids. Older larvae (instar 5 to 6) appear brown/green with lateral beige stripes (Figure 2A) and often display a characteristic inverted 'Y' on the head (Figure 2B). Male moths appear grey/brown and mottled with a white patch on the outer tip (Figure 2C), while female moths appear uniform grey to brown but with no distinct wing markings.



▲ Figure 2. (A) FAW larva (5th instar); (B) FAW head showing inverted "Y", (C) FAW male moth.

Biology

Moths tend to fly on prevailing winds and migrate from countries north of South Africa. Moths lay eggs in batches of 20-250 on both sides of leaves, and eggs are covered in light brown scale-hairs.

Damage

FAW is a polyphagous pest which a preference for grain crops. Maize and sweetcorn are currently infested in South Africa, with some reports of damage on sorghum. The moth is a strong flyer but it is the caterpillar stage that causes the damage. In maize, the caterpillar is known to cause extensive damage to the leaf whorl, tassels, green leaves, sheaths and even emerging maize ears.

Control

Without clear evidence that sugarcane is under threat, it is advised that the pest be judiciously controlled in those crops where it is currently a problem, i.e., on maize grown alongside cane along the cane belts. As a proactive measure of control, DAFF has issued a guide for the use of agricultural chemicals to control infestations of FAW should it become a problem on sugarcane in South Africa. Two chemical options have been registered for use on sugarcane, i.e., Coragen (active ingredient: chlorantraniliprole) and Steward (active ingredient: indoxacarb). Growers are encouraged to use only these options should there be an outbreak in cane.

African Armyworm *(Spodoptera exempta)*

Identification

Armyworm moths are dark coloured, with brown to black forewings and white hindwings. The larvae, which attack the leaves of young cane, and especially young plant cane, are green and black in colour with longitudinal black stripes and a green underside (Figure 3). They are gregarious and are usually present in large numbers. A non-gregarious phase also occurs in non-outbreak years. Their larvae are cryptically coloured.

Figure 3. Armyworm larva feeding on sugarcane leaf. ▲

Biology

Adult moths fly vast distances but are at the mercy of winds, so egg-laying may be concentrated in particular areas and result in the production of countless progeny. Eggs are laid in masses of one or more layers on leaves and covered with hairs from the females. The emerging caterpillars move en masse across the soil in search of grasses or other narrow-leaved plants on which they feed.

Damage

Mature cane is seldom severely damaged, but young plant crops may be completely defoliated. Outbreaks occur in late summer when growth is usually good, so that the sugarcane usually recovers quickly. However, the destruction of the crop canopy may necessitate additional weeding or herbicide application.

Control

Armyworm is attacked by a variety of natural enemies, which often curb infestations. The insect is susceptible to many insecticides, however, care must be taken when using an insecticide as none are registered for control of armyworm on sugarcane.

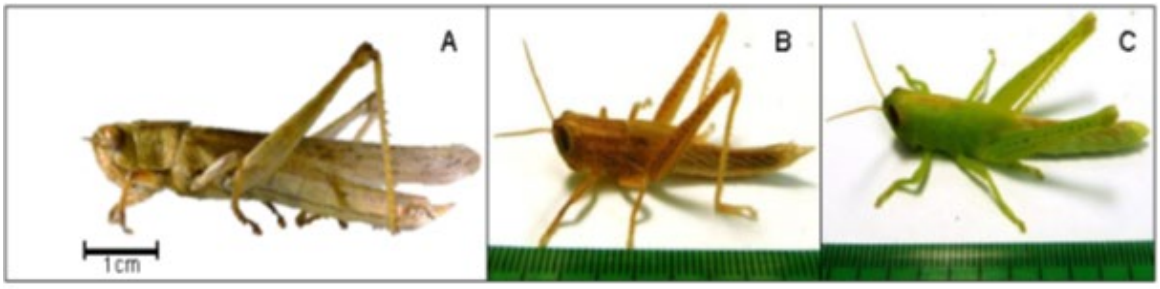
Surveys conducted from 2011 to 2014 during an outbreak of these insects in the Empangeni area showed a complex comprising of five species: *Petamella prosternalis, Nomadacris septemfasciata, Cataloipus zuluensis, Cyrtacanthacris aeruginosa and Ornithacris cyanea.* It was found that damage was closely associated with two of these species, namely *Petamella prosternalis*, which was the most abundant, and *Nomadacris septemfasciata.* These two species are of particular concern due to their higher densities and large body size resulting in them being the biggest threat to sugarcane.

▲ Figure 4: Damage to sugarcane because of acridid feeding near Empangeni, KwaZulu-Natal, showing that only the mid-rib is left on some leaves. Damage is exacerbated by the fact that leaves are often cut down during feeding without being consumed.

Petamella prosternalis

Distribution and Identification

Petamella prosternalis is a relatively large and slender grasshopper with a uniform tan/brown coloured body (Figure 5A). It has been recorded in the Zululand region and midlands region of KwaZulu-Natal and is presumed to be widely distributed over much of Africa. Incidental collections in South African sugarcane have occurred since 1994 as documented in the SASRI insect collection. This grasshopper has been a sporadic pest of sugarcane in the past and became damaging from 2011 to 2014 in the Empangeni area.



▲ Figure 5: *Petamella prosternalis* adult male (A), brown coloured hopper (B) and green coloured hopper (C). Most brown coloured hoppers are males while the majority of green coloured hoppers are female.

Biology

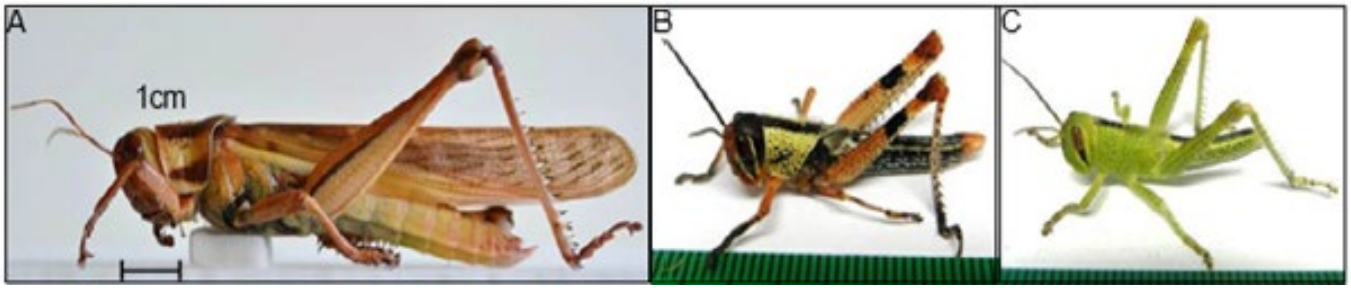
P. prosternalis mate and lays their eggs before the onset of the dry winter months (April), the eggs then enter a diapause of up to six months. At the onset of the wet summer months, hoppers emerge and undergo seven moults before becoming adults after about two months.

The life cycle can be summarised as follows:
Adult-Fliers/Egg-Laying: March–May. **Egg-diapause:** June-October. **Hopper stages:** November-February.

***Nomadacris septemfasciata* (Red locust)**

Distribution and Identification

Nomadacris septemfasciata is highly mobile and swarms are known to travel over 100km in a day. Northern Natal was heavily invaded from 1933-1937. The scientific name *'septemfasciata'* refers to the seven dark, transverse bands on the forewings of adults. The overall body colour of adults is a mixture of beige and brown, they are a relatively large (Males: 70mm Females: 80mm) and slender looking species and are very strong, mobile fliers (Figure 6).



▲ Figure 6: *Nomadacris septemfasciata* adult male (A), gregarious type hopper (B) and solitarious type hopper (C).

Biology

The main breeding grounds of this large grasshopper-like insect are in northern Zambia and southern Tanzania, where it periodically swarms and migrates. In outbreak areas which can be considered as ideal *N. septemfasciata* habitat, the following common characters between all of these areas:

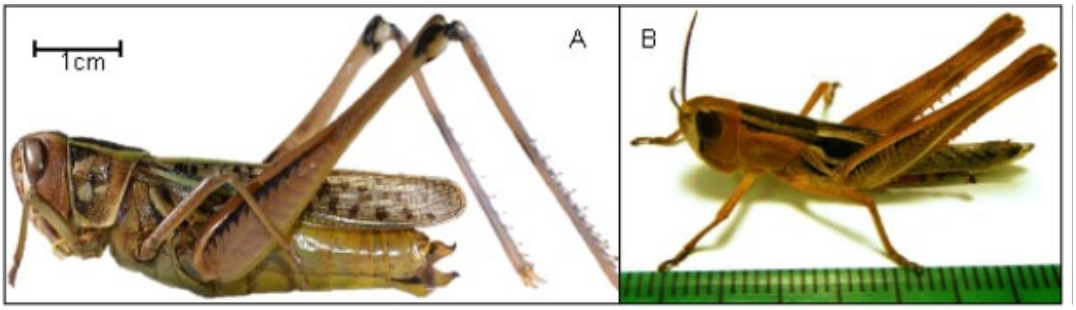
- An extensive mosaic of tall and short grasses dominated by the species of *Echinochloa pyramidalis, Cynodon dactylon, Hyparrhenia* spp.
- Flood plains with impeded or closed drainage systems.
- A distinct dry and wet season.
- Fairly wide diurnal temperature fluctuations.

The young hoppers are flightless. They move about in large bands and are voracious feeders. They develop into winged adults, form swarms and may travel vast distances. Eggs are laid in pods containing 20 to 100 each with 3-4 pods per female. They hatch in approximately 30 days. Hoppers emerge from November through to January and the first adults appear after about two months (February and March). For approximately eight months adults exist in a reproductively immature state (reproductive diapause). Mating and egg laying coincided with the commencement of summer rains in October/November. The adults live for approximately nine months, and there is only one generation per year.

The life cycle can be summarised as follows:
Adult-Fliers/Egg-Laying: October-December. **Hopper stages:** November-March. **Adult-Fliers/Reproductive Diapause**: April-September.

Cataloipus zuluensis

Owing to the relatively short wings (extending to the end of the abdomen), *Cataloipus zuluensis* is a weak flier, often crawling deeper into sugarcane stools when disturbed as opposed to flying away like the other species. This species has overwintering eggs, the hoppers go through 6 instars during the rainy season. Damage to crops has been reported widely in Africa on cotton, maize, sorghum, rice and soya.

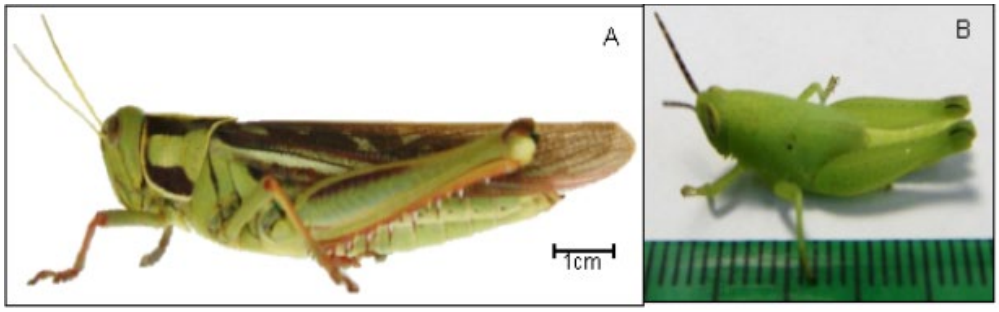


▲ Figure 7: *Cataloipus zuluensis* adult female (A) and hopper (B).

Cyrtacanthacris aeruginosa

Cyrtacanthacris aeruginosa occurs throughout southern and central Africa. It is a large species (body length 55mm) with a stocky appearance. Body colour is predominantly green with a thin white line along the forewings, the hind wings are pale yellow (Figure 8). Immature adults survive through winter in a sexually immature state (reproductive diapause).

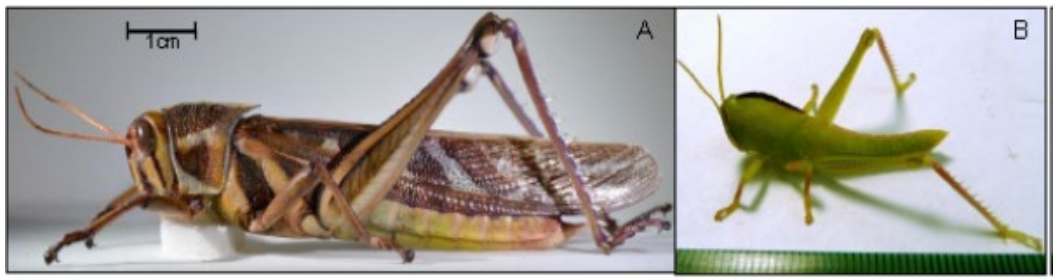
C. aeruginosa is regarded as a minor pest of vegetables and tobacco while sporadic damage has also been reported in numerous central and southern African countries attacking a wide range of crops including sugarcane.



▲ Figure 8: *Cyrtacanthacris aeruginosa* adult (A) and hopper (B).

***Ornithacris cyanea* (Bird locust)**

The bird locust *Ornithacris cyanea* is the largest and strongest flying grasshopper found along South Africa's eastern Grassland region with conspicuous violet-fuchsia coloured hind wings (Figure 9). Its habitat preferences include woodland and wooded grassland. The bird locust is known to cause damage on graminaceous and other crops including coffee, cotton, corn and millett.



▲ Figure 9: *Ornithacris cyanea* adult male (A) and hopper (B).

***Zonoceros elegans* (Elegant grasshopper)**

This large, non-flying grasshopper can become seasonally abundant on the perimeters of cane fields. These insects are conspicuously coloured, blue-grey with yellow bands (Figure 10). They feed, usually harmlessly, on cane foliage. In South African sugarcane, it has never been necessary to apply control measures for this grasshopper.

▲ Figure 10: The elegant grasshopper, *Zonoceros elegans*.

***Locusta migratoria migratorioides* (Tropical migratory locust)**

Identification

Similar in size and biology to the red locust but generally grey, rather than conspicuously red. This locust has been seen in quite large numbers in cane fields in northern KwaZulu-Natal, but has not been associated with widespread damage.

Locust and Grasshopper Control

In the event of a major invasion by true locusts, the problem would almost certainly be tackled on a national, if not an international scale, and aircraft would be used to apply suitable insecticides to the swarms.

To be effective on a local scale, an insecticide treatment must be properly targeted, and scouting is essential to identify areas to treat. The insecticide SUMI-ALPHA® 200 EW is registered for the control of grasshoppers and locusts in sugarcane. SUMI-ALPHA® should be applied only to young sugarcane before the crop canopies.

Table 1: Simplified summary of the two life cycle types present in the complex of grasshoppers attacking Empangeni sugarcane.

	Life cycle type	
Month	**Egg diapause type** *Petamella prosternalis, C. aeruginosa, C. zuluensis*	**Reproductive diapause type** *Nomadacris septemfasciata, O. cyanea*
January	Hoppers	Hoppers
February	Hoppers	Hoppers
March	Mating/oviposition	Hoppers
April	Mating/oviposition	Reproductive diapause
May	Mating/oviposition	Reproductive diapause
June	Egg diapause	Reproductive diapause
July	Egg diapause	Reproductive diapause
August	Egg diapause	Reproductive diapause
September	Egg diapause	Reproductive diapause
October	Egg diapause	Mating/oviposition
November	Hoppers	Mating/oviposition/hoppers
December	Hoppers	Oviposition/hoppers

Hoppers:
Hopper bands are most easily targeted and scouting for hopper bands of the two most damaging species *(Petamella prosternalis* and *Nomadacris septemfasciata)* should take place between November and March (Table 1). Insecticide should be applied to 1st – 3rd instar hopper bands preferably during early morning or late afternoon when hoppers are roosting (smaller stages require lower doses to kill).

4-5th Instar hoppers & Adults (Fliers):
Apply during late afternoon or early morning while the swarm is roosting. Control of 4-5th instar hoppers and adults (fliers) however will be variable, and it is therefore recommended that control measures are targeted on the younger instar hopper stages.

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