

SHORT COMMUNICATION

## A CHECKLIST OF PHYTOPHAGOUS INSECTS OF SUGARCANE IN ETHIOPIAN ESTATES

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### Abstract

Surveys of the insect fauna in Ethiopian sugarcane estates were carried out between 2003 and 2007. Species belonging to the orders Coleoptera, Lepidoptera, Hemiptera, Isoptera and Orthoptera were recovered. In addition to this being the first survey of its kind in Ethiopian sugarcane, providing the first inventory of possible phytophagous insects, a number of new associations of insects species with sugarcane in Africa were discovered. In particular, *Busseola* sp. and *Chilo partellus* were found in high numbers.

This paper lists the phytophagous insects in Ethiopian sugarcane estates and discusses the attention each species received in the estates.

*Key words:* Ethiopia, phytophagous insects, sugarcane, check list

### Introduction

Sugarcane, *Saccharum* spp. L. (Poaceae), is one of the most widely grown cash crops in Ethiopia (Assefa, 2006). There is no well-documented reference on how, where and when sugarcane was introduced into Ethiopia, although some records claim its introduction during the early 18th century (Duri, 1969). However, the first commercial cultivation of the crop was in 1954 by a Dutch Company, Handles-Vereening Amsterdam (HVA) (Tafesse and Haile-Michael, 2001). At present, sugarcane is produced commercially solely by three Government-owned estates in Ethiopia, for both export and domestic consumption.

Sugarcane worldwide is attacked by a variety of insects from a broad spectrum of orders, such as Lepidoptera, Homoptera, Coleoptera, Hemiptera, Orthoptera and Isoptera (Pemberton and Williams, 1969; Conlong, 1994; Carnegie and Conlong, 1994; Leslie 2004). The geographic distribution of most of these pests is generally restricted except for a few species that are cosmopolitan (Pemberton and Williams, 1969; Conlong, 1998). Studies in Africa reported the insect pest species of sugarcane to be predominantly local insects that have adopted the crop as a host consequent to its cultivation (Conlong, 1994, 1998; Leslie, 2004).

Phytophagous insect in Ethiopian commercial sugarcane have not been studied in detail, and therefore information in this country is limited (Assefa, 2006). However, funding for sugarcane research has increased in recent years with the objective of increasing production.

Preliminary studies on sugarcane estates of Ethiopia showed the presence of several economically important pests, although these were not identified to species level (Assefa *et al.* 2007, Tafesse and Haile-Michael 2001). In many cases, the common names were given, leading to much confusion. Information on the diversity and economic importance of insect pests is essential for designing insect management strategies. This study aimed at identifying and cataloguing the diversity of phytophagous insects of sugarcane in Ethiopian estates as the first step in the development of an effective integrated pest management strategy for the Ethiopian sugarcane industry.

## Materials and Methods

Surveys were conducted during December 2003 to February 2004; from November to December 2004 and in April 2007 on the three estate in Ethiopia: Wonji (08°31'N; 39°12'E), Metehara (08°49'N; 39°58'E) and Finchawa (09°52'N; 37°19'E). Sugarcane of all ages growing in estate fields were examined for possible infestation by insects.

Fields were randomly selected with consideration given to include all varieties. The fields were inspected for signs of insect infestation, and insects found feeding on sugarcane were collected and placed in 30 ml plastic vials. Some vials contained diet medium (Graham and Conlong, 1988), and others sections of sugarcane. Information collected included the part of the sugarcane where the specimen was found, amount of damage, name of the organism (if known), developmental stage, and date and area of collection. Together with the field surveys, interviews were conducted with crop protection staff on the estates concerning insect pest problems. Literature reviews of estate internal reports on the history of insect pest problems was conducted at each estate, and sample specimens of economically important insect pests identified and/or collected by the crop protection staff, with relevant data, were collected.

The insect specimens were sent to the South African Agricultural Research Council's Plant Protection Research Institute (ARC-PPRI) Quarantine Laboratory, from where they were sent to the ARC-PPRI Biosystematics Division in Pretoria for identification.

## Results and Discussion

### *Sugarcane insect species encountered*

A number of insect species were collected from sugarcane (Table 1). Some species were rarely encountered, while others were abundant.

The predominant species group found were stem borers, (*Busseola* sp (Lepidoptera: Noctuidae) and *Chilo partellus* Swinhoe (Lepidoptera: Crambidae)); termites, (*Odontotermes* sp. and *Macrotermes* sp. (Isoptera: Termitidae)) and black sugarcane beetle (*Heteronychus licas* Klug (Coleoptera: Scarabaeidae)).

**Table 1. Phytophagous insect species encountered in the Ethiopian sugarcane estates of Wonji, Metehara and Finchawa during surveys conducted from December 2003 to February 2004, from November to December 2004, and during April 2007.**

Insect order species and family	Common name	Damage symptoms on sugarcane
Lepidoptera		
<i>Busseola</i> sp. (Noctuidae)	Maize stalk borer	Leaf eaten (Shot holes) and stems bored in younger sugarcane
<i>Chilo partellus</i> Swinhoe (Crambidae)	Spotted stalk borer	Leaf eaten (Shot holes) and stems bored in young sugarcane
<i>Sesamia calamistis</i> Hampson (Noctuidae)	Pink stalk borer	stems bored in young and older sugarcane
<i>Spodoptera</i> sp. (Noctuidae)	Army worm	Free feeding on green leaf blades, generally in younger cane
Isoptera		
<i>Odontotermes</i> sp. (Termitidae)	Large fungus growing termites	Damage on young shoots and roots
<i>Macrotermes</i> sp. (Termitidae)	Large fungus growing termites	Damage on young shoots and roots
Coleoptera		
<i>Heteronychus licas</i> Klug (Scarabaeidae)	Black sugarcane beetle	Damage on young shoots below ground and roots
<i>Gonocephalum</i> sp. (Tenebrionidae)	False wireworm	Damage on young shoots and roots
Hemiptera		
<i>Saccharicoccus sacchari</i> Cockerell (Pseudococcidae)	Sugarcane mealybug	Adults covered by waxy secretion, on mature cane stalk surface, sucking the phloem sap through the stalk rind
Orthoptera		
Unidentified	Grasshoppers	Free feeding on green leaf blades

### Commonly encountered phytophagous insects in the estates

#### Stem borers

Stem borers were common in all three estates, but with much variation in their abundance and species composition between estates. *Chilo partellus* and *S. calamistis* were recorded in all estates, while *Busseola* sp. was recorded only at Wonji and Finchawa estates (Assefa et al., 2006). High levels of infestation on sugarcane by *Chilo partellus* and *Busseola* sp. were reported only from Ethiopia (Assefa et al., 2006). *Sesamia nonagroides botanephaga* Tam and Bowden (Lepidoptera: Noctuidae), which was previously described by the Commonwealth Institute of Entomology from Wonji estate (Anon, 1975), was not found in these surveys. The absence of this species may be due to unsuitability of the diet used in the survey (causing larval mortality), or the immatures collected may have been very few so that no immatures of this species reached the adult stage to allow identification (Assefa et al., 2007). In 1979 an outbreak of *S. nonagroides botanephaga* was reported from sugarcane fields at Wonji estate (Tafesse and Haile-Michael, 2001). In the current surveys, however, C.

*partellus* and *Busseola* sp. were the predominant stem borers of sugarcane in the estates. No yield loss assessment was conducted, therefore the impact of these borers on sugarcane yield is unknown.

#### *Termites*

Termites cause serious damage on sugarcane in Finchawa estate. Specimens collected from this estate were identified as *Odontotermes* sp. and *Macrotermes* sp. To manage termites in the sugarcane fields and buildings, destruction of termitaria, killing of the queen manually and insecticide application have been employed on the estate (Tafesse and Haile-Michael, 2001).

#### *Black sugarcane beetle*

Black sugarcane beetle, *Heteronychus licas*, is a commonly occurring insect that causes damage to sugarcane roots and young shoots in Metehara and Wonji estates. Despite the frequent use of pesticides to manage this insect, the level of damage by black sugarcane beetle is increasing year after year (Tafesse and Haile-Michael, 2001).

#### *Phytophagous insects rarely encountered in the estates*

##### *False wireworm*

False wireworm, *Gonocephalum* sp., was recorded from sugarcane in Wonji estate. False wireworms are not reported to be serious problems in sugarcane production in Ethiopia (Tafesse and Haile-Michael, 2001). The lower level of infestation by false wireworm on the estates may be associated with the trash left in the field. False wireworms feed on stubble, and damage to crops increases in low-stubble fields (Robertson, 1993). There are several species of wireworms that attack sugarcane seedlings (Robertson *et al.*, 1994) and identification of the species complex in the estate is important for proper management of these insects in sugarcane fields of the estates.

##### *Sugarcane mealybug*

Infestation by sugarcane mealybug was recorded in Metehara sugarcane estate. The rate of infestation on sugarcane at the time of the surveys was minimal. As there was no research conducted on this insect on the estates, the economic importance of this insect to sugarcane production in Ethiopian estates is unknown. It is, therefore, essential to study the importance of this insect in sugarcane production in the estates.

##### *Other phytophagous insects*

Several species of grasshoppers and *Spodoptera* sp. were also recorded feeding on sugarcane in the estates. The grasshoppers could not be identified as there was no reference specimen in ARC-PPRI collection similar to that collected in Ethiopia.

### **Conclusion**

These preliminary surveys of phytophagous insects feeding on sugarcane of the commercial sugarcane estates in Ethiopia has revealed communities and associations found in other African sugarcane industries. However, the stem borer fauna found, other than *Sesamia calamistis*, was unique to Ethiopia. Sugarcane estates in Africa have not shown such common occurrences of *Busseola* sp and *C. partellus*. Studies on the diversity of insect species and the economic importance of these in sugarcane production need to be conducted.

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