A RECRUDESCENCE OF THE BORER *ELDANA SACCHARINA* WALKER (LEPIDOPTERA: PYRALIDIDAE)

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ABSTRACT

During the last three years the borer *Eldana saccharina* Walker (Lepidoptera: Pyralididae) has resumed pest status in South Africa and has attacked sugarcane in Swaziland. It had been a serious pest 30 years ago on the Umfolozi river flats, but in the intervening years it had remained dormant and unnoticed. For many years it has been a recognised pest of sugarcane and cereal crops in West and East Africa, where in recent years its increased importance as an agricultural pest has resulted in intensified studies of its biology and control. Its present position in South Africa and Swaziland is outlined, with a discussion of incidence, varietal susceptibility and control.

Introduction

Two lepidopterous borers are known to damage sugarcane in South Africa and Swaziland. The more frequently encountered one is *Sesamia calamistis* Hamps. (Noctuidae), which is commonly known as top grub. At its normal, low level of infestation it is not a serious pest; but it may occasionally cause conspicuous damage especially to young plant cane on the coast, or to the upper stem of older cane in the higher altitude areas. The damage it causes very seldom results in economic loss.

A much more serious borer is *Eldana saccharina* Walker (Pyralididae), which may cause severe damage to cane of all ages (Fig. 1). During the last year an

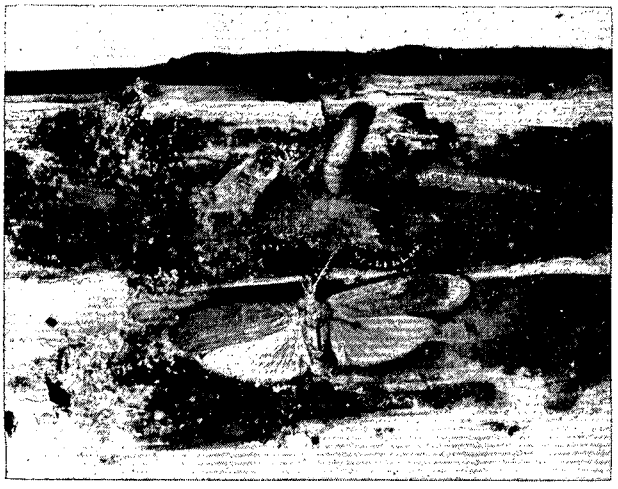

FIGURE 1 The borer *Eldana saccharina* Walker.
top: pupa
right: boring larvae
bottom: adult moth (pinned)

increasing number of outbreaks have been reported and investigated. In Natal, outbreaks of *Eldana* have occurred mainly in standover cane, but a disturbing aspect of Swaziland infestations has been its presence, in considerable numbers even in young ratoons. All stages of the borer, i.e. eggs, larvae, pupae and moths, may be present at once, and cane of all ages may be affected.

In West and East Africa *Eldana* is a recognised pest of maize and other cereal crops, and a number of alternate host plants have been recorded, including millet, rice, sorghum, cassava, sedges, papyrus, large grasses and pigweed (*Amaranthus dubius*).

History

Eldana saccharina was described over 100 years ago from specimens reared from sugarcane in West Africa. It is an African species, and has been recorded from a variety of crops in Sierra Leone, Gold Coast, Nigeria, Ghana, Uganda, Tanzania and other parts of West and East Africa. In recent years in East Africa records have shown that the sugarcane pest status of *Eldana* has increased,[2] and there are indications that it has different food preferences in different areas, and may acquire a preference for sugarcane after being in contact with it for some time.[5]

Its history as a sugarcane pest in South Africa dates from 1939 when it was found damaging cane on the Umfolozi flats[1] (Fig. 2). During the following 5 years

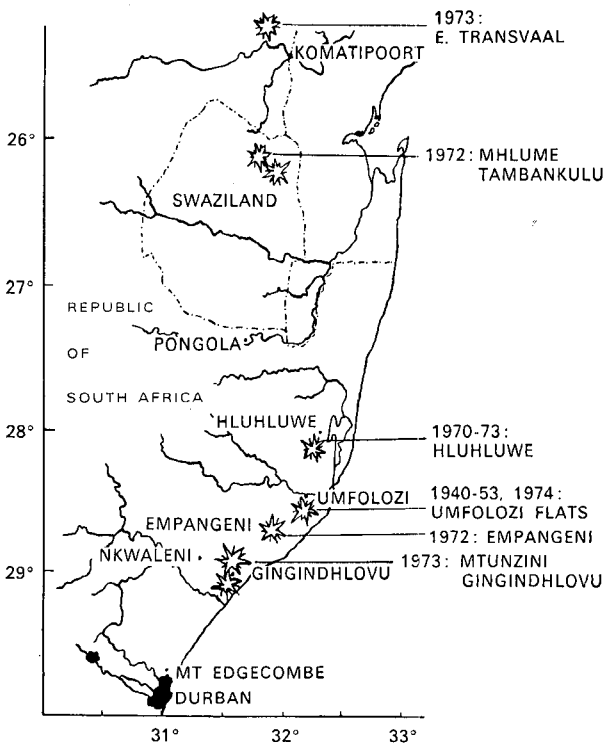

FIGURE 2 Outbreak history of *Eldana saccharina* in South Africa and Swaziland.

it became a serious pest, but it was restricted at pest level to that area, although occasional specimens were collected from other parts of the cane belt. Crops other than sugarcane were not affected. It was feared at the time that *Eldana* might be a new migrant and that infestations might be progressive, but it is now assumed to be an indigenous insect. The relatively soft varieties, especially POJ 2725, were the most severely affected and it was felt that the advent of harder varieties had ended the problem. Certainly from the early 1950's it was of no further importance in Natal until 1970, when a field of cane near Hluhluwe was very severely affected rendering it unmillable. The variety concerned was NCo 376. The infestation persisted on this estate, and immediately adjacent estates also were affected.

There followed further outbreaks. In 1972 at Empangeni one estate in particular was affected and in 1973 further infestations were noted. Also in 1972 two estates in northern Swaziland suffered infestations, and although initial damage was not very serious, the situation there in 1973 was rather worse. In 1973 infestations were noted also at Mtunzini, Gingindhlovu and in the eastern Transvaal; and in January 1974 another infestation was seen on the Umfolozi flats — the first one there for about 20 years.

Biology and damage caused

The biology of *Eldana* has been studied in Natal by Dick[1] and in East Africa by Waiyaki[7] and by Girling.[2,3] The most conspicuous stages of the life cycle are illustrated in Fig. 1.

The moth is light brown with a wing span of 30-35 mm, and rests with its wings folded across its back. Moths emerge shortly after sunset and mate, and the female begins oviposition after about 24 hours The female may fly 200 m or more before ovipositing, but more usually eggs are laid closer to the adult's emergence site.

Preferred oviposition sites are under leaf sheaths and in the area between the stem and the soil; but they may be laid also on clods or on plant residue material. Each batch contains about 20 eggs, and one female lays about 450, which hatch after about 8 to 10 days.

The hatching larva does not enter the cane stem immediately, but feeds initially either on cane leaves, or else as a scavenger on oddments of organic matter. After a variable period the larva is sufficiently robust to enter the plant tissue, and the rest of its immature active life is spent as a borer in the cane stem. The larval period varies from about 20 days in summer to 60 days in winter during which time the male moults 5 or 6 times, and the female 6 or 7 times, before entering the dormant pupal stage. Boring larvae have the characteristic habit, when disturbed, of moving either forwards or backwards with equal ease. They are active voracious feeders, hollowing out the stems and pushing frass from them through holes to the exterior. At low infestation levels these holes may be the only indication of the borer's presence. In extreme cases the cane stick becomes no more than a brittle bodiless framework and there is severe crop loss. As many as 12 larvae may be found in a single joint and all parts of the stalk may be attacked, with borers extending even into the underground parts of the stool.

The mature larva spins a protective cocoon and pupates within it. The pupa may be located either within the hollowed stem or be attached to the outside of the stalk, usually beneath a leaf sheath. From this the adult moth emerges after about 10 days.

Varietal susceptibility

Although it was thought that the advent of our newer varieties, with their thinner stalks and tougher rinds, had ended the problem, *Eldana* is now found in all varieties which are grown in areas where the pest occurs. Even NCo 382, which is considered one of the hardest of our released varieties, is affected. However, there is some variation in varietal susceptibility, and recent outbreaks here have suggested that the variety N 55/805 is more readily attacked than others. It is interesting that Waiyaki[8] found in East Africa that of the varieties studied NCo 376 was the least susceptible, although in Natal heavy infestations have occurred in this variety; (the other varieties he studied are not grown commercially here). No opportunity has yet arisen for a comprehensive study of susceptibility among our released varieties but the figures shown in Table 1 are of some interest, and were obtained in 1973 when a variety trial was harvested in northern Swaziland.

TABLE 1

Incidence of *Eldana saccharina* in 6 sugarcane varieties from two variety trials in Swaziland

Variety	% stalks bored by *Eldana*	
	Trial A	Trial B
N 55/805	11,1	17,6
N 55/168	2,8	19,4
NCo 310	4,6	9,5
CB 36/14	3,7	5,9
NCo 334	1,9	4,6
NCo 376	0,0	0,9

There is a clear indication that N 55/805 is relatively susceptible and that NCo 376 showed some measure of resistance. In trial B the variety N 55/168, which is of medium hardness, was heavily infested.

In the early outbreaks on the Umfolozi flats the most severely damaged variety was POJ 2725. Other POJ varieties also suffered, but Co 281 appeared to be resistant.[1] In Uganda, Girling[4] found the soft variety M 134/32 to be particularly susceptible, and in Tanzania, the variety H 39-5803 was so heavily attacked that it is no longer grown there.[7]

Surveys

In recent years, when outbreaks have been reported a survey has been made of cane on farms in the surrounding area, so that some knowledge of incidence and area affected may be gained.

TABLE 2

Summarized results of Eldana saccharina surveys

District	Date	No. of farms included	% stools affected			Max. No. holes per stick	Average No. holes per stick
			Maximum	Minimum	Average		
Hluhluwe	15/ 6/71	9	100,0	0,0	17,6	33	0,7
Hluhluwe	13/ 6/73	11	38,0	3,0	1,9	6	0,3
Mtunzini/Gingindhlovu	11/ 6/73	23	63,0	0,0	13,6	9	0,3
Empangeni	21/ 9/73	14	77,5	0,0	18,9	11	0,5
Nkwaleni	7/12/73	15	35,0	0,0	8,7	2	0,1

Procedure

The assessment has been made by a team from the Experiment Station. Initially fields on farms surrounding the infested area were examined *in situ*. In each chosen field cane stools were inspected at 10-pace intervals into the field to a distance of 100 paces, the number of inspection sites per field varying from 10 to 50. At each site a note was made as to whether any sticks had been bored. If they had, one infected stick was examined and the number of holes recorded. This provided a measure both of incidence and intensity. Latterly cane has been examined at field loading zones or at railway sidings, each person examining 10 sticks from each stack and recording the number of borer holes in each infested stick. This method has its disadvantages, but it enables many more farms to be included in a given period. Any farm showing a maximum stick infestation of 30% or more was visited for further investigations. For the purpose of the survey all borer holes were included, although it is possible that a few of them may not have been caused by *Eldana*.

Results

These are summarised in Table 2.

The first of the recent infestations, i.e. the one at Hluhluwe in 1970, was the heaviest so far recorded, and was restricted at that level to one only of the 9 farms inspected. One adjoining farm showed a fairly high level of infestation, but on another no *Eldana* was recorded. A feature of the outbreaks has been the great variation in infestation levels found sometimes between adjacent farms, where cane of similar ages and varieties is growing. This was particularly noticeable in the Hluhluwe and Empangeni areas.

The detailed results show that the percentage of stools affected increased with cane age, and that highest numbers recorded were for stand-over cane of 16 months or more.

Control

No egg parasites of *Eldana* have been recorded, and there are few useful larval or pupal parasites. Once the larva enters the plant tissue it is well protected, and the cocoon surrounding the pupa protects it from potentially useful parasites. Girling[3] and Mohyuddin and Greathead[6] list and discuss a number of insect parasites which have attacked *Eldana*, but the picture is not very encouraging. A few of these have been shown to afford some measure of control in West Africa and were being introduced and tried in Uganda, but this work has now been suspended indefinitely.

It is known that ants destroy both the eggs and the hatching larvae before they bore into the stems,[3,5] and the use of insecticides — especially persistent chemicals — is not recommended because of their effect on ant populations.

A large measure of control may be achieved by a combination of management practices. It is most important that cane be harvested as early as possible and that the presence of stand-over cane is avoided. Cane should be cut at or below ground level, so that there remains a minimum of stubble in which borers may survive into the next ratoon; and what stubble does remain should be covered with earth. (In the Mount Edgecombe insectary no borers survived in heavily infested setts planted 12 cm below soil level, although germination was reasonable.) No residual plant material should remain in a field after harvest, because from it borers or moths may move to the ratooning cane.

Discussion and conclusions

The causes of the recent recrudescence of this pest are probably extremely complex. That its disappearance was due entirely to the advent of harder cane varieties can now be discounted. There is evidently a varietal preference, based mainly on stem texture, but even hard varieties are attacked. It is an indigenous insect which over the years has been present in unnoticeable numbers in and around cane fields; but recently a combination probably of climatic, bionomic or genetic factors caused its numbers suddenly to increase to a level where the damage it caused betrayed its presence.

In East Africa its status as a pest of sugarcane has been progressively important. It appears to have become better adapted to the crop and to have spread into new areas. The same may happen here and the situation will be followed with interest, with due consideration being given to control measures. Alternatively it may disappear as it did 30 years ago.

Acknowledgement

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