

THE INCIDENCE OF MOTH BORERS IN SOUTH AFRICAN SUGARCANE DURING THE 1979/80 SEASON

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Abstract

The present situation regarding the pyralid borer *Eldana saccharina* Walker is discussed, using statistics from millyard and field surveys. A general increase in incidence of both *Eldana* and of the less serious borer *Sesamia calamistis* was recorded in many parts of the industry, with the Amatikulu mill area being most adversely affected. A comparison of borer numbers and aspects of field management practices showed that where *Eldana* is present, there is a marked potential for build up in numbers as the crop ages.

Introduction

This paper gives a further annual account of the incidence of the two borers *Eldana saccharina* Walker (Pyralidae) and *Sesamia calamistis* Hampson (Noctuidae) as reflected from millyard and field surveys conducted as a routine during past seasons^{1, 2, 3, 4}.

Methods

Mill surveys :

These have been described by Smaill³. As cane consignments arrive at the mill they are sampled by resident inspection teams who examine 20 stalks per consignment selected at random, and record various statistics regarding borer incidence. All South African mills except Entumeni, Dalton and Noodsberg now have resident inspectors, and during last season the whole programme was intensified, with the numbers of inspectors per mill varying from one to seven.

Recently provision has been made to enable mill inspectors at some mills to identify the field from which the sampled cane came. This in turn has made it possible to accumulate historical data concerning each particular field, and to investigate any correlations between borer incidence and field history.

Field surveys

Since 1978 systematic field surveys for borer have been conducted in the Amatikulu coastal area. These were designed originally to help decide milling priorities, but were continued after the mill had closed right through the off-crop until the mill re-opened. This programme has now been intensified, with three teams operating in the Amatikulu area, and one at the marginal southern limit of *Eldana*-infested cane (just north of Mount Edgecombe). Additional teams are planned for the coming season, with certain estates providing their own inspection teams.

A computer programme is in operation to cope with the data which amass from these mill and field surveys.

Results

Monthly levels of *Eldana* recorded at mills during the 1978/79 and 1979/80 season are shown in Figure 1. Those for the worst affected mill, Amatikulu, are shown separately in Figure 2 and the figure is drawn to a smaller scale.

Mill survey data for three seasons are shown in Tables 1 and 2. Table 1 includes the percentage of stalks damaged

by borers, and Table 2 shows the percentages for the two borers *Eldana* and *Sesamia*. Two sets of means are given, distinguishing between mills which have recorded *Eldana* for some time, and those which constitute recent records. A measure is given also, for the two groups, of percentage increase over previous seasons.

Table 3 shows what the probability was, during the 1979/80 season, of finding a borer in a damaged stalk, it having been noted that a relationship exists between numbers of borers found and proportion of stalks damaged.

In Table 4 are recorded, for Amatikulu mill, various statistics from millyard inspections, and these are grouped according to the main sources from which the cane originated.

A comparison of survey results regarding borer numbers and field history has suggested some interesting trends,

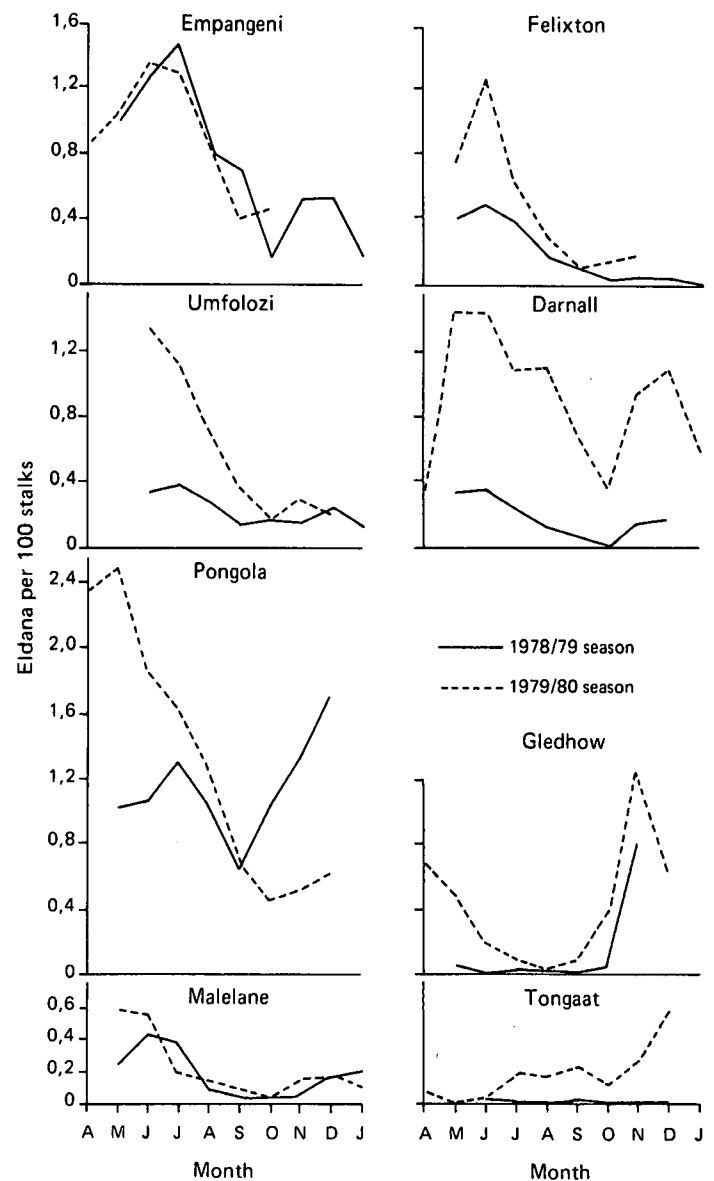


FIGURE 1 Eldana borer populations for the last two seasons.

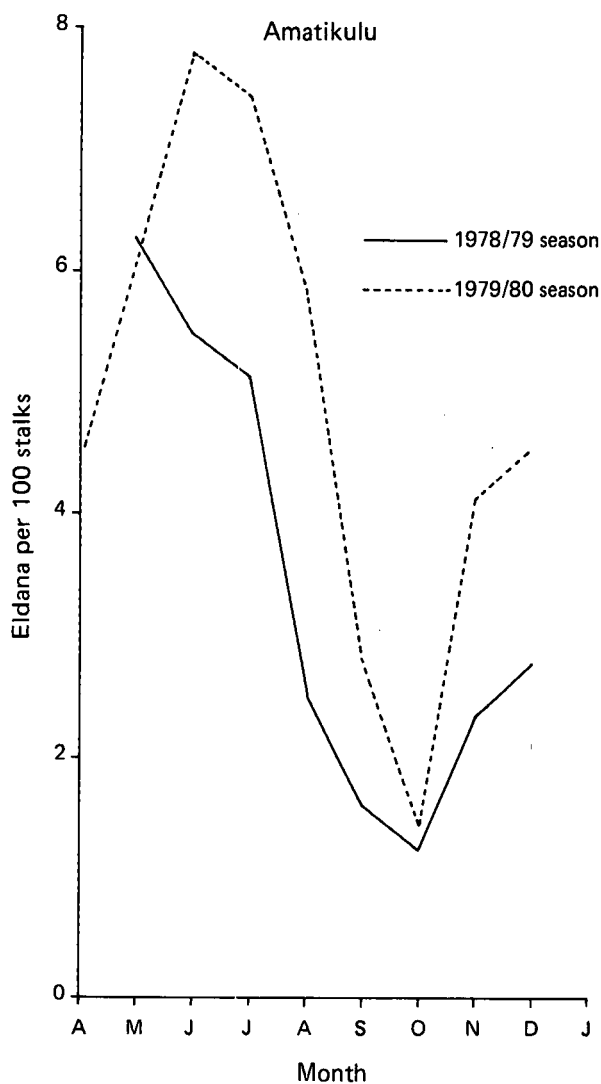


FIGURE 2 Eldana borer populations for the last two seasons (Amatikulu Mill).

although so far there has materialised little upon which firm conclusions may be based, and results are often conflicting. One constant association is that between *Eldana* numbers and cane age. Figure 3 shows results from Amatikulu field surveys for *Eldana* conducted during 1978, and on the same graph are plotted figures for *Sesamia* taken from surveys of Tongaat fields.

TABLE 1

Level of damage to cane by borers over three seasons
% stalks damaged

Mill	1977/78	1978/79	1979/80
Malelane	4	1	2
Pongola	7	9	5
Umfoloji	8	3	5
Empangeni	6	6	5
Felixton	4	3	5
Amatikulu	26	26	28
Darnall	6	10	15
Sub Mean	9	8	9
Gledhow	—	15	19
Glendale	—	9	18
Tongaat	—	11	15
Mount Edgecombe	—	14	16
Illovo	—	13	9
Sezela	—	2	3
Umzimkulu	—	8	18
Mean	—	9	12

TABLE 2

Borer numbers per 100 stalks of cane for three seasons

Mill	Borer numbers per 100 stalks					
	<i>Eldana</i>			<i>Sesamia</i>		
	1977/78	1978/79	1979/80	1977/78	1978/79	1979/80
Malelane	0,31	0,18	0,23	0,01	0,01	0,01
Pongola	0,88	1,09	1,30	0,02	0,01	0,01
Umfoloji	0,27	0,25	0,60	0,01	0,01	0,01
Empangeni	0,88	0,76	0,90	0,02	0,08	0,25
Felixton	0,09	0,20	0,43	0,01	0,01	0,07
Amatikulu	3,68	3,52	5,08	0,07	0,08	0,28
Darnall	0,06	0,19	0,97	0,07	0,06	0,41
Sub Mean	0,88	0,88	1,36	0,03	0,03	0,15
% increase from previous season	—	0%	55%	—	0%	400%
Gledhow	—	0,13	0,35	—	0,09	0,38
Glendale	—	0,01	Nil	—	0,18	0,36
Tongaat	—	0,01	0,23	—	0,30	1,12
Mt Edgecombe	—	Nil	Nil	—	0,23	0,34
Illovo	—	Nil	Nil	—	0,59	0,21
Sezela	—	Nil	Nil	—	0,04	0,05
Umzimkulu	—	Nil	Nil	—	0,03	0,03
Mean	—	0,45	0,72	—	0,12	0,25
% increase from previous season	—	—	60%	—	—	108%

TABLE 3

Probability of finding a borer in a damaged stalk during 1979/80

Mill	Probability
Malelane	0,1
Pongola	0,3
Umfoloji	0,1
Empangeni	0,2
Felixton	0,1
Amatikulu	0,2
Darnall	0,1
Gledhow	0,04
Glendale	0,02
Tongaat	0,1
Mt. Edgecombe	0,02
Illovo	0,02
Sezela	0,02
Umzimkulu	0,002

TABLE 4

Mill survey results for *Eldana* and *Sesamia*: Amatikulu Growers 1979/80 season

	All growers	European coastal growers	Melmoth growers	African growers
Consignments inspected	28 724	19 039	4 911	1 155
% Consignments with <i>Eldana</i>	25%	35%	1%	3%
Growers inspected	744	122	50	506
% Growers with <i>Eldana</i>	25%	96%	18%	5%
% Stalks damaged	28%	35%	7%	11%
<i>Eldana</i> per 100 stalks	5,08	7,07	0,02	0,26
<i>Sesamia</i> per 100 stalks	0,28	0,40	0,03	0,07

Discussion

During the 1979/80 season levels of borer damage increased and the industrial average is now approximately

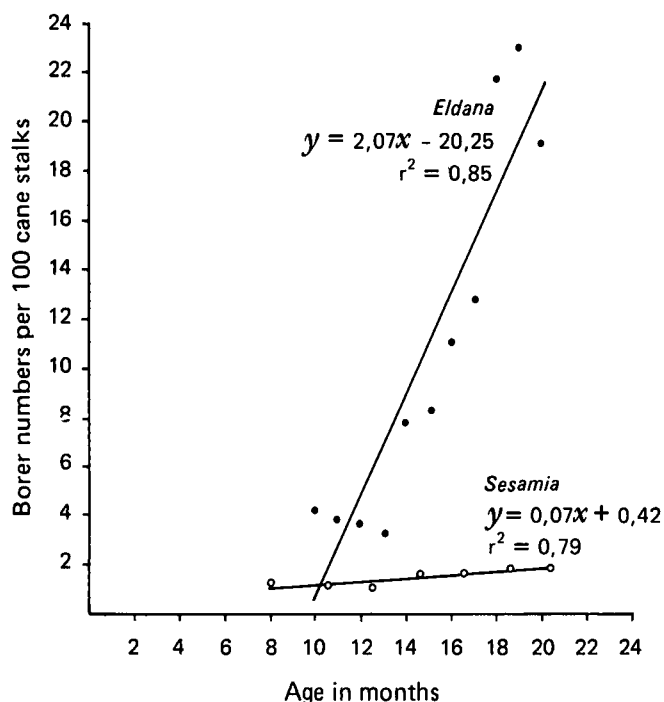


FIGURE 3 Borer incidence and cane age.

12% stalks damaged by cane borers. However, Amatikulu mill with an average of 28% stalks damaged, continues to be the only mill with a high level of damage, and the main borer involved there is *Eldana*. Applying a figure for crop loss of 1% less sucrose for every 10% of stalks damaged⁴, the loss at Amatikulu mill will be approximately 3%. That figure would apply to the mill as a whole, but many individual growers would suffer losses well in excess of that figure.

During the season levels of both borers increased (Table 2). *Eldana* increased from 0,45 per 100 stalks in 1978/79 to 0,72 last season, an increase of 60%. *Sesamia* increased from 0,12 to 0,25 per 100 stalks, an increase of over 100%. If only the mills from Malelane to Darnall are considered, no increase in *Eldana* or *Sesamia* occurred between 1977/78 season and 1978/79. However, for the same mills last season there was increase for *Eldana* of 55% and for *Sesamia* of 400% (although *Sesamia* levels in those northern mills still remain low).

At Malelane *Eldana* levels increased last season but still remained lower than they had been in 1977/78. Pongola mill has shown a steady increase in *Eldana* levels over the last two seasons while the situation at Umfolozi remained static from 1977/78 to 1978/79, but increased by more than 100% last season. At Empangeni mill, levels have remained fairly static, but at both Felixton and Darnall mills *Eldana* levels have increased markedly over the last two seasons. During the 1977/78 and 1978/79 seasons Amatikulu mill maintained a steady level of *Eldana*, but last season there was an increase of nearly 50%. Large increases in *Eldana* levels were recorded last season at both Gledhow and Tongaat mills, while no *Eldana* was recorded at Glendale, Mount Edgecombe, Illovo, Sezela or Umzimkulu mills.

Despite the general increase in borer levels Amatikulu mill remains the only one where the level is serious. At Pongola, Umfolozi, Empangeni and Darnall the *Eldana* level could be regarded as moderate while at Malelane, Felixton, Gledhow and Tongaat, it is low. However, within those mill areas there have been individual fields which have supported heavy infestations.

The dramatic increase in *Eldana* levels at Darnall, Gledhow and Tongaat mills has given cause for concern because it reflects a progressively southwards increase in *Eldana* populations in cane. This may be particularly important as the age at which cane is normally harvested tends to be greater in the south than in the north.

However, since there has been an increase also in levels of the other less important borer, *Sesamia*, it may be that conditions (eg climatic) have been particularly favourable for this type of insect. It is possible that a suitable change in conditions could cause levels to fall once again, although it would be wishful thinking to expect the problem to disappear in the course of one season.

Although the number of borers found at mills varies considerably (Table 2) there is a strong relationship between numbers of borers found and numbers of stalks damaged, and this can be expressed as the probability of finding a borer in a damaged stalk. For the mills where *Eldana* is the dominant borer this probability is about 0,2. Malelane mill, which has the lowest *Eldana* level has a probability figure of 0,1. Amatikulu mill, with the highest *Eldana* level has a figure of 0,2, while Pongola with a moderate *Eldana* level has a figure of 0,3. Mills where *Sesamia* is the dominant borer have a probability figure of 0,02. There are exceptions, for example, at Gledhow mill where neither borer is dominant the probability is 0,04, slightly higher than the general *Sesamia* level, and there is no obvious reason for the very low probability figure for Umzimkulu mill. Tongaat mill, which recorded high numbers of *Sesamia* has a probability figure of 0,1.

The difference in probability rating between *Eldana* dominant mills and *Sesamia* dominant mills may result from the way in which the different borer populations develop. *Eldana* populations increase progressively as the cane ages (Figure 3) and become cumulative so that large populations are frequently present when the cane is harvested. *Sesamia* populations, possibly because of the braconid parasite *Apanteles sesamiae* Cam. do not develop in this way (Figure 3) and although the damage remains, the borer is less frequently present at harvest.

Amatikulu mill, which has the highest *Eldana* levels, collects cane from a large and rather heterogeneous area. Most cane comes from European growers in the coastal regions, a proportion from European growers in the higher altitude Melmoth area, and a small amount from African growers in the coastal area. An analysis by area (Table 4) gives a figure for coastal European grown cane of 7,07 *Eldana* per 100 stalks, while the level for Melmoth growers is only 0,02. *Eldana* is not yet a problem in higher altitude, cooler areas. It is interesting that the figure for African-grown cane in coastal areas is only 0,26 *Eldana* per 100 stalks, although some of the fields are adjacent to European farms. The explanation for such differences may be in the quantities and type of agricultural chemicals which are used (a subject which is at present receiving considerable attention), and the fact that African cane lands are more diffuse, with large areas of fallow land between them. However, the age factor is probably important also, African cane being harvested at a comparatively young age, before *Eldana* populations become excessive (Figure 3).

Conclusion

Sugarcane borer populations and damage increased last season, and the problem continues to be serious, especially in the Amatikulu mill area. Although populations in other areas are comparatively low, individual growers have been

adversely affected, and the southward spread of the problem is cause for concern.

Increasing cane age remains the main factor that can be associated with increasing *Eldana* borer populations.

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