MILL YARD SURVEYS OF THE LEPIDOPTEROUS CANE BORERS *ELDANA SACCHARINA* WALKER AND *SESAMIA CALAMISTIS* HAMPSON

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Abstract

Survey data for the borer *Eldana saccharina* Walker (Pyralididae) are given. Compared with the previous season there was an improvement during 1977/78 for some mills and a deterioration for others. Results indicate an increase in Eldana incidence in cane south of the Tugela River, and that Eldana is now a severe problem in the Amatikulu area. Another borer, *Sesamia calamistis* Hampson (Noctuidae) is shown to be widely distributed throughout the industry, with its highest density in the south.

Introduction

Since 1970 in the South African sugar industry there has been a gradual increase in numbers of the pyralid cane borer *Eldana saccharina* Walker, and in the area being affected by it. By means of field and mill yard surveys a check has been kept on the situation[1], and the purpose of this paper is to discuss the data obtained during the last season. In the course of Eldana surveys further attention has been drawn to the more widely distributed but less harmful noctuid borer *Sesamia calamistis*, records of which are enabling various comparisons to be made.

Procedure

Resident mill survey teams have been operating at Pongola, Umfolozi, Empangeni, Felixton, Amatikulu and Darnall mills since August 1975, and in Malelane since August 1976[1]. These mill teams select 20 stalks from each consignment sampled, trash it and inspect it. They record the following: grower's name and code number, cane variety, whether the cane was burnt or trashed, number of stalks bored, and number and species of borer larvae or pupae present. The identification is checked, and the data sent for processing by the Sugar Association computer in Durban.

More detailed information is collected by teams from the Experiment Station from their mill yard inspections. These started in June 1975 to establish the distribution of Eldana in cane throughout the industry and so far over 125 000 stalks of cane have been inspected. In addition to the information collected also by the mill survey teams the following statistics were recorded: total number of joints, and number of joints bored. Where there was damage but no borer present, a subjective assessment was made of the borer species involved.

Monthly mean maximum temperatures were obtained from a meteorological station at Amatikulu mill. These figures were used, with a development threshold of 14°C, to calculate the degree months between each larval peak for the Amatikulu mill area. The threshold temperature is that at which growth of the borer stops. This has not yet been measured for Eldana, but it is not too critical for the calculations involved. The threshold value is subtracted from the monthly mean maximum temperature. The results for each month are summed to give the degree months between each larval peak.

Results

Table 1 is a summary of the surveys carried out by the Experiment Station team over the past three seasons at mills not affected by Eldana. In Table 2 appear the results for the northern, Eldana affected mills. Except for Big Bend, they refer to the resident mill team survey results for 1977/78 only. Also given are the percentages of consignments observed with Eldana in the 1976/77 season.

TABLE 1

Results obtained by Experiment Station survey team at mills not affected by Eldana over three seasons from 1975/76 to 1977/78

Mill	Number of consignments inspected	Number of Sesamia per consignment	% stalks damaged
Dalton	266	0,08	7
Noodsberg	299	0,02	6
Umzimkulu	288	0,16	9
Sezela	296	0,09	8
Illovo	377	0,06	6
Mt. Edgecombe	434	0,10	9
Tongaat	491	0,10	10
Melville	389	0,08	9
Gledhow	398	0,08	9
Glendale	253	0,07	8
Entumeni	343	0,11	11

TABLE 2

Results obtained by resident mill teams at Eldana – affected mills.

Mill	Number of consignments inspected	% consignments with Eldana		Number of Eldana per consignment	Number of Sesamia per consignment	% stalks damaged
	1977/78	1976/77	1977/78	1977/78	1977/78	1977/78
Darnall	13 832	Nil	1	0,01	0,01	6
Amatikulu	31 811	13	20	0,74	0,01	26
Felixton	12 790	2	1	0,02	<0,01	4
Empangeni	9 889	10	8	0,18	0,02	6
Umfolozi	17 997	3	3	0,05	<0,01	8
Pongola	12 108	6	8	0,18	<0,01	7
Malelane	19 708	3	3	0,06	<0,01	4
Big Bend*	124	–	–	0,04	<0,01	2

* Big Bend data refer to Experiment Station survey team results for three seasons, 1975/76 to 1977/78

Figure 1 shows the percentage of consignments with Eldana, on a monthly basis, for mills with resident teams, for the 1976/77 and 1977/78 seasons.

Table 3 shows the mean monthly maximum temperatures at a meteorological station at Amatikulu.

TABLE 3

Monthly mean maximum temperatures (°C) for Amatikulu

Month	1976	1977
January	30	31
February	30	30
March	30	29
April	27	29
May	25	27
June	25	26
July	25	25
August	23	25
September	27	27
October	26	27
November	28	28
December	31	31

Figure 2 shows the numbers of Eldana larvae per consignment for Amatikulu mill on a monthly basis from May 1976 to January 1978 (excluding March and April of 1977 when the mill was closed). Also given are the month degrees, using a threshold of 14°C, for the periods between larval peaks.

Discussion

Consignments of cane have been inspected by the resident mill teams for the past three years, but all the details given in Table 2 are available only for the 1977/78 season. This is because at the end of the 1976/77 season the system of inspection and recording was extensively revised and improved in a manner which has permitted computerisation of results.

For the mills which did not have resident teams, three seasons' results have been used in order to provide a larger sample and to account for some of the variation between seasons.

The results obtained from the mill yard surveys showed that two important changes took place between the 1976/77 and 1977/78 seasons. Most important was the dramatic increase in Eldana intensity at Amatikulu. The proportion of consignments with Eldana intercepted at Amatikulu is now more than twice that at any other mill.

Secondly, the spread of Eldana southwards in sugarcane in the industry was a serious development. At Darnall Mill Eldana now occurs at a low but consistent level in cane from south of the Tugela River.

Other changes include an improvement in the situation at Felixton where the intensity of Eldana is now at a very low level. At Empangeni mill there was also an improvement, but the situation there remains potentially serious. At Umfolozi and Malelane there has been no change, but at Pongola the situation has deteriorated.

It is interesting to note in Table 2 the difference in Eldana levels between mills. The best examples are Amatikulu mill with a very high level, and Felixton, 40 km away, with a low level. These differences are difficult to explain and are being investigated.

Two factors that have been reasonably well established are:

(i) the intensity of Eldana infestation increases with cane age

(ii) in the Amatikulu region the most heavily infested areas are about 11 km from the coast.

For a clearer understanding of the situation more work will have to be done.

The numbers of Eldana and Sesamia per consignment show clearly that Eldana is not a problem south of the Darnall mill area and that Sesamia is not widely prevalent north of the Gledhow mill area, except at Entumeni. (The fact that Entumeni mill is at a higher altitude may be relevant). Sesamia does occur in the northern areas but, north of the Empangeni mill area, it is at a very low intensity.

From the overall figures for Eldana and Sesamia per consignment, and from the proportion of stalks damaged, it can be seen that only at Amatikulu is there at present a severe problem. The data for borer intensities at Pongola and Empangeni indicate that these may also be classified as constituting a moderate problem, as could Umzimkulu due to the intensity of Sesamia.

The remaining mills have mild borer problems. Of these mills, it is those with a predominance of Sesamia that generally have the greatest numbers of borers and most damage. However, Eldana is the more serious pest to the industry because it has the ability to build up a high population intensity and cause serious losses. Sesamia is unable to do this because populations are controlled effectively by naturally occurring parasites. In South Africa no natural parasite has yet been reared from Eldana. Because they refer to mill survey results, the data in Figure 1 concern only mature cane delivered to the mill, but they may be assumed to reflect the situation for the mill area as a whole.

Darnall and Felixton mills have low levels of Eldana and there are no discernible patterns of variation. At Amatikulu and Empangeni Mills there is a clear pattern with two peaks of Eldana per season. The second peak is smaller than the first. The data for Umfolozi, Pongola, and Malelane mills all show signs of two peaks, but the second peak is not very clear. This may be associated with the shorter cutting cycle and higher temperatures in these mill areas.

The results of surveys conducted in cane fields show that any stage of the life cycle may be recorded at any time, but the two peaks of larval populations per season suggest that there is some synchronisation of generations. The two larval peaks at Amatikulu occur in June and November. It can be seen from Fig 2 that there are 59 degree months between the June 1976 and November 1976 peaks, 105 degree months between November 1976 and June 1977, and 62 degree months between June 1977 and November 1977. It would be reasonable to expect from these figures that there is another peak (or generation) between the November and June peaks. This would mean three generations of Eldana per year. Some overlap of generations obviously does occur.

Synchronization of the life cycle of Eldana populations appears to be caused by some consistent factors. Between the two seasons shown, the period of minimum larval intensity varied by only one week (16th - 29th September). Further results may confirm this, and if so this would help considerably in the timing of any insecticide applications which might be considered to be warranted. At this stage insecticide use is not recommended but, should it ever become policy, it would be essential to apply it at a time when the pest is predominantly in its most exposed and vulnerable stages, i.e. adults and young larvae.

Conclusion

During the 1977/78 season the Eldana situation deteriorated. This pest is now found in cane south of the Tugela River, and its intensity in the Amatikulu area is a serious problem. At the other mills in the industry, damage caused by Eldana or Sesamia is cause for concern but is not at present a very serious problem. Patterns in Eldana intensity indicate three generations per year with some synchronisation of generations. If this is confirmed it could be helpful in planning any chemical control which might be considered to be warranted.

REFERENCES

1. Carnegie, A. J. M. (1977). Current situation regarding the borer *Eldana saccharina* Walker (Lepidoptera : Pyralididae) SASTA Proc **51** : 24-26.

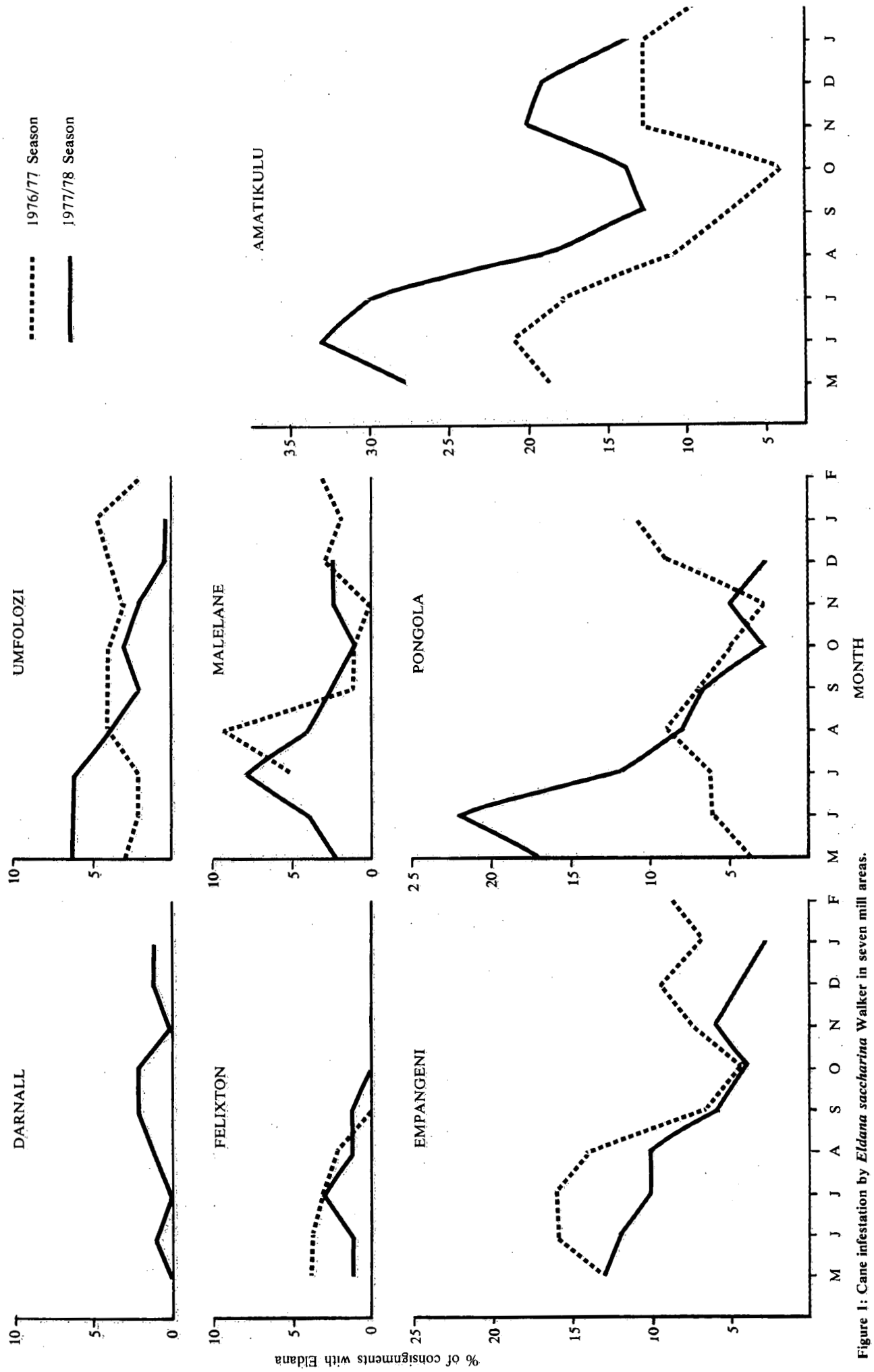

Figure 1: Cane infestation by *Eldana saccharina* Walker in seven mill areas.

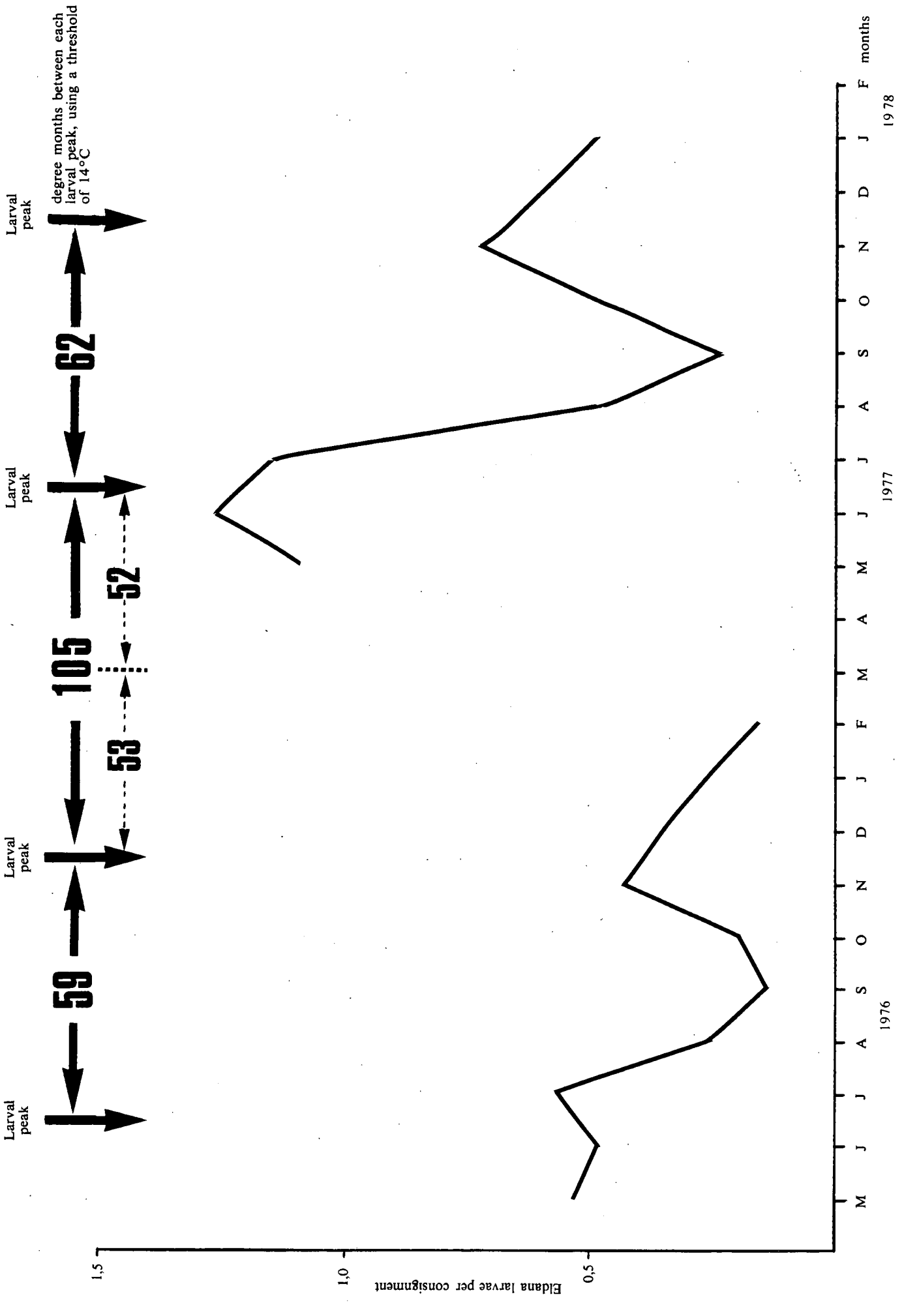

Figure 2: Intensity of *Eldana saccharina* Walker at Amatikulu mill showing degree – months between peaks.