TRENDS SHOWN BY LIGHT TRAP CATCHES OF SOME SUGARCANE PESTS

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Abstract

Seasonal trends in light trap catches for five pests of sugarcane, over the period 1983 to 1990, are presented. The species recorded were the noctuids *Sesamia calamistis* Hampson, *Mythimna* spp. and *Spodoptera exempta* (Walker) as well as the melolonthid *Schizonycha affinis* Boheman and other white grubs. The population trends of *S. calamistis* and *Mythimna* spp. showed two annual peaks: one during the winter months (March to August) and the other in spring (August to October). Conversely, the populations of *S. exempta* showed only one, late summer peak (January to March). For both *S. affinis* and the other white grubs, distinct peaks in numbers trapped occurred in the early summer months. Trends were evident also in the total annual catches of all species over the eight year period. These findings are discussed in relation to rainfall trends, agronomic practices and the location of the light traps.

Introduction

Since 1969, Robinson-type light traps have been used by the Experiment Station to record various cane pests. The trapping programme resulted from membership of the Southern African Light Trap Grid, whose co-operators recorded and exchanged information on various insect crop spoilers, particularly armyworm (*Spodoptera exempta* (Walker)). When the grid was disbanded the Experiment Station continued recording sugarcane pests in various parts of the industry. Records of the borer *Eldana saccharina* Walker, which had been trapped over a 10-year period, have been discussed (Carnegie and Leslie, 1990). This paper concerns other moth and beetle pests, the adult stages of which fly and are readily caught in light traps.

Methods

Seven Robinson-type traps (Robinson and Robinson, 1950) were distributed as shown in Figure 1. Six were in the immediate vicinity of sugarcane; one was remote, being on the edge of a forest which adjoined sedges and grasses fringing the fresh water lake, Nhlange. The traps, from north to south, were designated as follows: P = Pongola, EM = Empangeni, LS = lakeside vegetation, MT = Mtunzini, GN = Gingindlovu, SK = Shakaskraal, UM = Umlaas. Traps, which were activated by photoelectric switches, ran from dusk to sunrise. Each morning the catch was removed and stored for sorting.

The light source was a 200 W tungsten filament domestic-type globe, used because it trapped eldana moths more efficiently than did more sophisticated sources (Atkinson, 1980).

From each trap, monthly totals were summarized in two ways. For each species monthly averages, as well as annual totals over the eight-year period, were calculated. Most data were not transformed. However, because catches of scarab beetles were often small but occasionally very large, data were transformed using $\log_{10}(x + 1)$.

Results and Discussion

These will be considered separately for each species. The trends in catches are presented in Figure 2. For each species the monthly averages and annual totals of insects trapped over the period 1983 to 1990 are shown. For the scarab beetles, records were available only from 1985.

Also presented in Figure 2, are the monthly and annual trends in rainfall recorded from meteorological sites closest to the light trap.

1. *Sesamia calamistis Hampson (Lepidoptera: Noctuidae)*

Monthly trends

From all but one trap, two distinct peaks in moth numbers, similar to those found with eldana (Carnegie and Leslie, 1990) were recorded: one over the period March to May and one during September/October, i.e. in late summer and in spring. From the Gingindlovu trap, only one peak is clear.

In the lakeside trap the peaks were less distinct. Also, numbers trapped were generally smaller, probably because this trap was remote from sugarcane and sampled indigenous vegetation only. This was true also of eldana catches from similarly positioned traps (Carnegie and Leslie, 1990) but with eldana the peaks, similar to those noted in traps adjacent to sugarcane, were clearly evident.

Annual trends

With the exception of the Shakaskraal and Gingindlovu traps, highest numbers were recorded in 1986 or 1987. Otherwise, no consistent trend was evident.

In attempting to explain such trends, rainfall over the eight year period was examined (see Figure 2). Peaks in numbers trapped were frequently preceded by years of high rainfall. In many traps, moth numbers were relatively high in 1985 and/or 1986; high rainfall was recorded in 1984 and/or 1985. The large 1989 peak in numbers caught in the Gingindlovu trap was preceded by two years of high rainfall. Such trends suggest a correlation between the moth population and the rainfall pattern, but other factors also will influence the catches.

For example, in 1986, in the Shakaskraal area, there was a major campaign to harvest maximum amounts of cane, in the interests of eldana borer control, and to encourage annual harvesting. Consequently, much of the larval population may have been removed, resulting in fewer moths being trapped.

2. *Mythimna spp (Lepidoptera: Noctuidae)*

Mythimna phaea Hampson is considered to be the most important 'trash caterpillar'. It is the most common of several noctuids which defoliate young ratooning cane and can be plentiful where trashing is practised (Carnegie, 1977, Carnegie and Dick, 1972). Records from traps were predominantly *M. phaea*, but included closely related species.

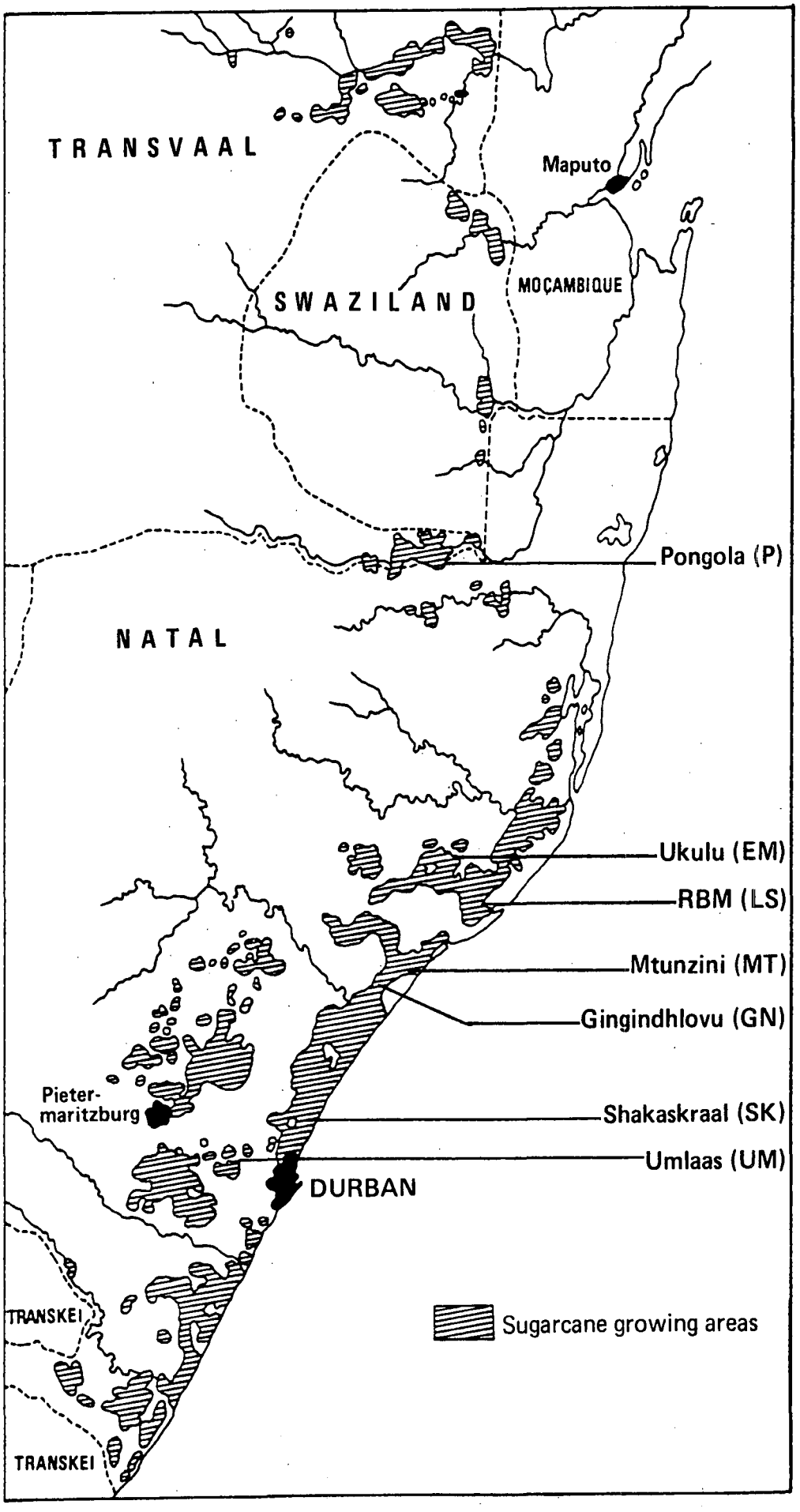

FIGURE 1: Location of six light traps

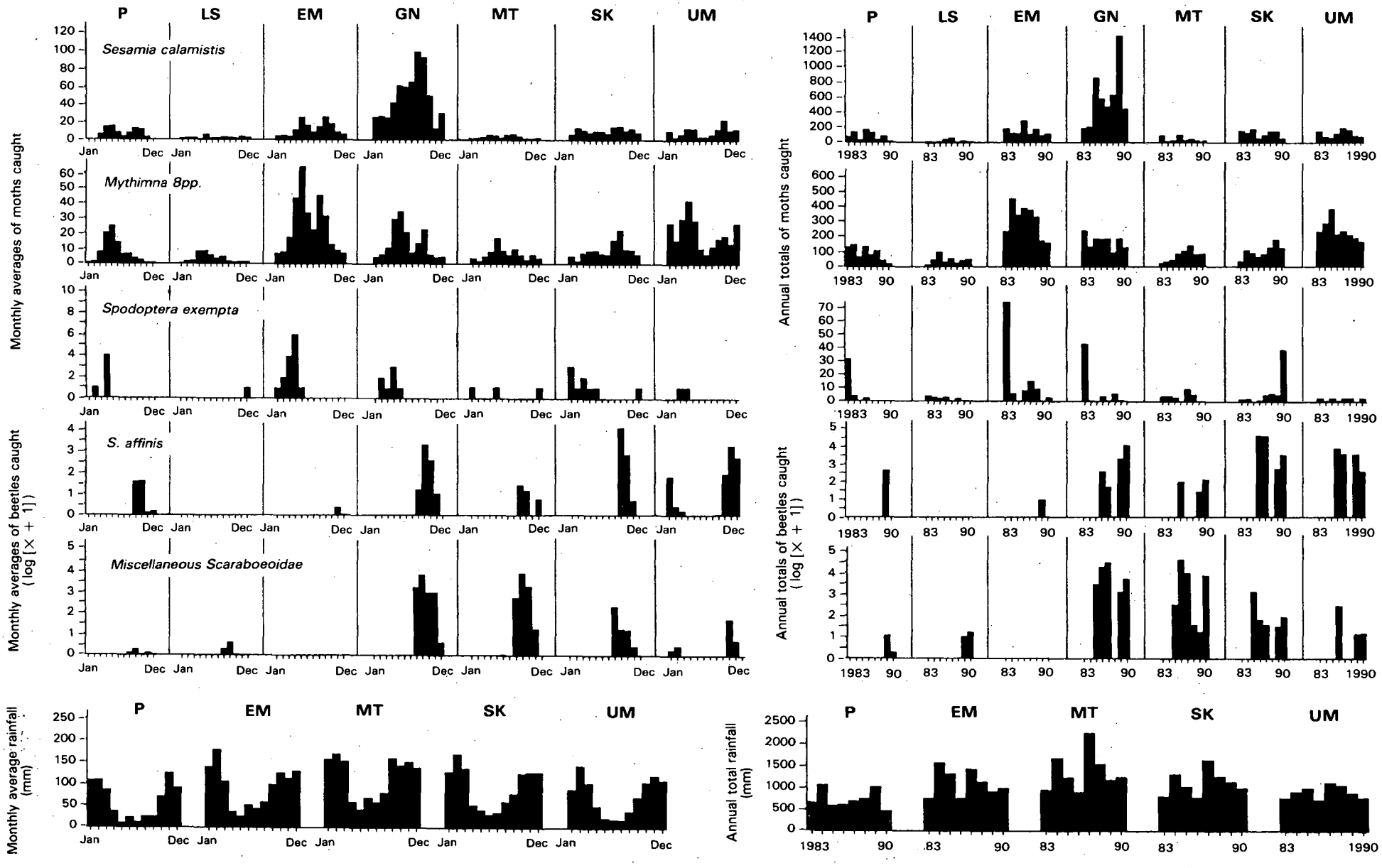

FIGURE 2: Monthly and annual trends in light trap catches of five sugarcane pests between 1983 and 1990. Included are monthly and annual rainfall records from nearest meterological stations.

Monthly trends

In most traps a peak in moth numbers was recorded in late summer (April/May) and again in the following spring (August to September). In all but one trap (Shakaskraal) the earlier peak was the greater. This confirms the light trap records of the 1970s (Carnegie, 1977). Such peaks relate to the two periods when damage by trash caterpillars can be expected: one in July, and one in October.

Although *Mythimna* spp. are indigenous noctuids, they thrive in young ratooning cane, and it is not surprising that the lakeside trap caught relatively few moths. They are pests only in fields where sugarcane is trashed at harvest (or sometimes where debris accumulates from wind-rowing or flooding). This may explain the large numbers recorded in the Empangeni trap, which is in an area where the crop is traditionally trashed at harvest. However, large numbers were also recorded at Umlaas, where burning is common. A possible explanation is that crops cultivated in this region (other than sugarcane) may have produced some of the moths recorded.

Annual trends

Since 1984, in all but the Mtunzini and Shakaskraal traps there has been a trend for numbers of moths trapped to decline. Possibly a change in field management practice is reflected. Since about 1984 there has been a trend to reduce the age at harvest of sugarcane. This might have reduced the quantities of trash in fields, which in turn could have influenced the populations of *Mythimna*. The trends in the Mtunzini and Shakaskraal traps are difficult to explain. However, in the Shakaskraal area, large sugarcane farms have recently changed hands, with a consequent increase in burning at harvest. This might explain the decrease in numbers recorded in 1990.

3. *Spodoptera exempta* (Walker) (Lepidoptera: Noctuidae)

This pest's effects on pastures and graminaceous crops can be disastrous, but in South Africa armyworm is not often a pest of sugarcane. However, severe damage to young plant cane and ratoons has been recorded (Carnegie, 1975). Influenced by climatic factors, the moths migrate extensively, and in many parts of Africa light traps have been used in attempts to forecast outbreaks (Brown, *et al.*, 1969).

Monthly trends

Numbers trapped were generally low, probably because the type of light source used was not an ideal attractant for this moth. Conspicuous peaks in numbers occurred, always towards the end of summer.

Annual trends

In the two northerly sugarcane traps, greatest numbers were caught in 1983, after which numbers declined. From 1983 to 1990 in the southerly traps, low numbers were trapped. An exception was Shakaskraal, where high numbers were recorded in 1990. With a migrant of this sort it is not easy to associate numbers with variations in local conditions.

4. *Schizonycha affinis* Boheman (Coleoptera: Melolonthidae)

This scarab beetle is an insect of wattle plantations, and feeds on wattle foliage, while the subterranean larva (a white grub) damages the roots. The insect does not attack sugarcane foliage, but the grubs can cause serious damage to the roots, and have been recognized as pests, especially where cane is grown adjacent to wattle (Carnegie, 1974). It is interesting that, although damage by this white grub to coastal cane is very rare, large numbers of beetles have on occasions been recorded in coastal light traps.

Monthly trends

Beetles were caught between September and December, a pattern similar to that recorded in the early 1970s (Carnegie, 1974). In the Umlaas (inland) trap, beetles were caught also from January to March. That trap was in a typical wattle area. Most peaks were recorded in late spring, when adults become plentiful on wattle foliage, mate, and oviposit in the soil, including that of adjacent cane fields. No beetles were recorded in the lakeside trap, which draws insects mainly from indigenous plant species.

Annual trends

The southerly traps caught beetles more frequently. There is no apparent reason why no beetles were trapped during 1988, whereas the following year large numbers were recorded in most traps.

5. Miscellaneous Scarabaeoidea

Several other local scarabs attack the subterranean parts of sugarcane (Carnegie, 1988). With the exception of the Umlaas trap, none of the traps discussed here was in an area where scarabs are commonly damaging. Therefore scarabs other than *S. affinis* were grouped together.

Monthly trends

In all traps scarabs were recorded from August to December (*S. affinis* was not recorded in August), and in the Umlaas trap there were records for January and February as well. The large numbers caught at Mtunzini cannot be explained. However, in recent years, white grub damage has been recorded at several places between Mtunzini and Tongaat in sufficient numbers to warrant insecticide trials. Although *S. affinis* was not recorded in the lakeside trap, various other scarabs were.

Annual trends

Again, no scarabs were caught in 1988, except at Mtunzini. Generally fewer scarabs were trapped in 1988 and 1989. This trend could be simply related to the rainfall pattern.

Conclusion

Light trapping has served as a useful and inexpensive means of monitoring certain insect crop spoilers. In some cases, records can be associated with climatic factors or agricultural practices.

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