

**BUREAU OF SUGAR EXPERIMENT STATIONS
QUEENSLAND, AUSTRALIA**

**An integrated pest management approach
for the control of sugarcane weevil borer,
Rhabdoscelus obscurus (Coleoptera: Curculionidae)**

by

¹S W Garrad, ²M N Sallam, and ³A C Oehlschlager

PR00005

¹Bureau of Sugar Experiment Stations, Meringa

²Bureau of Sugar Experiment Stations, Tully

³ChemTica International, San Jose, Costa Rica

SUMMARY

Treatments with Regent® alone and in combination with pheromone trapping of sugarcane weevil borers were assessed in field trials in the Mulgrave area. Results suggest that the combination of insecticidal treatment with pheromone trapping reduce the number of stalks infested as well as number of damaged internodes. Rat infestation, however, was an important factor influencing the degree of infestation and biased our results. Weevil borer control can only be efficiently achieved if an Integrated Pest Management approach is implemented taking into consideration other control options. More work is needed to investigate the usefulness of chemical treatment against weevil borers and the economic return following application.

1.0 INTRODUCTION

An improved strategy for the management of the sugar cane weevil borer (SCWB), *Rhabdoscelus obscurus* (Coleoptera: Curculionidae), was developed based on results from the 1999 trials (Sallam *et al.* 2000). Trials conducted in 1999 showed that, in four replicates out of five, pheromone treated plots had a higher percentage of infested stalks compared to control paddocks. On the other hand, there was a negative correlation between numbers of damaged internodes in the pheromone treated plots and the total number of trapped borers. This suggested that pheromone trapping can be effectively used as a part of an overall IPM strategy to control weevil borers in canefields, provided that a large area is treated in an area wide management scheme. Trials conducted this year aimed at evaluating the impact of insecticidal treatment with and without the aid of pheromone trapping. An integrated pest management scheme for the control of SCWB can be established by way of combining a number of management practices. In addition to the use of pheromone trapping and application of insecticides, other management strategies should also be considered. Rat management in canefields would be on top of the list of practices required to avoid subsequent damage by weevil borers. Tolerant varieties, trash management, weed management and general farm hygiene are all recommended practices that should be followed to minimise borer infestation. Planting late may also be an option to avoid severe wind damage during the cyclone season, which in turn encourages subsequent borer infestation.

2.0 OBJECTIVES

The aim of this work was to study the effect of insecticidal treatment, alone or in combination with pheromone trapping, on the extent of weevil borer infestation in canefields of far north Queensland.

3.0 METHODOLOGY

Five blocks were chosen in the Mulgrave area to conduct the trial, these were the properties of Bill Thomas, John Rossi, John Ferrando, Andrew Greenwood and Adrian Woods. Each block was divided into three 1-hectare plots, with a buffer zone of about 40 metres between plots. The first plot was left untreated and did not receive any pheromone or insecticidal treatment until harvest time. In the second plot, Regent®, which is the only registered insecticide for the control of weevil borers in cane, was applied to cane at the recommended rate of 5.7 ml/100 m. The first Regent® application took place in late December 1999, and then another application was conducted in late February 2000. Regent® was applied to 16 bands within the one-hectare plot. Bands were 12 metres long and were separated each by 20-metre long untreated areas, with 16 rows of cane in between treated rows (fig. 1). Same layout as in plot 2 was repeated in plot 3, with one pheromone trap laid in the middle of each band (fig. 1). Pheromone traps were laid in the field on the same day of the first Regent® application. Trap design was the same as in 1999 (see Sallam *et al.* 2000), but the plastic bag inside the trap was coated with a contact insecticide (pyrethrin) instead of filling it with water.

Just prior to harvest, a number of 175 stalks/plot were sampled from each treatment. Where the plot area was less than a hectare, which was the case in plot 3, only 150 stalks were sampled. Stalks were split all the way down to the base to check for damage and the number of damaged internodes was recorded for each sampled stalk.

3.1 Data analysis

General linear model procedure was conducted to compare numbers of damaged stalks in the different plots under different treatments. Multiple regression analysis was conducted to compare the impact of two independent variables (treatments vs rat infestation) on the percentage of damaged stalks.

4.0 RESULTS AND DISCUSSION

Figure 2 (a) shows the percentage of bored stalks in the four plots under the different treatments. Results were only obtained from four plots as cane in the property of Adrian Woods was harvested without prior notification. In three replicates out of four, plots treated with Regent® + pheromone had significantly less borer infestation compared to untreated plots (plot 1 ($F = 26.41$; $df = 3,446$; $P = 0.0001$), plot 2 ($F = 5.20$; $df = 3,521$; $P = 0.0015$), plot 4 ($F = 9.92$; $df = 3,521$; $P = 0.0001$)). Percentage of damaged internodes in the different plots showed the same pattern as with the percentage of infested stalks (fig. 2, b). Plot 3, however, had more damaged stalks and damaged internodes in blocks treated either with Regent® alone or with Regent® + pheromone compared to the control block ($F = 33.72$; $df = 3,486$; $P = 0.0001$). This was mainly due to high rat infestation in the treated blocks. Multiple regression analysis showed that borer infestation was more influenced by the extent of rat damage rather

than any of the treatments ($F = 143.35$; $df = 3, 1986$; $P = 0.0001$) (fig. 2, c). The inconsistency in results was primarily due to the impact of infestation by rats, therefore it was difficult to investigate the actual effect of Regent® alone or in combination with pheromone lures due to the interference from rat infestation.

Similarly to last year, borer infestation was mostly concentrated in the basal internodes of the canestalk (fig. 3). Again, cane in plot 3 experienced less damage in the lower internodes, which suggests that infestation in that plot had started later than the other plots under study. This may explain the lack of effect of insecticide or pheromone treatment that had been conducted fairly early in the season, which was apparently before borer infestation took place in that particular plot. Moreover, a good proportion of the untreated area in that plot belonged to younger cane that skipped a harvesting round. This clearly helped cane skip severe wind damage, which affected older cane in that area due to cyclone Steve (27/2/2000). This is again a strong evidence, as demonstrated last season, that wind damage creates favourable conditions for borer infestation.

5.0 CONCLUSION

The combined effect of pheromone trapping and insecticidal application proved to minimise damage caused by weevil borers in cane. However, results also showed that rat infestation and wind damage, are important factors encouraging infestation. On the other hand, weevil borer damage can be significantly reduced by means of implementing an integrated pest management system that takes into consideration other recommended farming practices (see Telford 1999). More work is required to investigate the cost-effectiveness of combining the two control methods and if it is economically acceptable to implement both methods in canefields. In addition, there is need to establish an economic injury level regarding weevil borer infestation of different cane varieties. That is, a critical pest density at which a control method is required, or at which the benefit gained if the crop is treated exceeds the cost of treatment. A correct decision whether to apply or not apply chemical control will benefit growers. By using a feasible monitoring method such as split-cane or pheromone traps, growers should be able to decide when the best time is for a chemical treatment, and if treatment will provide an economic benefit at the end of the season.

6.0 ACKNOWLEDGMENTS

The authors wish to acknowledge the input of Keith Chandler, Peter Allsopp and Peter Samson in planning this work based on the earlier trials of weevil borer pheromones.

The establishment and sampling of these trials at harvest was possible with efforts from Terry Hillard, John Erbacher and Gerard Puglisi. Assistance from the Mulgrave canegrowers where the trials took place is also highly appreciated.

7.0 REFERENCE

Sallam M N, Garrad S W and Oehlschlager A C (2000). The use of aggregation pheromones for the management of weevil borers in canefields. *BSES Project Report PR00001*: 1- 11.

Telford D E (1999). Sugarcane weevil borer. Summary of activities 1993 – 1997. *BSES Project Report TE99001*: 1- 23.

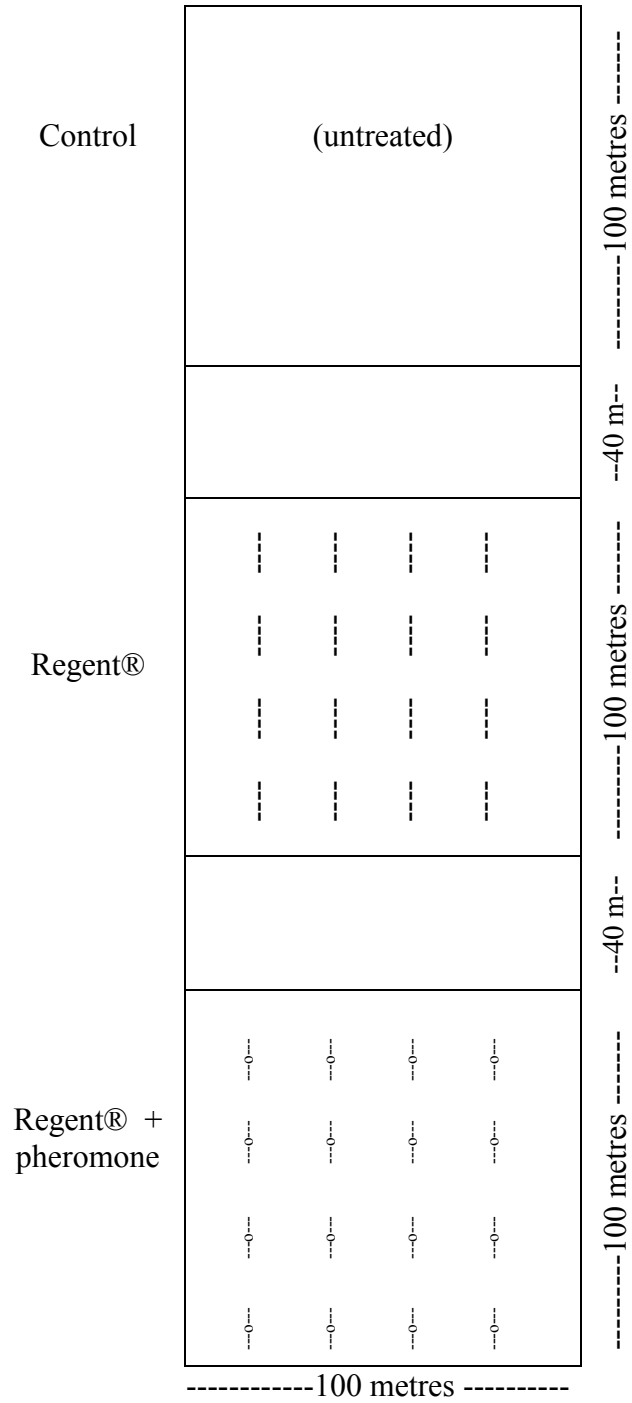
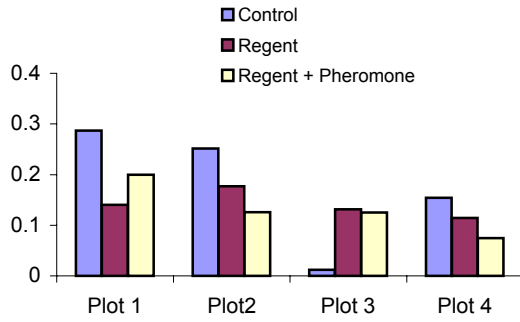
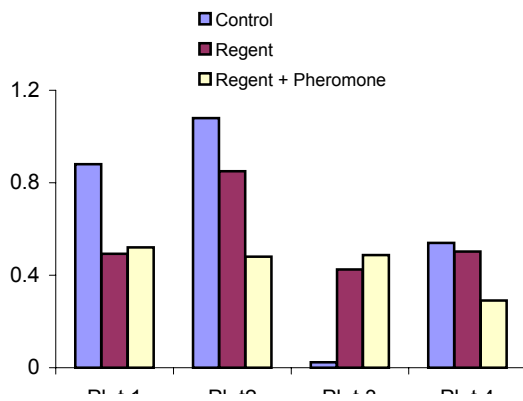


Fig. 1. Experimental layout. Broken lines show where Regent® was applied. Circles indicate location of pheromone traps.

a



b



c

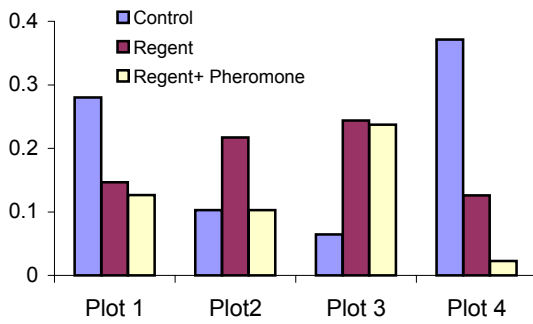


Fig. 2.

a) Percentage of infested stalks/hectare.

b) Percentage of damaged internodes/stalk.

c) Percentage of rat damage/hectare.

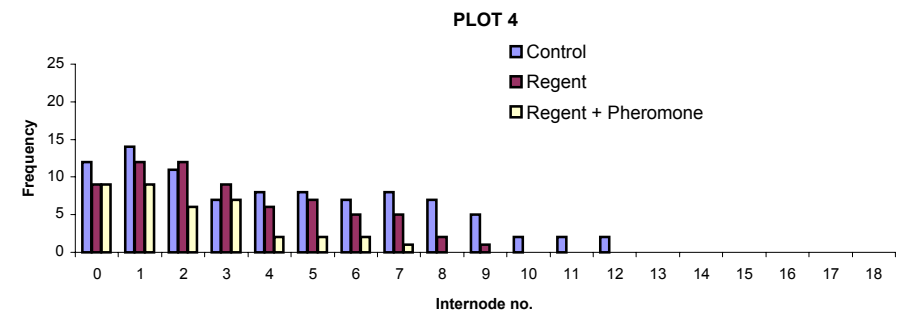
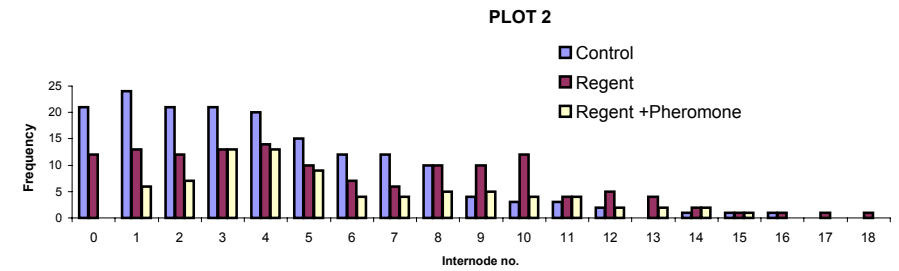
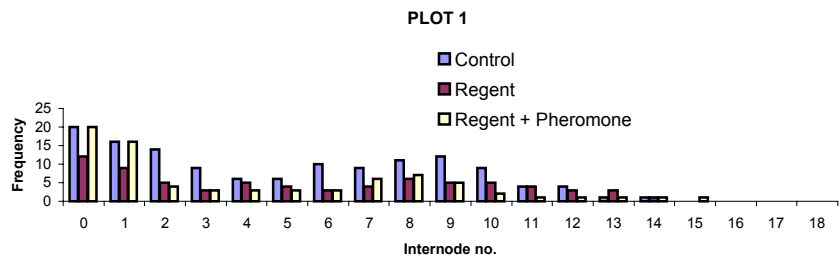


Fig. 3. Frequency of damaged internodes in plots 1, 2, 3 and 4.