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Incidence and Severity of Cashew Pest (*Helopeltis antonii* Sign.) Damage and the Effect of Flushing Stage on Severity During Fruiting Season

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ABSTRACT. *The incidence and severity of cashew pest (Helopeltis antonii Sign.) damage and the effect of flushing stage on these were studied during a fruiting season. The linear logistic model gave the best fit for the progress of the damage (G^2 =2.38, P=0.6662). The Kendall's correlation coefficients for severity against time and severity against flushing stage were 0.46 (P<0.0001) and 0.42 (P<0.0001) respectively. The significant correlation of severity against time indicates that the severity of the damage has progressed steadily through the season. The significant correlation of severity against flushing stage indicates the fact that progress of the severity corresponds to the progress of the flushes.*

INTRODUCTION

The cashew pest *Helopeltis antonii* Sign. (Heteroptera: Miridae) is a serious pest of cashew in all cashew-growing areas of Sri Lanka causing around 30% loss (Dept. of Census and Statistics and Sri Lanka Cashew Corporation, 1996). It feeds on tender succulent shoots, inflorescences, immature nuts and apples resulting in drying of shoots, blighting of inflorescences and immature nut fall. *Helopeltis* population begins to develop after the emergence of new flushes of the trees with the onset of monsoon rain from December to February and least abundant from March to May (Jeewaratnam and Rajapakse, 1981).

Biology of *H. antonii* has been studied by many authors (Pillai and Abraham 1974; Pillai *et al.*, 1976; Sathiamma, 1977; Ambika and Abraham 1979; Jeevaratnam and Rajapakse, 1981 and Sathiamma, 1984). However, the information on the pest and its damage in Sri Lanka is yet inadequate. With this background, this research was carried out to study the incidence and severity of *H. antonii damage* and the effects of flushing stage on these two aspects.

MATERIALS AND METHODS

The study was carried out at fields of Kamandaluwa plantation of Cashew Research Centre belonging to the Sri Lanka Cashew Corporation, Andigama, during November 2000 to April 2003. The incidence and severity of damage by *H. antonii* was studied in a field consisting five-year-old cashew plants. There were a total of 450 bud-grafted plants in the block, established from 4 different mother trees.

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Susceptibility for the cashew pest had not been a selection criterion for the 4 mother trees. Also, there were no records of pesticide application in the selected block during the 5-year period. From these 450 trees, twenty-five trees were randomly selected at weekly intervals for 7 consecutive weeks. At each time point selected trees were closely observed and from each tree, incidence, severity and flushing stage measured by number of flushes were recorded.

The incidence was recorded on the basis of presence and absence of the damage on each tree. Since the incidence form a binary outcome, it was analyzed by fitting linear logistic model (McCullagh and Nelder, 1989). The severity (Number of flushes damaged) and number of flushes were recorded by means of scores. The reason for adopting a scoring method is that counting of exact number of flushes damaged as well as the number of flushes is not practicable. Therefore non-parametric methods (Siegel and Castellan, 1988) were used in the analysis.

RESULTS AND DISCUSSION

Incidence

The best fitting model for the data was

$$\log\left(\frac{\hat{p}_i}{1-\hat{p}_i}\right) = -1.86 + 0.80\, t_i \text{ -----(1)}$$

$G^2 = 2.38$ ($P = 0.6662$). The observed incidence along with the fitted incidence is given in fig. 1. From the fitted model the incidence (p_i) for any given time point (t_i) can be estimated using the equation

$$\hat{p}_i = \frac{e^{1.86 + 0.80\, t_i}}{1 + e^{1.86 + 0.80\, t_i}} \text{ -------(2)}$$

Using equation (2), it can be estimated that by 2.33 weeks 50% of trees are damaged. Also by 6th week almost all trees are damaged.

Severity

Kendall's correlation coefficient for the severity against time was 0.46 ($P <$ 0.0001). The severity scores of individual tree were used in the analysis (Number of observation 150). Small P value indicates correlation between severity and time. The positive correlation coefficient can be interpreted as a gradual increase in the damage through the season.

Effects of flushes on severity

The Kendall's correlation coefficient for severity against number of flushes was 0.42 ($P<0.0001$). The severity scores and number of flushes of individual tree were used in the analysis (Number of observations 150). The small P value indicates correlation between severity and number of flushes. The positive correlation oefficient can be interpreted as a gradual increase in the severity of the damage with the increase of number of flushes.

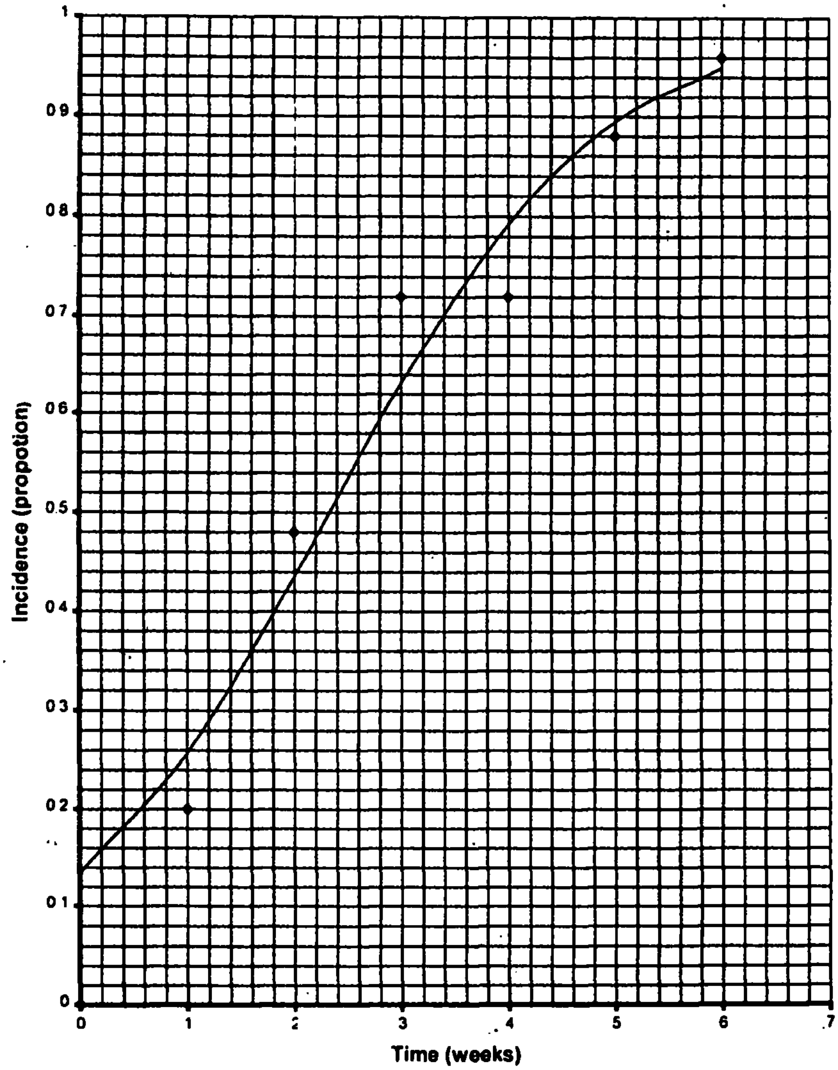

Fig. 1. **Progress of the *Helopeltis* damage during the fruiting season (in proportion)**

◆ Observed incidence — Predicted incidence (in proportion)

CONCLUSIONS

The linear logistic model of the form given, provided the best fit and thus the damage incidence can be predicted by using the fitted model at any time point. The severity has gradually increased through the season. This could mostly be due to the increase of the flushes through the season.

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