SAMPLING METHODS FOR DAMAGE ASSESSMENT OF *PIESMOPODA OBLIQUIFASCIELLA* (HAMPS) ON *CASSIA FISTULA* L.

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ABSTRACT

Piesmopoda obliquifasciella (Hamps) has been recorded damaging *Cassia fistula* severely at Peshawar. A survey was carried out to determine the number of samples per tree for accurate and precise damage assessment. A maximum of 39.06 $\pm$ 6.10 and minimum of 25.88 $\pm$ 2.58 percent damage was recorded at 2-3.5 and 4-5 metres tree height, respectively. On western, eastern, and northern side of crown, difference in damage at the two tree heights was significant ($P<0.05$), while it was insignificant on southern side. Similarly, the overall damage on the four directions differed significantly. The highest (36.49%) and the lowest (31.88%) overall damage was recorded on western followed by eastern (34.96%,31.81%), southern (30.93%, 29.67%) and northern (30.29%, 28.95%) sides.

Key words:
Sampling methods, Assessment, Damage, *Piesmopoda obliquifasciella*, *Cassia fistula*

INTRODUCTION

Cassia fistula L. (amaltas) is a multipurpose tree species, being used for the manufacturing agricultural tools, furniture, building houses and synthesizing medicines (Troup, 1909; Nadkarni, 1954; Baquar, 1989). In addition to be a beautiful avenue tree with yellow inflorescence in summer, bark and wood extracts of *C.fistula* have insect growth regulating capabilities (Jaipal et al., 1983). Unfortunately such a valuable tree is attacked heavily by an insect pest named *Piesmopoda obliquifasciella*, (Lepidoptera, Pyralidae). The larvae stitch the leaves together and feed within them.

In case of severe infestation, only leaf skeletons are left behind which results in low photosynthetic activities alongwith bad appearance. Khawaja et al. (1983) and Shah (1990) have reported more than 50% and 50-70% foliar damages, respectively. Similarly Kazi (1992) has recorded an average damage of 44.8% and also found the maximum loss in the middle followed by bottom and top portion of trees.

Population density and extent of damage are the pre-requisite information for successful pest management (Ruesink and Kogan, 1994). The pest population density is subjected considerably to physical factors, like temperature, relative humidity, wind and sunshine (Chaudhry and Bajwa, 1993). These factors, may also play a role in damage variation. However, the damage is an additive attribute that correspond to pest density in successive generations. Sometimes, this variation in damage leads towards erroneous assessment of damage. The false estimates of damage are usually due to inappropriate sampling methodology. Keeping the above mentioned facts in view, the present study was undertaken to determine the number and place of samples in the crown for getting true picture of damage of *P.obliquifasciella* on *C.fistula*.

MATERIALS AND METHODS

In April, 1995 a survey was conducted at the Pakistan Forest Institute, Peshawar campus, to assess the foliar damage of *P.obliquifasciella* on *C.fistula*. Keeping in view the exposure of trees to climatic factors, three sites about 800-1000m apart were selected. The sites were: linear plantation around Botanical garden (I), residential area (III) and road side plantation (II).

Twelve trees at each site were taken alternatively and a 2-2.5 cm thick branch was selected as a sampling unit. These samples were collected from two levels in the crown viz; 2.5 to

3.0 m and 4.0 to 5.0 m height of the tree. Eight samples were collected from each tree with two samples each from northern, southern, eastern and western side of the tree. Both healthy and damaged leaves per sample were counted and the percent infestation was calculated. Data were analyzed statistically, using Student's t-Test, Analysis of Variance and Least Significant Difference Test.

RESULTS

The damage recorded at three sites is presented in Table 1. Maximum (39.06% ± 6.10) and minimum (25.88% ± 2.58) damage was recorded on site III and II on West at bottom and top, respectively. Similarly, respective maximum and minimum percent damage of 36.59 ± 4.06, 31.02 ± 5.13; 36.55 ± 4.76, 26.44 ± 5.11 and 32.98 ± 3.91, 28.65 ± 5.06 was recorded at 2.5-3m and 4.5m heights at sites II, III; II, I and II, I. on east, north and south. The results showed that on all directions damage was higher at bottom than at top irrespective of survey sites.

Table 1. Mean percent damage caused by *P.obliquifasciella* to *C.fistula*.

Directions	Positions	Sites		
		I	II	III
West	Bottom	38.29 ±5.79*	37.87 ±8.00*	39.06 ±6.10*
	Top	32.43 ±3.77	25.88 ±2.58	33.91 ±3.42
East	Bottom	33.46 ±4.43*	36.59 ±4.06*	32.59 ±7.03ns
	Top	31.29 ±3.31	32.98 ±3.91	31.02 ±5.13
North	Bottom	32.13 ±4.60*	36.55 ±4.76*	31.5β ±3.74*
	Top	26.44 ±5.11	29.84 ±3.24	28.98 ±3.79
South	Bottom	30.68 ±4.38ns	32.98 ±3.77ns	32.32 ±4.60ns
	Top	28.65 ±5.06	30.56 ±5.16	29.53 ±3.18

* - significant at 5% level, n.s.- non significant

The damage was statistically significantly higher ($P<0.05$) at the bottom on western and northern side than that at the top on three survey sites. Likewise, pattern of damage change was the same on eastern side but with non-significant difference on site III. On southern side there was no significant difference in damage between two considerative tree heights on observed sites (Table 1). The survey sites were also compared among themselves and found non significantly different ($P>0.05$; Ft 3.275 > Fc 0.475, one way ANOVA).

Apart from comparison between two tree heights, effect of directions was also measured, for this purpose overall damage was worked out after adding up both bottom and top damages. The damages so obtained are given in Table 2.

Table 2. Multiple comparison of mean percent damage caused by *P.obliquifasciella* on *C.fistula*

Directions	Sites		
	I	II	III
Western	35.36 a*	31.88ns	36.49 a*
Eastern	32.39 ab	34.96	31.81 b
Southern	29.67 b	32.26	30.93 b
Northern	28.95 b	33.26	30.29 b

* significant at 5% level, n.s.- non significant

Figures in the same column having same letter are non significant. The directional impact on overall damage was significant on Site I and III, while it was non significant on site II. In case of individual comparison on site I non-significant differences were observed between western and eastern; eastern, southern and northern sides of trees ($P< 0.05$). Likewise, on site III damage on western side of the tree was significantly higher than that on the eastern, southern and northern side while the latter three were non significant among themselves.

DISCUSSION

Results indicate that *P.obliquifasciella* (Hamps) is a serious pest of *C.fistula* causing 29-36% damages in April. Maximum pest population exists in November-December when damage is at peak (Kazi, 1992; Chaudhry and Bajwa, 1993). However, the ratio of percent damage decreases after winter on account of more fall of damaged than healthy leaves due to wind and frost.

The highest damage (39.06% ± 6.10) at the bottom is significantly higher than that at top (25.88% ± 2.58). This indicates the adaptive behaviour of the pest to withstand adverse climatic factors, such as wind and sunshine. Chaudhry and Bajwa (1993) have found that temperature, relative humidity, wind and sunshine have significant impact on population dynamics of *P. obliquifasciella*. Temperature correlates positively, while wind, relative humidity and sunshine correlate negatively to its population. Only the wind caused 26.44% out of 37.034% fluctuation in population. Therefore, to avoid wind disturbance the pest may preferably feed on low level (2.5-3m), which is a possible reason of higher damage at bottom than top. The Observatory wind data showed that wind blows throughout the year in the array of North-East > North > East > North-West > South > West > South-West. This wind pattern also supports findings of the study.

The second reason may be a little bit more addition of new leaves at top than at bottom. However, this factor is nullified by the fact that the pest passes through more than 6 generations per year with maximum population in November-December. Henceforth no more new leaves are sprouted till next growing season (June-July). Therefore this factor has little to do with damage variation with the increase of tree height and change of direction.

The overall damage on West is higher than East, North and South. This damage difference may be attributed to pest behaviour in response to wind and sunshine in combination. The West side is less exposed to sun and wind, therefore bear more pest population and consequently more damage.

CONCLUSION

From these results it can be concluded that to make accurate and precise estimates of population density , as well as damage, at least 5 samples per tree should be taken: two from West (bottom and top), one from South, two from East and/or North (bottom and top).

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