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EVALUATION OF LOSSES CAUSED BY RED PUMPKIN BEETLE IN MAJOR CUCURBITACEOUS VEGETABLES IN SOUTH EAST RAJASTHAN

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ABSTRACT

A field experiment was conducted during 2007 to evaluate the losses caused by red pumpkin in beetle, *Raphidopalpa foveicollis* (Lucas) on major cucurbitaceous crops. The insect caused heavy loss to summer, squash, pumpkin and ridge gourd leaves whereas it did not prefer bitter gourd. The insect pest also caused heavy loss to flowers of pumpkin crop while others were free from infestation. In summer squash the mean reduction in leaf damage over unprotected plants during first, second and third month was 26.89, 32.44 and 32.22 per cent respectively, whereas in pumpkin it was 40.47, 30.01 and 29.48 per cent. The reduction in beetle infestation in pumpkin flower was 37.60 and 52.66 per cent during second and third month respectively. The mean reduction in leaf damage over unprotected plants in ridge gourd was 26.11, 31.57 and 31.85 per cent respectively.

Key words: Red pumpkin beetle, *Raphidopalpa foveicollis*, loss, cucurbitaceous vegetables

Cucurbits are an important group of vegetable crops in India and are very good source of minearls and water, which are easily supplied to the body preferably in the summer season when they are in more need. In Rajasthan, ridge gourd and bottle gourd are cultivated in 1151 and 2248 ha, respectively with annual production of 2769 and 8288 tonnes, while cucumber is grown in 3233 ha area with a production of 12273 tonnes (Anonymous, 2002-03). The productivity per unit area of these crops is low as compared to their inbuilt potential; hence, the production can be increased by minimizing the damage caused by insect pests. Red pumpkin beetle, *Raphidopalpa foveicollis* has been observed as a major constraint for successful cultivation of these crops in Rajasthan (Kavadia *et al.,* 1975).

The losses caused by the red pumpkin beetle in cucurbits are not fairly studied. Hence, it was felt important to evaluate the losses in summer squash, pumpkin, bitter gourd and ridge gourd.

MATERIALS AND METHODS

The present investigation was carried out at the Horticulture Farm of Rajasthan College of Agriculture, Udaipur during *Zaid* 2007. Udaipur is located at 23.4°N longitude and 75°E latitude at an elevation of 579.5 MSL in the state of Rajasthan. The maximum and minimum temperature during *Zaid* season is 40.6°C and 15.0°C respectively with an average temperature of 29.8°C. Besides, the maximum, minimum and average relative humidity during the season was 54, 10 and 24.9 per cent respectively.

The crops were grown on one meter wide raised beds with bed to bed distance of three meters. The seeds were sown at about 2 cm depth and 60 cm apart on both the edges of the bed. All agronomic practices were followed as per recommendations given in package of practices for raising a good and healthy crop. The losses caused by red pumpkin beetle in major cucurbitaceous crops were quantified through the damaged leaves and flowers. The typical damaged leaf by the red pumpkin beetle had peculiar irregular holes. The damaged flowers were visually observed. The damaged leaves and flowers were counted from five plants in each plot. The damaged leaves were counted from 1 month, 2 month and 3 month old plants. For evaluation of damage caused by red pumpkin beetle, the experiment was conducted as per the method suggested by Leclerg (1971). There were four replications in both protected and unprotected treatments. Five plants from each replication were selected and thus there were 20 plants in each treatment. One set of 20 plants was kept protected with application of endosulfan @ 0.07 per cent at fortnightly intervals from germination up to 3 months old crop. Other set of 20 plants was exposed to natural infestation of red pumpkin beetle. Careful observations were made to distinguish the infestation of red pumpkin beetle from other foliage feeding insects, if any. The data obtained from 20 plants, each from protected and unprotected treatments were considered for further statistical analysis.

The per cent leaf damage and flower damage was calculated by comparing the leaf damage from protected and unprotected plants using the standard formula. The data were analyzed statistically and significance was tested by using 't' test.

$$sd = \sqrt{\frac{1}{n-1}\left\{\Sigma d^2 - \frac{(\Sigma d)^2}{n}\right\}}$$

$$t_{(n-1)} = \frac{|\bar{d}|}{sd/\sqrt{n}}$$ Where

x_1 = Observations in treated plants

x_2 = Observations in untreated plants

sd = Standard error of mean difference

n = number of paired differences

$d = x_1 - x_2$

$\bar{d} = \frac{\Sigma d}{n}$

The following formula was used to calculate the per cent leaf damage in protected and unprotected plants.

$$\text{Leaf damage (\%)} = \frac{\text{Total number of leaf / plant} - \text{Total number of healthy leaf / plant}}{\text{Total number of leaf / plant}} \times 100$$

RESULTS AND DISCUSSION

The data recorded on per cent leaf damage in protected and unprotected plant are presented in Table-1.

(i) Summer squash : It is apparent from the table that infestation of red pumpkin beetle in summer squash increased continuously from first month to third month in protected and unprotected plants. Leaf damage in protected plants was 13.66, 16.04 and 18.29 compared to 28.08, 35.16 and 39.36 per cent in unprotected plants in first, second and third month respectively. The reduction in leaf damage in protected plants was 26.89, 32.44 and 32.22 per cent during first, second and third month of observation respectively.

(ii) Pumpkin : The infestation of red pumpkin beetle was recorded both on leaves and flowers, hence, data recorded have been presented separately.

a) Leaves : It is evident from the table that mean per cent leaf damage in protected plants during first, second and third month was 13.23, 23.37 and 26.38 per cent respectively which was significantly lower than 33.49, 47.17 and 51.90 per cent in unprotected plants. It is also clear from the data that reduction in per cent leaf damage in protected plants over unprotected plants was reduced from 70.47 per cent during first month to 30.01 and 29.48 per cent in second and third month respectively.

b) Flowers : The infestation of red pumpkin beetle on flowers was recorded from 2nd month onwards. The flower damage during second and third month was 13.06 and 13.16 per cent respectively, which was significantly lower to 31.69 and 41.11 per cent in unprotected plants. The reduction in flower damage in protected plants was 37.60 and 52.66 per cent during experimental period.

Table 1: Infestation of red pumpkin beetle in protected and unprotected plants of cucurbitaceous crops, 2007

S. No.	Name of crop	Observation months	Mean leaf damage (%)		Difference		Reduction in leaf damage over unprotected Plants (%)
			Protected	Unprotected	d**	d^2	
1.	Summer squash	First month	13.66 (21.69)	28.08 (32.00)	10.30	124.34	26.89 (31.24)
		Second month	16.04 (23.61)	35.16 (36.37)	12.77	173.27	32.44 (34.72)
		Third month	18.29 (25.32)	39.36 (38.86)	13.55	192.91	32.22 (34.59)
2.	Pumpkin leaves	First month	13.23 (21.33)	33.49 (35.36)	14.02	204.49	40.47 (39.51)
		Second month	23.37 (28.91)	47.17 (43.38)	14.47	219.41	30.01 (33.22)
		Third month	26.38 (30.91)	51.90 (46.09)	15.17	233.36	29.48 (32.89)
	Pumpkin flowers	Second month	13.06 (21.15)	31.69 (34.26)	13.11	183.52	37.60 (37.82)
		Third month	13.16 (21.27)	41.11 (39.88)	18.60	352.37	52.66 (46.53)
3.	Ridge gourd	First month	12.43 (20.65)	25.18 (30.12)	9.47	99.74	26.11 (30.73)
		Second month	17.27 (24.56)	37.16 (37.56)	13.00	183.15	31.57 (34.19)
		Third month	18.39 (25.40)	39.36 (38.86)	13.45	189.74	31.85 (34.35)
4.	Bitter gourd	First month					
		Second month					
		Third month					

Figures in parenthesis are sine transformation
d** (difference) = unprotected – protected

(iii) Ridge gourd: It is apparent from the table-1 that infestation of red pumpkin beetle in ridge gourd also increased continuously from first month to third month in protected and unprotected plants. Leaf damage in protected plants was significantly lesser than unprotected plants. Mean per cent leaf damage in protected plants was 12.43, 17.27 and 18.39 compared to 25.18, 37.16 and 39.36 in unprotected plants during first, second and third month respectively. The reduction in leaf damage in protected plants over unprotected plants was 26.11, 31.57 and 31.85 per cent in first, second and third month of observation respectively.

(iv) Bitter gourd : In the present investigation no incidence of red pumpkin beetle was recorded on bitter gourd.

The present investigation clearly shows that red pumpkin beetle caused heavy loss to summer squash, pumpkin and ridge gourd leaves. The bitter gourd was not preferred as natural host by red pumpkin beetle; hence, there was no loss in the crop. The beetle also caused heavy loss to pumpkin flowers whereas flowers of summer squash, ridge gourd and bitter gourd remained free from infestation.

Various workers reported the similar results on losses caused by red pumpkin beetle in different cucurbits. Sharma *et al.* (1999) reported 15.32 per cent damage on musk melon while bitter gourd was free from insect damage. The present findings are also in close resemblance with Singh *et al.* (2000) who observed maximum leaf damage (58.68%) on musk melon and minimum (6.00%) on bitter gourd, whereas it was 46.59, 45.99, 43.73, 42.70 and 40.29 per cent in water melon, round gourd, bottle gourd, cucumber and pumpkin respectively. Das and Ishaque (1998) reported 3 to 20 per cent damage of *R. foveicollis* in different cucurbits.

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