

## RELATIVE ABUNDANCE OF THE RED PUMPKIN BEETLE, *AULACOPHORA FOVEICOPHORA* LUCAS, ON DIFFERENT CUCURBITACEOUS VEGETABLES

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### ABSTRACT

Studies on the relative abundance of Red Pumpkin Beetle, *Aulacophora foveicollis* L. on different cucurbitaceous vegetables were carried out from the first week of May, 1998 upto the second week of August, 1998 in the Peshawar valley. Out of eleven varieties, Squash and Cucumber varieties hosted more population of Red Pumpkin Beetle during the cropping season. Two Cucumber (*Cucumis sativus*) varieties, F<sub>1</sub>-Beitalpha, SK-Marketmore and two Squash (*Cucurbita pepo*) varieties, Light Green Zucchini, Local Round Green were found susceptible to the attack of the Red Pumpkin Beetle and supported 8.48, 8.20, 8.52 and 7.29 mean number of Red Pumpkin Beetle respectively. Two Sponge Gourd (*Luffa scutannils*) varieties, RKS-6, RKS-7 and three Gourd (*Lagenaria siceraria*) varieties, DIK Round Green, SW Sweet Yellow and Bottle Gourd Long varieties were found moderately susceptible to the attack of the Red Pumpkin Beetle, on which 4.00, 4.50, 3.54, 5.47 and 3.56, average number of Red Pumpkin Beetle were recorded respectively. 0.12 and 1.02 mean number of Red pumpkin Beetle were found on two Bitter Gourd (*Momordica charantia*) varieties Jaunpuri, Jhalri respectively and found comparatively more resistant to the Red Pumpkin Beetle. The infestation of Red Pumpkin Beetle was high from May 7 to June 18, 1998, while from June 25 to August 13, 1998, the population gradually declined.

### INTRODUCTION

The Cucurbits; Cucumber (*Cucumis sativus*), Muskmelon (*Cucumis melo*), Watermelon (*Citrullus lanatus*), Gourd (*Lagenaria siceraria*) Squash (*Cucurbita pepo*), Bitter Gourd (*Momordica charantia*) are tender annuals, grown for their fruits, thrive only in hot weather and would not with stand frost. All these vegetables belong to the same family, (Cucurbitaceae), having homogenous cultural requirements and almost, same diseases and same insect pests. Most of them are monoecious some are andromonoecious and some are dioecious. They thrive well with mean optimum temperature of 18-30 C<sup>0</sup> (68-85 F<sup>0</sup>). All are harvested as immature fruits and are ready for harvest within 3-7 days. Usual storage temperature require 7-13 C<sup>0</sup> with relative humidity 85-95% for 14 days to 4-6 months.

Cucurbits are attacked by a number of insect pests, including striped cucurbit beetle, 12 spotted cucumber beetles, squash bug, squash vine borers, melon aphids and Red Pumpkin Beetle. The Red Pumpkin Beetle, *Aulacophora foveicophora* Lucas is the most serious pest of the cucurbits. It causes 35-75% damage to all cucurbits except Bitter Gourd at seedling stage and the crop needs to be resown. They feed underside the cotyledonous leaves by biting holes into them. Percent damage

rating gradually decreases from 70-15% as the leaf canopy increases. Percent losses are obvious from the percent damage, which may reach upto 35-75% at seedling stage (Yamaguchi, 1983).

Keeping in view the above mentioned facts and figures, the present research work has been conducted, to know about the relative abundance of Red Pumpkin Beetle at different stages and dates, to cope with their abundance, in order to keep the economic injury level at a manageable level.

### MATERIALS AND METHODS

The relative abundance of the Red Pumpkin Beetle (*Aulacophora foveicollis* L.) was assessed on different cucurbitaceous vegetables. Eleven host varieties (names are presented in Table-I) were sown on 15th April (1998) at Village Regi, (Peshawar) near NWFP Agricultural University, Peshawar. There were 11 treatments and 11 plots/row, each plot measured 2x3 m and was replicated 3 times in Randomized Complete Block Design.

Weekly observations were regularly carried out after germination of the seed. The Red Pumpkin Beetles were counted on three plants selected randomly in each plot per replication. In each plant top, middle and bottom leaves were taken and the adults of the Red Pumpkin Beetle were counted at

weekly intervals till the maturity of plants. Mean densities of the beetles were worked out and subjected to statistical analysis. LSD values were worked out and means were separated/underscored for significant/non significant differences.

The data were analysed by analysis of variance of Randomized Complete Block design (Mead *et al.* 1993), using MSTAT-C computer programme. The means were compared by using LSD (Steels and Torrie, 1960).

## RESULTS

The results obtained have been given in the Table-II. It is apparent that the Red Pumpkin Beetles started its initial infestation from the first week of germination on all host varieties of cucurbitaceous vegetables. However, the population trend varied significantly among the host varieties of the relevant vegetables. During the whole cropping season the population density of beetles was more on the Squash (Light Green Zucchini and Local Round Green) which was followed by the remaining varieties. The Squash (Light Green Zucchini) supported relatively the higher population of beetles in the 3rd, 5th, 6th, 9th, 11th, 13th, 15th weeks of the cropping season. The Squash (Local Round Green) supported relatively more number of beetles during the 2nd, 7th, 15th and 16th weeks of the cropping season. The beetles were observed on Cucumber ( $F_1$ -Beitalpha) in greater number during the 2nd, 3rd, 4th, 7th, 9th, 10th, 12th, 13th weeks of crop development. The Cucumber (SK-Marketmore) monitored as such in the 1st, 2nd, 3rd, 6th, 10th, 15th weeks of the cropping period. The Gourd (SW-Sweet Yellow) monitored more Red Pumpkin Beetle population during the 3rd week, while Sponge Gourd (RKS-7) showed higher numbers of Red Pumpkin Beetle in the 2nd and 3rd weeks. The Sponge Gourd (RKS-6) indicated more numbers of Red Pumpkin Beetle during the 15th week of growing season, which was found moderately resistant to the pest. Significant variations were noted among the varieties on seasonal mean basis as apparent from Fig.-1.

From 9th-16th week the population density was relatively lower than the previous weeks as evident from the pooled mean, which indicated that host varieties were most preferable to the beetles in the early stage of growth (Fig.-2). Pooled mean

revealed that one Squash (Light Green Zucchini) and two Cucumber varieties ( $F_1$ -Beitalpha and SK-Marketmore) supported significantly higher number of beetles as compared to the remaining varieties. The next Squash variety (Local Round Green) supported the higher number of beetles, Sponge Gourd (RKS-7, RKS-6), Gourd (DIK Round Green, SW-Sweet Yellow and Bottle Gourd Long) hoasted moderate number of beetle. The Bitter Gourd varieties (Jaunpuri and Jhalri) supported a negligible level of pest population. It is evident that the maximum number of beetles were found during the 6th week (June 5th, 1998) of crop growth when pooling the means of all the varieties. Thereafter, it gradually declined and remained at lower level of density upto 16th week.

## DISCUSSION

In the present study eleven varieties of cucurbitaceous vegetables were screened out for their relative preference by the Red Pumpkin Beetle. The varieties were RKS-7, RKS-6 (Spong Gourd), DIK-Round Green, SW-Sweet Yellow, Bottle Gourd Long (Gourd), Jaunpuri, Jhalri (Bitter Gourd), Local Round Green, Light Green Zucchini (Squash),  $F_1$  Beitalpha, SK-Marketmore (Cucumber). Variability in relation to preference order was noted among these varieties. The varieties Light Green Zucchini (Squash),  $F_1$ -Beitalpha and SK-Marketmore (Cucumber) showed greater preference response for supporting the maximum number of the beetles. The local Round Green (Squash) achieved a second order of preference of the relative abundance of the beetles. The varieties SW Sweet Yellow (Gourd), RKS-7, RKS-6 (Sponge Gourd), Bottle Gourd Long and DIK Round Green (Gourd) had a moderate level of preference for the beetles. The Bitter Gourd varieties, Jaunpuri and Jhalri did not support the abundance of the beetles and regarded as highly resistance ones.

In literature a variable performance of the cucurbitaceous vegetables in relation to the preference/non preference of the beetles has been reported. A glimpse of these studies is being given here.

Mehta and Sandhu (1989) studied 10 cucurbitaceous vegetables and found that Bitter Gourd (*Momordica charantia*) was highly resistant

to the beetles while Sponge Gourd (*Luffa scutannils*) and Bottle Gourd (*Lagenaria siceraria*) were resistant. The Cucumber (*Cucumis sativus*), Muskmelon (*Cucumis melo*) and Watermelon (*Citrullus lanatus*) varieties were moderately resistant to the pest. Roy and Pande (1990) investigated the preference order of 21 cucurbit vegetables and noted that the Bitter Gourd (*Momordica charantia*) was highly resistant to the beetles, while Sponge Gourd (*Luffa scutannils*), Bottle Gourd (*Lagenaria siceraria*) were moderately resistant. Muskmelon (*Cucumis melo*) and Cucumber (*Cucumis sativus*) were susceptible ones. Roy and Pande (1991a) observed that Banana Squash (*Cucurbita maxima*), Muskmelon (*Cucumis melo*) and Bottle Gourd (*Lagenaria siceraria*) were the preferred food plants for the adults while Musk melon (*Cucumis melo*), Cucumber (*Cucumis sativus*), White Gourd (*Benincasa hispida*), Chinese Okra (*Luffa acutangula*), Bitter Gourd (*Momordica charantia*, *Momordica cochinchinensis*), Snake Gourd (*Crichosanthus anguina*), Watermelon (*Citrullus lanatus*) and Sponge Gourd (*Luffa cylindrica*, *L. aegyptiaca*), achieved the second order of preference to the beetles (*Aulacophora foveicollis*).

In the present case the two varieties of Bitter Gourd (Jaunpuri and Jhalri) were found comparatively more resistant to the Red Pumpkin Beetle (*Aulacophora foveicollis*) and hence these results are strongly in line with the previously reported observations as reviewed above.

Presently the two Squash (Local Round Green, Light Green Zucchini) and two Cucumber (F1-Beitalpha, SK-Marketmore) varieties were found susceptible to the Red Pumpkin Beetle (*Aulacophora foveicollis*) and are in lines with some of the investigations or may be partially different from the other investigators as reviewed above.

In the present case the two Sponge Gourd (RKS-7, RKS-6) and three Gourd (DIK-Round Green, SW-Sweet Yellow, Bottle Gourd Long) varieties were found to be moderately resistant to this beetle and hence are in line with some of the reports of the investigators.

Initial infestation of the beetle was noted in the beginning of May (1998) which subsequently increased later on and peaked in the first week of

June (1998). In later weeks (2nd week of June to mid August, 1998) the population of the beetles gradually declined. Microclimatic temperature range from 17-42C<sup>0</sup> while relative humidity were within the range of 23-99%. It is concluded that temperature 19-37 C<sup>0</sup> and relative humidity 30-82% had a favourable effect on the pest prevalence. Chaudhry and Khan (1990) noted that 30 C<sup>0</sup> and relative humidity 70% were optimal for the development and duration of various stages of the beetles (*Aulacophora foveicollis*). Roy and Pande (1991b) noted that the most favourable temperature for biological parameters of the beetles was 27.5 C<sup>0</sup>.

#### CONCLUSION AND RECOMMENDATIONS

The infestation of Red Pumpkin Beetle was started in the beginning of May, 1998 which subsequently increased and reached to the peak in the first week of June, 1998. While from June to August, 1998, the population gradually declined.

Out of the eleven varieties, the two varieties of Bitter Gourd (Jaunpuri and Jhalri) were found comparatively more resistant to the Red Pumpkin Beetle. All these information can be utilized/combined with some other management techniques for having a best IPM package for cucurbitaceous vegetables.



**Table I Different varieties of the cuurbitacious vegetables**

Common Name	Botanical Name	Varietal Name
Sponge Gourd	<i>Luffa scutannils</i>	V <sub>1</sub> : RKS-7
"	"	V <sub>2</sub> : RKS-6
Gourd	<i>Lagenaria siceraria</i>	V <sub>1</sub> : DIK Round Green
"	"	V <sub>2</sub> : SW-Sweet Yellow
"	"	V <sub>3</sub> : Bottle Gourd Long
Bitter Gourd	<i>Momordica Charentia</i>	V <sub>1</sub> : Jaunpuri
"	"	V <sub>2</sub> : Jhalri
Squash	<i>Cucurbita pepo var.</i>	V <sub>1</sub> : Local Round Green
"	"	V <sub>2</sub> : Light Green Zucchini
Cucumber	<i>Cucumis sativus</i>	V <sub>1</sub> : F <sub>1</sub> -Beitalpha
"	"	V <sub>2</sub> : SK-Marketmore

**Table II Population density of Red Pumpkin Beetle, *Aulacophora foveicollis* L., on different cucurbits in Peshawar, during 1998.**

S.No	Host plant	Variety	WEEKLY MEAN POPULATION DENSITY/3 PLANTS							
			1 May 1	2 May 8	3 May 15	4 May 22	5 May 29	6 June 05	7 June 12	8 June 19
1	Sponge Gourd	RKS-7	4.33 cd	6.66bc	10.66abc	7.66d	7.66c	11.67c	5.33c	4.33ef
2	"	RKS-6	3.33 d	5.33cd	5.33de	5.33e	3.33d	4.33ef	4.33cd	5.33e
3	Gourd	DIK-Round Green	2.00 e	3.33 e	3.33ef	5.33e	7.66c	11.00cd	2.00e	3.33f
4	"	SW-Sweet Yellow	2.00 f	8.00 b	11.33abc	5.33e	3.66d	16.67b	11.00b	7.00d
5	"	Bottle Gourd Long	4.66 c	4.33de	7.66cd	5.33e	10.00b	6.66e	3.33de	0.00g
6	Bitter Gourd	Jaunpuri	1.00 ef	0.00 f	0.00 f	0.00f	0.00 e	0.00g	0.00f	0.00g
7	"	Jhalri	0.00 f	0.00 f	1.00f	.00f F	0.00e	0.66fg	0.00f	0.00g
8	Squash	Local Round Green	5.33bc	11.00a	10.00bc	9.00cd	11.33b	7.33de	14.67a	8.66c
9	"	Light Green Zucchini	4.33cd	6.66bc	14.00a	11.00 b	14.33a	14.33a	10.67b	8.66c

10	Cucumber	<i>F<sub>1</sub> Beitalpha</i>	6.00ab	11.00a	11.00abc	14.00a	10.66b	15.67b	14.33a	8.66c	
11	"	<i>SK-Marketmore</i>	6.66 a	11.00a	12.00ab	10.00bc	11.33b	22.33a	10.00b	10.00b	
	<b>Pooled Mean</b>		<b>3.60 e</b>	<b>6.12c</b>	<b>7.90b</b>	<b>6.69c</b>	<b>7.27b</b>	<b>10.66a</b>	<b>6.87c</b>	<b>6.39c</b>	
LSD at alpha 0.05			0.794	1.432	2.695	1.398	1.645	2.734	1.051	0.930	
Air temperature °C											
		Maximum	29.85	35.14	38.85	42.00	38.57	37.57	39.00	41.57	
		Minimum	17.00	18.14	20.85	22.00	19.85	19.42	19.28	22.57	
Relative Humidity %											
		Maximum	92.85	92.57	90.00	89.14	67.97	82.71	90.57	93.14	
		Minimum	37.14	29.00	25.71	23.28	39.57	30.14	24.14	29.57	
S.No	Host plant	Variety	WEEKLY MEAN POPULATION DENSITY/3 PLANTS								Pooled seasonal mean
			9 June 26	10 July 3	11 July 10	12 July 17	13 July 24	14 July 31	15 Aug 07	16 Aug 14	
1	Sponge Gourd	<i>RKS-7</i>	2.00 e	2.00 e	3.33 d	3.33 c	2.00 e	1.00	0.00 c	0.00 e	<b>4.50 d</b>
2	"	<i>RKS-6</i>	3.33 de	6.66 bc	3.33 d	2.00 cd	5.33 bc	4.33	3.33 a	1.00 cd	<b>4.00 de</b>
3	Gourd	<i>DIK-Round Green</i>	3.66 d	3.33 d	5.33 c	2.00 cd	2.00 e	1.00	1.00 bc	1.00 cd	<b>3.54 e</b>
4	"	<i>SW-Sweet Yellow</i>	5.33 c	3.33 d	5.33 c	1.00 de	3.33 de	3.33	0.00 c	1.00 cd	<b>5.47 c</b>
5	"	<i>Bottle Gourd Long</i>	<b>2.00 e</b>	4.33 d	1.33 e	0.00 e	4.00 cd	2.00	1.33 b	0.00 e	<b>3.56 e</b>
6	Bitter Gourd	<i>Jaunpuri</i>	0.00 f	0.00 f	0.66 ef	0.00 e	0.00 f	0.33	0.00 c	0.00 e	<b>0.12 g</b>
7	"	<i>Jhalri</i>	0.00 f	0.00 f	0.33 f	0.00 e	0.00 f	0.00	0.00 c	0.00 e	<b>1.02 f</b>
8	Squash	<i>Local Round Green</i>	6.66 bc	7.33 bc	5.66 c	5.33 b	4.33 cd	4.00	3.33 a	3.33 a	<b>7.29 b</b>
9	"	<i>Light Green Zucchini</i>	9.00 a	6.33 c	3.33 a	3.33 c	7.66 a	5.33	2.66 a	1.66 bc	<b>8.52 a</b>
10	Cucumber	<i>F<sub>1</sub>-Beitalpha</i>	7.66 ab	8.66 a	5.66 c	7.66 a	6.66 ab	4.33	1.00 bc	0.33 de	<b>8.48 a</b>
11	"	<i>SK-Marketmore</i>	7.33 b	7.66 ab	6.66 b	3.33 c	3.33 de	4.66	3.33 a	2.00 b	<b>8.20 a</b>
	<b>Pooled Mean</b>		<b>4.27 d</b>	<b>4.51 d</b>	<b>4.33 d</b>	<b>2.54 ef</b>	<b>3.51 e</b>	<b>2.75 ef</b>	<b>1.45 g</b>	<b>0.93 h</b>	
LSD at alpha 0.05			1.080	0.758	0.908	1.326	1.201	NS	0.769	0.591	
Air temp C <sup>0</sup>											
		Maximum	39.42	38.71	34.14	36.28	37.14	37.14	36.28	35.57	
		Minimum	28.85	25.71	25.57	24.71	23.28	23.57	25.00	25.14	
Relative humidity (%)											
		Maximum	99.71	97.42	91.00	87.42	88.14	87.05	89.57	90.14	
		Minimum	52.71	67.00	69.28	50.71	47.14	53.57	56.71	53.00	

Means followed by different letters (column wise) are significantly different from each other at 5 % level of probability.

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