



## RELATIVE PREFERENCE OF RED PUMPKIN BEETLE ON DIFFERENT MAJOR CUCURBIT VEGETABLES

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### ABSTRACT

Cucurbits are mostly grown in tropical and subtropical conditions but some of the vegetables like cucumber are grown in temperate zone under the severe attack of various arthropod pests including striped and spotted cucumber beetle, spider mite, melon aphid, fruit fly, leaf miner and red pumpkin beetle. Red pumpkin beetle is the most important and destructive pest of cucurbit vegetables and is present throughout the world mainly in tropical and subtropical zones. This study was conducted to check the relative preference of red pumpkin beetle on major cucurbit vegetables. Results of this study showed that red pumpkin beetle exhibited less attraction to bitter melon and more attraction to musk melon. This study provides helpful information to cucurbit breeders to develop resistance in musk melon against red pumpkin beetle in future.

**Keywords:** Cucurbit varieties, Red pumpkin beetle, Relative infestation

### INTRODUCTION

Cucurbitaceous vegetables like cucumber (*Cucumis sativus*), bottle gourd (*Lagenaria siceraria*), water melon (*Citrullus lanatus*), muskmelon (*Cucumis melo*), round gourd and bitter melon (*Momordica charantia*) constitute an important and the biggest group of vegetable. Cucurbits are mostly grown in tropical and subtropical conditions but some of the vegetables like cucumber are grown in temperate zone under artificial conditions (Gupta and Verma, 1992; Dhaliwal, 2008). The family cucurbitaceae has 118 genera and 825 species and most of them derived from the old world (Rai and Kumar, 2008). Most of the cucurbits are annual and grown through the seeds by direct sowing in the field but some cucurbits are perennial. Cucurbit vegetables are grown in warm weather and can't grow under the cold conditions. Area under cultivation of cucumber, bottle gourd, melons and bitter melon is 715, 449, 19711 and 681 hectares. Cucurbitaceous vegetables are tender annual winter vegetables and are grown only for their fruits. All these vegetables have same cultural requirements, most of diseases and insect pests. These vegetables flourish under temperature of about 18 to 30 °C (68-85 °F). All these vegetables are harvested at immature stage and used as raw or after cooking (Saljoqi and Khan, 2007).

A number of insect pests like striped and spotted cucumber beetle, spider mite, melon aphid, fruit fly, leaf miner and red

pumpkin beetle have been reported infesting cucurbit crops. Red pumpkin beetle is the most destructive pest of the cucurbitaceous vegetables among these pests. This pest is distributed over Asia, Australia, Europe and Africa (Atwal and Dhaliwal, 1997). Red pumpkin beetles were active at 27 to 32°C but become inactive at temperature above the 35°C (Ravlakos, 1943). Large number of insect pests infest cucurbit vegetables from germination to the maturity but few of them like hadda beetle, red pumpkin beetle and fruit flies have serious concern (Ravlakos, 1943; Dhaliwal, 2008). Originally, red pumpkin beetle is a pest of pumpkin, bottle gourd, and musk melon, but it feeds all cucurbitaceous vegetables (Raman and Annadurai 1985). Red pumpkin beetle is polyphagous insect distributed all over the India (Butani and Jatwani, 1984). It causes damage to cucurbits at both larval and adult stages. Damage caused by red pumpkin beetle may range 35 to 75 % (Saljoqi and Khan, 2007). Vines are damaged by feeding on cotyledon or leaves from seedling stage to maturity. Beetles start attack right after the germination and slower down the growth of plants due to serious attack. Both adult and larvae stage attack on the vegetables but larvae live underground and are destructive for the roots. Roots start rotting due to attack of saprophytic fungi. Beetle starts activity from March and remains in the field till October. Peak activity period of red pumpkin beetle is from April to June and its population decreases from September (Butani and Jatwani, 1984).

Present study was carried out to investigate the relative abundance of red pumpkin beetle on different varieties of six cucurbits crops including cucumber, bottle gourd, water melon, musk melon, round gourd and bitter gourd.

## MATERIALS AND METHODS

The experiment was conducted to study relative infestation of red pumpkin beetle on different cucurbit vegetables. Six crops namely cucumber, bottle gourd, water melon, musk melon, round gourd and bitter gourd with two varieties of each crop were selected for these trials. These field trials were sown on 15<sup>th</sup> March 2013 at Barani Agricultural Research Institute, Chakwal. There were twelve treatments and each treatment was replicated thrice in randomized complete block design. Each block was 6 × 4 m in dimension with crops in main plots and varieties in sub plots. All the agronomic practices were carried out uniformly in all treatments. The data for insect pest's infestation were initiated to record from 1<sup>st</sup> April and continued for eighteen weeks. Red pumpkin beetles were counted from three plants selected from each plot per replication. Each vine was divided into 3 parts i.e. basal, middle and the apical part for recording beetle infestation. The collected data was subjected to ANOVA technique for determining the ANOVA parameters and significance of the treatments. The means of significant treatments were compared by Least Significant Difference (LSD) test.

## RESULTS

Vegetables were sown from 11<sup>th</sup> to 15<sup>th</sup> March 2013. When the study was initiated, the density of red pumpkin beetle was high. All the host varieties were infested by the red pumpkin beetle except that of bitter gourd which were found the least infested cultivars. But the infestation of red pumpkin beetle was not same on all the crops.

### Weekly infestation of red pumpkin beetle

During the whole study period, the infestation of red pumpkin beetle was higher on cucumber. Red pumpkin beetle was high on the cucumber (Liza) during 1<sup>st</sup>, and 5<sup>th</sup> week of study. Cucumber (Sulaman) shows the higher infestation of red pumpkin beetle during 1<sup>st</sup> and 2<sup>nd</sup> weeks of study. Beetles were calculated higher during 1<sup>st</sup> week on bottle gourd (Arya). Bottle gourd (BSS-687) supported higher red pumpkin beetle during 1<sup>st</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> weeks of study. Water melon (Asia black star) shows higher infestation during 5<sup>th</sup> and 6<sup>th</sup> week of study. Water melon (sugar body) hosted higher number of red pumpkin beetle during 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> week of study. Musk melon shows relatively lower infestation. Infestation of red pumpkin beetle was observed higher on round gourd (Asian) during 6<sup>th</sup> week of study. Round gourd (Jade ball F1) supported higher infestation during 5<sup>th</sup> and 6<sup>th</sup> week of study. Both varieties of bitter gourd (Palee F1 and Nirali) show nearly equal to zero infestation of red pumpkin beetle. Mean pooled data of the weeks shows that the relative infestation of red pumpkin beetle was highest during the 8<sup>th</sup> to 14<sup>th</sup> weeks of study when mean and total population of red pumpkin beetle were recorded in the range of > 60 to < 100 and ≥ 2000 to ≥ 3500 beetles, respectively. An intermediate population

infestation ranging from > 30 to < 50 beetles (mean) and >1000 to < 2000 (total) was observed during 6<sup>th</sup>, 7<sup>th</sup>, 15<sup>th</sup> and 16<sup>th</sup> weeks of study. But lower population of red pumpkin beetle ranging from > 9 to < 30 beetles and < 350 to < 1000 beetles (Total) was recorded during 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 17<sup>th</sup> and 18<sup>th</sup> week of study (Table 1).

**Table 1**

Mean and total density (infestation) of red pumpkin beetle recorded during different weeks of study irrespective of the cucurbits varieties.

Weeks	Mean	Total
1	9.9	358
2	12.8	462
3	18.1	651
4	23.3	837
5	26.7	9626
6	38.4	1381
7	49.1	1768
8	66.1	2379
9	73.4	2642
10	82.6	2972
11	84.9	3056
12	86.8	3127
13	91.7	3303
14	81.8	2947
15	41.8	1504
16	30.9	1112
17	21.3	768
18	10.1	363

### Infestation of red pumpkin beetle with respect to crops

Mean pooled data show that bitter gourd demonstrated resistance while the musk melon, tinda gourd and water melon proved highly susceptible to red pumpkin beetle. Cucumber and bottle gourd revealed intermediate susceptibility (Table 2).

**Table 2**

Mean and total density (infestation) of red pumpkin beetle recorded on different cucurbits crops irrespective of their varieties and weeks of study.

Vegetables	Mean	Total
Cucumber	52.0	5618
Bottle gourd	45.3	4894
Water melon	58.1	6277
Musk melon	64.1	6926
Bitter gourd	0.02	2
Tinda gourd	63.06	6875

## Infestation of red pumpkin beetle with respect to varieties of different cucurbits crops

Constable variety of cucumber shows the more susceptibility against the red pumpkin beetle than the Beitalpha variety of cucumber. While in case of bottle gourd, varieties BSS- 687 F1 shows the lower infestation of red pumpkin beetle than Arya variety. Water melon were the 3<sup>rd</sup> most attractive vegetables to red pumpkin beetle and its variety Andaman showed less attraction towards of red pumpkin beetle than the Sweet Delight variety. Musk melon showed higher attack of red pumpkin beetle during study on both varieties. The variety Moon-star and Tinda-321 of Tenda gourd also found highly susceptible to red pumpkin beetle during the whole study. Both varieties of bitter gourd exhibited the least infestation of red pumpkin beetle (Fig. 1).

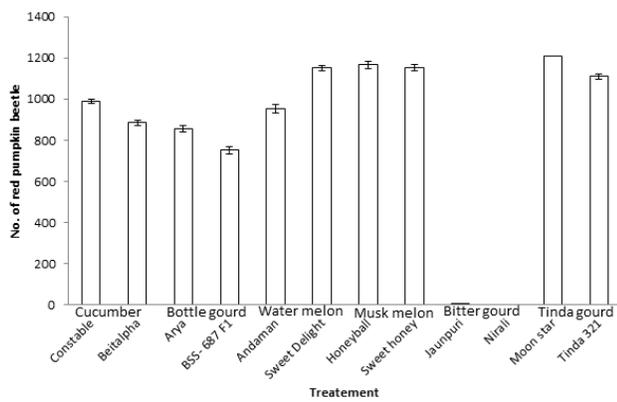


Fig. 1

Total density (infestation) of red pumpkin beetle recorded on different varieties of selected cucurbits crops irrespective of weeks of study.

## DISCUSSION

In this study 12 varieties of cucurbit vegetables were studied for the relative abundance of red pumpkin beetle. A significant variation in the relative abundance of red pumpkin beetle on different varieties and cucurbits crops. These results can be compared with the different studies which were conducted by various researchers to check the preference and non-preference of red pumpkin beetle against different cucurbit vegetables. The results of present study reveal that bitter gourd demonstrated resistance while the musk melon, tinda gourd and water melon proved highly susceptible to red pumpkin beetle. Cucumber and bottle gourd revealed intermediate susceptibility. Mehta and Sandhu (1989) conducted experiment on ten different cucurbit vegetables and found that bitter gourd was strongly resistance against the red pumpkin beetle but the bottle gourd (*Lagenaria siceraria*) and sponge gourd (*Luffa scutannils*) were less resistant. Water melon (*Citrullus lanatus*), musk melon (*Cucumis melo*) and cucumber (*Cucumis sativus*) were moderately susceptible to red pumpkin beetle. These results are in agreement with the results of present study. Roy and Panda (1990) conducted study to investigate the relative susceptibility of different cucurbit vegetable to red pumpkin beetles. They reported that

bitter gourd were highly resistant to red pumpkin beetle while sponge gourd and bottle gourd were moderately resistance. They further documented that Cucumber (*Cucumis sativus*) and Musk melon (*Cucumis melo*) were high susceptibility. These results also confirm the results of present study. Banana squash (*Cucurbita maxima*), bottle gourd and musk melon shows the relatively high susceptibility against red pumpkin beetle. While water melon, bitter gourd, snake gourd and sponge gourd attains the second position in this study for the preference of red pumpkin beetle Roy and Panda (1991). These results of Roy and Panda (1991) are highly in consistent with those of present studies in which both varieties of bitter gourd (Jaunpuri, Nirali) were highly resistant both varieties of water melon (Andaman, Sweet Delight) exhibited intermediate resistance and both varieties of cucumber and bottle gourd revealed relatively moderate susceptibility to red pumpkin beetle.

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