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STUDY ON THE STATUS OF PUMPKIN BEETLES INFESTING CUCURBITS IN SOME AREAS OF BANGLADESH

M. M. H. Khan[1], M. Z. Alam[2], M. M. Rahman[2] and M. I. H. Miah[3]

[1]Department of Entomology, Patuakhali Science and Technology University, Dumki, Patuakhali, Bangladesh [2]Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh [3]Department of Plant Pathology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh

Abstract

A comprehensive survey was conducted by extensive tour in Gazipur, Narsingdi, Comilla, Noakhali, Barisal, Rangpur, Dinajpur and Jessore districts of Bangladesh to record the present status of pumpkin beetles infesting cucurbits. Results of survey revealed that two species of pumpkin beetles found on cucurbits in Bangladesh and they were identified as red pumpkin beetle, *Aulacophora foveicollis* (Lucas) and blue pumpkin beetle, *Aulacophora atripennis*. The red pumpkin beetle was the most abundant species which representing 82.39% and the blue pumpkin beetle was less abundant species which representing only 17.61% of the total number of beetles recorded during survey. Population of female was higher than that of male in both species. RPB was much larger insects as compared to BPB. In both insect species female adults are larger in dimension than males. The highest population of RPB was found on cucumber followed by bottle gourd and sweet gourd. The highest population of BPB was found on bitter gourd. The maximum population of RPB was in Gazipur followed by Narsingdi and Comilla districts and that of BPB was in Gazipur followed by Noakhali.

Key words: Pumpkin beetles, population, cucurbits, districts

Introduction

Cucurbits are the most important crops grown in winter and summer seasons in Bangladesh. Cucurbit crops occupy about 66 % of the vegetable lands producing only 11 % of total vegetable production (Nasiruddin *et al.* 2004). In summer, the major vegetables grown in Bangladesh are cucurbits (Rashid 1993). A large number of cucurbits

such as sweet gourd, bottle gourd, ash gourd, cucumber, sponge gourd, ribbed gourd, snake gourd, khira, muskmelon, bitter gourd etc are grown in different parts of the country. All cucurbits are attacked by red pumpkin beetle (Butani and Jotwani 1984, Nath and Thakur 1965). Atwal (1993) reported that the two species namely red pumpkin beetle, *Raphidopalpa foveicollis* and blue pumpkin beetle, *R. atripennis* are common in north-western India, the former being more important. The pumpkin beetles *Aulacophora atripennis* (blue), *A. cincta* (yellow with black border), *A. intermedia*, and *Raphidopalpa foveicollis* (red) are very common on cucurbitaceous plants (Nayar *et al.* 1995, David and Ananthakrishnan 2004). Azim (1966) reported that the genus *Aulacophora* is widely distributed throughout zoogeographic regions and also cited that *A. foveicollis* is a serious pest of cucurbits in every district of the then East Pakistan. The red pumpkin beetle is widely distributed all over the South-East Asia, Africa as well as the Mediterranean region towards the west and Australia in the East (Butani and Jotwani 1984, McKinlay *et al.* 1992). Alam (1969) mentioned that the red coloured (*A. foveicollis*) and the orange coloured (*A. abdominalis*) beetles as two separate species that are equally serious and major pests of cucurbitaceous vegetable crops in Bangladesh. Shaha (1992) stated that the probable con-specificity of *A. foveicollis* and *A. abdominalis*, the two different and equally serious species in Bangladesh on the basis of red and orange colouration of adults, respectively, should be resolved through careful studies. The pest, however, occurs throughout the year and causes severe damage to the crops, especially at the seedling stage. It may cause up to 70 % damage on leaves and 60 % damage on flowers of cucumber (Alam 1969). However, the status and the levels of their incidence in different parts of the country are not known clearly.

Considering the above facts the present study was undertaken to find out present status of pumpkin beetle species infesting cucurbits and to know their incidence on the cucurbits in some selected areas of Bangladesh.

Materials and Method

Eight cucurbit growing districts of Bangladesh namely Gazipur, Narsingdi, Comilla, Noakhali (Coastal area), Barisal, Rangpur, Dinajpur and Jessore were selected for this study. A comprehensive survey was conducted by extensive tour throughout the selected locations during both winter

and summer seasons from April 2007 to December 2008. In the selected locations two or more cucurbits are grown every year. The selected locations were visited 2 times and pumpkin beetle infested cucurbit fields were observed in the morning and afternoon. In each survey location, three cucurbit fields were randomly selected. A total of 60 plants selecting 20 plants from each field were checked for recording the incidence of pumpkin beetles. Two species of pumpkin beetles were observed and identified as red and blue pumpkin beetles. The specimens of red pumpkin beetle (RPB) and blue pumpkin beetle (BPB) of both sexes (male and female) were collected by hand picking. Some collected specimens were brought back to the Entomology Laboratory at BSMRAU for morphometric study. The percentage of plant infestation per location was calculated from the number of total plants observed and the number of infested plants. The collected data were analyzed using SPSS program.

Results and Discussion

Species of pumpkin beetle and their incidence: A total of 653 individuals (314 males and 339 females) were recorded from the hosts of selected locations and identified into 2 species belonging to a single genus under a single family Chrysomelidae (Table 1). They were red pumpkin beetle (RPB), *Aulacophora foveicollis* (Lucas) and blue pumpkin beetle (BPB), *A. atripennis*. The red pumpkin beetle was the most abundant species which had 538 individuals representing 82.39 % of the total beetles recorded during the survey from eight districts namely Gazipur, Barisal, Narsingdi, Comilla, Noakhali, Rangpur, Dinajpur and Jessore. It was associated with 5 infested cucurbit vegetables namely sweet gourd, bottle gourd, ash gourd, cucumber and bitter gourd. The male and female ratio was 1.00: 1.08 (Table 1). The blue pumpkin beetle was the minor species which had 115 individuals representing only 17.61 % of the total beetles recorded during the survey from five districts namely Gazipur, Narsingdi, Comilla, Noakhali and Jessore. It was associated with 4 infested cucurbit vegetables namely sweet gourd, bottle gourd, cucumber and bitter gourd. The male female ratio was also 1.00: 1.10. The $x^2(1)$ values (0.0009 and 0.0020) indicated that the distribution of RPB and BPB was independent on sex (Table 1). In all districts, population of female was higher than that of male (Figure 1).

Table 1. Pumpkin beetles infesting different cucurbit hosts as observed at eight districts of Bangladesh during April 2007 to December 2008

District of survey	Date of observation	Number of beetles per 60 plants per location			
		RPB +	Host	BPB +	Host
Gazipur	02. 04. 2007	08 + 10	Big	15 + 17	Big
		19 + 20	Botg	03 + 03	Botg
		21+ 23	Swg	02+ 02	Swg
Barisal	30. 12. 2007	36 + 38	Swg	-	-
Narsingdi	04. 04. 2008	33 + 35	Cuc	05 + 06	Cuc
		10 + 10	Asg	-	-
Commilla	06.04.2008	24 + 26	Swg	04 + 04	Swg
		15 + 16	Cuc	02 + 03	Cuc
Noakhali	08. 04. 2008	11 + 12	Swg	16 + 16	Swg
Rangpur	18. 11. 2008	17 + 17	Swg		
		06 + 07	Botg	-	-
Dinajpur	20. 11. 2008	18 + 19	Swg		
		08 + 10	Botg	-	-
Jessore	22. 12. 2008	24+26	Swg	08+09	Swg
		09+10	Botg		
Male (?) + Female (?)		259 + 279		55 + 60	
Male & Female ratio		1.00: 1.08		1.00: 1.10	
x^2 (1) value		0.0009 (NS)		0.0020 (NS)	
Total no. & %		538 (82.39%)		115 (17.61%)	
Grand total		**653**			

Swg=Sweet gourd; Cue = Cucumber ; Big = Bitter gourd ; Botg = Bottle gourd ; Asg = Ash gourd;

Population of pumpkin beetle: The population of red pumpkin beetle (RPB) on cucurbitaceous crops grown in farmers' fields ranged 0.0 -5.0 per plant with mean 1.10 and standard deviation 1.21 per plant. Out of 480 plants checked during the survey 196 was free from RPB infestation. One hundred thirty plants showed 1 insect per plant. The insect population per

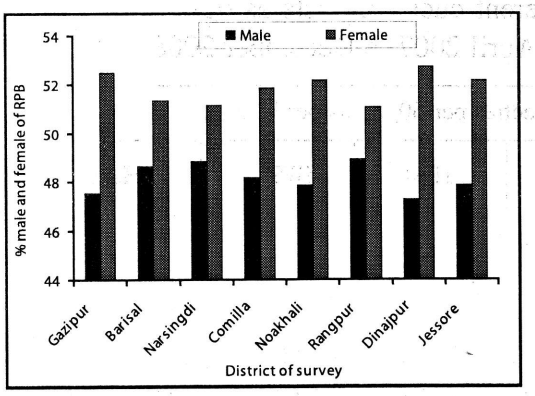

Figure 1. Occurrence of adult male and female of RPB in different locations.

plant was 2, 3, 4 and 5 on 86, 42, 22 and 4 plants, respectively (Figure 2). Similarly, the population of blue pumpkin beetle (BPB) on cucurbitaceous crops grown in farmers' fields ranged 0.0 -5.0 per plant with mean 0.2 and standard deviation 0.62 per plant. The population of blue pumpkin beetle (BPB) was 2 -5 on only 21 plants. Sixty

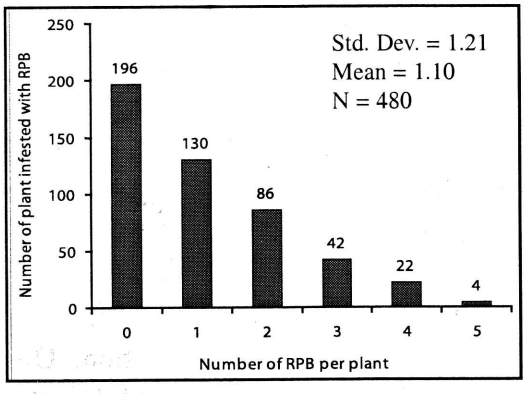

Figure 2. Number of cucurbitaceous plants infested with red pumpkin beetle (RPB) in farmers' fields.

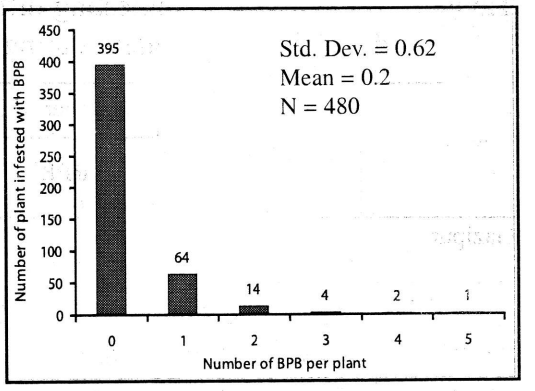

Figure 3. Number of cucurbitaceous plants infested with blue pumpkin beetle (BPB) in farmers' fields.

four plants had 1 insect per plant. Three hundred ninety five plants were free from the pest (Figure 3).

Length and breadth of pumpkin beetle: The morphmetrics of adult male and female red and blue pumpkin beetles are summarized in Table 2. The adult of both males and females of RPB have bright orange-red coloured elytra. Adults of both sexes have shiny black ventral surface covered with short and soft white hairs. The length of adult male ranges 5.75-6.70 mm with mean 6.34 mm and standard error (SE) 0.09 mm. The breadth ranges 2.25-2.99 mm with mean 2.73 mm and SE 0.07 mm. In case of adult female, length ranges 6.50-7.50 mm with mean 6.84 and SE 0.09 mm. The breadth ranges 2.75-3.50 mm with mean 3.14 mm and SE 0.07 mm (Table 2).

Table 2. Measurement of length and breadth of male and female adult red and blue pumpkin beetles collected from different districts of Bangladesh

Sample no.	Red pumpkin beetle				Blue pumpkin beetle			
	Male		Female		Male		Female	
	L (mm)	B (mm)	L (mm)	B (mm)	L (mm)	B (mm)	L (mm)	B (mm)
1	6.30	2.75	7.00	2.95	6.00	2.50	7.00	3.25
2	6.40	2.90	6.90	3.10	6.30	2.80	6.50	3.00
3	5.75	2.97	6.50	3.00	5.50	2.60	6.00	2.90
4	6.00	2.75	6.60	3.20	5.50	2.40	6.80	3.15
5	6.55	2.85	6.80	3.50	5.20	2.20	6.50	2.80
6	6.25	2.99	6.70	3.45	5.76	2.70	6.50	2.75
7	6.60	2.65	6.69	2.75	5.98	2.30	6.80	2.70
8	6.50	2.70	6.75	2.95	5.80	2.50	6.50	3.00
9	6.70	2.50	7.50	3.25	5.60	2.20	7.00	2.80
10	6.35	2.25	7.00	3.20	6.10	2.70	7.00	3.10
Mean	6.34	2.73	6.84	3.14	5.77	2.47	6.78	2.95
	0.09	0.07	0.09	0.07	0.11	0.08	0.17	0.06

L= Length; B = Breadth

The adult forms of BPB of both sexes have bluish-black coloured elytra and orange-red head. Similarly both sexes of adult BPB have shiny red ventral surface covered with short and soft white hairs. The length of male and female of BPB ranges 5.20-6.30 mm with mean 5.77 mm and SE 0.11 mm, and 6.00-7.00 mm with mean 6.78 mm and SE 0.17 mm, respectively. The breadth of male and female varies 2.20-2.80mm with mean 2.47 mm and SE 0.08 mm, and 2.70-3.10 mm with mean 2.95 mm and SE 0.06 mm, respectively (Table 2).

Distribution of pumpkin beetle on hosts and in location: The population of RPB ranged from 0.9 -1.6 per plants of five cucurbitaceous crops. The highest population was found on cucumber, which was followed by bottle gourd and sweet gourd. The lowest number of insect per plant was observed on bitter gourd, which was followed by ash gourd (Figure 4). In case of blue

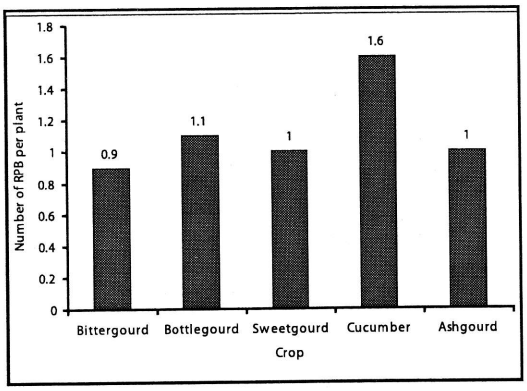

Figure 4. Number of red pumpkin beetle (RPB) on five cucurbitaceous crops grown in farmers' fields of eight districts.

pumpkin beetle (BPB), the maximum population was recorded on bitter gourd, which was followed by cucumber, sweet gourd and bottle gourd. Ash gourd was not infested with the pest (Figure 5).

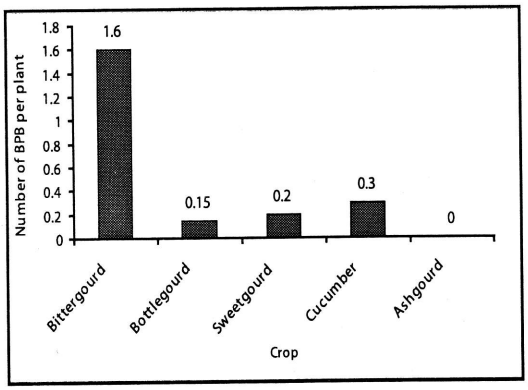

Figure 5. Number of blue pumpkin beetle (BPB) on five cucurbitaceous crops grown in farmers' fields of eight districts.

Population of RPB was the maximum in Gazipur district, which was followed by Narsingdi, Comilla and Barisal. The lowest population of the insect was recorded from Noakhali, which was followed by Rangpur, Dinajpur and Jessore (Figure 6). The population of BPB was also the highest in Gazipur, which was followed by Noakhali, Jessore, Comilla and Narsingdi. Blue pumpkin beetle was not observed in

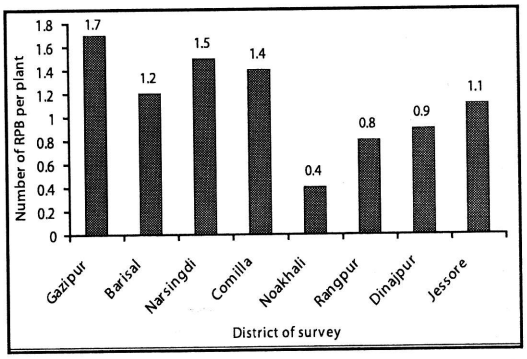

Figure 6. Number of red pumpkin beetle (RPB) on cucurbitaceous crops grown in farmers' fields of eight districts.

Barisal, Rangpur and Dinajpur districts (Figure 7).

The highest infestation of cucurbit plants by RPB was found in Gazipur, which was followed by Narsingdi. Percent infested plants in Narsingdi and Comilla was identical. The lowest infestation of RPB was found in Noakhali, which was followed by Rangpur, Dinajpur, Jessore and Barisal (Figure 8). In case of BPB, the maximum infested cucurbit plant was recorded in Noakhali district, which

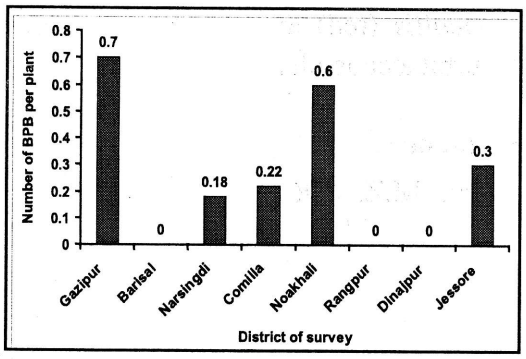

Figure 7. Number of blue pumpkin beetle (BPB) on cucurbitaceous crops grown in farmers' fields of eight districts.

was followed by Gazipur, Jessore, Comilla and Narsingdi. Cucurbit plants in Barisal, Rangpur and Dinajpur were not infested with BPB (Figure 9).

Findings of the present survey clearly indicated that occurrence of RPB was much higher as compared to BPB. RPB was much larger insects as compared to BPB. In both insect species female adults are larger in dimension than males. Their populations varied with the variation of crops and location of survey. The preferable host of RPB was found to be cucumber. The bitter gourd was the least preferred crop to the insect. The highly preferred host of BPB was bitter gourd. Bottle gourd, sweet gourd and cucumber were found to be very low preferable host of BPB.

Other investigator also recorded morphometrics of RPB in Bangladesh (Alam 1969). He found that the adult male RPB measures 5.5 mm to 6.75 mm in length. The breadth at its widest region, the second abdominal segment, average 2.45 mm. The adult female is slightly larger than the male and is 6.25 mm to 8.25 mm in length and on the average 3.01 mm in breadth (Alam 1969). The adult RPB, *A. foveicollis* is approximately 7 mm in length (York, 1992). The adults are oblong and 5-8 mm long. Their dorsal body surface is brilliant orange red and the ventral surface is black, being clothed in short

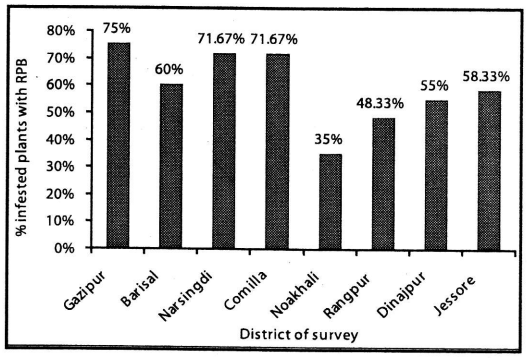

Figure 8. Percentage of infested plant with red pumpkin beetle (RPB) on cucurbitaceous crops in farmers' fields of eight districts.

white hair (Atwal 1993, Pradhan 1969). Shaha (1992) has stated that *A. foveicollis* beetles are brilliant orange-red coloured with black ventral surface covered with short and soft white hairs. No published research report was available to support the findings related

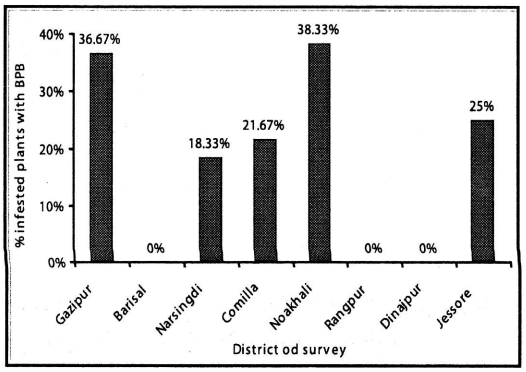

Figure 9. Percentage of infested plant with blue pumpkin beetle (BPB) on cucurbitaceous crops in farmers' fields of eight districts.

to morphometric measurement of blue pumpkin beetle.

Azim (1966) reported that the genus *Aulacophora* is widely distributed throughout all zoogeographic regions and also cited that *A. foveicollis* (red) is a serious pest of cucurbits in every district of the then East Pakistan. It was reported that all cucurbits are attacked by red pumpkin beetle (Butani and Jotwani 1984, Nath and Thakur 1965). Atwal (1993) reported that the two species, red pumpkin beetle, *Raphidopalpa foveicollis*, and blue pumpkin beetle, *R. atripennis* are common in north-western India, the former being more important. Nayar *et al.* (1995) reported that the pumpkin beetles *Aulacophora atripennis* (blue), *A. cincta* (yellow with black border), *A. intermedia*, and *Raphidopalpa foveicollis* (red) are very common on cucurbitaceous plants.

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