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RESEARCH ARTICLE

WEATHER PARAMETERS AFFECTING THE POPULATION DYNAMICS OF LEAF FOLDER AND POD BORERS ON MUNGBEAN

Kazi Nazrul Islam[a*], Md. Mahbubul Islam[b] and Dr. Md. Mohasin Hussain Khan[c]

[a]OFRD, Bangladesh Agricultural Research Institute, Patuakhali, Bangladesh
[b]SCWMC, Soil Resource Development Institute (SRDI), Bandarban, Bangladesh
[c]Department of Entomology, Faculty of Agriculture Patuakhali Science and Technology University Patuakhali, Bangladesh
*Corresponding Author e-mail: kbd_nazrul@yahoo.com

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ABSTRACT

The experiment was conducted to know the abundance of major insect pests on 15 mungbean varieties *viz.*, BARI Mung-1, BARI Mung-2, BARI Mung-3, BARI Mung-4, BARI Mung-5, BARI Mung-6, BINA Moog-4, BINA Moog-5, BINA Moog-6, BINA Moog-7, BINA Moog-8, BU Mug-1, BU Mug-2, BU Mug-4 and Patuakhali local Mung and the role of weather parameters on the population mobility of insects at the farmer's field of sadar upazila of Patuakhali district, Bangladesh during late Robi season 2016. Variety BARI Mung-4 had the lowest number of leaf folder while variety BARI Mung-6 had the highest number of leaf folder indicating higher susceptibility to leaf folder. Variety BARI Mung-4 had the lowest number of gram pod borer and BARI Mung-6 had the highest abundance of gram pod borer followed by BINA Moog-7. Variety BINA Moog-4 had the lowest number of legume pod borer and BARI Mung-6 had the highest abundance of legume pod borer followed by BINA Moog-7. Population of leaf folder showed a negative correlation (R^2= -0.020) with temperature. Similarly, gram pod borer (R^2= -0.317) and legume pod borer (R^2= -0.014) showed a negative correlation with temperature. In case of relative humidity, population of leaf folder (R^2= -0.175) showed a negative correlation while gram pod borer showed a positive correlation (R^2= 0.031) but legume pod borer (R^2= -0.086) showed a negative correlation.

KEYWORDS

gram pod borer, leaf folder, legume pod borer, relative humidity, temperature.

1. INTRODUCTION

Mungbean (*Vigna radiata* (L.) Wilczek) is an important pulse crop and a protein (22-24%) rich source (Nazir, 1994). It is an excellent source of easily digestible protein which complements the stable rich diet in the country. It also contains amino acid lysine, which is generally deficit in food grains (Elias *et. al.,* 1986). After chickpea, mungbean is called as poor people diet owing to its protein nature and is meeting the major protein demand of the people (Shafique *et. al.,* 2009). Additionally, it has the unique ability to fix the atmospheric nitrogen (58-109 kg/ha) in symbiotic association with *Rhizobium* bacteria, which not only enables it to meet its own nitrogen requirement but also benefits the succeeding crops (Ali, 1992). Mungbean is a tropical and sub-tropical crop that requires a warm temperature system.

The optimum temperature ranges from 20°-35°C based on season (BARC, 2013). It is sensitive to cloudy weather and cannot tolerate frost (Gowda and Kaul, 1982). It is also cultivated in hot, dry regions in Southern Europe and the Southern United States. It is grown in three seasons in a year in Bangladesh and more than 70% mungbean area is concentrated in the three southern districts viz. Patuakhali, Barisal, and Noakhali within AEZ 13 and 18 and Patuakhali alone occupies about 30% area (Mondol *et. al.,* 2013). Mungbean is usually sown in this region at the end of January to mid-February. Most of the soils in this region are cracking clay type which becomes compact and hard on drying (Choudhury *et. al.*, 2000). There are many constraints such as varietal aspect, climatic factors, management practices, diseases and insect pests etc. responsible for the poor yield of mungbean (Rahman *et. al.,* 1981).

Mungbean is one of the most promising pulse crops in Bangladesh and there are various obstacles for its low yield. Among the various obstacles, insect pests are considered to be the most important one. The relative abundance of different species of mungbean insect pest is not identical in all seasons. The severity of the damage is related to the abundance of different insects and environmental conditions. Several insect pests have been reported to infest mungbean and damage the seedlings, leaves, stems, flowers, buds, pods causing considerable losses (Sehgal and Ujagir, 1988; Karim and Rahman, 1991). Depending on the growing season, management practices and crop variety the abundance and infestation level of insect pests of mungbean existed separately. Among major insect pests (i.e., leaf folder, gram pod borer and legume pod borer) are most damaging in the climatic condition of Bangladesh.

In mungbean larvae of leaf folder fold the leaves and feed on green tissues (the mesophyll layer) of the leaf causing in the appearance of linear, pale-white stripe damage. Ultimately the damaged leaves dry up or even plant may die. Pod borer is one of the serious pests of mungbean (Rahman *et. al.*, 1981) and attacks at flowering and pod filling stage. In the field, gram pod borer and legume pod borer is considered to be a major insect pests in Bangladesh. The larvae bore into the young pods, stay there and feed on

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the seeds inside. Sometimes the larvae may roll up the leaves shift to pods be a serious pest of pigeon pea in India (Patnaik *et. al.*, 1986). Therefore, the present research was conducted to assess 15 varieties including Patuakhali local variety of mungbean and to identify the influence of these varieties and weather parameters on the population mobility of leaf folder, gram pod borer and legume pod borer of mungbean.

2. Materials and Methods

The experiment was conducted at the farmer's field of sadar upazila of Patuakhali district, Bangladesh to screen mungbean varieties against major insect pests *i.e.*, leaf folder (*Cnaphalocrocis medinalis*), gram pod borer (*Helicoverpa armigera*) and legume pod borer (*Maruca vitrata*) of mungbean and their yield performances during late Robi season 2016.

2.1 Experimental location

It was located in between 22°14' and 22°29' North latitudes and in between 90°12' and 90°28' East longitudes (BANGLAPEDIA: National Encyclopedia of Bangladesh, 2015). It is adjacent to the Bay of Bengal and this area lies at 0.9 to 2.1 metre above mean sea level (Iftekhar and Islam, 2004).

2.2 Experimental layout and fertilizer application

Experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Each replication represented a block which was divided into 15 unit plots. There were 45 unit plots altogether in the experiment. Each unit plot (4 m x 2.5 m) was made ready as per treatment design. The distance from block to block and from plot to plot was 1.0 m and 0.5 m, respectively. The fertilizers were applied as per fertilizers recommendation guide (BARI, 2011). Urea, triple super phosphate (TSP) and muriate of potash (MoP) were applied in the field uniformly @ 50, 85 and 35 kg ha^{-1}, respectively during the final land preparation. The fertilizers were then properly mixed with the soil by spading and the plots of the experimental unit were leveled.

2.3 Planting materials and sowing of seed in the field

15 mungbean varieties *viz*., BARI Mung-1, BARI Mung-2, BARI Mung-3, BARI Mung-4, BARI Mung-5, BARI Mung-6, BINA Moog-4, BINA Moog-5, (Anonymous, 1986). In addition to mungbean, this pest is also reported to BINA Moog-6, BINA Moog-7, BINA Moog-8, BU Mug-1, BU Mug-2, BU Mug-4 and Patuakhali local Mung were used as study materials. The seeds of these mungbean varieties were collected from Bangladesh Agricultural Research Institute (BARI), Gazipur, Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur and Patuakhali local Mung variety collected from farmers' of Patuakhali district, Bangladesh. The seeds of mungbean were sown on the 29th January, 2016 at the rate of 30 kg ha^{-1} (BARI, 2011). In rows, the seeds were sown continuously at a depth of 6-7 cm and covered by loose soil by hand. The distance from row to row was 30 cm.

2.4 Data collection of insect pests

The plants were exposed to natural insect pests' infestation and insecticide was not applied during the experimental. Population of leaf folder, gram pod borer and legume pod borer were recorded at an interval of 7 days commencing from first incidence. All plants from each unit plot were observed individually and the number of leaf folder, gram pod borer and legume pod borer were recorded at early in the morning (6.30 a.m.-9.00 a.m.). Data on insect pests were recorded at 18, 25, 32, 39, 46 days after sowing (DAS) for leaf folder and at 51, 58, 65 DAS for gram pod borer and legume pod borer. During experimental period meteorological data on temperature and relative humidity (RH) were collected from the Weather Observatory, Meteorological office, Patuakhali.

2.5 Statistical analysis

The collected data was statistically analyzed through the analysis of variance using Web Agri Stat Package (WASP 1.0). Means were separated by critical difference (CD) values at 5% level of significance. The insect population data were transformed to square root ($\sqrt{x + 0.5}$) values.

3. Results

3.1 Abundance of leaf folder

Mean population of leaf folder per plot at 18, 25, 32, 39 and 46 days after sowing (DAS) is presented in Table 1.

Table 1: Mean number of leaf folder per plot at different days after sowing on 15 mungbean varieties

Varieties	Mean Number of leaf folder per plot					Mean
	18 DAS	25 DAS	32 DAS	39 DAS	46 DAS	
BARI Mung-1	0.88 c	1.29 bcd	1.65 cd	1.27 bcd	1.17 bc	1.25def
BARI Mung-2	0.71 c	1.17 bcd	2.06 bcd	1.65 abcd	1.05 bc	1.33def
BARI Mung-3	0.71 c	1.27 bcd	2.20 abc	1.81 abc	1.05 bc	1.41 cd
BARI Mung-4	0.88 c	1.05 cd	1.72 bcd	0.88 d	1.05 bc	1.08 f
BARI Mung-5	1.00 bc	1.56 abc	2.00 bcd	2.04 ab	1.46 ab	1.61bc
BARI Mung-6	1.46 a	1.86 a	2.91 a	2.08 ab	1.94 a	2.05 a
BINA Moog-4	0.71 c	1.05 cd	2.23 abc	1.17 cd	1.00 bc	1.10ef
BINA Moog-5	0.88 c	0.88 d	1.34 d	1.35 abcd	0.88 c	1.10ef
BINA Moog-6	0.71 c	1.17 bcd	1.94 bcd	1.17 cd	0.88 c	1.17def
BINA Moog-7	1.34 ab	1.86 a	2.90 a	2.11 a	1.22 bc	1.89ab
BINA Moog-8	0.88 c	1.34 abcd	2.26 abc	1.29 abcd	1.05 bc	1.36cde
BU Mug-1	0.71 c	1.65 ab	2.39 abc	0.88 d	0.88 c	1.30def
BU Mug-2	1.00 bc	1.17 bcd	2.40 abc	1.34 abcd	1.05 bc	1.39 cd
BU Mug-4	0.88 c	1.46 abc	1.86 bcd	1.18 cd	1.00 bc	1.28def
Patuakhali local Mung	1.05 abc	0.88 d	2.48 ab	1.05 cd	1.05 bc	1.30def
CV (%)	29.78	25.27	22.15	35.27	29.03	12.00
CD (0.05)	0.45	0.55	0.79	0.84	0.54	0.28

Note: In a column means having dissimilar letter(s) differ significantly as per 0.05 level of probability. CV- Coefficient of Variation, CD- Critical Difference, DAS- Days after Sowing

At 18 DAS, significantly the highest number of leaf folder per plot was recorded on BARI Mung-6 (1.46) followed by that of BINA Moog-7 (1.34). The lowest number of leaf folder per plot was observed on variety BARI Mung-2 (0.71) which statistically similar to that of BARI Mung-3 (0.71), BINA Moog-4 (0.71), BINA Moog-6 (0.71) and BU Mug-1 (0.71).

At 25 DAS, significantly the highest number of leaf folder per plot was recorded on BARI Mung-6 (1.86) which statistically similar to that of BINA Moog-7 (1.86). The lowest number of leaf folder per plot was observed on variety BINA Moog-5 (0.88) which statistically similar to that ofPatuakhali local Mung (0.88).

At 32 DAS, significantly the highest number of leaf folder per plot was recorded on BARI Mung-6 (2.91) which statistically similar to that of BINA Moog-7 (2.90). The lowest number of leaf folder per plot was observed on variety BINA Moog-5 (1.34) followed by that of BARI Mung-1 (1.65).
At 39 DAS, significantly the highest number of leaf folder per plot was recorded on BINA Moog-7 (2.11) followed by that of BARI Mung-6 (2.08) and BARI Mung-5 (2.04). The lowest number of leaf folder per plot was observed on variety BARI Mung-4 (0.88) which statistically similar to that of BU Mug-1 (0.88).

At 46 DAS, significantly the highest number of leaf folder per plot was also `recorded on BARI Mung-6 (1.94) followed by that of BARI Mung-5 (1.46). The lowest number of leaf folder per plot was observed on variety BINA Moog-5 (0.88) which statistically similar to that of BINA Moog-6 (0.88) and BU Mug-1 (0.88).

It was evident that the leaf folder abundance per plot was the highest on BARI Mung-6 which was highly susceptible to leaf folder followed by that of varieties BINA Moog-7 and BARI Mung-5. The variety BARI Mung-4 was the least susceptible to leaf folder followed by BINA Moog-4 and BINA Moog-5. None of the tested varieties showed complete resistance against leaf folder while variety BARI Mung-4 was found comparatively tolerant to leaf folder among the tested varieties.

3.2 Abundance of gram pod borer

Mean population of gram pod borerper plot at 51, 58 and 65 days after sowing (DAS) is presented in Table 2.

Table 2: Mean number of gram pod borer per plot at different days after sowing on 15 mungbean varieties

Varieties	Mean number of gram pod borer per plot			Mean
	51 DAS	58 DAS	65 DAS	
BARI Mung-1	1.27 bcd	1.82 bc	1.44 abcde	1.45 cd
BARI Mung-2	1.00 cd	1.44 cd	1.27 bcde	1.24 cde
BARI Mung-3	1.00 cd	1.56 bcd	1.00 e	1.19 de
BARI Mung-4	0.88 d	1.34 cd	0.88 e	1.03 e
BARI Mung-5	1.10 cd	1.87 bc	1.47 abcde	1.48 cd
BARI Mung-6	2.20 a	2.48 a	2.04 a	2.24 a
BINA Moog-4	1.05 cd	1.22 d	1.39 abcde	1.22 de
BINA Moog-5	2.04 ab	1.76 bcd	1.86 abc	1.88 b
BINA Moog-6	1.17 cd	1.65 bcd	1.17 cde	1.33 cde
BINA Moog-7	1.74 abc	2.08 ab	1.95 ab	1.93 ab
BINA Moog-8	1.05 cd	1.56 bcd	1.87 abc	1.49 cd
BU Mug-1	1.29 bcd	1.65 bcd	1.10 de	1.35 cde
BU Mug-2	1.27 bcd	1.64 bcd	1.56 abcde	1.49 cd
BU Mug-4	1.29 bcd	1.68 bcd	1.77 abcd	1.58 bc
Patuakhali local Mung	1.27 bcd	1.74 bcd	1.19 cde	1.50 cd
CV (%)	35.27	20.17	29.95	14.36
CD(0.05)	0.77	0.57	0.74	0.35

Note: In a column means having dissimilar letter(s) differ significantly as per 0.05 level of probability. CV- Coefficient of Variation, CD- Critical Difference, DAS- Days after Sowing

At 51 DAS, significantly the highest number of gram pod borerper plot was recorded on BARI Mung-6 (2.20) followed by that of BINA Moog-5 (2.04). The lowest number of gram pod borer per plot was observed on variety BARI Mung-4 (0.88). The number in variety BARI Mung-2 was statistically identical to that of BARI Mung-3.

At 58 DAS, significantly the highest number of gram pod borerper plot was recorded on BARI Mung-6 (2.48) followed by that of BINA Moog-7 (2.08). The lowest number of gram pod borerper plot was observed on variety BINA Moog-4 (1.22) while no significant differences were observed among that of varieties BARI Mung-4 (1.34) and BARI Mung-2 (1.44).

At 46 DAS, significantly the highest number of gram pod borerper plot was recorded on BARI Mung-6 (2.04) followed by that of BINA Moog-7 (1.95). The lowest number of gram pod borer per plot was observed on variety BARI Mung-4 (0.88) followed by that of BARI Mung-3 (1.00).

From the mean of all varieties gram pod borer population was higher in variety BARI Mung-6 and was susceptible to gram pod borer followed by that of BINA Moog-7 and BINA Moog-5. BARI Mung-5, BINA Moog-8 and BU Mug-2were found moderately susceptible while BARI Mung-4 was the least susceptible to gram pod borer followed by BARI Mung-3 and BINA Moog-4.

3.3 Abundance of legume pod borer

Mean population of legume pod borer per plot at 51, 58 and 65 days after sowing (DAS) is presented in Table 3.

At 51 DAS, significantly the highest number of legume pod borer per plot was recorded on BARI Mung-6 (2.39) followed by that of BARI Mung-5 (2.11). The lowest number of legume pod borer per plot was observed on variety BINA Moog-4 (0.88) followed by that of BARI Mung-3 (1.05).

At 58 DAS, significantly the highest number of legume pod borer per plot was recorded on BARI Mung-6 (3.75) followed by that of BINA Moog-7 (3.69). The lowest number of legume pod borer per plot was observed on variety BINA Moog-4 (1.56) followed by that of variety BARI Mung-3 (1.86).

At 46 DAS, significantly the highest number of legume pod borer per plot was recorded on BARI Mung-6 (2.11) followed by that of BINA Moog-7 (1.95). The lowest number of legume pod borer per plot was observed on variety BARI Mung-3 (0.71) which statistically similar to that of BINA Moog-4(0.71).

From the mean of all varieties legume pod borer population was higher in variety BARI Mung-6 and was susceptible to legume pod borer followed by that of BINA Moog-7 and BARI Mung-5. BARI Mung-1, BU Mug-2 and Patuakhali local Mung were found moderately susceptible while BINA Moog-4 was the least susceptible to legume pod borer followed by BARI Mung-3.

Table 3: Mean number of legume pod borer per plot at different days after sowing on 15 mungbean varieties

Varieties	Mean Number of legume pod borer per plot			Mean
	51 DAS	58 DAS	65 DAS	
BARI Mung-1	1.34 c	2.79 abcd	1.05 cd	1.73 c
BARI Mung-2	1.29 c	2.46 cde	1.29 cd	1.68 cd
BARI Mung-3	1.05 c	1.86 de	0.71 d	1.21 d
BARI Mung-4	1.17 c	3.14 abc	1.35 bcd	1.89 bc
BARI Mung-5	2.11 ab	3.39 abc	1.35 bcd	2.28 ab
BARI Mung-6	2.39 a	3.75 a	2.11 a	2.75 a
BINA Moog-4	0.88 c	1.56 e	0.71 d	1.18 d
BINA Moog-5	1.27 c	3.12 abc	1.05 cd	1.81 bc
BINA Moog-6	1.17 c	2.57 abcde	1.17 cd	1.64 cd
BINA Moog-7	1.57 bc	3.69 ab	1.95 ab	2.40 a
BINA Moog-8	1.10 c	2.59 abcde	1.05 cd	1.58 cd
BU Mug-1	1.29 c	3.14 abc	1.05 cd	1.83 bc
BU Mug-2	1.27 c	2.52 bcde	1.44 bc	1.74 c
BU Mug-4	1.17 c	2.63 abcde	1.05 cd	1.62 cd
Patuakhali local Mung	1.35 c	3.02 abcd	0.88 cd	1.75 c
CV (%)	33.64	25.41	32.07	17.10
CD (0.05)	0.76	1.20	0.66	0.51

Note: In a column means having dissimilar letter(s) differ significantly as per 0.05 level of probability. CV- Coefficient of Variation, CD- Critical Difference, DAS- Days after Sowing

3.4 Effect of weather parameters on incidence of leaf folder

There was a negative correlation (R^2 = -0.020) between the population of leaf folder and temperature. It indicates that the population of leaf folder was decreased with increasing temperature. A linear regression was fitted between temperature and population of leaf folder (Figure 1). The regression equation y = a + bx, where y = population of leaf folder, a = 3.316, b = -0.069 and x = temperature. The contribution of the regression (R^2 = 0.020) was 2%.

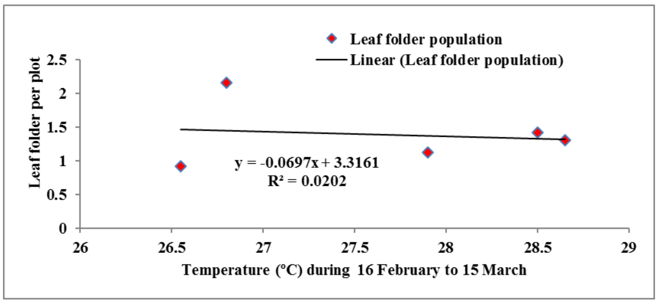

Figure 1: Relationship between the population of leaf folder and temperature

There was a negative correlation (R^2 = -0.175) between the population of leaf folder and relative humidity. It indicates that the population of leaf folder was decreased with increasing relative humidity. A linear regression was fitted between relative humidity and population of leaf folder (Figure 2). The regression equation y = a + bx, where y = population of leaf folder, a = 5.581, b = -0.057 and x = relative humidity. The contribution of the regression (R^2 = 0.175) was 17.5%.

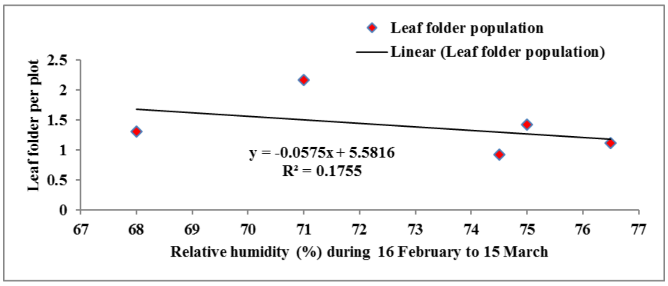

Figure 2: Relationship between the population of leaf folder and humidity

3.5 Effect of weather parameters on incidence of gram pod borer

There was a negative correlation (R^2 = -0.317) between the population of gram pod borer and temperature. It indicates that the population of gram pod borer was decreased with increasing temperature. A linear regression was fitted between temperature and population of gram pod borer (Figure 3). The regression equation y = a + bx, where y = population of gram pod borer, a = 7.074, b = -0.197 and x = temperature. The contribution of the regression (R^2 = 0.317) was 31.7%.

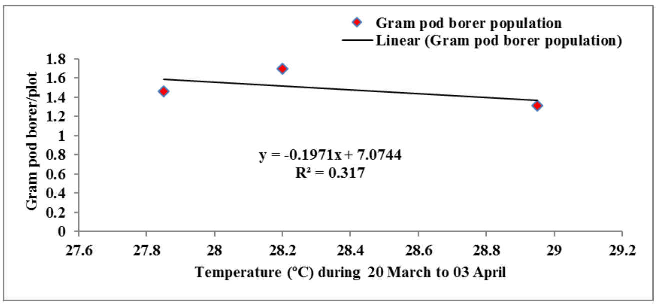

Figure 3: Relationship between the population of gram pod borer and temperature

There was a positive correlation (R^2 = 0.031) between the population of gram pod borer and relative humidity. It indicates that the population of gram pod borer was increased with increasing relative humidity. A linear regression was fitted between relative humidity and population of gram pod borer (Figure 4). The regression equation y = a + bx, where y = population of gram pod borer, a = 0.779, b = 0.008 and x = relative humidity. The contribution of the regression (R^2 = 0.031) was 3.1%.

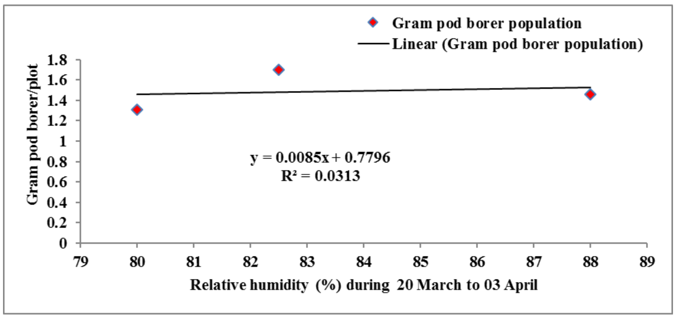

Figure 4: Relationship between the population of gram pod borer and humidity

3.6 Effect of weather parameters on incidence of legume pod borer

There was a negative correlation (R^2 = -0.014) between the population of legume pod borer and temperature. It indicates that the population of legume pod borer was decreased with increasing temperature. A linear regression was fitted between temperature and population of legume pod borer (Figure 5). The regression equation y = a + bx, where y = population of legume pod borer, a = 7.276, b = -0.193 and x = temperature. The contribution of the regression (R^2 = 0.014) was 1.4%.

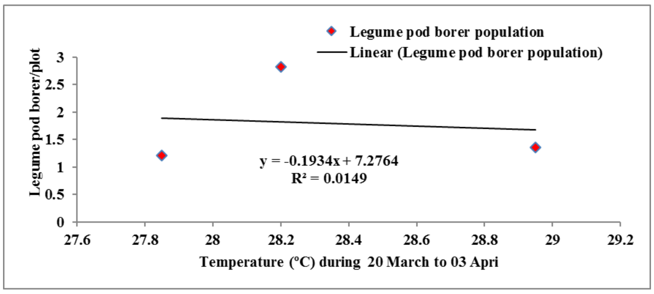

Figure 5: Relationship between the population of legume pod borer and temperature

There was a negative correlation (R^2 = -0.086) between the population of legume pod borer and relative humidity was obtained (Figure 6). It indicated that population of legume pod borer was decreased with increasing relative humidity. The regression equation y = a + bx, where y = population of legume pod borer, a = 7.118, b = -0.063 and x = relative humidity. The contribution of the regression (R^2 = 0.086) was 8.6%.

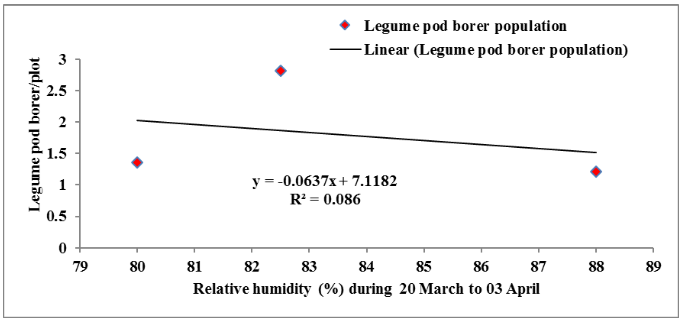

Figure 6: Relationship between the population of legume pod borer and humidity

4. Discussion

The incidence and development of all the insect pests are much dependent upon the prevailing weather conditions; which showed agreement with Aheer *et al.* (1994). Similar findings are also observed by Hossain *et al.* (2012) who found that the incidence and population fluctuation of various insect pests was very much dependent on the prevailing climatic conditions of the cropping season. Sarkar *et al.* (2008) observed that the severity of major insect pests on mungbean might be due to variable weather conditions in the two cropping seasons. Akhgauri *et al.* (1994) reported that the pod borer community remained active from January to March, with their collective larval population being more during end of February to third week of March. Yadav and Singh (2013) reported that pod borer population showed negatively correlation with temperature. Afterwards, Yadav and Singh (2015) reported that the correlation of pod borer with weather factors exhibited significantly negative correlation with temperature. These findings are found by Khan et al. (2018) who reported that the tested mutants did not show resistance against pod borer but rather found highest abundance of pod borer in BARI moog-6 and further noted that pod borer abundance showed a negative relationship with humidity.

5. Conclusion

On the basis of present study conducted on mungbean, it may be concluded that the varieties did not show complete resistance against major insect pests (i.e., leaf folder, gram pod borer and legume pod borer) associated with temperature and relative humidity could be used for evaluating varieties in insect pests' prone areas.

References

Ali, M., 1992. Weeds are great threat to kharif pulses. Indian Farming. 42, 29-30.

Aheer, G.M., Ahmed, K.J., Ali, A., 1994. Role of weather in fluctuating aphid density in wheat crop. Journal of Agricultural Research. 32(1), 295–301.

Akhgauri, R.K., Sinha, M.M. Yadav, R.P., 1994. Population build up and relative abundance of pod borer complex in the main season

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of pigeon pea, *Cajanus cajan*. Journal of Entomology. 18(3), 217-222.

ANON., 1986. Annual Report. Bangladesh Institute of Nuclear Agriculture Mymensingh. p. 117.

BANGLAPEDIA: National Encyclopedia of Bangladesh (5 February 2015): en.banglapedia.org/index.php?title = Patuakhali_Sadar_Upazila.

BARC., 2013. Bangladesh Agricultural Research Council, Farmgate, Dhaka. Published HandBook of Agricultural Technology. p. 61.

BARI., 2011. Krishi Projukti Hatboi (Handbook on Agro-technology), 5th edition Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh. pp. 164-165.

Choudhury, D.A., Hasem, A., Miah, G.U., 2000. Mungbean seed germination under soil moisture regimes. Bangladesh Journal of Agricultural Research. 25(2), 375-377.

Elias, S.M., Hossain, M.S., Sikder, F.S., Juber Ahmed, Rezaul Karim, M., 1986. Identification of constraints to pulse production with special reference to present farming systems. Annual Report of the Agricultural Economics Division, BARI, Joydebpur. p. 1.

Gowda, C.L.L. Kaul, A.K., 1982. Pulses in Bangladesh. Bangladesh Agricultural Research Institute, Joydebpur, Dhaka and Food & Agricultural Organization of the United Nations. pp. 154-167.

Hossain, M.A., Alam, M.J., Zaman, M.S., 2012. Effect of seasonal variation in different sowing dates on the incidence of major insect pests and yield of mungbean. The Annals of Bangladesh Agriculture. 16(1), 55-70.

Iftekhar, M.S., Islam, M.R., 2004. Managing mangroves in Bangladesh: A strategy analysis. Journal of Coastal Conservation. 10, 139-146.

Karim, M.A., Rahman, M.M., 1991. Status of insect and vertebrate pest management research on pulses. pp. 135-138. In: Proceedings of the Second National Workshop on Advances in Pulses Research in Bangladesh, 6-8 June 1989, Joydebpur, Bangladesh.

Khan, M.M.H., Islam, M.M., Asaduzzaman, M., Uddin, M.N., 2018. Mutants and weather parameters affecting the population dynamics of three major insect pests of mungbean. SAARC Journal of Agriculture. 16(2), 1-12. doi.org/10.3329/saj.v16i2. 40254

Mondol, M.E.A., Rahman, H., Rashid, M.H., Hossain, M.A., Islam, M.M., 2013. Screening of mungbean germplasm for resistance to mungbean yellow mosaic virus. International Journal of Sustainable Crop Production. 8(1), 11-15.

Nazir, M.S., 1994. Crop Production. NBF, Islarnabad, p.51.

Patnaik, N.P., Samalo, A.P., Samalo, B.N., 1986. Susceptibility of some early varieties of pigeon pea for pod borer under protected conditions. Legume Research. 9(1), 7-10.

Rahman, M.M., Mannan, M.A., Islam, M.A., 1981. Pest survey of major summer and winter pulses in Bangladesh. In Proc. National Workshop on Pulses (eds.) A.K. Kaul. pp. 265-273.

Sarkar, M.A., Mannan, M.A., Dutta, N.K., Mahmudunnabi, M., Salim, M.M.R. 2008. Incidence of major insect pests attacking mungbean in relation to seasonal variation. Bangladesh Journal of Entomology. 18(1), 101-106.

Sehgal, V.K., Ujagir, R., 1988. Insect and pest management of mungbean in India.Mungbean: Proceedings of the Second International Symposium. Asian Vegetable Research and Development Centre, Shanhua, Taiwan.

Shafique, M., Nadeem, S., Hamed, M., Atta, B.M., Shah, T.M., 2009. Performance of some advance desi chickpea genotypes against pod borer, *Helicoverpa armigera* (Hubner) resistance. Pakistan Journal of Zoology. 41, 277-280.

WASP 1.0 (ICAR – Central Coastal Agricultural Research Institute, Goa, Web Access Statistical Packages. http://icargoa.res.in/waspnew.html)

Yadav, N.K., Singh, P.S., 2013. Seasonal abundance of insect pests on mungbean and its correlation with abiotic factors. Journal of Entomological Research. 37(4), 297-299.

Yadav, N.K., Singh, P.S., 2015. Population dynamics of insect pests of Mungbean (*Vigna radiata* L. Wilczek) in Gangetic plains. Journal of Food Legumes. 28(2), 82-84