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SEASONAL FLUCTUATION OF INSECT PESTS OF BRINJAL AT AGRICULTURAL RESEARCH STATION, BURIRHAT, RANGPUR

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ABSTRACT

Rashid MH, Khatun MJ, Mahfuz MS, Dash CK, Hussain MA (2013) Seasonal fluctuation of insect pests of brinjal at agricultural research station, Burirhat, Rangpur. *Int. J. Expt. Agric.* 3(1), 4-8.

The experiment was conducted at Agricultural Research Station, Burirhat, Rangpur during 2011-2012 cropping season to know the seasonal fluctuation of insect pests of brinjal. The major insect pests were found in brinjal crop *viz*. brinjal shoot and fruit borer (BSFB), aphid, white fly, jassid and thrips. However, the peak population of whitefly (23.6 whieflies/5 leaves) was on the third week of December. Thrips (22.67 thrips/5 cm and aphid (91.8 aphids/5 leaves) population reached peak in the last week of February, while jassid (8 jassids/5 leaves) and brinjal shoot and fruit borer (15.3 BSFB/trap) population reached peak in 2nd week of April. Average temperature recorded significant positive correlation with the population of aphid, jassid, thrips and BSFB. A significant negative relationship was noticed with population of whitefly. Average relative humidity had significant negative correlation with aphid and BSFB. A significant positive correlation was observed between rainfall and jassid and also with BSFB. Mealy bug, leaf hopper, epilachna beetle, leaf roller, red spider mite, *Spodoptera litura* and squash bug appeared as the minor and infrequent pests of brinjal.

Key words: *brinjal, seasonal fluctuation, population, correlation*

INTRODUCTION

Brinjal (*Solanum melongena* L.) is one of the widely used vegetable crops by most of the people and is popular in many countries *viz.*, Central, South and South East Asia, some parts of Africa and Central America (Harish *et al*. 2011). Brinjal, is one of the three most important vegetables in South Asia (India, Bangladesh, Nepal and Srilanka), which accounts for almost 50% of the world`s area under cultivation (Alam *et al*. 2003).

Brinjal, also known as eggplant or aubergine belonging to the family "Solanaceae". The family contains more than 2450 species distributed in 95 genera (Mabberley 2008). Among the vegetable crops grown in Bangladesh, brinjal is the most popular vegetables grown widely. Due to its nutritive value, consisting of minerals like iron, phosphorous, calcium and vitamins like A, B and C, unripe fruits are used primarily as vegetable in the country. It is also used as a raw material in pickle making (Singh *et al.* 1963) and as an excellent remedy for those suffering from liver complaints. It has been reported as Ayurvedic medicine for curing the diabetes. In addition it is used as a good appetizer, good aphrodisiac, cardiotonic, laxative and reliever of inflammation. Though brinjal is a summer crop, it is being grown throughout the year under irrigated condition. The average yield of brinjal in Bangladesh is very low. There are many reasons responsible for such poor yield. These include biotic factors as insect pests and pathogens. The losses caused by brinjal pests vary from season to season depending upon environmental factors (Gangwar and Sachen, 1981). Several pests are becoming predominated while some major pests become minor. Hence, it is subjected to attack by number of insect pests right from nursery stage till harvesting (Regupathy *et al.* 1997). Among the insect pests infesting brinjal, the major ones are shoot and fruit borer, *Leucinodes orbonalis* (Guen.), whitefly, *Bemicia tabaci* (Genn.), leafhopper, *Amrasca biguttula biguttula* (Ishida), and non insect pest, red spider mite, *Tetranychus macfurlanei* (Baker and Pritchard). Different biotic and abiotic factors *viz*. climate change, indiscriminate use of pesticides etc. are changing the insect pests scenarios. To effectively implement Integrated Pest Management (IPM) programs, it is first necessary to monitor the seasonal variations in pest populations. Such study will provide an opportunity to fact the pest challenge by manipulating the manageable ecological parameters in the form of planting or harvesting time adjustment, correct time of pesticide application etc. Therefore, the present study was formulated to observe the population fluctuation of major insect pests of brinjal.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Station, Burirhat, Rangpur during 2011-2012 cropping season. The experiment was laid out in RCB design with three replication. The row to row distance was kept to be 75 cm and plant to plant to be 60 cm. The plot size was maintained at 6×3 m. No plant protection measure was applied. All the recommended agronomic practices were adopted during the experiment. Observations were made at weekly intervals throughout the cropping season and number of insect pests recorded on 15 randomly selected plants. The pheromone traps was placed for brinjal shoot and fruit borer catch. Number of brinjal shoot and fruit borer caught in the pheromone traps recorded. The meteorological parameters *viz*. temperature, relative humidity and rainfall were also recorded during the study period (November, 2011 to April, 2012). The mean values of previous 7 days data of the above parameters were computed for 7th days of observations.

RESULTS AND DISCUSSION

The meteorological parameters *viz.* maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity and rainfall were showed at Table 1 during the insects infestation period(63 days crop age to 175 days crop age) at 7 days interval at ARS, Burirhat, Rangpur.

Table 1. Meteorological data during the insects infestation period at 7 days interval at ARS, Burirhat, Rangpur

Observation Date	Crop age (DAS)*	Temperature (^{0}C)		Relative humidity (%)		Rainfall (mm)
		Max.	Min.	Max.	Min.	
21.12.2011	63	18.8	10.6	74	60	0
28.12.2011	70	24.7	10.6	98	46	0
04.01.2012	77	22.4	11.8	98	60	0.004
11.01.2012	84	22.5	9.6	98	61	0
18.01.2012	91	18.4	7.2	99	70	0
25.01.2012	98	22.1	9.2	96	50	0
01.02.2012	105	24.4	11.3	96	43	0
08.02.2012	112	26.7	13.1	95	44	0
15.02.2012	119	26.6	13.3	97	44	0.29
22.02.2012	126	25.8	15.4	97	51	0.086
29.02.2012	133	28.5	14.6	96	32	0
07.03.2012	140	29.7	15.5	91	34	0
14.03.2012	147	30	17.3	92	38	0.119
21.03.2012	154	30.7	19.3	90	49	0.029
28.03.2012	161	30.2	21	89	45	0
04.04.2012	168	30.6	20.5	90	43	1.971
11.04.2012	175	27.1	19.7	90	43	7.079

*DAS-Days After Sowing

Seasonal incidence of aphid (*Aphis gossypii*)

Incidence of the aphid on brinjal crop was first noticed on 21 December, 2011 (0.4 aphids/5 leaves) and there was a gradual increase in aphid population upto 15 February, 2012 and then increased sharply reached its peak (91.8 aphids/5 leaves) on 29 February, 2012 at 133 days crop age. From 140 days crop age on 07 March, 2012 onwards there was rapidly decline in aphid population and reached to a lowest population of 3.8 aphids/5 leaves at 175 days after sowing on 11 April, 2012 (Fig. 1).

Seasonal incidence of whitefly (*Bemisia tabaci*)

The highest population of whitefly on brinjal was found at 63 days crop age on 21 December, 2011 (23.6 whieflies/5 leaves). Then, there was gradual decline in whitefly population and reached to a lowest population of 0.1 whieflies/5 leaves at 168 days crop age on 04 April, 2012 (Fig. 1).

Seasonal incidence of jassid (*Amrasca biguttula*)

Activity of Jassid on brinjal crop started from at 63 days crop age on 21 December, 2011 (0.2 jassid /5 leaves) and there was a gradual increase in jassid population and the highest population at 175 days crop age on 11 April, 2012 (8 jassid/5 leaves). However, population was low throughout the cropping season (Fig. 1).

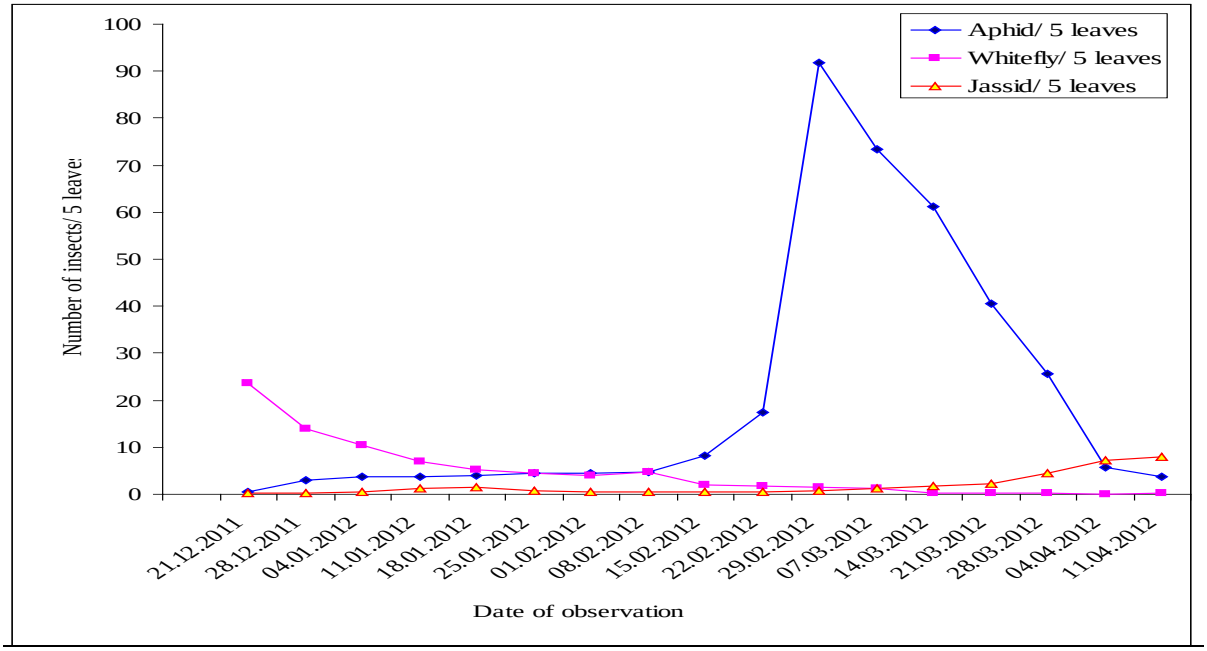

Fig. 1. Population fluctuation of aphid, white fly, jassid in brinjal at ARS, Burirhat, Rangpur during 2011-12

Seasonal incidence of thrips (*Thrips palmi*)

Incidence of the thrips on brinjal crop was first recorded on 21 December, 2011 (0.65 thrips/5 cm twig) and there was a gradual increase in thrips population and reached a peak at 133 day crop age on 29 February, 2012 (22.67 thrips/5 cm twig). Then, there was gradual decline in thrips population and reached to a lowest population (2.67 thrips/5 cm twig) at 175 days crop age on 11 April, 2012 (Fig. 2).

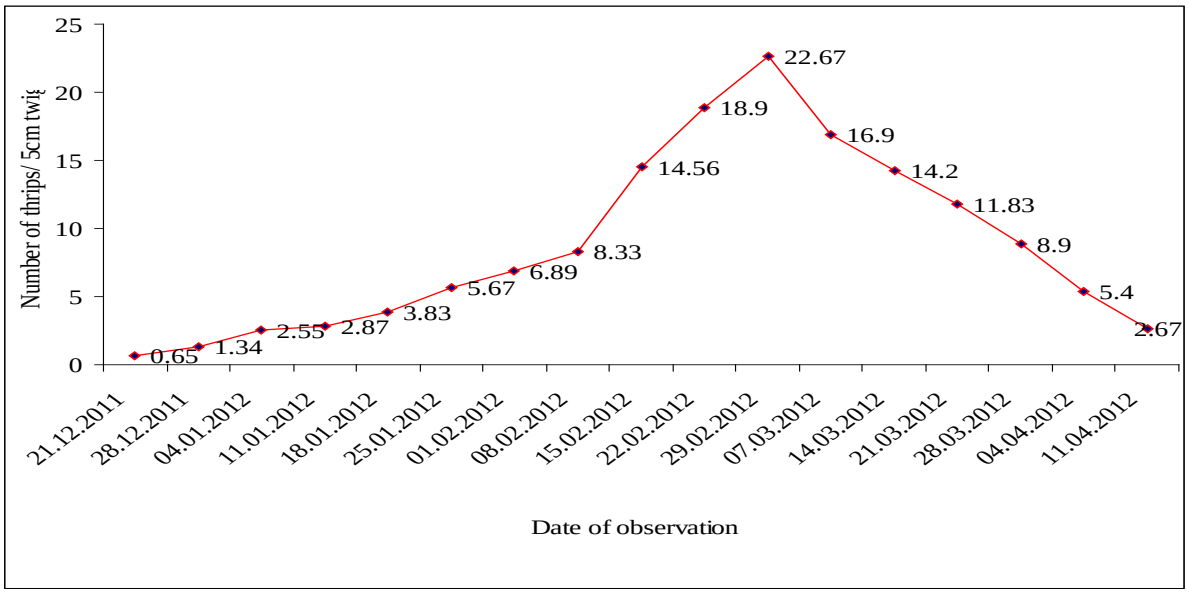

Fig. 2. Population fluctuation of thrips in brinjal at ARS, Burirhat, Rangpur during 2011-12

Seasonal incidence of male brinjal shoot and fruit borer (*Leucinodes orbonalis*)

Seasonal incidence was monitored through placing sex traps. Pheromone trap collections of BSFB were started in 21 December, 2011. BSFB moths have been collected every week. At 63 days crop age on 21 December, 2011 captured BSFB were 0.3/trap and there was a gradual increase in BSFB population. The highest number of captured BSFB was 15.3/trap at 175 days crop ages on 11 April, 2012 (Fig. 3).

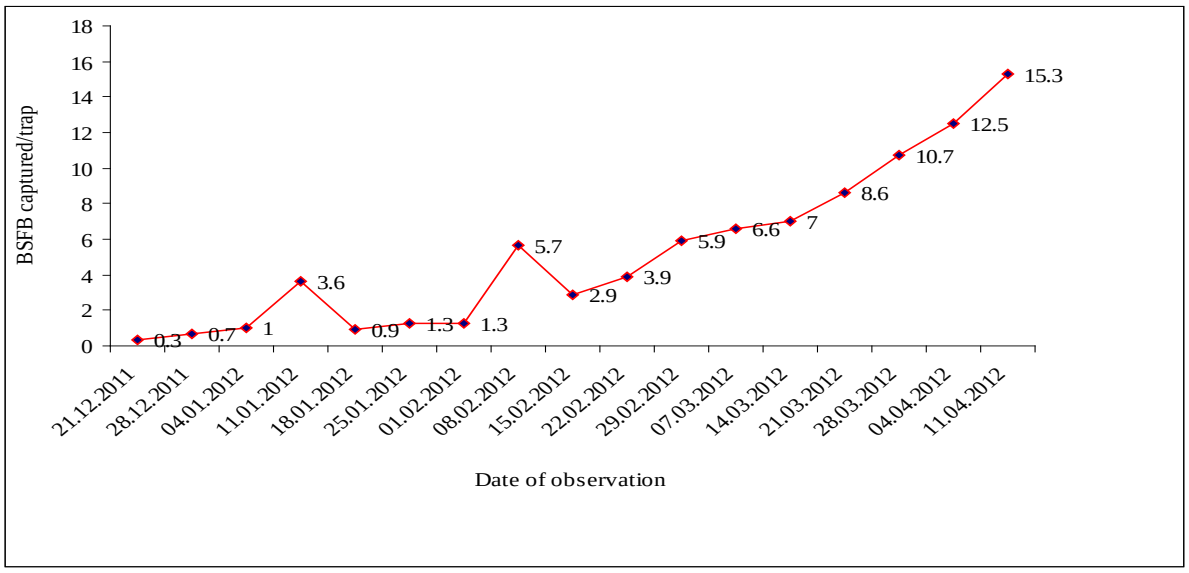

Fig. 3. BSFB captured at different dates in pheromone trap at ARS, Burirhat, Rangpur during 2011-12

The fruit infestation by BSFB first observed at 98 days crop age on 25 January, 2012. After, there was a gradual increase in percentage fruit infestation (Fig. 4).

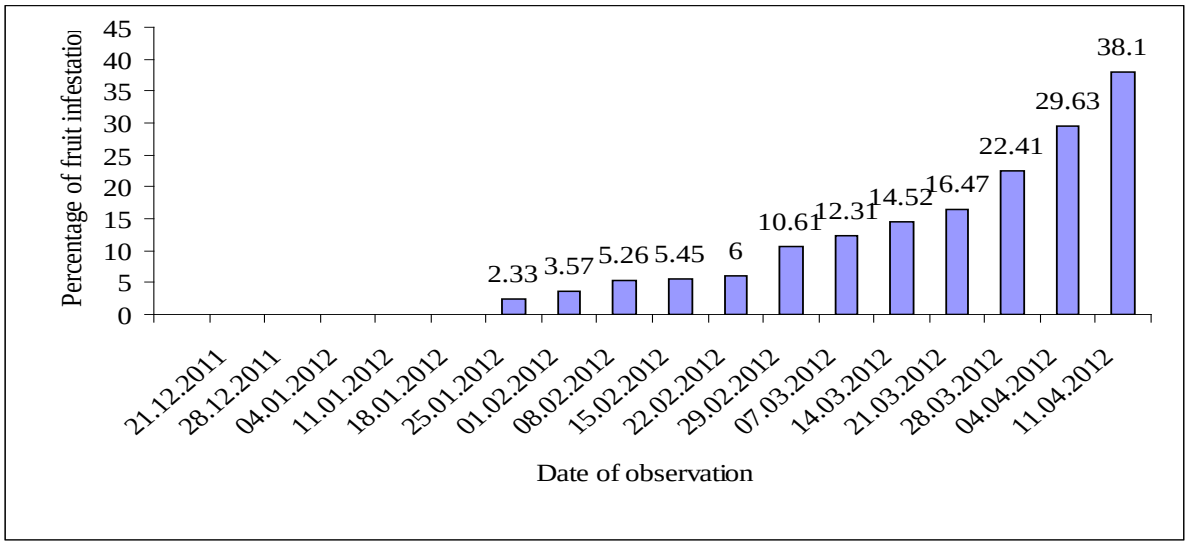

Fig. 4. Percentage of fruit infestation in different dates at ARS, Burirhat, Rangpur during 2011-12

The relationship between BSFB population and fruit damage

Fig. 5 showed that there was a relationship between BSFB population and fruit damage. There was a gradual increase in fruit infestation with increase of BSFB population.

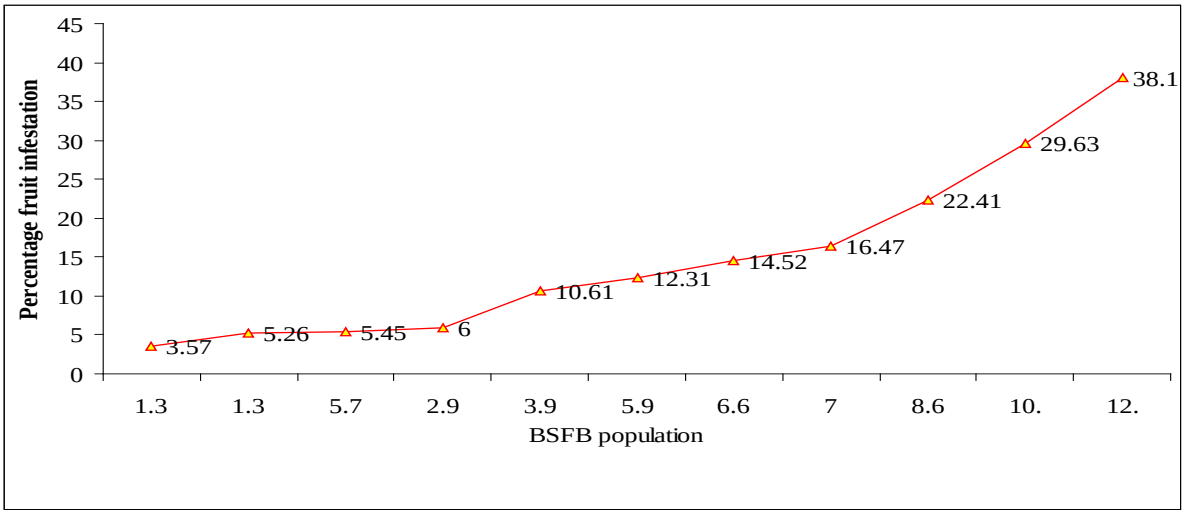

Fig. 5. The relationship between brinjal shoot and fruit borer population and percentage fruit infestation

Influence of weather parameters on major insect pests of brinjal

Correlation coefficient (Table 2) between different weather parameters and population of insect pests revealed that, average temperature recorded significant positive correlation with population of aphid, jassid, thrips and BSFB with a correlation coefficient of r=+0.480, r=+0.608, r=+0.468 and r= +0.852 respectively. A significant negative relationship was noticed with population of whitefly r=-0.679. Average relative humidity had significant negative correlation with aphid (r=-0.563) and BSFB (r=-0.535). The present findings are in agreement with the reports of Singh and Malik (1998) that the increase in temperature was significantly conducive for aphid multiplication but relative humidity has shown negative response on its intensity. A significant positive correlation was observed between rainfall and jassid (r=+0.796) and also with BSFB (r=+0.681).

Table 2. Effect of weather parameters on insects population in brinjal at ARS, Burirhat, Rangpur during 2011-2012 cropping season through correlation matrix

Name of insects	Average temperature (^{0}C)	Average relative humidity (%)	Rainfall (mm)
Aphid	+0.480*	-0.563*	-0.190
White fly	-0.679**	+0.242	-0.249
Jassid	+0.608**	-0.296	+0.796**
Thrips	+0.468*	-0.438	-0.247
BSFB	+0.852**	-0.535*	+0.681**

** = Significant at 1% level

* = Significant at 5% level

Seasonal incidence of minor insect pests on brinjal at ARS, Burirhat, Rangpur during 2011-2012 cropping season in Table 3. Results indicated that mealy bug, leaf hopper, epilachna beetle, leaf roller, red spider mite, *Spodoptera litura* and squash bug are minor and infrequent pests of brinjal, but can be a major pest in some regions of Bangladesh.

Table 3. Seasonal incidence of minor insect pests on brinjal at ARS, Burirhat, Rangpur during 2011-2012 cropping season

Name of insects	Infestation period
Mealy bug (*Centrocccus insolitus*)	Mid March-Mid April
Leaf hopper (*Amrasca biguttula biguttula*)	Infrequent occurrence throughout the cropping season
Epilachna beetle (*Epilachna vigintioctopunctata*)	Second week of April
Leaf roller (*Eublemma olivacea*)	Last week of December
Red spider mite (*Tetranychus urticae*)	Last week of November-Mid December
Spodoptera litura	Last week of December
Squash bug (*Anasa tristis*)	Mid March

CONCLUSION

The present study demonstrates, the major insect pests of brinjal crop were brinjal shoot and fruit borer (BSFB), aphid, white fly, jassid and thrips. However, the peak population of whitefly (23.6 whieflies/5 leaves) was on the third week of December. Thrips (22.67 thrips/5 cm and aphid (91.8 aphids/5 leaves) population reached peak in the last week of February, while jassid (8 jassids/5 leaves) and brinjal shoot and fruit borer (15.3 BSFB/trap) population reached peak in 2nd week of April. Average temperature recorded significant positive correlation with the population of aphid, jassid, thrips and BSFB. A significant negative relationship was noticed with population of whitefly. Average relative humidity had significant negative correlation with aphid and BSFB. A significant positive correlation was observed between rainfall and jassid and also with BSFB.

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