

Original Research Article

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Effect of Weather Parameters on Population Buildup of Predatory Coccinellids and Spiders Present in Brinjal Crop Ecosystem of Assam

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ABSTRACT

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Field investigation was carried out during *rabi* seasons of 2017-18 at the farmer's field, Allengmora, Jorhat to study the effect of weather parameters on population buildup of some predators on brinjal ecosystem. Correlation studies revealed a significant positive association of coccinellid predators with maximum temperature ($r= 0.669$). Moreover, all the parameters were showed a positive association with coccinellids except average relative humidity ($r= -0.259$) which showed a negative impact. However, population buildup of spiders influenced by maximum temperature ($r= 0.242$), minimum temperature ($r= 0.106$) and bright sunshine hours (0.373) positively, but, average relative humidity ($r= -0.449$) and total rainfall ($r= -0.149$) showed a non-significant negative impact during the present study of investigation.

Introduction

Brinjal, *Solanum melongena* L. is a nutritious and delicious solanaceous vegetable grown all over India. It is often known as "poor man's vegetable" as well as "King of vegetables" due to popularity amongst common people. In regards to production, India produces 12.8 million metric tonnes per annum from an area of 7.30 lakhs hectare (Anon, 2018). Interestingly, different types insect pests along with their natural enemies are present in

brinjal crop ecosystem (Borah *et al.*, 2016 and Borkakati *et al.*, 2019a) and conservation of natural enemies can reduces the dependence on harmful pesticides (Borkakati *et al.*, 2019b). Therefore, proper understanding of biocontrol agents is very much essential in brinjal ecosystem. However, weather parameters play an important role for population buildup of natural enemies along with their pests. Saikia *et al.*, 2020 reported that the significant positive correlation of aphid, *Aphis gossypii* Glover ($r= 0.662$) and

leafhopper, *Amrasca biguttula biguttula* Ishida ($r= 0.560$) with maximum temperature in brinjal crop ecosystem. Therefore, present study was carried out mainly to focus on the effect of weather parameters on population buildup of predators present in brinjal ecosystem.

Materials and Methods

Field experiment was carried out during *rabi* seasons of 2017-18 at the farmer's field, Allengmora, Jorhat under AICRP on Biological Control of Crop Pests and Weeds. The investigation site is situated at 26°756' latitude and 94°209E' longitude at an altitude of 86.6m above mean sea level. For this purpose, a field with 1000 m² was raised by adopting Bio-intensive IPM module. The data were recorded from five randomly selected plants from 5 spots of 200 m² area. Since Coccinellids were congregated towards terminal parts of the plant; three leaves were sampled from each of the five randomly selected plants and the number of beetles per leaf were counted. Such observations were recorded at weekly interval. Spiders were trapped by using pitfall trap @ 5 nos. in each spots.

Results and Discussion

During the period of present investigation, four numbers of predator was predominant viz., Coccinellid beetle (*Coccinella transversalis* and *Serangium parcesetosum*) and Spider (*Oxyopes javanus* & *Lycosa pseudoannulata*) in the brinjal ecosystem (Table-1).

Coccinellid beetle, *Coccinella transversalis* & *Serangium parcesetosum*

The activity of Coccinellid beetle was recorded to fluctuate at various time intervals. Coccinellid predators were observed during

the period of investigation from last week of September 2017 with a population ranging from 0.14 to 2.60 adult/plant. However, the peak activity of the coccinellid predator was recorded during second week of November 2017. This might be due to favorable weather conditions and presence of huge number of prey like aphids and leafhopper. The present findings of population buildup of the coccinellids was analogous with the findings of Chandrakumar *et al.*, (2008) to some extent, they reported that the maximum population of coccinellids appeared in the field during first week of December.

Correlation studies (Table-2) revealed a significant positive association of coccinellid predators with maximum temperature ($r= 0.669$). Moreover, all the parameters were showed a positive association with coccinellids except average relative humidity ($r= -0.259$) which showed a negative impact. The present finding was in conformity with Begam *et al.*, (2016); and Borah and Saikia (2017) who reported that maximum temperature had a significant association with population buildup of coccinellid predators. Besides, these, the present findings were also in line of conformity with the findings of Pal and Singh (2012) who reported that the population buildup of coccinellids exerted significant positive impact on the aphid population.

Spider, *Oxyopes javanus* & *Lycosa pseudoannulata*

The incidence of spiders were observed on brinjal crop from first week of October 2017 and remained active up to first week of December 2017 with a fluctuating population ranging from 0.57 to 3.00 spider/plant. Peak population of the spider was recorded during last week of November 2017 with 3.00 spider/plant. In the present investigation, moderately high maximum temperature had been found to

be conducive for population buildup of the spiders. These results were not supported by the findings of Koushik *et al.*, (2014), who recorded the maximum number of spiders during April month.

The correlation study (Table-2) indicated that, maximum temperature ($r= 0.242$), minimum temperature ($r= 0.106$) and bright sunshine hours (0.373) showed a non-significant positive effect whereas, average relative humidity ($r= -0.449$) and total rainfall ($r= -0.149$) showed a non-significant negative

impact on the population buildup of spiders in the brinjal ecosystem during the present study of investigation. These findings were fairly in line of conformity with that of Koushik *et al.*, (2014), who established a non-significant positive correlation with maximum and minimum temperature and average rainfall on spider incidence. Mutkule *et al.*, 2017 observed that the fruit borer damage correlated with weather parameters indicated highly significant positive correlation with maximum temperature, mean temperature and bright sunshine hours.

Table.1 Population build-up of predators of brinjal pests

Period of observation	Coccinellids per plant#			Spider per spot*		
	<i>Coccinella transversalis</i>	<i>Serangium parcesetosum</i>	Total	<i>Oxyopes javanus</i>	<i>Lycosa pseudoannulata</i>	Total
28.09.17-04.10.17	0	0.91	0.91	0	0	0
05.10.17-11.10.17	0.11	1.77	1.88	0	0.57	0.57
12.10.17-18.10.17	1.78	0.73	2.51	0.15	0.99	1.14
19.10.17-25.10.17	1.5	0.21	1.71	0.5	0.5	1
26.10.17-01.11.17	0.5	0.55	1.05	0.8	0.34	1.14
02.10.17-08.11.17	1.13	1.18	2.31	0.7	1.01	1.71
09.11.17-15.11.17	2.3	0.3	2.60	1.5	1.36	2.86
16.11.17-22.11.17	1.9	0.04	1.94	1.7	1.3	3
23.11.17-29.11.17	1	0.11	1.11	1.2	0.23	1.43
30.11.17-06.12.17	0	0.54	0.54	0	0.71	0.71
07.12.17-13.12.17	0.5	0.67	1.17	0	0	0
14.12.17-20.12.17	0.7	0.1	0.80	0	0	0
21.12.17-27.12.17	0.1	0.24	0.34	0	0	0
28.12.17-04.01.18	0.13	0.01	0.14	0	0	0

#Mean of 5 randomly selected plants of 5 spot/ *#Mean of 5 randomly installed spot of 5 spot

Table.2 Correlation studies of predators of brinjal pests with the weather parameters

Insect Pests	Maximum temperature (°C)	Minimum temperature (°C)	Average Relative Humidity (%)	Total Rainfall (mm)	BSSH (hr)
Coccinellids per plant	0.669*	0.524	-0.259	0.129	0.241
Spider per spot	0.242	0.106	-0.449	-0.149	0.373

* Correlation is significant at 0.05 level

It is concluded, from the present investigation a significant positive association of coccinellid predators with maximum temperature observed. On the other hand, maximum temperature, minimum temperature and bright sunshine hours showed a positive correlation with spiders. Therefore, the influence of weather parameters cannot be ignored for maintaining the natural enemies in brinjal ecosystem.

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