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Short Communication

Effect of weather parameters on population dynamics of Coccinellids on different crop ecosystems

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Ladybeetles are of great significance as biological control agents, as they are predaceous on several groups of insect pests, including aphids, coccids, adelgids and aleyrodids. Ninety percent of the known 4200 coccinellid species are predaceous (Iperti and Paoletti, 1999). A particular set of environmental conditions is required for coccinellids for their survival and multiplication. The population build up of any insect is very closely associated with various environmental factors prevailing during a periods. Coccinellid predators usually aggregate in patches of high prey abundance, but their relative abundance often changes in space and time due to unpredictable condition of extrinsic and intrinsic factors (Majumder *et al.,* 2013). The present study was carried out to establish the relationship between populations of three important species of ladybird beetle with abiotic factors of environment.

The seasonal incidence of three dominant coccinellid beetles was studied at Pundibari(Lat. 26^{0}19'86" N,Long. 89^{0}23'53" and elevation of 43 meter above MSL) under the sub-Himalayan Terai ecological conditions of West Bengal during 2015-16 and 2016-17. The population of *Coccinell a transversalis* and *Cheilomenes sexmaculata* was monitored fortnightly on Brinjal whereas; the population of *Coccinella septempunctata* was monitored in the wheat field. The observations were recorded by random sampling of 25 plants from each crop. The weather data were collected from the meteorological unit of the University. To establish the relationship between populations of predatory coccinellids with abiotic factors, simple linear correlation coefficients (r) were derived between the pooled mean population of coccinellids incidence and various abiotic parameters pooled over two years. The data were statistically analyzed using OPSTAT software package.

The lady bird beetle, *Coccinella transversalis* appeared in 49th SMW (i.e., 1st fortnight of December) (0.8/ plant) on Brinjal, *Cheilomenes sexmaculata* from 1st SMW (i.e., 1stfortnight of January) (0.23/plant) on Brinjal and *Coccinella septempunctata* from 3rd SMW (i.e., 2ndfortnight of January (0.11/plant) on wheat crop (Fig. 1). The highest population of *Coccinella transversalis* was recorded on 7th SMW (2.58/plant), *Cheilomenes sexmaculata* on 7th SMW (1.95/plant), when average maximum temperature was 28.2 ^{o}C, minimum temperature was 11.9 ^{o}C, relative humidity was 91 per cent. The highest population of *Coccinella septempunctata* on wheat was observed in 11th SMW (1.72/ plant) when temperatures were slightly higher and humidity was lower. In a similar type of studies Hugar *et al.,* (2008) reported that aphidophagous predator (Coccinellids) viz., *Coccinella septempunctata, Coccinella transversalis, Cheilomenes sexmaculata* appeared from last week of January to first week of March (0.20 to 1.55 Coccinellids per plant). Vermora *et al.* (2010) also observed that the incidence

Table 1: Correlation coefficients (r) of coccinellids with meteorological parameters (pooled data of 2016 and 2017)

Weather parameters	*Coccinella transversalis* on Brinjal	*Cheilomenes sexmaculata* on Brinjal	*Coccinella septempunctata* on Wheat
Max. temp. (ºC)	0.189	0.152	0.419
Min. temp. (ºC)	-0.255	-0.299	0.107
Max. R.H. (%)	0.221	0.209	-0.168
Min. R.H.(%)	-0.775 **	-0.837 **	-0.849 **
R.F. (mm)	-0.045	-0.078	0.286

* Significant at 5% level(r = ± 0.632); ** Significant at 1% level(r = ± 0.765)

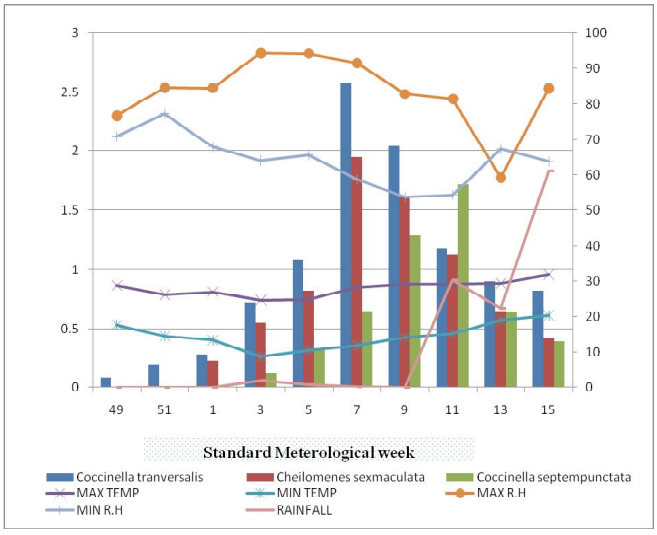

Fig. 1: Population of coccinellids with respect to weather parameters (Two years mean data).

of coccinellid beetles started from January and reached to its peak in the second week of February and gradually decreased thereafter.

Correlation coefficients (r) between *Coccinella transversalis* and weather parameters revealed that minimum relative humidity had highly significant negative correlations with the occurrence of *Coccinella transversalis* on Brinjal(-0.775), *Cheilomenes sexmaculata* on Brinjal(-0.837) and *Coccinella septempunctata* on wheat (-0.849). All other weather parameters had non-significant association with all the three lady bird beetle population. Kalasariya and Parmar (2018) also reported non-significant correlation of lady bird beetle in mustard with most of the weather parameter at Junagadh, Gujarat. Saha *et al.* (2018) reported that coccinella in cucumber in Bihar was positively correlated with temperature and negatively correlated with humidity.

The abiotic factors were mostly found to have little influence on the population of coccinellids. Only the relative humidity was found to influence the population greatly. Probably the coccinellids population was more dependent on the population of their respective host insect and fluctuated according to their prey density.

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