

### Influence of Weather Parameters on Population of *Cheilomenes sexmaculata* (Fab)\*

Ladybird beetle (*Cheilomenes sexmaculata* Fab.) (Coccinellidae : Coleoptera) is the farmers friend as it predate upon aphids, mealybugs, scale-insects, whiteflies, thrips, leafhoppers, mites and other soft bodied insects which are capable of causing severe crop losses (Omkar and Pervez, 2000). The coccinellids requires a particular set of environmental conditions for their survival and multiplication. It is fact that population build up of any insect is very intimately associated with various environmental factors prevailing during proceeding and corresponding periods. Conflicting views on the influence of weather parameters on ladybird beetle have been placed on record. Inspite of very rich biodiversity of this important generalised predator, information on the correlation between *C. sexmaculata* and weather parameters is very scanty. The present study was carried out to establish the relationship between population of ladybird beetle with abiotic factors of environment.

An attempt was made to establish the relationship between the population of *C. sexmaculata* recorded on some important field crops grown in vicinity of Anand Agricultural University, Anand (Gujarat) during the year 2004-2005. For the purpose, number of grubs and adults of this coccinellids were recorded at weekly interval by observing 50 randomly selected plants during kharif (cotton, cowpea and maize), winter (cotton, maize, gallardia and wheat) and summer (pearl millet) season. The data on various weather parameters viz; minimum and maximum temperature, morning and evening relative humidity, bright sunshine hours, rainfall, wind speed and morning and evening vapour pressure were obtained from the meteorological observatory, Anand Agricultural University, Anand. The correlation coefficients worked out are presented in Table 1.

The correlation coefficient (r) between *C. sexmaculata* on cotton crop and weather parameters (Table 1) revealed that all the meteorological parameters studied in present study showed negative association, except morning relative humidity. Significantly negative correlation was observed between the grubs of *C. sexmaculata* with minimum temperature ( $r = -0.493^*$ ), wind speed ( $r = -0.411^*$ ) and morning ( $r = -0.433^*$ ) and evening ( $r = -0.385^*$ ) vapour pressure, whereas significant and negative correlation existed between the adult population with minimum temperature ( $r = -0.688^*$ ) and morning ( $r = -0.612^*$ ) and evening ( $r = -0.448^*$ ) vapour pressure. Grub and adult population of the predator recorded on cowpea showed negative relationship with minimum temperature, evening relative humidity, rainfall wind speed 8 morning as well as evening vapour pressure whereas positive relationship existed with bright sunshine hours. Negative and significant correlation was recorded between *C. sexmaculata* with minimum temperature ( $r = -0.829^*$  for grubs and  $r = -0.923^*$  for adults), evening relative humidity ( $r = -0.897^*$  for grubs and  $r = -0.965^*$  for adults), wind speed ( $r =$

$0.874^*$  for adults) and morning ( $r = -0.751^*$  for grubs and  $r = -0.889^*$  for adults) and evening ( $r = -0.881^*$  for grubs and  $r = -0.939^*$  for adults) vapour pressure. Similarly positive and significant association was noticed between sunshine hours and grub ( $r = 0.873^*$ ) as well as adult ( $r = 0.907^*$ ) population on cowpea crop.

The population of *C. sexmaculata* recorded on gallardia crop when correlated with different weather parameters revealed negative association for minimum temperature, bright sunshine hours and wind speed, while positive association for relative humidity and vapour pressure recorded during morning and evening hours. However, in none of the cases it was significant. No definite relationship was established between the weather parameters and the population of *C. sexmaculata* on maize crop grown during winter season. However, minimum temperature, evening relative (humidity, rainfall, wind speed and morning as well as evening vapour pressure influenced negatively, whereas bright sunshine hours influenced positively with the grub and adult population recorded on maize crop in kharif season. None of the cases showed significant impact on coccinellid.

The beetles of *C. sexmaculata* were found sheltering on pearl millet crop during summer in the absence of any host insect on it. All the meteorological parameters, except maximum temperature indicated its negative impact on adult population, however, none of the weather parameters influenced significantly the coccinellid adults.

Results revealed that minimum and maximum temperature negatively correlated with the coccinellid population on cotton, cowpea, gallardia, maize, wheat and pearl millet. This is in agreement with the report of Parikh (2001) who reported that the minimum temperature negatively correlated with the coccinellid population in the lucerne. However, in contrast to above, Patel (1998) and Patel (2000) reported significant positive effect of temperature on the activity of coccinellids. Relative humidity (R.H.) influenced negatively with *C. sexmaculata* population on cotton, cowpea, maize, wheat and pearl millet. These results corroborate with the earlier report of Parikh (2001), Patel (2002) and Bhatt (2005) who established negative association between R.H. and the coccinellid population on lucerne, isabgol and gallardia, respectively.

Bhatt (2005) established significant positive correlation between predatory coccinellids and sunshine hours in gallardia crop which in turn supports to the present findings where bright sunshine hours influenced positively with the population of *C. sexmaculata* in cowpea, maize and wheat crops. Rainfall and wind speed showed negative influence on the activity of coccinellid beetles. Negative association between vapour pressure and population of predatory coccinellid revealed in present study corroborated with the findings of Parikh (2001).

\* Part of M. Sc. (Agri.) thesis submitted by the senior author to the Anand Agricultural University, Anand - 388 110, India.

Table 1. Correlation coefficient between *C. sexmaculata* recorded in different field crops and weather parameters

Crops	Stage	Temperature (U C)		Relative humidity (%)		Bright sunshine (hrs/day)	Rainfall (mm)	Wind speed (kmph)	Vapour pressure (mm of Hg)	
		Minimum	Maximum	Morning	Evening				Morning	Evening
Cotton	Grubs	-0.493**	-0.155	0.079	-0.194	-0.053	-0.177	-0.411 *	-0.433 *	-0.385 *
	Adults	-0.688**	-0.313	0.061	-0.133	-0.031	-0.232	-0.314	-0.612 *	-0.448 *
Cowpea	Grubs	-0.829*	-	-	-0.897**	0.873**	-0.692	-0.738	-0.751 *	-0.889**
	Adults	-0.923**	-	-	-0.965**	0.907**	-0.688	-0.874**	-0.881 **	-0.939**
Gallardia	Grubs	-0.107	-0.334	0.517	0.232	-0.049	-	-0.121	0.097	0.169
	Adults	-0.243	-0.518	0.338	0.241	-0.241	-	-0.122	0.087	0.005
Maize (Winter)	Grubs	0.207	-0.009	-0.312	-0.461	0.632	-	0.410	0.161	-0.473
	Adults	0.501	0.282	0.061	-0.193	0.262	-	-0.537	0.625	0.376
Maize (Kharif)	Grubs	-0.463	-	-	-0.115	0.172	-0.201	-0.381	-0.164	-0.068
	Adults	-0.347	-	-	-0.483	0.518	-0.426	-0.188	-0.562	-0.445
Wheat	Grubs	-0.349	-0.209	-0.023	-0.080	0.446	-	0.376	-0.311	-0.555
	Adults	-0.283	-0.209	-0.433	-0.128	0.498	-	0.748	-0.354	-0.301
Pearl	Adults	-0.416	0.483	-0.528	-0.611	-0.621	-	-0.559	-0.334	-0.419

\*\* Significant at 1 % level

\* Significant at 5 % level

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(Received: August, 2006)

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