

RELATIVE ABUNDANCE OF LADYBIRD BEETLE, *Menochilus sexmaculatus* FABRICIUS IN RELATION TO APHID, *Lipaphis erysimi* KALT INFESTING MUSTARD

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ABSTRACT

*The field experiment was conducted to study the relative abundance of Ladybird beetle, Menochilus sexmaculatus Fabricius in relation to Aphid, Lipaphis erysimi Kalt infesting Mustard at the Instructional Farm, College of Agriculture, JAU, Junagadh during rabi 2012-13 and 2013-14. The total population of M. sexmaculatus and aphid index was almost coincided in the month of February. The correlation analysis showed highly significant positive correlation ($r = 0.908^{**}$) between predator and aphid. The information congregated on correlation analysis could be useful to predict the population of L. erysimi at any given time and also to develop effective control measures to avoid the high yield loss in Indian mustard.*

KEY WORDS: Correlation, *Lipaphis erysimi*, *Menochilus sexmaculatus*, mustard

INTRODUCTION

Mustard *Brassica juncea* (Linnaeus) Czern and Coss, is an important oilseed crop, which constitutes as a major source of edible oil. Mustard belongs to family *Cruciferae*. It originated in China and from there it was introduced into North Eastern India. Brassica is the second most important edible oilseed crop in India after groundnut and accounts for nearly 30 per cent of total oilseeds produced in the country. Mustard is an important oilseed crop which is widely cultivated in Gujarat state. This crop is attacked by different insect pests have been recorded on mustard, among which aphid, *Lipaphis erysimi* Kalt is an important pest of mustard and has become a serious pest; the crop is severely attacked by aphid at the flowering stage. Aphid *L. erysimi* causes 35.4 to 73.3 per cent yield loss, 30.09 per cent seed weight loss and 2.75 per cent oil loss (Sharma and Kashyap, 1998). Different

types of predators were found among that the *Menochilus sexmaculatus* Fabricius are considered to be efficient predators on mustard aphid and keep the aphid infestation naturally checked. The *M. sexmaculatus* are popularly called as the ladybird beetle. They are of great economic importance because a large majority of them are predaceous both in their grub as well as adult stages on the various small bodied insects including aphid (Rawat and Modi, 1969).

Natural enemies also play a key role in reducing the population of insects and therefore, their conservation and augmentation are of great importance. The mustard aphid is known to be preyed upon or parasitized by a large number of biotic factors predators/parasites (coccinellids, syrphids and braconids). The present investigation was, therefore, conducted to study relative abundance of ladybird beetle,

M. sexmaculatus and *L. erysimi* infestation through correlation analysis.

MATERIALS AND METHODS

Indian mustard, *B. juncea* was grown in 20 m x 20 m experimental plot at the Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh during *rabi* 2012-13 and 2013-14 in order to study the relative abundance of Lady bird beetle, *M. sexmaculatus* in relation to mustard aphid, *L. erysimi* and kept unsprayed. The entire plot was divided into 10 equal sectors. To

determine the correlation analysis of *L. erysimi* vis-à-vis biotic factors especially *M. sexmaculatus*, population count of lady bird beetle (grub and adult) and aphid (index: 0-5) was recorded from randomly selected 10 plants at weekly interval starting from germination to harvest of the crop.

Generally, it was observed that mustard aphid sit in an overlapping manner and hence, it was difficult to record aphid on numerical basis. Hence, aphid index was calculated as described by Patel *et al.* (1995) as under:

Aphid index	Criteria
0	Plant free from aphid infestation.
1	Only few aphids with very little injury.
2	Small colonies on few twigs, no curling or yellowing of leaves.
3	Aphid colonies on almost all the twigs, stunted growth, curling and yellowing of leaves.
4	Very heavy population of aphids on inflorescence, leaves, stem and siliqua (pod).
5	Complete drying of plants due to heavy infestation of aphids.

The average aphid index was worked out by using the following formula.

$$\text{Average aphid index} = \frac{0N + 1N + 2N + 3N + 4N + 5N}{\text{Total number of plants observed}}$$

Where,

0, 1, 2, 3, 4, 5 are the aphid index

N = Number of plants showing respective aphid index

RESULTS AND DISCUSSION

The perusal of data presented in Table 1 & Figure 1 showed that the aphid incidence continued throughout the cropping season right from seedling to maturity stage of the crop. The infestation of aphid commenced during 2nd week after sowing i.e. the third week of December (50th Standard Meteorological Week, SMW) with 0.28 aphid index, Thereafter, continuous increase in population build-up of aphid was recorded. The higher activity of aphid was observed during 4th week of December to 1st week of March. After which aphid population started declining with the increase in temperature and maturity of the crop. However, at maturity of crop, negligible population with more number of winged aphids was observed on green stem of mustard plants.

The population of *M. sexmaculatus* was ranged from 0.00 to 5.93 / plant with an average of 2.27 / plant during study period (Table 1 and Figure 1). The population of *M. sexmaculatus* commenced from the fourth week of December (51st SMW) with initial population of 0.11 *Coccinellids* / plant. The higher activity of *M. sexmaculatus* was observed during 3rd week of January to 1st week of March with a peak activity on 3rd week of February (5.93 *Coccinellids* / plant, 8th SMW) due to population build up of mustard aphid during the same period. The population of *M. sexmaculatus* then gradually decreased with decline in aphid population. Looking to the fluctuated population of aphid and predators, it was apparently happened that the population of *M. sexmaculatus* was

increased with the increase of aphid population. It meant that the activity of predator was positively related with its host density. The present findings are in agreement with those of Kulkarni and Patel (2001) and Bilashini and Singh (2010). To ascertain the above results, correlation analysis of *L. erysimi* vis-à-vis biotic factors especially *M. sexmaculatus* was done (Table 2). The results revealed that the population of *M. sexmaculatus* had highly significant positive correlation with aphid population during 2012-13 ($r = 0.898^{**}$) and 2013-14 ($r = 0.918^{**}$). The correlation between predator and prey pooled over years also had highly significant positive correlation ($r = 0.908^{**}$). Looking to the overall association of *M. sexmaculatus* with aphid population, it clearly showed that there was very strong positive correlation existed between aphid and ladybird beetle population during both the years. Similar results have been reported by Choudhary and Pal (2006) and Ali and Rizvi (2012).

CONCLUSION

In nutshell, it can be concluded that that the population of *M. sexmaculatus* was increased with the increase in aphid population. It meant that the activity of the predator was positively related with its host density. Thorough understanding of interaction between pest and predator dynamics is a pre-requisite for weather based pest forecasting model. The information so gathered could be useful to predict the population of *L. erysimi* at any given time and we can develop effective control practice to avoid the high yield loss.

ACKNOWLEDGEMENT

The authors are highly thankful and indebted to Dr. K. L. Raghvani, Professor and Head, Department of Entomology, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat for providing all necessary infrastructure facilities to conduct the research experiments and his invaluable suggestions.

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Table 1: Population dynamics of *L. erysimi* and *M. sexmaculatus* on mustard

Sr. No.	Months	Standard Meteorological Week	Aphid Index / Plant (0-5)	Lady Bird Beetle/Plant
1	December	49	0.00	0.00
2		50	0.28	0.00
3		51	1.04	0.11
4		52	1.58	0.31
5	January	1	1.82	0.58
6		2	2.26	1.14
7		3	2.40	1.80
8		4	2.08	2.30
9		5	3.47	3.11
10	February	6	3.65	3.81
11		7	4.22	5.18
12		8	4.04	5.93
13		9	4.17	5.81
14	March	10	3.91	3.61
15		11	3.30	1.68
16		12	1.36	1.06
Average			2.51	2.27

Table 2: Correlation between population of *L. erysimi* and *M. sexmaculatus*

Natural Enemies	Correlation Co-efficient 'r' Value		
Ladybird beetle	2012-13	2013-14	Pooled
	0.898**	0.918**	0.908**

** Significant at 1 per cent level ($r = 0.623$) $n=14$

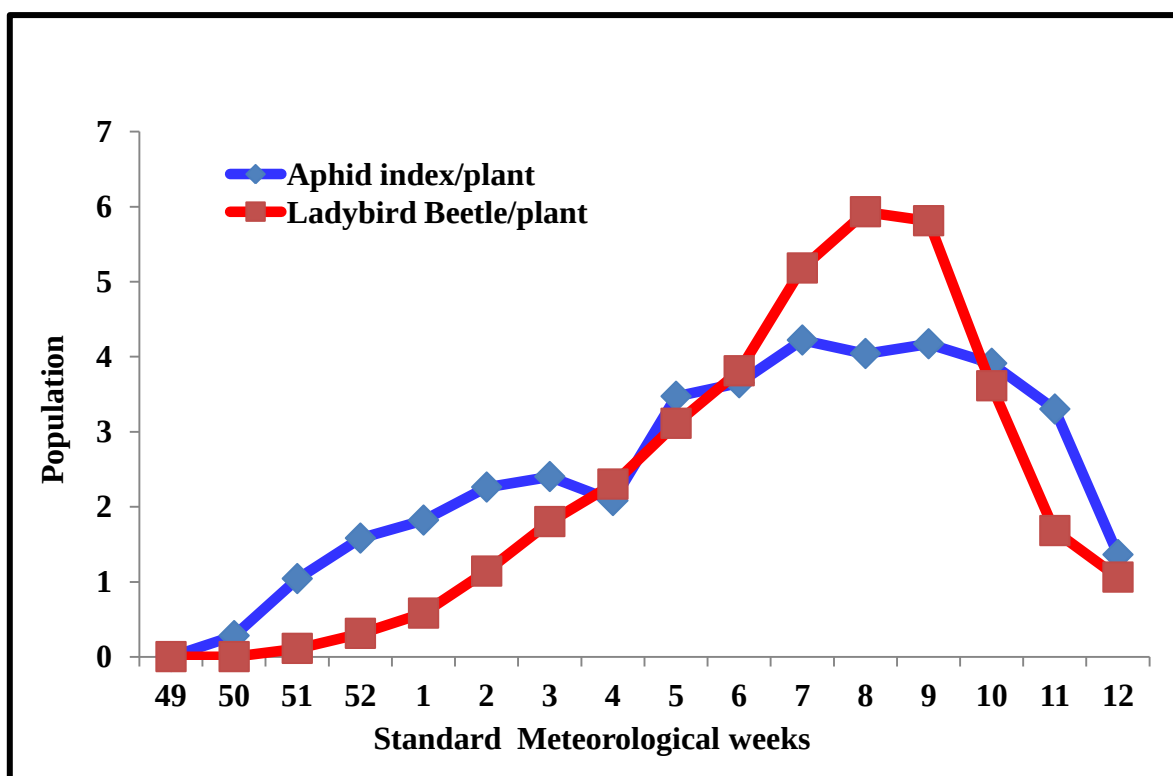


Figure 1. population dynamics of *L. erysimi* and *M. sexmaculatus* on mustard