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LADYBIRD BEETLES IN MAJOR *RABI* OIL SEEDS AND PULSE CROPS AT SABOUR, BIHAR

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Abstract: The field experiments were conducted for two consecutive years in order to investigate the relative abundance of different coccinellid predators in mustard, linseed, lentil and chickpea. Mustard (variety: Pusa Mahek), linseed (variety: Garima), chickpea (variety: PG 186) and lentil (variety: HUL 57) crops were sown during first week of December, 2012 and 2013, These crops were maintained as per the recommended package of practices except for insect-pest management. The weekly observations on coccinellid predators were recorded. Three coccinellids namely, *Coccinella septempunctata*, *Coccinella transversalis* and *Menochilus sexmaculatus* were recorded in mustard. Amongst these, *C. septempunctata* was found to be the most abundant species. Whereas in linseed, only two coccinellid predators namely, *C. transversalis* and *Micraspis discolor* were recorded. Amongst pulses, two coccinellid predators namely, *M. sexmaculatus* and *C. septempunctata* were observed in lentil wherein *C. septempunctata* was the abundant species. However in chickpea, only *M. sexmaculatus* was recorded. It was concluded that only four coccinellids namely, *C. septempunctata, C. transversalis, M. discolor* and *M. sexmaculatus* were observed during *Rabi* season in these crops at Sabour. The maximum population of these coccinellids was observed during 9-10th standard weeks. While planning for management strategies, the present finding may be considered in order to enhance conservation biological control of insect-pests of these crops.
Keywords: Coccinellids, Oilseeds, Pulses, Bihar

Introduction

Oilseeds and pulses are the important crops of Bihar and being cultivated during *Rabi* and *Kharif* seasons. During 2012-13, the total oilseeds and pulses were cultivated over an acreage of 1.37 and 5.28 lakh hectares, respectively in the state (Anonymous, 2013). Amongst oilseeds, rapeseed/mustard stands for first position in terms of area and production followed by linseed and sunflower. However, lentil stands for first position in area and production followed by summer moong, khesari and chickpea amongst pulses being grown in the state. These crops severely suffer from the ravages of different insect-pests resulting in economic

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loss to the growers. Natural enemies are very important in every crop ecosystema and play pivotal role in natural regulation of the insect-pests. Coccinellid predators generally known as ladybird beetles are of great economic importance as majority of them are predatory in nature at both larval and adult stages on aphids, coccids and other soft bodied insects infesting different crops. The present study was undertaken to investigate the relative abundance of different coccinellid beetles amongst *Rabi* oilseeds (mustard and linseed) and pulses (lentil and chickpea) at Sabour (Bhagalpur), Bihar.

Materials and Methods

The field experiments were carried out at Experimental Farm, Bihar Agricultural College, Bihar Agricultural University, Sabour (24º14'55''N, 87º02'48''E and 32 m asl) in order to study the relative abundance of coccinellid beetles in important rabi oilseeds and pulses at Sabour, Bihar. Two oilseed crops (Mustard, Variety-Pusa Mahek; Linseed, Variety -Garima) and two pulse crops (chickpea, Variety PG 186; Lentil, Variety HUL 57) were sown during first week of December during 2012 and 2013. Three separate sections for each crop measuring (10m × 10m each) were considered as three replications. In mustard, linseed, chickpea and lentil the observation on coccinellid predators was initiated from third standard meteorological week at weekly interval till harvesting. For each crop, the experiment was conducted in randomized block design. Population of coccinellids was taken as total count of those from 30 randomly selected plants from each replication. This was followed for each of the four crops. The data were transformed to square root values and analysis of variance was done. The means were compared by Duncan's Multiple Range Test (Duncan, 1951). The record of monthly temperature (°C), relative humidity (%) and rainfall (mm) during the experimental period is presented in Table 1.

Table 1: Average monthly temperature (°C), relative humidity (%) and rainfall (mm) during the period of observation (January, 2013 to March, 2013 and January, 2014 to March, 2014)

Months	Temperature °C			Relative Humidity (%)			Rainfall (mm)
	Max.	Min	Mean	Max	Min	Mean	
January	19.75	8.63	14.19	93.75	65.00	79.38	0.15
February	23.49	9.74	16.62	89.10	56.13	72.62	8.13
March	29.51	13.50	21.51	81.00	44.25	62.63	1.70

Results and Discussion

The perusal of data presented in Table 2 indicates that throughout the growing season of mustard, linseed, chickpea and lentil, a total of four coccinellid predators were recorded during both the years (2012-13 and 2013-14). *C. septempunctata*, *C. transversalis* and *M. sexmaculatus* were found in mustard; *C. transversalis* and *M. discolor* were found in linseed; *M. sexmaculatus* was found in chickpea; *M. sexmaculatus* and *C. transversalis* were found in lentil. Amongst these coccinellids, *C. septempunctata* was found to be the most abundant in mustard. Population of *C. septempunctata* and *C. transversalis* reached their peak during the tenth standard week whereas *M. sexmaculatus* reached its peak during 9th standard week. Yadav and Singh (1994) reported altogether seven species of predatory coccinellids namely, *C. septempunctata*, *C. septempunctata* var. *divaricata*, *C. transvarsalis*, *Coccinella* sp., *M. discolor*, *M. sexmaculatus* and *Menochilus* sp. to predate upon *Lipaphis erysimi* in rapeseed-mustard ecosystem under North Bihar conditions. These coccinellids were found to feed upon mustard aphid in the beginning, middle and end of the crop season. The present findings are in conformity with those recorded by Yadav and Singh (1994) except for number of species recorded which might be due to different agro-climatic conditions of the studies. As far as the abundance of the *C. septempunctata* was concerned, the present study completely corroborated with the findings of Kalra (1988). Prabhakar and Roy (2010) also reported *C. septempunctata* as common and potential predators of aphids in north-east Bihar. In linseed, two coccinellid predators namely, *C. transversalis* and *M. discolor* were recorded to occur starting from 5th standard week. Among these two coccinellids, *M. discolor* was most abundant species. For both of these ladybirds, peak population was recorded during the ninth standard week. In chickpea, only one ladybird beetle (*M. sexmaculatus*) was recorded but this was found to be absent during 3rd to 5th standard week. Population of the same was highest during ninth standard week. In lentil, two coccinellid predators namely, *M. sexmaculatus* and *C. septempunctata* were recorded starting from 6th standard week. Among these two ladybird beetles, the later one was found to be the most abundant. Population of these two reached their peak during the ninth standard week. *M. sexmaculatus* and *C. septempunctata* have been reported to feed on *Aphis craccivora* by several authors like Joshi *et al.,*(1998), Agarwala and Bardhanroy (1999), Prabhakar and Roy (2010), Sharma and Yadav (1994) and Sharma *et al*., (1991) which corroborated the findings of the present authors.

Table 1: Abundance of different coccinellid predators in relation to standard week in mustard, linseed, chickpea and lentil during 3rd to 12th standard week during the years 2013 and 2014

Standard meteorological week	No. of various coccinellid species (per plant) on oilseed and pulse crops							
	Mustard			Linseed		Chickpea	Lentil	
	CS	CT	MS	CT	MD	MS	MS	CS
3	0.07 (0.75^{g**})	0.17 (0.82^{g})	0.03 (0.73^{e})	-	-	-	-	-
4	0.20 (0.84^{f})	0.13 (0.80^{g})	0.13 (0.80d^{e})	-	-	-	-	-
5	0.33 (0.91^{e})	0.37 (0.93^{f})	0.23 (0.86^{cd})	0.13 (0.80^{de})	0.03 (0.73^{c})	-	-	-
6	0.67 (1.08^{c})	0.50 (1.00^{e})	0.33 (0.91^{c})	0.20 (0.84^{cd})	0.13 (0.80^{bc})	0.23 (0.86^{cd})	0.07 (0.75^{cd})	0.10 (0.77^{ef})
7	1.00 (1.22^{b})	0.90 (1.18^{c})	0.50 (1.00^{b})	0.37 (0.93^{b})	0.17 (0.81^{b})	0.27 (0.88^{cd})	0.13 (0.80^{bc})	0.20 (0.84^{de})
8	0.90 (1.18^{b})	1.00 (1.22^{bc})	0.70 (1.09^{a})	0.33 (0.91^{b})	0.50 (1.00^{a})	0.50 (1.00^{b})	0.17 (0.82^{b})	0.37 (0.93^{c})
9	1.40 (1.38^{a})	1.10 (1.26^{ab})	0.63 (1.06^{ab})	0.53 (1.02^{a})	0.57 (1.03^{a})	0.80 (1.14^{a})	0.30 (0.89^{a})	0.90 (1.18^{a})
10	1.53 (1.43^{a})	1.20 (1.30^{a})	0.60 (1.05^{ab})	0.27 (0.88^{bc})	0.47 (0.98^{a})	0.60 (1.05^{b})	0.17 (0.82^{b})	0.67 (1.08^{e})
11	0.97 (1.21^{b})	0.70 (1.09^{d})	0.27 (0.87^{cd})	0.07 (0.75^{ef})	0.10 (0.77^{bc})	0.33 (0.91^{c})	0.13 (0.80^{bc})	0.33 (0.91^{cd})
12	0.47 (0.98^{d})	0.53 (1.01^{e})	0.13 (0.80^{de})	0.03 (0.73^{f})	0.03 (0.73^{c})	0.20 (0.84^{d})	0.03 (0.73^{d})	0.07 (0.75^{f})
Mean population/week	0.75	0.66	0.36	0.24	0.25	0.42	0.14	0.38
***Rank abundance (crop wise)**	1	2	3	2	1	1	2	1

Figures in the parenthesis are square root transformed values; CS = *C. septempunctata*, CT = *C. transversalis*, MS = *M. sexmaculatus*, MD = *M. discolor*;
*Numbers in the row are rank abundance values; **Values with different letters in a column are significantly different at 5% level of probability.

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