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Studies on diversity of insect pests and their arthropods predator in the agroecosystem of maize in Udaipur

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Abstract
An on site-investigation was conducted at MPUAT Agriculture Farm, Udaipur, Rajasthan. A random survey was done during kharif seasons, 2024 to investigate the diversity of insect pests and their Arthropods predator in the agroecosystem of maize. Insect pests complex infesting the maize crop was recorded from 25 days after germination till harvest of crop at weekly interval. The maize crop attacked by the several insect pests during different growth stages like vegetative, flowering and pod stages. In this study, 24 insect pest species were collected and identified from the field. Insect species belonging to 12 families under 5 orders namely Lepidoptera, Hemiptera, Coleoptera, Diptera, and Orthoptera were recorded. The order Lepidoptera exhibited the maximum 9 species followed by Coleoptera 8 species, Hemiptera 4 species, Orthoptera 2 Species and Diptera 1 species. Among all the insect pests' tobacco cutworm, fall army worm, army worm, maize stem borer, cob bore, pink stem borer and aphid were found most abundance in the field. The predator's species was also quite diverse. We observed 13 predator's species, belonging to Coleoptera, Hemiptera, Hymenoptera, Neuroptera, Montodea order in the class Insecta and two spider species, belonging to Araneae order in the class Arachnida of the phylum Arthropoda.

Keywords: Maize, insect pests, agroecosystem, predators, abundance

Introduction

Maize (*Zea mays* L.) is the world's leading crop and widely cultivated as cereal grain that was acclimated in central America. Maize belongs the family *Poaceae* and is one of the most versatile crop having high yield potential and wide adaptability as compared to other cereals (Scott and Emery 2016). Maize can be grown in rabi, kharif and spring seasons but it is mainly kharif season crop. It is used as human food, animal feed, industrial products (corn oil, starch, fiber, biofuels) and as baby corn (Singh, 2014) [6]. Maize grains are a good source of protein and also contains other nutrients like carbohydrate, fat, fiber, and minerals. In the agriculture of India maize occupies an important place. it ranks fifth in total area with 9.43 hectares, third in total production and productivity with production of 24.35 million tonnes and productivity of 2.58 tonnes/ ha (Anonymous, 2014) [1]. In India, maize is a high economically significant crop. Its production is increasing at a rate three time the annual rate of wheat and two time of annual rate of rice (Fischer *et al*.,2014*)*. Many biotic and abiotic factor are responsible for low production of maize while insect pests are the major factor for economic damage of maize. Nearly 32.1 per cent of the actual yield is lost due to insect pests in India (Borad *et al*., 1983) [2]. The maize crop attacked by the Several insect pests during different growth stages like vegetative, flowering and pod stages. Maize crop infested by 250 species of insect pests with different level of damage (Mathur, 1992) [5] however, only about a dozen are extremely serious (Sarup *et al*., 1987; Siddiqui and Marwaha, 1993) [7, 8]. Economic yield losses of maize during different seasons all over the country caused by major insect pest such as stem borer *Chilo partellus*, pink stem borer, *Sesamia inferens*, shoot fly *Atherigona soccata*, fall army worm, *Spodoptera frugiperda*, maize cob borer, *Helicoverpa armigera*, and maize aphid, *Rhopalosiphum maidis* (Siddiqui and Marwaha, 1994). There are various different kinds of maize pests, including stalk borers, sucking pests, leaf feeders, root feeders, and cob borers. In spite large number of insect species, many of them are still unexplored. These insect pests can cause serious damage and yield loss. Biological control is considered as a reliable and ecofriendly solution to the insect pests' problem. So, keep these facts in mind the present investigation on diversity of insect pests and their Arthropods predator in agroecosystem of maize was carried out.

Material and Methods

The present investigation on the diversity of insect pest species and their Arthropods predators in maize agroecosystem was conducted at the MPUAT agriculture farm during Kharif season, 2024. The experiment field was located at 75.4^0 E Latitude and 23.4^0 N longitude. And experimental field size 4.0 m x 5.0 m replicated 4 times with row-to-row 20cm. Sowing of kharif crop was done on second week of July 2024 and insect pests complex infesting the maize crop was recorded from 25 days after germination till harvest of crop at weekly interval.

Observations were taken on a weekly basis during 9 to 10 AM. Regular field visits were done to record the diversity of insect pest species and their predators. Different species of insects were visually observed and collected by sweep net, simple net and hand-picking methods. Insect fauna was collected in morning because majority of insect become active when temperature is about 25^0 to 30^0 C (Garcia *et al*., 1995). The insect fauna was recorded on 10 randomly selected plants from the middle row. The crop observations for infestation by insect pests was taken on the basis of presence of dead hearts, presence of damaged leaves and other damaged plant parts. The collected insect fauna was killed by ethyl acetate or chloroform inside the polythene bags. The killed insect fauna was stretched, pinned, labelled, preserved in wooden collection boxes. The weekly data obtained from the field. Insect fauna was identified and classified them into their respective taxonomic groups with

the help of taxonomical keys (Samiayyan, 2014) [10] and available authentic literature.

Results and Discussion

Based on a random survey of the maize crop during its Kharif season 2024 an inventory of the insect fauna was prepared. The results from the investigation revealed the occurrence of numerous insect pest species and their Arthropods predator.

During the investigation it is observed that maize crop attacked several insect pests during different growth stages like vegetative, flowering and pod stage. A total of 24 insect pest's species collected in the experimental field. Insect species belonging to 12 families under 5 orders namely Lepidoptera, Hemiptera, Coleoptera, Diptera, and Orthoptera were recorded. The order Lepidoptera exhibited the highest number of 9 species followed by Coleoptera 8 species, Hemiptera 4 species, Orthoptera 2 Species and Diptera 1 species(fig.1).

Among all the insect pest's tobacco cutworm, fall army worm, army worm, maize stem borer, cob bore, pink stem borer and aphid were found predominant group of insect pest species which caused extreme yield loss of maize in experimental field.

During the investigation 13 species of insect predators observed in maize crop agroecosystem during the kharif season. Insect species belonging Coleoptera, Hemiptera, Hymenoptera, Neuroptera, Montodea order in the class Insecta and two spider species, belonging to Araneae order in the class Arachnida of the phylum Arthropoda (Table 2). Spider species *Argiope aurantia* (corn spider) of Araneidae family and Thomisidae sp. of Thomisidae family of Araneae order were observed. The species *Coccinella septempunctata* (Seven spot ladybird beetle), *Coccinella transverslis (*Transverse ladybird beetle), *Cheilomenes sexmaculata* (Six- spot zigzag ladybird beetle) of Coccinellidae family and *Chauliognathus lugubris* (solider beetle) of Chatheridae of Coleoptera order were observed. The species *Eocanthecona furcellata* (Predatory stink bug), of Pentatomidae family, *Rhynocoris Iracundu* (Assassin bug) of Reduviidae family and *Geocoris punctipes* (Big – eye bugs) of Geocoridae family of Hemiptera were observed. The species *Vespula vulgaris* (common wasp) of family Vespidae of order Hymenoptera were observed. The species *Mantis religiosa* (predatory mantis) of family Montidae of order Montodea were observed. The species *Chrysoperla carnea* (green lace wing) of family Chrysopidae of order Neuroptera were observed (Table 2).

Table 1: Diversity of insect pest species in the agroecosystem of maize at MPUAT agriculture farm

S. NO	Order	Family	Species (Scientific name)	Common name	Damage Status
1.	Coleoptera	Chrysomelidae	*Chaetocnema pulicaria* (Melsheimer, 1847)	Corn flea beetle	Minor
2.	Coleoptera	Chrysomelidae	*Aulacophora foveicollis* (Lucas, 1849)	Red pumpkin beetle	Minor
3.	Coleoptera	Curculionidae	*Phyllobius maculicornis* (Germar, 1823)	Green leaf weevil	Minor
4.	Coleoptera	Chrysomelidae	*Monolepta signata* (Fabricius, 1781)	White- spotted leaf beetle	Minor
5.	Coleoptera	Cicadellidae	*Dalbulus maidis* (DeLong, 1923)	Corn leaf hopper	Minor
6.	Coleoptera	Chrysomelidae	*Oulema melanopus* (Linnaeus, 1758)	Cereal leaf beetle	Minor
7.	Coleoptera	Chrysomelidae	*Phyllotreta striolata* (Fabricius, 1801)	Striped flea beetle	Minor
8.	Coleoptera	Meloidae	*Mylabris* pustulata (Thunberg,1821)	Blister beetle	Minor
9.	Lepidoptera	Noctuidae	*Heliocavera zea* (Boddie, 1850)	Corn earworm	Minor
10.	Lepidoptera	Noctuidae	*Heliocavera armigera* (Hubner, 1808)	Cob borer	Major
11.	Lepidoptera	Noctuidae	*Sesamia inferens* (Walker, 1856)	Pink stem borer	Major
12.	Lepidoptera	Crambidae	*Chilo partellus* (C. Swinhoe, 1885)	Maize stem borer	Major
13.	Lepidoptera	Noctuidae	*Sesamia cretica* (Lederer, 1857)	Corn stem borer	Minor
14.	Lepidoptera	Noctuidae	*Spodoptera frugiperda* (J.E. smith, 1797)	Fall armyworm	Major
15.	Lepidoptera	Noctuidae	*Spodoptera litura* (Fabricius, 1775)	Tobacco cutworm/ cotton leafworm	Major
16.	Lepidoptera	Noctuidae	*Spodoptera picta* (Guerin – Meneville, 1838)	Lily caterpillar	Minor
17.	Lepidoptera	Noctuidae	*Mythimina separata* (Walker, 1865)	Army worm	Major
18.	Hemiptera	Lophopidae	*Pyrilla perpusilla* (Walker, 1851)	Sugarcane plant hopper	Minor
19.	Hemiptera	Pentatomidae	*Rhaphigaster nebulosa* (Poda, 1761)	Sting bug	Minor
20.	Hemiptera	Coreidae	*Leptoglossus occidentalis* (Heidemann, 1910)	Seed bug	Minor
21.	Hemiptera	Aphididae	*Rhopalosiphum maidis* (Fitch, 1851)	Aphid	Major
22.	Orthoptera	Acrididae	*Hieroglyphus perpolita* (Uvarov, 1933)	Grass hopper	Minor
23.	Orthoptera	Acrididae	*Acrida willemsei* (Dirsh, 1954)	Asian grass hopper	Minor
24.	Diptera	Muscidae	*Antherigona soccata* (Rondani, 1871)	Sorghum shoot fly	Minor

Table 2: Diversity of arthropod predators of insect pest at MPUAT Agriculture farm

S. No.	Natural enemies		Family	Order	Prey
	Common name	Scientific name			
1.	Seven spot ladybird beetles	*Coccinella septempunctata* (Linnaeus,1758)	Coccinellidae	Coleoptera	Soft bodied insects
2.	Transverse ladybird beetle	*Coccinella transverslis* (Fabricius, 1781)	Coccinellidae	Coleoptera	Soft bodied insects
3.	Six- spot zigzag ladybird beetle	*Cheilomenes sexmaculata* (Fabricius,1781)	Coccinellidae	Coleoptera	Soft bodied insects
4.	Solider beetle	*Chauliognathus lugubris* (Fabricius, 1801)	Catharidae	Coleoptera	Aphid and their larva
6.	Common wasp	*Vespula vulgaris* (Linnaeus ,1758)	Vespidae	Hymenoptera	Lepidopteran larva
7.	Praying mantis	*Mantis religiosa* (Linnaeus, 1758)	Montidae	Montodea	Thrips, insect egg and larva
8.	Green lace wing	*Chrysoperla carnea* (Stephens, 1836)	Chrysopidae	Neuroptera	Soft bodied insects

9.	Corn spider	*Argiope aurantia* (Lucas, 1833)	Araneidae	Araneae	Soft bodied insects, larva
10.	Crab spider	Thomisidae sp.	Thomisidae	Araneae	Soft bodied insects, larva
11.	Predatory stink bug	*Euthryrhynchus floridanus* (Linnaeus, 1767))	Pentatomidae	Hemiptera	Small insect, caterpilars
12.	Assassin bug	*Rhynocoris Iracundus* (Latreille, 1807)	Reduviidae	Hemiptera	Any insect
13.	Big – eye bugs	*Geocoris punctipes* (Fallen, 1814)	Geocoridae	Hemiptera	Fles beetle, caterpillars and small insect

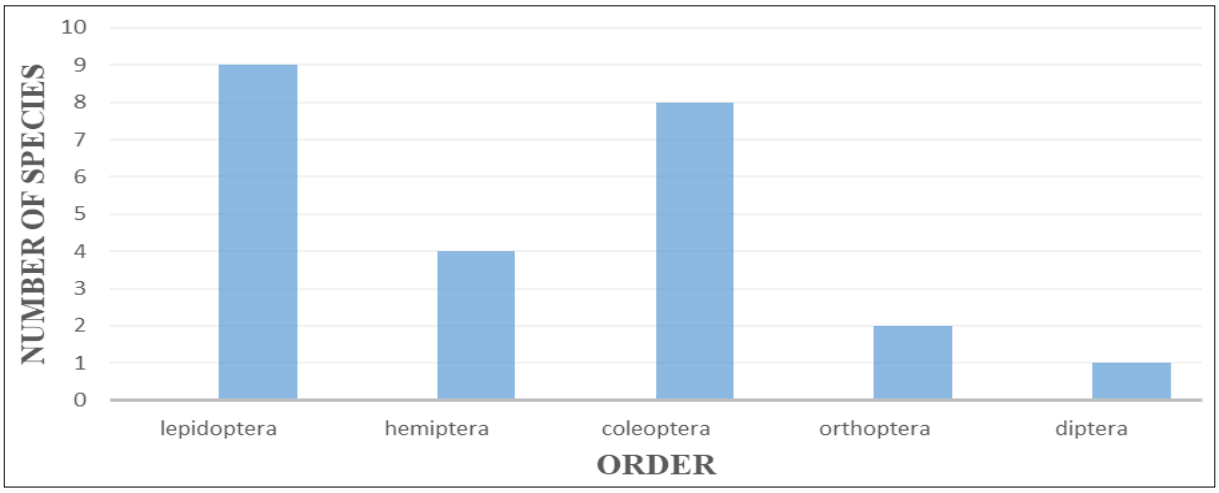

Fig 1: Diversity of Insect pest species of distinct orders on maize agroecosystem

Noctuidae family of Lepidoptera was the maximum number of species 9 followed by Chrysomelidae of Coleoptera with number of species 5, Acrididae of Orthoptera with number of species 2, Curculionidae of Coleoptera with number of species 1, Cicadellidae of Coleoptera with number of species 1, Meloidae of Coleoptera with number of species 1, Crambidae of Lepidoptera with number of species 1, Lophopidae of Hemiptera with number of species 1, Pentatomidae of Hemiptera with number of species 1, Coreidae of Hemiptera with number of species 1, Aphididae of Hemiptera with number of species 1, and Muscidae of Diptera with number of species 1, on maize crop in the experimental fields (Fig. 2).

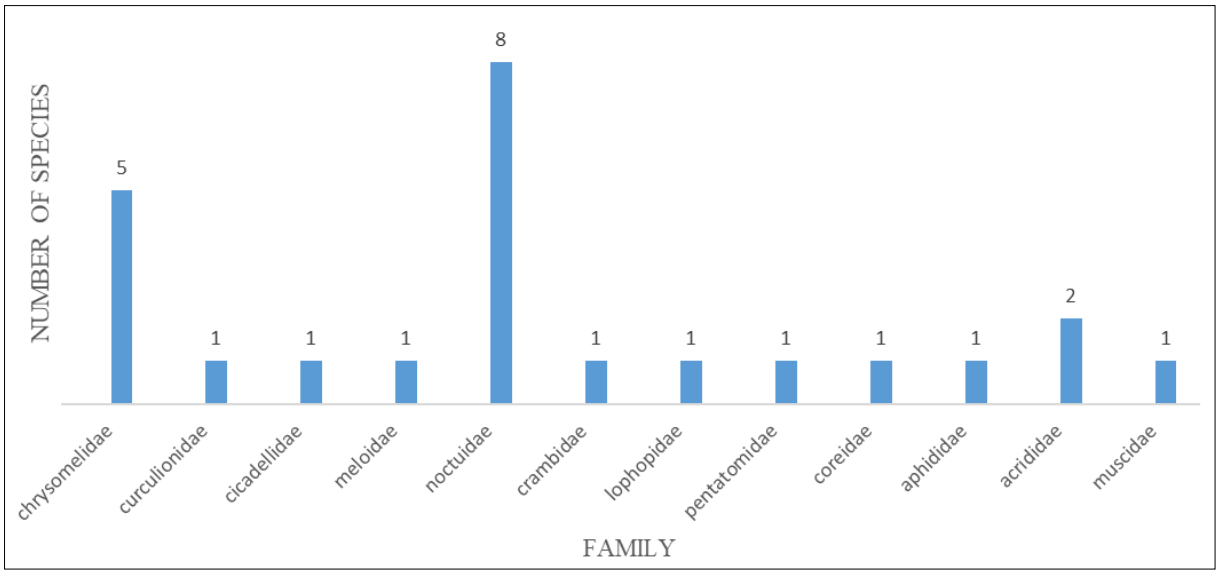

Fig 2: Diversity of Insect pest species of distinct families on maize agroecosystem

Conclusion

From the present study it can be concluded that a larger number insect pest species infests maize crop and their predator species is also quite diverse. A total of 24 insect pest's species collected in the experimental field. Insect pest's species belonging to 12 families under 5 orders namely Lepidoptera, Hemiptera, Coleoptera, Diptera, and Orthoptera were recorded. Out of which 7 insect pests species damage the crop vigorously that need effective management strategies. During the survey 13 species of insect predators observed in maize crop agroecosystem. Future research could be expanded on the current study findings to investigate insect diversity for effective biocontrol pest management strategies.

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Reference

1. Anonymous. Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, Krishi Bhawan, New Delhi -110 001, 2014, 37.
2. Borad PK, Mittal VP. Assessment of losses caused by pest complex on hybrid sorghum CSH 5. In: Proc. Nation. Sem., Crop losses due to insect pests, (Eds. Krishnamurthy Rao, B H. and Murty, K. S. R. K). 7-9 January, 1983. Hyderabad, A. P., India, 1983, 271.
3. Fisher RA, Byerlee D, Edmeades GO. Crop yields and global food security: will yield increase continue to feed the world? ACIAR Monograph No. 158, Australian Centre for International Agriculture Research, Canberra,2014:22:634.
4. Garcia A, Gonzalez D, Leigh TF. Three methods for sampling arthropod numbers on California cotton. Environ. Ent,1982:11(3):565-572.
5. Mathur LML. Changing complex of maize pests in India. Proceedings National Seminar on Changing Scenario in Pest Complex. Hyderabad, c 1992.
6. Singh AD. Maize in India. India Maize Summit,2014:FICCI:2.
7. Sarup P, Siddiqui KH, Marwaha KK. Trends in maize pest management research in India together with bibliography. J. Entomol. Res,1987;11:19 -68.
8. Siddiqui KH, Marwaha KK. The vistas of maize entomology in India. Kalyani publishers, Ludhiana /New Delhi, 1993, 184.
9. Scotta MP, Emery M. Overview. Encyclopedia of food grains,2016:1:99-104.
10. Samiayyan K. Spiders – The generalist super predators in agroecosystem. Integrated Pest Management, 2014, 283 -310.