

Diversity of Arthropod fauna associated with Chilli (*Capsicum annum*)

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ABSTRACT

A field trial was conducted to study the arthropod fauna association in chilli at private agriculture farm, Jhansi (U.P.) during the two consecutive years. The study revealed the occurrence of arthropods fauna belonging to the diverse group. About twenty one diverse groups of species belonging to order Hemiptera – three, Thysenoptera - one, Araneae-two Coleopteran-four, Orthoptera -one, Lepidoptera - three, Hymenoptera - three, Odotenone, dictyoptera-one, Neuroptera-one and *Clubiona* sp. The arthropods were grouped under different categories on the basis of their nature of damage/activity found during the crop seasons.

Figure : 00

References : 16

Table : 00

KEY WORDS : Arthropod, Chilli, Diversity..

Introduction

Chilli (*Capsicum annum*) an important cash crop of India belongs to family *Solanaceae*. The chief producers state in India are Karnatka, Andhra Pradesh, Bihar, Maharastra, Chhattisgarh and Madhya Pradesh. India is a chief exporter to countries like Bangaladesh, USA, Europe, Japan, Israel, Malaysia. Chilli widely used as culinary purpose and widely used for chutney, pickles, sauces and condiments. Chilli contains nutrients and is very rich source of minerals like Fe, K, Mg and Mn. Over 20 species of insect pest attacks the chill crop¹. The major insects pests *Amrasca biguttula biguttula*, *Aphis gossypii*, *Bemisia tabaci*, *Scirtothrips dorsalis*, *Polyphagotrsonemus latus*, *Aulacophora foveicollis*^{6,7}. Chilli Pod borers include *Mylabris pustulata*, *Oxycetonia versicolor* and *Helicoverpa armigera*. For sustainable agriculture, it is essential to utilize the Earth's assets for our advantage. It is fundamental that we comprehend the biology of human-altered systems and the organic entities that occupy them². The insect pest of chilli are controlled by their natural preadators like *Coccinella septempunctata* sp. *Chrysoperla carnea*, *Agriocnemis* sp. Agro ecosystem includes activities including living and non living components that interacts in different ways. Beneficial arthropods, like pollinators of yields and natural enemies of arthropod pest and weeds, assume significant role in environmental sustainability of agro ecosystems^{3,4}. The yearly consolidated worth of fertilization administrations by insect predators and parasitoids has been assessed at very high rate in India ^{5,8,9}.

Materials and Methods

The present work was designed on its peer objectives to conduct to study the arthropod associated with chilli crop ecosystem at private agriculture farm, Jhansi (U.P.) during the two consecutive years. The experiment was laid out using (CRBD) complete randomized block design. Chilli variety 'Surya-31' was transplanted into the main field comprising of plots with (4x5m²) during *Kharif* season. The study revealed that the occurrence of arthropods fauna belonging to the diverse group. About twenty one diverse group of species belong to order Hemiptera – three, Thysenoptera - one, Araneae -two coleopteran - four, orthoptera - one, Lepidoptera - three, Hymenoptera - three, Odotenone, dictyoptera-one, Neuroptera-one and *Clubiona* sp. The arthropods were grouped under different categories on the basis of their nature of damage/activity found during the crop seasons. The incidence of insects pest were observed in tagged plants and separate observation were made at early morning 7:00 AM to 8:00 AM hours.

Quantification of Arthropod diversity

Population of all the arthropods present on chilli variety Surya -31 was recorded. The incidence of insects pest were observed in tagged plants except the incidence of fruit borer, *Spodoptera litura* and separate observation were made at early morning 7:00 AM to 8:00 AM hours. The population of aphid (*Aphis gossypii*) and white white fly (*Bemisia tabaci*) present on three leaves, on each from lower, upper and middle part. The population of

tobacco caterpillar (*Spodoptera litura*) was recorded separately on tagged plants.

Results and Discussions

Jassid *A. biguttula biguttula*

Jassid *A. Biguttula Biguttula* is an important pest of chilli. Jassid population commenced on one week after the transplanting i.e, 4th week of July (31st SW). Constant higher population was maintained throughout the crop growth period and reached its peak activity level of 9.14. Jassid / leaf on last week of August (35th SW) at a temperature ranged 33.0 - 25.90°C and RH 84.0 percent during first year 2019 and 10.12 jassid *A. biguttula*/ leaf on first seven days of September (36th SW) at a temperature went 34.06 - 26.50°C and RH 82% during the second year 2020. The results of the present findings are similar to the findings ^{11,13}.

Aphid : *Aphis gossypii*

The population of Aphid *A. gossypii* was showed up when transplanting in chilli was done. Infestation rate was started on 3rd stretch of August (34th SW) during first year and in last week of August (35th SW) during the subsequent year. The populace slowly expanded and became most significant level of 12.38 aphid/leaf on first seven week of September (36th SW) during 2019 at which a temperature went 32.50-25.30°C and RH 81.00 percent and 12.83 aphid/leaf on first seven days of September (36th SW) during 2020 at which a temperature ran 34.60 – 26.50°C and RH 82.00 percent. From there on, its populace became decline and were dynamic in the field upto last week of September (39th SW) during both the years 2019 – 2020. The results of the present findings are similar to the findings ¹⁴⁻¹⁶.

Whitefly : *Bemisia tabaci*

The movement of both sprite and grown-ups of *B. tabaci* were seen for the first time in the third week of July (30th SW) during both the years. Populace was consistently expansion in the field upto second seven day stretch of October (41st SW) during 2019 and third week of October (42nd SW) during 2020. The pest population showed fluctuating patterns during the whole yield time frame and came to its maximum level of 11.25 Whitefly, *Bemisia tabaci*/leaf on second week of August (33rd SW) at a temperature ran 31.50 - 24.00°C and RH 87.50 per cent during first year. During second year 2020 the greatest populace of 12.50 Whitefly *Bemisia tabaci*/ leaf was recorded in week of August (34th SW) at a temperature ran 31.10 – 25.20°C and RH 89.80 percent. The results of the present findings are with the findings ^{11,13}.

Foliage feeder/Defoliators

Red Pumpkin Beetle : *Aulacophora foveicollis*

Adults insects of *A. foveicollis* were first seen

benefiting from leaves from third week of July (30th SW) during second year and in fourth week of July. Consequently, the greatest population of 0.40 beetles / plant was recorded in third week of August (33rd SW) at which temperature went 31.50 – 24.00°C and RH 82.0 per cent during first year 2019 and 0.45, 0.42 and 0.38 beetles/plant in 31st, 33rd and 38th SW during second year 2020 at which temperature ran 36.30 – 25.20°C and RH 74.50 – 74.50 per cent were recorded. The results of the present study confirm the previous findings ^{10,14}.

Kharif Grass hopper, *Hieroglyphus nigrorepletus*

Kharif grass hoppers were recorded during whole harvest period of Kharif 2019 and 2020. Both nymphs and adults of the surface grass hopper were showed up before in third week of July (30th SW) during both the years. During second year its population was additionally expanded step by step and came to its greatest degree of 1.45 and 1.20 hoppers/plant recorded in 35th and 36th SW at a variable temperature ran 32.10 – 24.30 °C and 33.80 – 29.25 RH 84.50 – 79.50 per cent. Similar observation were made earlier ^{11,13}.

Tobacco caterpillar, *Spodoptera litura*

The tobacco caterpillar *Spodoptera litura* is a significant bug of vegetables in the Southern UP was recorded benefiting from leaves without precedent for the fourth week of July (31st SW) during both the years and stays in the field up to second weeks of October (41st SW). Its populace expanded step by step and came to top degree of 0.87 larvae/plant in first week of September (36th SW) at a variable temperature ran 34.60 – 26.50°C and RH 82.00 percent during 2019 and declined from there on. During 2020 the greatest populace of 0.70 larvae/plant was recorded in first week of August (32nd SW) at a variable temperature went 32.50-25.40°C and RH 86.00 percent.

Natural enemies/Beneficial insects

Coccinella septempunctata

The population of this predator was showed up in fourth week of July (31st SW) during both the years. Its populace didn't show any similar patterns during both the years - 2019-20. Constantly population expanded gradually upto last week of August (39th SW) and arrived at its most significant level of 2.00 beetles/plant in fourth week of September (39th SW) during 2019 at a variable temperature ran 30.60-23.50°C and RH 87.50% and 1.25 beetles/plant during 2020 was additionally recorded in same SW at which temperature went 34.20-23.30°C and RH 77.0 per cent. Similar results were earlier reported ^{11,15}

Preying (*Mantis sp.*)

The Mantis predating upon whiteflies, little caterpillars, grass hoppers, dragonfly and so forth and

appeared for third week of August (34thSW) during first year-2019 and in last week of August (35thSW) during second years 2020. The population continued expanding and came to its greatest peak of 0.35 mantis/plant in second week of September (37th SW) during first year at a temperature went 32.50 -25.40°C and RH 86.00 percent. During second year 2020 the greatest populace of 0.45 mantis/plant was seen in fourth week of September (39th SW) at a variable temperature went 34.20 - 23.30°C and RH 77.0 per cent. The result obtained in the present study are more or less similar to the previous findings.^{11,16}

Conclusion

It should be noted that correct observation and identification of arthropods specimen is much more challenging and produce heavy loss year around. As habitat destruction, climate change and other anthropogenically driven challenges continue to unfold. If climate change leads to increased insect pest populations and changes in pest geographic ranges, it will be very difficult to resist the temptation to respond with even greater dependency on malpractices which is hampering the beneficial arthropods.

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