Hemipteran Insect Pests Associated with Different Agricultural Crops from Chhatrapati Sambhajinagar (M.S), India.

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ABSTRACT

A field investigation was conducted in Chhatrapati Sambhajinagar, Maharashtra, from May 2023 to April 2024 to look into the seasonal occurrence of hemipteran pests in different agricultural sectors. In this study, 11 hemipteran insect species from 10 genera, 7 families, and 8 subfamilies were collected from the study area. The Aphididae family was the most common, whereas the Pentatomidae family was the most diverse. This study aimed to give a brief overview of hemipteran insects and the damages they cause to agricultural crops in the Chhatrapati Sambhajinagar district.

Keywords: Seasonal incidence, hemipteran insects, damaging crops, agricultural crops.

Introduction:

Insects are among the most prevalent creatures to visit crop fields, acting as pests, pollinators, and other ecologically important organisms to a particular plant (Mitra et al. 2018). The global diversity of tropical insect fauna significantly exceeds predictions, as insects are key components of animal diversity in terms of the number of species in most habitats and ecosystems (Stork, 1988). Insect pests and illnesses, which thrive in intensive agriculture, are significant barriers to higher yield. Resistance, more outbreaks, and new pests have resulted in increased financial losses. Pest infestation reduces the quality and quantity of agricultural crops. According to Singh *et al*., (2003), insect diseases and pests can account for up to 38% of agricultural losses in India, followed by weeds at 10% and birds at 1-2%. Proper identification of agricultural pests is essential for a successful integrated pest management (IPM) program.

Hemipteran insects, usually known as 'true bugs', are economically significant because the majority of them are pests of a variety of agricultural crops. Hemiptera is classified as a monophyletic group because they have unique piercing and sucking mouth parts called rostrums, which are made up of concentric stylets that interlock to produce the feeding and salivary canal (Backus, 1988). Hemipterans, also known as bugs, are one of the most diverse groups of exopterygote insects. Additionally, some live in aquatic environments and are predators of other insects. Not all Hemipteran insects are a nuisance. Furthermore,

numerous hemipterans are essential natural predators of several insect pests. The most common insect orders that eat other insects and mites include Coleoptera, Neuroptera, Hymenoptera, Diptera, Hemiptera, and Odonata. The world's known Hemipteran species number 103,590 and are classified into 152 families and four suborders.

According to ZSI (2012) and Chandra (2011), the Indian Hemipteran fauna consists of 6479 species distributed across 92 families. The impact of hemipteran insects on agricultural crops in the Chh. Sambhajinagar (M.S) region of India has become an issue of worry for both agricultural practitioners and researchers. Many pestiferous and predatory insect species of the order Hemiptera have been incompletely reported for agricultural crops in Chh. Sambhajinagar district. Therefore, the current study aims to identify the hemipteran species associated with diverse agricultural fields in the Chhatrapati Sambhajinagar district of Maharashtra, India. The purpose of this study is to provide insight into the incidence of hemipteran insects on agricultural crops in Chh. Sambhajinagar and how they may affect crop productivity. By gathering this information, researchers and farmers may work together to develop sustainable and ecologically friendly pest management solutions adapted to local conditions, assuring the long-term health and productivity of agricultural crops in the area.

Materials and Methods:

This study was conducted in Chh. Sambhajinagar district of Maharashtra, located at 19.8776° N 75.3423° E. Based on the convenience of season and cropping patterns, different sites from Chh. Sambhajinagar were selected for the study of the infection of hemipteran bugs associated with different agricultural crops. The adult bugs were collected from these sites during May 2023 to April 2024. Numerous agricultural sites from the study area were randomly visited for the collection of different methods such as the sweep net method, hand picking, and baiting were used for the collection of bugs. Specimens collected from various agricultural crop fields were killed in killing bottles (containing chloroform / ethyl acetate), pinned, preserved dry, and labelled to indicate host plant, locality, and date. During the present study, the standard methodology suggested by Borror and White (1970), Richard and Davies (1997), Triplehorn and Johnson (2005), was adopted for the collection, preservation, and identification of hemipteran insects.

Photo Plate I: Material & Methods

Result and Discussion:

During the present investigation, Hemipteran species related with different agricultural crops and other plant species such as soyabean, pigeon pea, cotton, wheat, maize, mung bean, parthenium and mulberry etc., were observed and collected. A total of 11 species belonging to 7 families, 8 subfamilies and 10 different genera were collected from the study area. Among these families, Pentatomidae was the most diversified while Aphididae was most abundant (in case of frequency).

Table 1: Taxonomic Composition of hemipteran insects from Chhatrapati Sambhajinagar.

Order	Family	Subfamily	Scientific Name	Common Name
Hemiptera	Reduviidae	Ectrichodiinae	*Scadra annulipes* (Reuter, 1881)	Assassin bugs
		Harpactorinae	*Zelus renardii* (Kolenati, 1856)	Assassin bugs
	Plataspidae	Plataspinae	*Megacopta cribraria* (Fabricius, 1798)	Bean plataspid
	Pentatomidae	Pentatominae	*Halyomorpha halys* (Stal, 1855)	Shield bugs
			Nezara viridula (Linnaeus, 1758)	Stink bugs
			Dictyotus caenosus (Westwood, 1837)	Brown shield bug
	Coreidae	Coreinae	*Anoplocnemis phasiana* (Fabricius, 1781)	Leaf footed bugs
	Pyrrhocoridae	Pyrrhocorinae	*Dysdercus cingulatus* (Fabricius, 1775)	Cotton stainer
	Scutelleridae	Scutellerinae	*Chrysocoris stollii* (Wolff, 1801)	Jewel bug
	Aphididae	Aphidinae	*Aphis gossypii* (Glover, 1877)	Cotton aphid
			Aphis craccivora (Koch, 1854)	Cowpea aphid

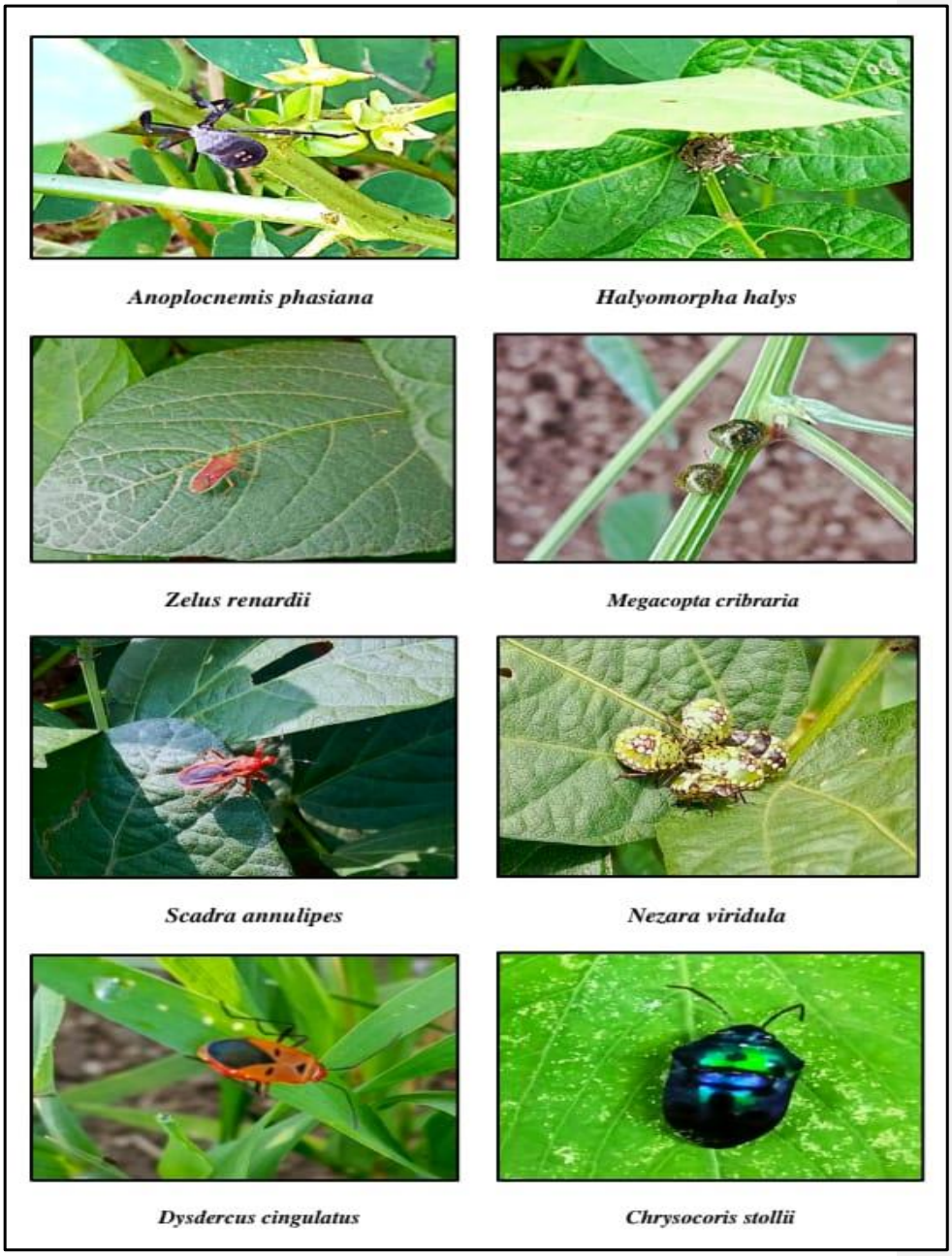

Plate II: Hemipteran Insects Collected from Chhatrapati Sambhajinagar District.

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Table 2: Damaging effects of Hemipteran insects on different host plants.

Sr. No	Name of the Hemipteran Species	Host Plants	Damaging Effects
1.	*Scadra annulipes*	Cotton, Pigeon pea	-Sucks fluids from leaves & stems -Discolouration, yellowing -Some assassin bugs can be beneficial as natural enemies of pests.
2.	*Zelus renardii*	Cotton, Pigeon pea (also feeds on pests)	-Leaf hopper -But, feeds on some pests such as cotton aphids.
3.	*Megacopta cribraria*	Pigeon pea, soyabean, cotton, wheat, citrus, mulberry	-Feeds on underside of the leaves and stems -Abnormal plant development -Formation of necrotic areas
4.	*Halyomorpha halys*	Soyabean, citrus, maize	-Sucks plant sap -Adults feed on fruits -Lesions, necrotic areas on leaves
5.	*Nezara viridula*	Soyabean, mung bean, pigeon pea, cow pea	-Feeds on plant sap -Brownish spots on fruits -Retarded fruit growth
6.	*Dictyotus caenosus*	Soyabean, mung bean, cotton	-Feed on developing seed -Reduced seed quality
7.	*Anoplocnemis phasiana*	Cow pea, mung bean	-Adults suck the juice of unripe seeds -tender part gets dried
8.	*Dysdercus cingulatus*	Cotton, okra	-Sucks fluid from host plants -Affects the flower, seed capsule/ boll, Staining of cotton bolls
9.	*Chrysocoris stollii*	Pigeon pea, mung bean, soyabean	-Feed on plant sap -Adults feed on leaves, seeds and inflorescence
10.	*Aphis gossypii*	Cotton, citrus, pigeon pea, soyabean, okra	-Adults feed on underside of leaves -Curling of leaves, Foliage may die permanently
11.	*Aphis craccivora*	Cow pea, pigeon pea, soyabean	-Sucks plant sap -Pods may become malformed -Drying of affected pods

Numerous entomologists have studied various aspects of hemipteran insects including their diversity and damaging effects. Kandibane (2008) conducted studies on diversity and abundance of phytophage hemipteran insects in in an irrigated rice ecosystem of Tamil Nadu and recorded 24 species of hemipteran insects. Kailash Chandra and Kushwaha (2013) studied the hemipteran insect pest diversity associated with *Lablab purpureus* L. from Jabalpur, Madhya Pradesh and recorded 7 species of hemipteran insects. Burman and Gupta (2016) oserved the assemblage of coleoptera and hemiptera community in Chakrashila Wildlife Sanctuary in Assam and collected 3 species of hemipteran insects. Harshita *et al*., (2020) carried out a study on the seasonal incidence of major insect pests of vegetable pigeon pea (*Cajanus cajan* L.) and concluded that *N. viridula* was one of the most severe pests of pigeon pea crop. Sahoo *et al*., (2021) conducted a study on the diversity and abundance of Hemipteran families at Agri-biodiversity park of Prof. Jayashankar Telangana State Agricultural University, Hyderabad. They recorded a total of 12,575 individuals under 22 families of Hemiptera. Seni (2021) carried out a study on the hemipteran insect fauna associated with pigeon pea and their relative abundance at Chiplima, Odisha and documented a total of 18 hemipteran insect taxa belonging to 11 insect families.

Singh *et al*., (2022) observed an infestation of 38 insect pests including *N. viridula* on mung bean. They also observed economic losses. Paunikar *et al*., (2023) studied the diversity and distribution of hemipteran fauna in the different forest areas of North-West Himalaya and collected 27 species of 23 genera under 7 families, belonging to order Hemiptera. All these works indicate that severe infestations of insect pests can affect the yield of agricultural, horticultural crops and also affect the normal growth of various other plants species

Conclusion:

The present investigation made an effort to provide an overview of Hemipteran insects in the Chhatrapati Sambhajinagar district. The objective of this investigation was to study and catalogue the hemipteran species that have been identified in the area. The results of this investigation will help us understand the diversity of hemipteran insects and their infestations on diverse agricultural crops in the Chhatrapati Sambhajinagar district. A long-term study is required to investigate species distribution across all seasons as well as how they interact with host plants as the environment changes. In addition to providing baseline data for future researchers and a large possibility for additional research, it provides useful information regarding the diversity of hemipteran insects in the area mentioned.

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