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HEMIPTERAN PEST ON KHARIF CROP IN REFERENCE OF EASTERN RAJASTHAN

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Abstract

The field survey that was place in 2020-22 in Tonk, Rajasthan, found that there are 19 insect pests recognized from kharif crops, whereas only 13 insect pests were documented from rabi crops. This was discovered throughout the period of time. The farm field was the location where the five biological control agents and two kinds of ants were recorded. Both the kharif and rabi crop seasons are adversely affected by a large number of insect pests, the majority of which belong to the orders Hemiptera and Lepidoptera. As a result, the current research offers useful information on a variety of insect pests and the insects that are related with them in agricultural areas .

Keywords: *Hemiptera, Kharif Crop,*

Introduction

Eastern Rajasthan, located in the northern part of India, is a region with a predominantly agrarian economy. The Kharif season, also known as the monsoon cropping season, typically spans from June to October. During this period, farmers in Eastern Rajasthan cultivate a variety of crops, including rice, maize, millet, soybeans, groundnuts, and cotton. However, the region is not immune to the challenges posed by pests, and one group of insects that often infests Kharif crops in this area is Hemipterans. Hemipterans, commonly referred to as true bugs, are a diverse order of insects known for their piercing-sucking mouthparts. These insects feed by piercing plant tissues and extracting sap, making them significant agricultural pests. They can cause damage to crops by directly feeding on plant juices, transmitting plant diseases, and secreting honeydew, which can lead to the growth of sooty molds, further reducing crop yields. In Eastern Rajasthan, the Hemipteran pests that affect Kharif crops can include species such as aphids, whiteflies, and leafhoppers, among others. These pests are particularly problematic because they can reproduce rapidly, leading to large infestations that can devastate crops if left unchecked. Farmers in Eastern Rajasthan face the constant challenge of managing and mitigating the damage caused by these Hemipteran pests to ensure a successful Kharif crop season. Pest control measures, including the use of chemical pesticides, integrated pest

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management practices, and crop rotation, are often employed to minimize the economic impact of these insect infestations. To effectively combat Hemipteran pests in Eastern Rajasthan, it is crucial for farmers and agricultural authorities to stay informed about the latest research, best practices, and pest management strategies, all while considering the environmental and health implications of their choices. Additionally, climate conditions and the specific crops grown can influence the prevalence and severity of Hemipteran infestations, making local knowledge and adaptation essential in addressing this agricultural challenge.

1. Hemipteran Pests:

Hemipterans belong to the order Hemiptera and are characterized by their piercing-sucking mouthparts. They are known for feeding on plant sap by piercing plant tissues with their specialized mouthparts and extracting nutrients. These pests can cause both direct and indirect damage to crops.

2. Common Hemipteran Pests in Eastern Rajasthan:

Several hemipteran pests are known to infest kharif crops in eastern Rajasthan. Some of the common ones include:

Aphids: These small, soft-bodied insects are often found on the undersides of leaves and can transmit plant diseases while feeding on crop sap.

Whiteflies are small, winged insects that feed on plant sap and can cause damage through their feeding activity. They also secrete honeydew, which can lead to the growth of sooty mold.

Jassids: Jassids, or leafhoppers, are another group of hemipteran pests that feed on plant sap and can cause leaf damage and reduced crop quality.

3. Damage Caused by Hemipteran Pests:

Hemipteran pests can cause a range of issues in kharif crops, including:

Reduced Yields: They can reduce crop yields by depleting plant nutrients and stunting crop growth.

Leaf Damage: Feeding by hemipterans can cause curling, wilting, and yellowing of leaves.

Transmission of Diseases: Some hemipteran pests can transmit plant diseases, such as viruses, which can further damage crops.

Honeydew and Sooty Mold: The excretion of honeydew by certain pests can lead to the

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development of sooty mold on plants, reducing photosynthesis and overall plant health.

Management Strategies: Effective management of hemipteran pests in kharif crops typically involves a combination of cultural, biological, and chemical control methods. These may include:

Crop Rotation:

Changing crop types in different seasons can disrupt pest life cycles.

Biological Control:

Encouraging natural predators like ladybugs and parasitic wasps can help control hemipteran populations.

Pesticides: In severe infestations, the judicious use of insecticides may be necessary.

Monitoring and Early Detection: Regular scouting for pests and implementing control measures at the early stages of infestation can be effective.

Local Variations: The specific hemipteran pest species and their prevalence may vary across regions and crops in eastern Rajasthan, so it is important for farmers and agricultural experts to stay informed about the local context and adopt suitable pest management strategies.

MATERIALS AND METHODS

a) Collection Method and Identification :

Every other week, a trip was taken out to look at the crops in the agricultural fields. The sample was performed at two distinct times throughout the day: first thing in the morning (between the hours of 6:30 and 9:30 am), and then again in the evening (between the hours of 4:30 and 6:30 pm). Throughout the entirety of the collecting procedure, both the method of hand selecting and the sweep net technique were applied. Handpicking was done in order to remove both large caterpillars and smaller sucking pests such as aphids and mealy bugs. This was done in order to prevent the spread of disease. In contrast, while utilizing the sweep net method, each quadrate was swept many times (10 sweeps were done each time, and a new set of ten sweeps was undertaken after a gap of ten minutes). This was done in order to collect as much data as possible. Jars containing potassium cyanide were used to put large insects to death so that they could be more easily kept and preserved in a state that was more manageable. The small insects were preserved by placing them in glass vials with ethyl alcohol that had a volumetric concentration of between 70 and 90 percent. The procedure of identifying and labeling was

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carried out in the laboratory with the assistance of the keys that could be located in the standard taxonomic literature as well as in the standard manuals.

b) An Assessment of the Insect Pests that Affect Kharif and Rabi Crops, Including a Calculation of the Rate of Infestation

The scale that was presented by Vennila and his Co-author at the National Centre for Integrated Pest Management in New Delhi in the year 2010 was utilized in order to perform an estimation of the incidence and infestation rate of insect pests on a range of kharif and rabi crops. This estimation was carried out with the help of the scale.

0-4 Scale infestation

0 Grade: There was not a single insect or else with a putrid odor that was found.

1 Grade: It is possible to spot a few insect pests here and there all over the plants.

2 Grade: A serious infestation of insect pests has only manifested itself in one of the branches.

3 Grade: On more than one branch, there were a substantial number of bug pests that needed to be removed.

4 Grade: It was seen that the entire plants were plagued by a heavy infestation of insect pests.

RESULTS AND DISCUSSION

An assessment of agricultural regions between 2020 and 2022 found that several insect pests were to blame for the destruction of economically important kharif and rabi crops. These plants matured between 2020 and 2022. Over the course of this study, insects from the orders Orthoptera, Hemiptera, and Lepidoptera were pinpointed as possible threats to the kharif crop. There were 19 different species represented here. However, scientists in the agricultural areas of Tonk, Rajasthan, found that rabi crops were plagued by thirteen different kinds of insect pests. These bugs were classified as either Hemiptera, Thysanoptera, or Lepidoptera. Insect pests accounted for the highest share of both the karif crop (58%) and the rabi crop (69%), with the Hemiptera order being the primary culprit in both cases, followed by the Lepidoptera order (37%) and the Coleoptera order (23%). Graphs 1 and 2 show that in the kharif crop, the proportion of pests belonging to the Orthoptera order was lowest (5%), whereas in the rabi crop, the percentage of pests belonging to the Thysanoptera order was highest (8%). Insects that are unwanted and belong to the order Hemiptera Aphis gossypi, and Myzus persicae (Family: Aphididae); Bemisia tabaci (Family: Aleyrodidae); Phenacoccus solenopsis (Family: Pseudococcidae); Dysdercus cingulatus (Family: Pyrrhocoridae) and Pyrilla perpusilla (Family:

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Lophopidae) were considered as serious concern to kharif crops such as paddy, cotton, maize and sugarcane. Most of the damage to rabi crops including mustard, wheat, and check pea in the agricultural areas of Tonk was caused by B. tabaci, but other pests like Aphis crassivora, Rhopalosiphum maidis, and M. persicae were also to blame (Tables I& II). The Cotton stem weevil, also known as Pernpherulus affinis, is responsible for the signs of damage seen in cotton plants. The family name Curculionidae is used to describe this order of insects. Bemisia tabaci was shown to be a major threat to agriculture in subtropical and tropical climates, as well as greenhouse production systems, by Olivera et al. (2001). Over 600 unique plant species were eradicated due to this disease. The results matched those previously published by Olivera et al. (2001). The insect Pyrilla perpusilla (Lophopidae) is responsible for the destruction of "Triticum sativum, Zea mays, sorghum, and sugarcane, resulting in direct and indirect monetary losses (Gupta and Ahmad, 1983; Kumara Singhe and Wratten, 1996; Gamehiarachi and Fernando, 2006). There will be monetary damages from this disaster on both the direct and indirect levels. This study found that M. persicae, B. tabaci, P. perpusilla, and Melanitis leda are all common insect species that are considered pests and are active all year round". This is because they are polyphagous and may consume the flesh of several animal and plant species. Mishkatullah and Mahmood (2007) conducted similar research, and they found that P. perpusilla benefited from relocating from wheat to sugarcane and maize throughout the year. They also found that the issue was exacerbated by the existence of distinct host ranges. Because they feed on so many different types of plants, Aphis gossypii and Phenacoccus solenopsis are regarded to be significant agricultural pests The ever-growing insect population is kept in check by naturally occurring biocontrol agents. Five kinds of insect parasitoids and predators have been identified in the city of Tonk. Mealybugs and aphids are staple foods for predators like the Chrysoperla zastrowi Arabica and the Sympherobius fallax. The parasitoids Aenasius bambawalei and Apanteles rubecula feed on mealybugs and cabbage butterfly larvae, respectively (Table III). The larvae of the cabbage butterfly are sometimes referred to as mealybugs. However, the usage of large quantities of pesticides has an effect on the population of bioagents, according to studies by Cork et al. (2003). Insecticide use continues to rise as farmers scramble to keep their crops safe from a wide range of pests. Pesticide resistance, resurgence, and environmental concerns were all consequences of heavy use, as reported by Mascarenhas et al. (2013). Gupta et al. (2004) state that "successful management of insect pests needs the integration of this knowledge with a number of tried-and-true methods of pest control that may be deployed against the target pests. The final result is that this will increase productivity and take the place of pesticides, to which the insect has developed resistance (Ahuja et al., 2012). Natural enemies, whether they are local or not, will also benefit from this because it will aid in their protection and development. In order to choose an effective and substantial environmentally friendly technique for the management of these polyphagous insect pests at the appropriate time, the current study

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provides the relevant knowledge about the presence and infestation state of insects (Pest or Biocontrol agents) in the fields. This is because the data presented above gives essential information on insects (as pest or biocontrol agents).

Table 1 Tonk, Rajasthan's kharif agricultural bug problem list

Pest Name	Family	Order	Kharif Crop	Status
Gryllotalpa fossor (Mole cricket)	Gryllotalpidae	Orthoptera	Paddy	1 Grade
Amrasca biguttula (Cotton Jassid)	Cicadellidae	Hemiptera	Cotton	2 Grade
Nephotettix nigropictus (Green rice leafhopper)			Paddy	2 Grade
Aphis gossypii (Cotton aphids)	Aphididae		Cotton	4 Grade
Myzus persicae (Green peach aphids)			Cotton	4 Grade
Dysdercus cingulatus (Red cotton bug)	Pyrrhocoridae		Cotton	4 Grade
Bemisia tabaci (Whitefly)	Aleyrodidae		Cotton	4 Grade
Pyrilla perpusilla (Sugarcane leaf hopper)	Lophopidae		Sugarcane, Maize	4 Grade
Phenococcus solenopsis (Mealy bug)	Pseudococcidae		Cotton	4 Grade
Lygaeus militaris (Plant bug)	Lygaeidae		Cotton	1 Grade
Lygaeus hospes (Lygaeid bug)			Cotton	0 Grade
Nezara gramineae (Green plant bug)	Pentatomidae		Paddy	0 Grade
Scirpophaga auriflua (Sugarcane top shoot borer)	Pyralidae	Lepidoptera	Sugarcane	4 Grade
Platyedra gossypiella (Pink bollworm)	Gelechiidae		Cotton	4 Grade
Melanitis leda (Common Evening Brown)	Nymphalidae		Paddy	1 Grade
Earias insulana (Spiny bollworm)	Noctuidae		Cotton	4 Grade
Helicoverpa armigera (American bollworm)			Cotton	4 Grade
Spodoptera littoralis (African Cotton Leaf worm)			Cotton	4 Grade
Pericallia ricini (Darth Maul Moth)			Maize	1 Grade

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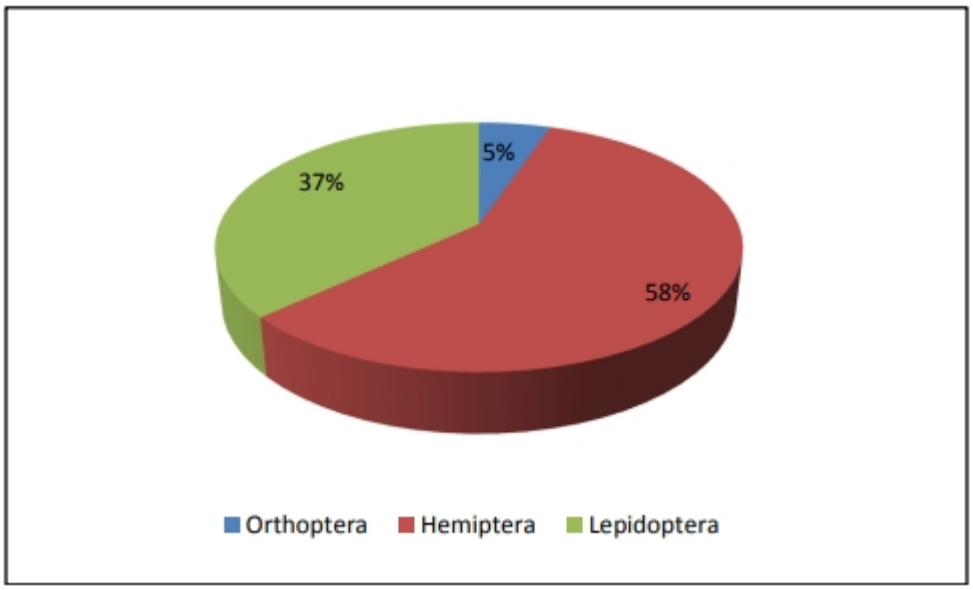

Fig-1 The percentage of insect pests found in Kharif crops grown in Tonk, Rajasthan

Table 2The following is a list of the insect pests that have been observed on rabi crops in Tonk, Rajasthan.

Pest Name	Family	Order	Rabi Crop	Status
Aphis crassivora (Cow pea aphids)	Aphididae	Hemiptera	Chick pea	4 Grade
Rhopalosiphum maidis (Maize aphid)			Wheat	4 Grade
Myzus persicae (Green peach aphids)			Mustard, Wheat	4 Grade
Bemisia tabaci (Whitefly)	Aleyrodidae		Mustard, Wheat	4 Grade
Pyrilla perpusilla (Sugarcane leaf hopper)	Lophopidae		Pea, Wheat	2 Grade
Anoplocnemis phasiana (Coreid bug)	Coreidae		Chick pea	0 Grade
Clavigralla gibbosa (Pod sucking bug)			Chick pea	1 Grade
Nezara gramineae (Green plant bug)	Pentatomidae		Wheat,	2 Grade
Bagrada picta (Bagrada bug/ Colourful bug)	Psychidae		Cabbage	0 Grade
Caliothrips indicus (Thrips)	Thripidae	Thysanoptera	Wheat	4 Grade
Pieris rapae (Small white butterfly)	Pieridae	Lepidoptera	Mustard	3 Grade
Melanitis leda (Common Evening Brown)	Nymphalidae		Wheat	0 Grade
Lampides boeticus (Long-tailed Blue)	Lycaenidae		Chick pea	4 Grade

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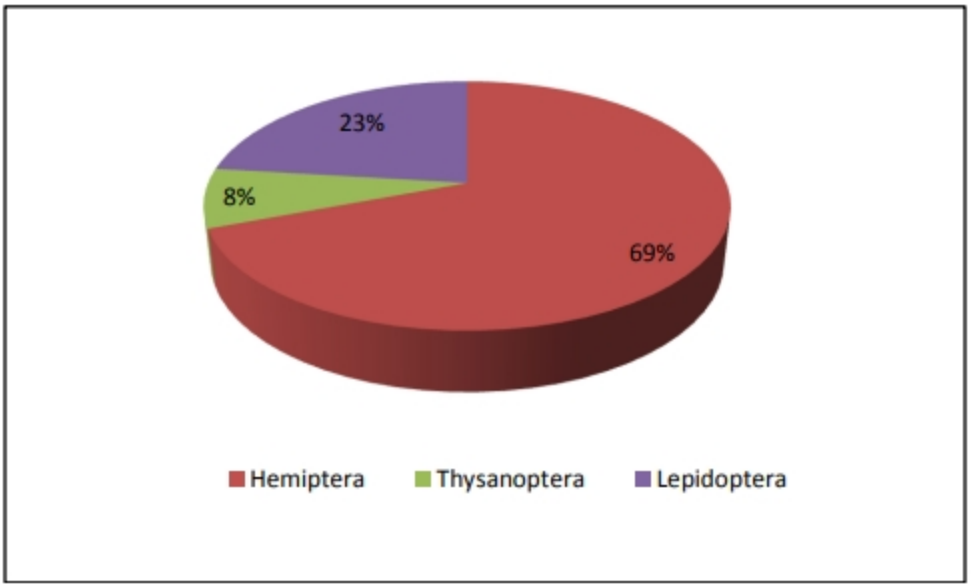

Fig- 2 The percentage of insect pests found in Rabi crops grown in Tonk, Rajasthan

Conclusion

In conclusion, the presence of hemipteran pests during the Kharif season in Eastern Rajasthan can have a major effect on crop output. It is important to use efficient management measures in order to reduce the amount of damage caused by these pests. Some of these tactics include integrated pest management, early identification, and the adoption of resistant cultivars. It is essential for farmers, government agencies, and agricultural professionals to work together in order to ensure environmentally responsible pest management techniques and the general health of the agricultural industry in the region as a whole.

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