A PRELIMINARY SURVEY ON INSECT PESTS IN COTTON ECOSYSTEM OF WASHIM DISTRICT OF MAHARASHTRA (INDIA)

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Abstract
The present survey was conducted during 2020-2023 to study diversity of selected insect pests in cotton ecosystem of Washim District of Maharashtra (India). During study period, about twenty species of major cotton pest insects belonging to five orders and sixteen families were observed. The reported orders are Orthoptera, Coleoptera, Hemiptera, Lepidoptera and Thysanoptera. The recorded families are Acrididae, Meloidae, Scarabaeidae, Aleyrodidae, Aphididae, Cicadellidae, Lygaeidae, Miridae, Pseudococcidae and Pyrrhocoridae Crambidiae, Erebidae, Gelechiidae, Noctuidae, Nolidae and Thripidae. The present study observed to be beneficial for identification diversity of pest insects in cotton ecosystem of Washim District of Maharashtra (India). This will aid in making timely maintaining farmer's socio-economic and environmental balances.
Keywords: *Arthropods, Cotton, Insects, Maharashtra, Pest.*

Introduction

In India agriculture is currently suffers an annual loss about US£ 36 billion due to insect pests. The last two decades have witnessed remarkable progress in various bio-pesticide strategies including the development of transgenic crops. Such strategies should be utilized in IPM (Integrated Pest Management) programme to reduce crop losses without affecting the quality of environment (Lavekar *et al.* 2004). This heavy crop loss causes the farmer to use huge amounts of pesticides. But both the quantity of food loss due to pests and the cost of pest control in terms of money and human health are significant (Dhaliwal *et al.* 2015).

Cotton is major *kharif* crop it is also called the king of fiber crops. Major pest of cotton is American bollworm, spotted bollworm, pink bollworm, and sucking pests like leafhopper, whitefly, thrips, aphids, etc. However, the bollworm menace has been tackled by introducing *Bt* cotton. Predatory arthropods growing wildly in fields are one of the natural sources of pest management. When natural enemies are abundant in cotton field, higher pest levels can be tolerated for longer periods without pesticide use that means there is a saving of pest control cost. Predatory fauna including spiders play an important role crops pests management (Akhtar *et al.* 2009).

India is one of the hotspots of arthropods biodiversity in the world. Diversity plays an important role in the functioning of an agro ecosystem. At present, scanty information is available on the changing pest scenario and bio-agent insect fauna in *kharif* crop agro-ecosystem (Akram *et al.* 2013). Looking into the significance of major pests, bio-agent fauna the present study was undertaken to explore the insect pests and predatory fauna of an agro- ecosystem of Akola in relation to its diversity. This work aimed to emphasize the need for conservation of the diversity of predatory insect fauna found in a major *kharif* crop ecosystem for estimating the species diversity as well as the present status of insect pest fauna (Naikwadi *et al.* 2015).

As the information regarding the biodiversity of insect pest in cotton ecosystem of Washim District of Maharashtra is scanty. Therefore, the present investigations were carried out to develop checklist of insect pests from cotton ecosystem in Washim vicinity.

Methodology

The district had a population of 1,020,216 of which 17.49% were urban as of 2001. Washim district is in the western region of Vidharbha (20.1390° N, 77.1025° E). Akola lies to its north, Amravati lies to its north-east, Hingoli lies to its south, Buldhana lies to its west, Yavatmal lies to its east. River Penganga is the main river of the district. It flows through the Tehsil of Risod. Later it flows through the boundary of Washim and Hingoli districts. River Kas is the main tributary of Penganga. River Kas meets Penganga about 1 km from the village of Shelgaon Rajgure. River Arunavati and its tributaries originate in the Tehsil of Washim and

them flows through the tehsils of Mangrul Pir and Manora into the district of Yavatmal. River Katepurna originates in the hilly areas of the district and flows northwards through the tehsil of Malegaon and enters the Akola district. The climatic condition of this district is characterized by a hot summer, well-distributed rainfall during the south-west monsoon season and generally dry weather during rest of the year. The cold season is from December to February. The *kharif* and *rabi* crop ecosystems mainly include cotton, bean, cowpea, okra, sorghum, mustard, safflower, sunflower, wheat, citrus crops.

Specimens were collected periodically from cotton fields. Collection was done by cutting infested plant parts along with arthropods in small plastic containers or polyethylene bags. As well arthropods were collected by using sweep net and grub and maggot of these predators were transfer into small plastic containers. Observed specimens were identified with the help of available literature (Shinde *et al.* 2017).

Results and Discussion

During study period, about twenty species of major cotton insect pests belonging to five orders and sixteen families were observed. The reported orders are Orthoptera (01 family with 01 species), Coleoptera (01 family with 02 species), Hemiptera (07 families with 08 species), Lepidoptera (06 families with 07 species) and Thysanoptera (01 family with 01 species). The recorded families are Acrididae (01 species), Meloidae (02 species), Scarabaeidae (01 species), Aleyrodidae (01 species), Aphididae (01 species), Cicadellidae (01 species), Lygaeidae (01 species), Miridae (01 species), Pseudococcidae (01 species), Pyrrhocoridae (02 species), Crambidiae (01 species), Erebidae (01 species), Gelechiidae (02 species), Noctuidae (02 species), Nolidae (02 species) and Thripidae (01 species).

The finding of present study is found to competent with earlier studies from different regions of India. Ghosh and Singh (2000) evaluated the biodiversity of Indian insects with special reference to aphids (Homoptera: Aphididae). Jarosik *et al.* (2003) made Comparison of field population growths of few cereal aphid species on winter wheat. Lavekar *et al.* (2004) observed the efficacy of pesticides against field insect pests of Bt cotton. Mifsud *et al.* (2011) studied the aphids associated with shrubs, herbaceous plants and crops in the *Maltese Archipelago* (Hemiptera, Aphidoidea).

Basappa (2011) studied biodiversity of biocontrol agents in sunflower ecosystem. Akram *et al.* (2013) studied the population dynamics of *Bemisia tabaci* and *Thrips tabaci* on Bt and non-Bt cotton genotypes. Dhaliwal *et al.* (2015) observed the crop losses due to insect pests with Global and Indian Scenario. Nagrare *et al.* (2015) studied the spider diversity in transgenic and non-transgenic cotton in rainfed agro ecosystem of central India. Naikwadi (2015) studied the diversity of predaceous insect fauna in major *kharif* crop agro ecosystem in Akola Maharashtra (India). Naikwadi *et al.* (2015) evaluated the diversity of predacious insect fauna in major kharif crop agro ecosystem in Akola district of Maharashtra. Singh *et al.* (2015) prepared an updated check list of host plants in India.

Table 1. Diversity of insect pests in cotton ecosystem of Washim District of Maharashtra (India)

Sr.	Order	Family	*Species*	Common Name
1.	Orthoptera	Acrididae	*Hieroglyphus nigrorepletus (Bolivar, 1912)*	Grasshopper
2.	Coleoptera	Meloidae	*Mylabris phalerata (Pallas, 1781)*	Blister Beetle
3.	Coleoptera	Meloidae	*Mylabris pustulata (Thunberg, 1821)*	Orange Blister Beetle
4.	Coleoptera	Scarabaeidae	*Oxycetonia versicolor (Fabricius, 1775)*	Flower Chafe
5.	Hemiptera	Aleyrodidae	*Bemisia tabaci (Gennadius, 1889)*	Silverleaf Whitefly
6.	Hemiptera	Aphididae	*Aphis gossypii (Glover, 1877)*	Cotton Aphid
7.	Hemiptera	Cicadellidae	*Amrasca biguttula (Ishida, 1912)*	Cotton Jassid
8.	Hemiptera	Lygaeidae	*Oxycarenus hyalipennis (Costa, 1843)*	Dusky Cotton Bug,
9.	Hemiptera	Miridae	*Campylomma livida (Reuter, 1878)*	Cotton Mirid
10.	Hemiptera	Pseudococcidae	*Phenacoccus solenopsis (Tinsley, 1898)*	Cotton Mealybug
11.	Hemiptera	Pyrrhocoridae	*Dysdercus koenigii (Fabricius, 1775)*	Red Cotton Stainer.
12.	Hemiptera	Pyrrhocoridae	*Dysdercus cingulatus (Fabricius, 1775)*	Red Cotton Stainer.
13.	Lepidoptera	Crambidiae	*Sylepta derogata (Fabricius, 1775)*	Cotton Leaf Roller
14.	Lepidoptera	Erebidae	*Anomis flava (Fabricius, 1775)*	Cotton Looper
15.	Lepidoptera	Gelechiidae	*Pectinophora gossypiella (Saunders, 1844)*	Pink Bollworm
16.	Lepidoptera	Noctuidae	*Spodoptera litura (Fabricius, 1775)*	Cotton Leafworm
17.	Lepidoptera	Noctuidae	*Helicoverpa armigera (Hübner, 1808)*	cotton bollworm,
18.	Lepidoptera	Nolidae	*Earias insulana (Boisduval, 1833)*	Spotted Bollworm
19.	Lepidoptera	Nolidae	*Earias vittellaa (Fabricius, 1794)*	Asian Spotted Bollworm
20.	Thysanoptera	Thripidae	*Thrips tabaci (Lindeman, 1889)*	Cotton Seedling Thrips

Ramya and Thangjam (2016) observed the predatory coccinellids of insect pests in Jorhat district of Assam. Emden *et al.* (2017) studied the impact of Aphids as Crop Pests. Shinde *et al.* (2017) evaluated the seasonal occurrence and diversity of arthropods in *Bt* cotton ecosystem under Akola conditions of Maharashtra. Van *et al*. (2017) studied the impact of Aphids as Crop Pests. Kale *et al.* (2020) studied the diversity of aphids and associated predatory fauna occurred in major *Kharif* and *Rabi* crop ecosystems of Akola, Maharashtra, India. Khyali *et al.* (2021) studied seasonal abundance of sucking pests and natural enemies in Bt cotton ecosystem and their correlation with abiotic factors.Wankhade and Bidwai (2022) studied the insect fauna during rainy season in the agricultural field of Karanja (Ghadge), District Wardha (Maharashtra). Samanta *et al.* (2023) studied the impact of pesticides on beneficial insects in various agroecosystem. Malinga and Laing (2024) reviewed the impact of pesticides for the control of some cotton pests.

Conclusion

Study revealed the presence of twenty species of major cotton insect pests belonging to five orders and sixteen families were observed. The present study observed to be beneficial for identification diversity of pest insects in cotton ecosystem of Washim District of Maharashtra (India). This will aid in making timely maintaining farmer's socio-economic and environmental balances.

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