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Seasonal incidence of insect pests on sweet corn and their natural enemies at Raipur (Chhattisgarh)

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Abstract

The present investigation was conducted during spring season of 2013-14 and 2014-15. Field experiments were conducted at Research Farm, IGKV, Raipur (C.G.). On the basis of seasonal activities of insect pests observed on sweet corn crop during spring 2013 and 2014, nineteen insect pests were observed at different growth stages of crop. Pink stem borer, *Sesamia inferens*, was found to be the dominant pest of sweet corn observed from seedling stage up to maturity stage in both spring seasons followed by cob borer, *Helicoverpa armigera* and corn aphid, *R. maidis*. Nineteen natural enemies (predators) were also observed among which eight were insects and remaining were spiders. Among predators staphylinid beetles, coccinellid beetles and spiders were predominant.

Keywords: Insect, maize, natural enemies, seasonal incidence

Introduction

Sweet corn (*Zea mays* L.) is the most important cereal in the world after wheat and rice with regard to the cultivation areas and total production (Anonymous, 2014) [2]. Corn is composed of 71.5 per cent starch, 1.9 per cent protein, 4.8 per cent fat and 1.4 per cent ash (Rathore, 2001) [10].

In spite of increase in acreage, maize production in India is remained almost stagnant with constant yield level. Insect pests are one of the major limitations for low yield of maize. In India, nearly 32.1 per cent of the actual produce is lost due to insect pests (Borad and Mittal, 1983) [5]. As many as 141 insect pests cause varying degree of damage to maize crop right from sowing till harvest (Reddy and Trivedi, 2008) [11]. The serious insect pests are, maize stalk borer (*Chilo partellus* Swinhoe), pink borer (*Sesamia inferens* Walker), shoot fly (*Atherigona soccata* Rondani) shoot bug (*Peregrinus maidis* Ashmead), corn leaf aphid (*Rhopalosiphum maidis* Fitch), sugarcane pyrrilla (*Pyrilla perpusilla* Walker), sugarcane leaf folder (*Marasmia trapezalis* Guen.) etc. Among them some important lepidopteran stem borers seriously affects the attainable yields by infesting the crop throughout its growth, from seedling stage to maturity.

The scenario with respect to insect pests of this crop has changed a lot in the recent past owing to increased area under single cross hybrids and monocropping practiced by the farmers using indiscriminate use of insecticides and chemical fertilizers. Insects attack maize throughout the cropping cycle and during storage, resulting in as little as 10% to complete loss (Bergvinson *et al.*, 2002) [3]. Owing to the change in pest scenario the pest infestation in almost all crops ecosystems, there is need to take up studies on the insect pests of sweet corn and their natural enemies also to update our knowledge and to suggest suitable cropping pattern and management practices

Material and Methods

Seasonal occurrence of insect pests on maize crop in field conditions

A plot size of 200 m² with Sugar -75, a popular hybrid was raised during 2013-14 and 2014-15 spring seasons and maintained without insecticide application. From this crop area, five sites of the samples were randomly selected and from each site five plants were observed throughout the cropping period, for the presence of insect pests at seven days interval. Throughout the cropping period the insects appearing on the crop were observed and recorded as per their activities shown during the different growth stages of the crop. As per the damages inflicted by different insects on to the crop they were finally rated accordingly.

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Seasonal occurrence of natural enemies on maize crop in field conditions

Seasonal occurrence of natural enemies was recorded throughout the cropping period at seven days interval. Throughout the cropping period the natural enemies appearing on the crop were observed on 25 plants and recorded as per their activities shown during the different growth stages of the crop during both spring seasons of year 2013-14 and 2014-15.

Result and Discussion

During study period as many as nineteen insect pests were observed at different growth stages of the crop. Insect pests belong to four different insect orders comprising of eight lepidopterans, seven hemipterans, three orthopterans and one coleopteran.

During seedling stage sweet corn was first infested by *Chaetocnema* sp. after seven to ten days of germination followed by *Sesamia inferens* and *Peregrinus maidis*; out of which *Sesamia inferens* continued up to maturity stage and *Peregrinus maidis* was observed only in vegetative stage of the crop. At growth stage or knee height stage crop was attacked by *Spodoptera litura*, *Pyrilla perpusilla*, *Nezara viridula*, *Dysdercus cingulatus*, and *Hieroglyphus banian* and they remained till late vegetative stage of the crop. Three species viz. *Pelopidas mathias*, *Amata cyssea*, *Cretonotus gangis* were also found during vegetative stage but their activity were as stray pests (Table 1).

Three lepidopteran such as caterpillar of *Sesamia inferens*, *Helicoverpa armigera* and *Euproctis* sp. were observed feeding on spikelets, silk and developing grains of corn cobs. *Spodoptera litura* appeared again in maturity stage of crop as minor pest. Adult moths of *Pelopidas mathias* and *Scirpophaga nivella* were observed at maturity of crop as stray pests. *Rhopalosiphum maidis* infested during silking stage and continued their damage till maturity of the crop. Painted bugs, *Bagrada cruciferum* was observed at maturity stage only during spring 2013. (Fig. 1, 2, 3)

On the basis of infestation level and activities of insect pests recorded during both the years, only *Sesamia inferens* was found to be the dominant pests of maize in this region. Twelve pests were maintained their minor status and rests were found to be stray pests. Present finding are falling in line of very earlier study of Fletcher (1914) [7] who reported more than 11 different insect pest from South India while, Butani (1961) who reported maize stem borer, Bihar hairy caterpillar, hairy caterpillars and brown field cricket as important pests of maize whereas minor ones were termite, aphids, rice grass hopper and wheat stem borer. Rajagopal and Chhannabasavanna (1975) [9] recorded 55 species of insects in maize belonged under nine orders and 29 families whereas Ahad *et al.* (2012) recorded 17 insect pests in maize from Jammu and Kashmir region.

Roving survey was undertaken by Biradar (2010) [4] in Karnataka region and found 11 insect pests feeding on maize crop. Out of which three belonged to lepidoptera, two to homoptera, two to coleopteran, one to diptera and one to dermaptera. Recently Patra *et al.* (2013) [8] recorded twenty four insect pests; among these, stem borer (*Chilo partellus* Swin.) cob borer (*Stenachroia elongella* Hamp.) and shoot fly

(*Atherigona soccata* Rond.) were found to be as major pests in Meghalaya region. While, Sidar (2015) [12] observed five insect species viz., pink stem borer (*Sesamia inferens*), green stink bug, maize leaf hoppers (*Cicadulina* sp.), black aphid (*Rhopalosiphum maidis*) and maize cob borer (*Helicoverpa armigera*) as major insect pest on sweet corn at Raipur region.

Natural enemies recorded in maize field

Natural enemies found in sweet corn during study period are presented in Table 2. Coccinellid beetles, Predatory beetles *Paederus fucipes* were recorded throughout the cropping period in large numbers and one predatory bug *Geocoris* sp. and one mud wasp was also observed during vegetative stage of the crop in few numbers. Among non-insect natural enemies spiders were observed throughout the study period during both seasons.

Five coccinellid beetles were found viz. *Cheilomenes sexmaculata*, *Cocinella transversalis*, *Micraspis* sp., *Adalia bipunctata*, *Anegleis cardoni*. The coccinellid beetles were active throughout the cropping period.

Among spiders species Aranidae and Oxyptidae were most predominant species in sweet corn field. Spiders, *Neoscona oaxacensis*, *Neoscona scylla*, *Lycosa* sp., *Thomisus* sp., *Oxyopes macilentus*, *Oxyopes salticus*, *Oxyopes* sp. *Neoscona* sp., *Argiope* sp., *Marpissa* sp. were observed on sweet corn during spring 2013 and 2014 cropping period.

Spiders were abundant in the field throughout the growing period of the crop. Some coccinellid predators such as *Brumus suturalis* Fab., *Cocinella septumpunctata* Lin. and *Menochilus sexmaculata* F., *Micraspis* sp, *Cocinella transversalis*, were earlier recorded in sweet corn field by other authors (Fletcher, 1919 and Patra *et al.*, 2013) [8]; which is partially matched with the present findings.

Table 1: Insect pests recorded on sweet corn crop during spring, 2013-14 and 2014-15

S. No.	Scientific name	Family	Stage of crop
Lepidopteran			
1	<i>Sesamia inferens</i>	Noctuidae	Seedling to maturity
2	<i>Helicoverpa armigera</i>	Noctuidae	Silking to maturity
3	<i>Euproctis</i> sp.	Lymantidae	Maturity
4	<i>Spodoptera litura</i>	Noctuidae	Vegetative - Maturity
5	<i>Pelopidas mathias</i>	Nymphalidae	Vegetative
6	<i>Scirpophaga nivella</i>	Crambidae	Silking
7	<i>Amata cyssea</i>	Arctiidae	Vegetative
8	<i>Cretonotus gangis</i>	Arctiidae	Vegetative
Hemipteran			
09	<i>Rhopalosiphum maidis</i>	Aphididae	Silking to maturity
10	<i>Nezara viridula</i>	Pentatomidae	Vegetative
11	<i>Pyrilla perpusilla</i>	Lophopidae	Vegetative
12	<i>Dysdercus</i> sp.	Pyrrhocoridae	Vegetative
13	<i>Leptocoris acuta</i>	Alydidae	Vegetative
14	<i>Peregrinus maidis</i>	Delphacidae	Vegetative
15	<i>Bagrada cruciferum</i>	Pentatomidae	Maturity
Orthopteran			
16	<i>Atractomorpha crenulata</i>	Pyrgomorphidae	Vegetative
17	<i>Hieroglyphus banian</i>	Acrididae	Vegetative
18	Unidentified	Acrididae	Vegetative
Coleopteran			
19	<i>Chaetocnema</i> sp.	Chrysomelidae	Seedling

Table 2: Natural enemies recorded on sweet corn crop during spring, 2013-14 and 2014-15

Insect enemies	Scientific name	Family	Stage of crop
1	<i>Paederus fucipes</i>	Staphylinidae	Vegetative –maturity
2	<i>Cheilomenes sexmaculata</i>	Coccinellidae	Vegetative –maturity
3	<i>Coccinella transversalis</i>	Coccinellidae	Vegetative –maturity
4	<i>Micraspis sp.</i>	Coccinellidae	Vegetative –maturity
5	<i>Adalia bipunctata</i>	Coccinellidae	Vegetative –maturity
6	<i>Anegleis cardoni</i>	Coccinellidae	Vegetative –maturity
7	<i>Geocoris sp.</i>	Geocoridae	Vegetative
8	<i>Diachasmimorpha sp.</i>	Vespidae	Vegetative
Non-insect enemies			
9	<i>Neoscona oaxacensis</i>	Araneidae	Vegetative –maturity
10	<i>Lycosa sp.</i>	Lycosidae	Vegetative –maturity
11	<i>Thomisus sp.</i>	Thomisidae	Vegetative
12	<i>Oxyopes sp.</i>	Oxyptidae	Vegetative –maturity
13	<i>Oxyopes macilentus</i>	Oxyptidae	Vegetative –maturity
14	<i>Oxyopes salticus</i>	Oxyptidae	Vegetative –maturity
15	<i>Neoscona sp.</i>	Araneidae	Vegetative –maturity
16	<i>Neoscona Scylla</i>	Araneidae	Vegetative –maturity
17	<i>Argiope sp.</i>	Araneidae	Vegetative –maturity
18	<i>Marpissa sp.</i>	Salticidae	Vegetative –maturity
19	Unidentified	Salticidae	Vegetative

*Sesamia inferens* larva*Sesamia inferens* pupa*Palopidas mathias**Scirpophaga novella**Helicoverpa armigera* larva and adult moth**Fig 1:** Lepidopteran Insect pests observed on sweet corn crop



Rhopalosiphum maidis



Leptocorisa acuta



Nezara viridula



Dysdercus cingulatus

Fig 2: Hemipteran Insect pests observed on Sweet corn crop



Paederus fuscipes



Geocoris sp



Spider



Coccinellid beetle

*Diachasmimorpha* sp.*Pogonomyrmex* sp.**Fig 3:** Natural enemies observed on Sweet corn crop**References**

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