



AN ASSESSMENT OF THE OCCURRENCE OF NATURAL ENEMIES (PREDATORS) AGAINST MAIZE STEM BORER, CHILO PARTELLUS

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ABSTRACT

Investigation on “an assessment of the occurrence of natural enemies (predators) against maize stem borer, *Chilo partellus*” was carried out during 2015 and 2016 in some regions of Indore (Depalpur, Mhow, Sanwer and Mangliya). Among the predators, the major insect groups included *Coccinellids*, *Chrysopa spp.*, *Pheidole spp.*, *Reduviid spp.*, *Mantis religiosa*, *Scolothrips* and *Euborellia spp.*. The relative abundance of predators was higher during 2016. *Coccinella septumpunctata* was having high relative abundance followed by *Chrysopa spp.* the least abundant predator was *Pantala spp.*. The study was carried out to find out the most abundant predators among all predators.

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INTRODUCTION

Agricultural maize fields under intensive agriculture often present environments that are unfavorable for natural enemies (predators). Habitat management that aims at utilizing practices to favor natural enemies, especially, predators towards achieving conservation biological control has been often advocated. A higher natural enemy diversity (Snyder *et al.*, 2006) or abundance (Ostman *et al.*, 2001) may not lead to improved biological control, because prey other than the pest species may be preferred. The management of maize stem borer, *Chilo partellus* insect pests through bio-intensive methods renders it important to record the diversity of natural enemies (Hindayana *et al.*, 2001). The present investigation thus envisages working out the diversity of arthropod natural enemies in maize cultivated regions of Indore.

MATERIALS AND METHODS

Evaluations were conducted in four regions of Indore district where maize is the main cereal crop. Sampling sites were selected at 5-15 km intervals along major roads in the selected regions (Depalpur, Mhow, Sanwer and Mangliya) and a total of 15-25 small scale farmers maize fields each measuring approximately 0.5 – 2.0 ha were sampled per region. During 2015 and 2016, for predators, direct observation was carried out for assessing the occurrence of predators (Whitcomb, 1967) and their relative density was calculated by the formula:

Relative density (RD)

$$RD\% = \frac{\text{Number of individual of one species} \times 100}{\text{Total number of individual of all species}}$$

Description and identification of the predators was carried out with reference to the key (Overholt *et al.*, 2001). Correlation technique was carried out by monitoring the predators during several seasons, or rate of increase of natural enemies (Debach *et al.*, 1950).

RESULTS

Predators recorded during 2015 and 2016

The predators species recorded during 2015 and 2016 in the selected regions of Indore by direct observation method are *Coccinella septumpunctata*, *Nabis spp.*, *Euborellia annulipes*, *Chrysopaspp.*, *Comptonotus spp.*, *Pheidolespp.*, *Anthocoris spp.*, *Hyperaspis maindroni*, *Mantis religiosa*, *Peucectia viridans*, *Pantala flavescens*, *Syrphid spp.* and *Scolothrips spp.*

During 2015, Among the predators recorded from selected regions of Indore *Coccinella septumpunctata* was most abundant having a relative density of 14.80% followed by *Chrysopa spp* having a relative density of 14.50% and *Pantala flavescens* were in least number having a relative density of 1.51%.

During 2016, Among the predators recorded from selected regions of Indore *Coccinella septumpunctata* was most abundant having a relative density of 22.01% followed by *Mantis religiosa* having a relative density of 21.11% and

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Pantala flavescens were in least number having a relative density of 4.87%.

Table 1 Predators recorded from maize fields by direct observation from selected regions of Indore region during 2015

Predators		Family: order	Presence & absence of predators				Relative density (%)
Scientific Name	Common name		Mangliya	Mhow	Depalpur	Sanwer	
<i>Coccinella septumpunctata</i>	Lady bird beetles	Coccinellidae: Coleoptera	+	-	+	+	14.80
<i>Nabis</i> spp	Damsel bugs	Nabidae: Hemiptera	-	-	-	+	3.32
<i>Euborellia annulipes</i>	Earwig	Anisolabidide: Dermaptera	+	+	+	-	13.29
<i>Chrysopa</i> spp	Green lace wings	Chrysopidae: Neuroptera	+	+	-	+	14.50
<i>Componotus</i> spp	Ants	Formicidae: Hymenoptera	+	+	+	+	9.46
<i>Pheidole</i> spp.	Ants	Formicidae: Hymenoptera	-	+	-	+	10.01
Reduviid bugs	Reduviid bugs/Assassin bug	Reduviidae: Hemiptera	-	+	+	+	11.17
<i>Anthocoris</i> spp.	Minute pirate bugs	Anthocoridae:Hemiptera	+	-	-	+	7.25
<i>Hyperaspis maindroni</i>	Beetle	Coccinella : Coleoptera	-	+	-	-	4.22
<i>Mantis religiosa</i>	Praying mantids	Mantidae: Mantodea	+	-	+	+	12.80
<i>Peucetia viridans</i>	Green Lynx Spider	Oxyopidae: Araneae	-	+	+	+	3.62
<i>Pantala flavescens</i>	Dragon flies	Libellulidae: Odonata	-	+	-	-	1.51
Syrphid spp.	Syrphid fly	Syrphidae: Diptera	+	-	-	+	4.83
<i>Scolothrips</i> spp.	thrips	Thripidae: Thysanoptera	+	+	+	+	10.27

Table 2 Predators recorded from maize fields by direct observation from selected regions of Indore region during 2016

Predators		Family: order	No. of predators				Relative density (%)
Scientific Name	Common name		Mangliya	Mhow	Depalpur	Sanwer	
<i>Coccinella septumpunctata</i>	Lady bird beetles	Coccinellidae: Coleoptera	+	+	-	+	22.01
<i>Nabis</i> spp	Damsel bugs	Nabidae: Hemiptera	-	-	-	+	10.23
<i>Euborellia annulipes</i>	Earwig	Anisolabidide: Dermaptera	+	+	-	+	17.12
<i>Chrysopa</i> spp	Green lace wings	Chrysopidae: Neuroptera	-	+	+	-	19.07
<i>Componotus</i> spp	Ants	Formicidae: Hymenoptera	-	-	+	+	7.11
<i>Pheidole</i> spp.	Ants	Formicidae: Hymenoptera	+	+	+	+	9.10
Reduviid bugs	Reduviid bugs/Assassin bug	Reduviidae: Hemiptera	+	-	+	+	15.34
<i>Anthocoris</i> spp.	Minute pirate bugs	Anthocoridae:Hemiptera	+	+	+	-	13.18
<i>Hyperaspis maindroni</i>	Beetle	Coccinella : Coleoptera	-	+	-	-	9.16
<i>Mantis religiosa</i>	Praying mantids	Mantidae: Mantodea	+	+	+	+	21.11
<i>Peucetia viridans</i>	Green Lynx Spider	Oxyopidae: Araneae	-	+	-	+	5.05
<i>Pantala flavescens</i>	Dragon flies	Libellulidae: Odonata	+	+	-	-	4.87
Syrphid spp.	Syrphid fly	Syrphidae: Diptera	+	-	+	+	11.42
<i>Scolothrips</i> spp.	Thrips	Thripidae: Thysanoptera	-	+	+	+	13.90

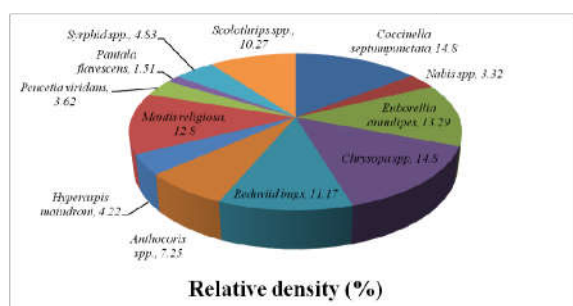


Figure 1 Predators recorded from maize fields by direct observation from selected regions of Indore region during 2015

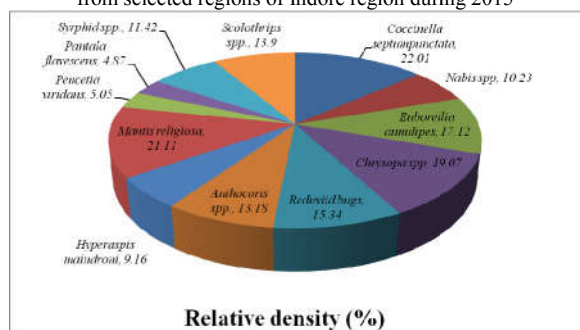


Figure 2 Predators recorded from maize fields by direct observation from selected regions of Indore region during 2016

Predators recorded during 2015 and 2016, among the predators recorded from selected regions of Indore, *Coccinella septumpunctata* was most abundant followed by *Chrysopa* spp. and *Pantala* spp. were in least number.

DISCUSSION

Predators recorded during 2015 and 2016, among the predators recorded from selected regions of Indore, *Coccinella septumpunctata* was most abundant followed by *Chrysopa* spp. and *Pantala* spp. were in least number.

Swaminathan *et al.*, (2016) reported that the relatively more common aphidophagous predators on maize belonged to the insect families Chrysopidae, Coccinellidae, Nabidae and Syrphidae; types of soil, forerunner crops and manures affected the population dynamics of predator system. Similar to our observation, among coccinellids, *C. septumpunctata*, *C. transversalis*, *Brumoides suturalis* and *Cheilomenes sexmaculata* are the most widespread. Thus, it can be inferred that coccinellids happen to be the most dominant aphidophagous predators of maize aphids as recorded during the present investigation.

Predators are most important components of Integrated Pest Management (IPM). Ants (Hymenoptera: Formicidae) are the

most important predators of stem borers in maize fields (Bonhof, 2000). They attack all stages of stem borers, and are among the few predators preying on stem borer larvae and pupae. According to (Mushore, 2005), *Componotus* spp. (Formicidae) and *Pheidole* spp. (Formicidae) appear to be the most important and common species in Zimbabwe. Ants of the genus *Lepisiota* were reported preying on eggs and larvae of stem borers (Bonhof, 2000).

There have been a number of investigations to study the effectiveness of native predators on many stem borer species in the few years ago. Similarly, all studies have reported that predators that are indigenous are not able to keep populations of maize stem borers below economic injury levels. There is no permanent management to control this pest except using ecofriendly plant extract control. However, predators are able to suppress the population dynamics of *C. partellus* but their activity was not enough to decrease the populations of pest below economic damage level.

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