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BIODIVERSITY OF SOIL ARTHROPODS IN BT-COTTON FIELDS OF WARANGAL, ANDHRA PRADESH, INDIA

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ABSTRACT
A survey of soil arthropods was undertaken in Bt-cotton (*Bacillus thrungienesis*) fields of Warangal, A.P., from June 2006 to December 2008. Besides, Araneida(spiders) and Acari(mites) four insect orders Collembola, Orthoptra, Hymenoptera, Coleoptera were collected by pitfall traps.

INTRODUCTION

Soil arthropods are a vital link in the food chain as decomposer and without these organisms nature would have no way of recycling organic material on its own (Trombetti and Williams, 1999). They perform a number of key functions essential to plants, such as decomposition, nutrient cycling, disease regulation agrochemical degradation, and the development and maintenance of physio-chemical properties of soil. Soil fauna (micro fauna, meso fauna and macro fauna) interactions play a critical role in a variety of biological functions both in the rhizosphere and near decomposing residuces (Coleman and Crossley, 1995; Gupta and Yeates, 1997). On the other hand, springtails are the prey of many arthropods, particularly ants, beetles and predaceous mites and thereby form a fundamental element of trophic interactions (Palacios – Vargos, 2004).

A significant proportion of the world's biodiversity is recorded in agro ecosystems (Pimentel *et al.,* 1992). Soil arthropods are ubiquitous in natural and agricultural habitats. They are useful indicators of overall species richness and health of terrestrial communities. (Noss, 1990). There is no information on soil arthropods diversity and general ecology of - Bt-cotton fields. The present work was undertaken to study the diversity and abundance of soil arthropods fauna in Bt-cotton fields of Warangal District, (A.P.).

MATERIALS AND METHODS

The survey of the study area was undertaken in Bt-cotton fields of Warangal(17º.51′ NL and 79º.22′El at 380m MSL) during June 2006 to December 2008. The climate of this area is distinct in winter, summer and monsoon, maximum and minimum temperature recorded in winter and summer was 35ºC and 10ºC and 47ºC and 15ºC, respectively and average relative humidity (RH) was 55.8%.

Soil surface arthropods were collected monthly by pitfall traps (Coddington and Levi 1991). The collected arthropods were preserved in 80 percent ethyl alcohol with a few drops of glycerin and identified under stereoscopic binocular microscope with help of keys.The arthropods belonging to different taxa were enumerated and their mean number per-trap was calculated.

RESULTS AND DISCUSSION

A total of 40 species belonging to four insect orders, Collembola, Orthroptera, Hymnoptera, Coleoptra and in Araneida (spiders), Acari (mites) , Chilopoda Acari (mites) and Araneida (spider) were recorded in three cropping seasons of Bt – cotton fields (Table 1).

The species composition of Collembola was represented by *Entomobrya* sp., *Psudosinella* sp., *Isotoma trispinota*, *Sminthrus viridus*, *Bourletiella hortensis*, *Sphoaridia* sp., *Onychiurus* sp., *Onychiurus armetus*, and *Lepidocyrtus* sp. The orde Orthroptera was represented by *Nemoblus silvestris, Archeta domesticus*, *Chortophoga viridifaciate* and *Melonoplus sanguinipes*. Hymenopterans were represented in *Monomorium induceum, Crematogaster* sp., *Componatus pennysylavanices*, *Pochycondyla tesserinoda*, *Occophylla smaragdina*, *Wasmannia aleropunctata* and *Diacammon cylonense*. In Coleoptera three families were recorded. Tenebrionidae contained four species *Mesomorphus* sp., Pachycera *pondicheryna*, *Pelopids angnamooe*, *Gonocephalum* sp., *Notocorox nervosus*. Carabidae family

Table 1: Diversity of soil fauna in Bt-cotton fields during 06 - 08

Order	Family	Species
Collembola	Entomobrydae	*Entomobrya Sp*
		Pseudosinella sp
	Isostomidae	*Isotoma trispinata*
	Sminthuridae	*Sminthrus viridus*
		Bourletiella hortensis
		Sphoeridia sp
	Onychiridae	*Onychiurus sp.*
		Onychiurus armatus
		Lepidocyrtus sp.
Orthoptera	Gryllidae	*Nemoblus silvestris*
		Acheta domesticus
	Acrididae	*Chortophoga viridifasciate*
		Melanoplus sanguinipes
		Hymenoptera
Formicidae	*Monomorium induceum*	
		Crematogaster sp.
		Componatus pennsylavanices
		Pochycondyla tesserinoda
		Occophylla smaragdina
		wasmannia aleropunctata
	Ponerinae	*Diacammon ceylonense*
Coleoptera	Tenebrionidae	*Mesomorphus sp.*
		Pachycera pondicheryna
		Pelopids angnamooe
		Gono cephalum sp.
		Notocorox nervosus
	Carabidae	*Coleolissus sp.*
		Scaritesendus oliver
		Scarites bengalenis.
		Amblystomus mangnus bates
		Oryzacphilus acuaninatus
	Erotylidae	*Lasiodactyes chevrolati*
Acari (Mites)	Mesotidae	*Cosmolaelaps sp.*
Mesostigmata		*Trambidium sp.*
Prostigmata	Stigmacidae	*Stigmaeus sp.*
Cryptostigmata	Crypotcidae	*Eremulus avenifea*
Araneida	Gonaphosidae	*Thanatus sp.*
(Spiders)		*Storena sp.*
	Lycosidae	*Hongma Carolinensis*
		Rabidosa Punctulata
		Schizocosa saltatix
		Pholcus Phalamgiodes

Table 2: Percentage of different soil fauna in Bt - Cotton field during 2006 - 2008

Soil fauna	2006	2007	2008
CollombolAla	68.15	41.75	43.34
Hymenoptera	16.28	30.43	15.95
Coleoptera	4.32	7.8O	10.37
Orthoptera	4.09	7.22	9.97
Acari	2.52	1.4O	5.8O
Araneida	4.5O	3.64	13.92
Chilopoda	0.06	5.62	0.33

had five species they are *coleolissus* sp., *scaritesendus oliver*, *Scarites bengalenis*, *Amblystomus mangnus bates, Oryzacphilus acuaninatus*. In Erotylidac family *Lasiodactyes chevrolati* was recorded. Acarina was represented by *Cosmolaelaps* sp., *Stigmaeus* sp., *Eremulus avenifera* Arachnida showed represention by two families. Gonaphosidae and Lycosidae. Gonophosida had two species *Thanatus* sp., *Storena* sp. and Lycosidae four specoes-*Hongma carolinensis*, *Rabidosa punctulata,Schizocosa saltatix, Pholcus phalangiodes*.

The percentage of different soil fauna in Bt – cotton field is presented in Table 2. Collembola was recorded in highest percentage (68.15%) followed by Hymenoptera (16.28%) Araneida (4.50%), Orthoptera (4.09%), Acari (2.52%) and other arthropods like Chilopoda (0.06%).

In 2007 Collembola occupied highest percentage (41.75%) followed by Hymenoptera (30.43%), Orthoptera (7.22%), Coleoptera (7.80%), Chilopoda (5.62%), Acari (1.40%), In 2008, Collembola shared 43.34% followed by Hymenoptera 15.95, Araneida 13.92%, Coleopten 10.37%, Orthoptera 9.97%, Acari.

DISCUSSION

The results presented in Table 2 revealed that among the insects Collembolans were abundant followed by Hymenoptera, while members of Coleoptera, Orthroptera, Araneida and Acari were least in number. Similar observation was made by Williams (1999). Ospina *et al.,* (2003) have also reported that Collembola were the dominant insect group in comparison to other soil fauna in Bt – cotton fields. The preliminary results presented here suggest that use of transgenic cotton may not have any adverse effects on soil arthropod abundance and diversity especially on Collembola.

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