DIVERSITY AND ABUNDANCE OF SOIL ARTHROPODS IN *CAPSICUM* FIELDS IN WARANGAL DISTRICT, ANDHRA PRADESH, INDIA

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ABSTRACT

Capsicum is a major commercial crop of the world. Soil arthropods were collected and identified from Capsicum field with help of pitfall traps. They are critically important soil organisms as decomposers, indicators and beneficial group in the soil. A total of 49 species were identified from insects such as Collembola, Orthroptera, Hymenoptera, Coleoptera and other than insects Mites, and Spiders. The Collembola represented high percentage among the species of other groups, in the percentage of different groups Collembola, followed by Hymenoptera, Coleoptera, Orthroptera and Acari and Aranea during the study period.

KEY WORDS: *Capsicum, soil arthropods, percentage,*

INTRODUCTION

Capsicum annum is considered as one of the major commercial crops of the world. Both green and dried *capsicum* is the important components of our routine diet and it also has medicinal value. *Capsicum* also contains vitamin A, C and E. Because of these reasons *capsicum* is having lot of export potential. *Capsicum* is raised over an area of 1776 thousand hectares in the world, with a production of 7182 thousand tones. India, China, Korea, Nigeria, USSR, Mexico are the major *capsicum* growing countries in the world. India is the largest producer of *capsicum* in the world. In India, *capsicum* crop is raised during last three decades for a ripe-green dry fruit varies from 634 to 921 thousand hectares, with total production of 364 to 895 thousand tons of dry fruits with an average yield of 574 to 957 kg/ha. The major *capsicum* growing districts in Andhra Pradesh are Dharwad, Nagapur, Prakasam, Khammam, Guntur and Warangal. Its ranks first both in area (1.85 lakh.ha.) and production (2.7 tones) with productivity of 1447 kg/ha.

A number of soil arthropods which attack *capsicum* are primary consumers or decomposers. The adults feed on leaves, stems, roots, flowers, fruits. Some adults are predators of the other insect species (Moron, 1997, 2004). Edephic species occur in all types of soils (Moron, 2001). A significant proportion of the world's biodiversity is recorded in agro ecosystems (Pimental *et al.*, 1992). The increasing use of agrochemicals in such systems affects non-target organisms in soil and water (Reinecke and Reinecke, 2007) and is often a major factor contributing to declining biodiversity (Benton *et al*., 2003. Bianchi et al., 2006). Nevertheless agricultural production is directly linked with the number and quantity of agrochemicals used and 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). The processes of decomposition are controlled largely by soil arthropods include the mites (Acacina) sprigtails (Collembola), followed by some families of insects and arachnids (Carvalho, 2006) with some soil invertebrates like protozoan and worms which also contribute to the soil community by mixing, loosening and aerating the soil (Evans, 1992). Soil arthropods are important in processing detritus and regulating the availability of nutrients (Anderson 1988). Soil fauna are sensitive to environmental conditions in the soil and can move through the soil profile in response to changes in temperature and water availability in order to find suitable micro habitats (Coleman and Crossley, 1996). Soil arthropods are one group of soil invertebrates that influence soil processes in a variety of fundamental ways. Their abundance, community composition and effects on various soil processes have been studied in terrestrial ecosystems (Peterson and Luxton, 1982).

Arthropods are critically important in decomposition, nutrient cycling and other to the effects of fragmentation. Arthropods sensitivity to disturbance makes them especially useful as indicator species. The aim of this investigation was to describe the diversity of soil arthropods fauna inhabiting in *Capsicum* fields in Warangal District of Andhra Pradesh.

MATERIAL AND METHODS

The study was carried out in *capsicum* agricultural field in semi-arid tropical region of Warangal. It is located between latitude (17°-51' North) and Longitude (79°-22' E) with an altitude of 380 meters. The Soil surface inhabiting arthropod fauna were collected in the field of *Capsicum* by pitfall traps as described in Reddy and Venkataiah (1986), from June 2009 to December 2011. Wide mouth bottles of 24 cm length and 5 cm mouth diameter with 100 ml of 5 per cent formalin solution were placed as pitfall traps by, digging in to the ground randomly at ten places. The distances between two traps maintain more than 5 meters. A flat stone was kept over each trap allowing a minimum distance of 2 cm between the mouth of the trap and the under surface of the stone to protect the trap from rain and dust, dead leaves of the crops. These bottles were collected monthly replacing every time separate bottle with fresh formalin. While replacing the bottle almost care was taken not to disturb the immediate surroundings of the trap. Besides, the trap was inspected once in every 5 days to avoid complete evaporation of formalin from the bottles. The traps after collections from the fields were tightly caped and brought to the laboratory. The content of each trap was emptied in a petri-dish. The arthropods, both the micro and macro-arthropods, were sorted under dissecting stereo scope binocular micro scope (wild M3 Heerbrugg). The arthropods belonging to different taxa were enumerated and their mean number per traps was calculated. Species identified with help of literature. The significance of the difference both in the quantitative and qualitative composition of arthropods in different habitat was analyzed. The abundance of different taxa of soil surface inhabiting arthropods was enumerated.

RESULTS AND DISCUSSION

A total of 49 species collected from different orders, Collembola, Orthroptera, Hymnopters, Coleoptera and other soil fauna, mites and spiders in three cropping seasons of *Capsicum* fields, from June 2009 to December, 2011 are presented in Table 1. The species composition of order Collembola *Entomobrya* sp., *Pseudosinella* sp., *Isotoma trispinata, Isotoma nigrifrons, Isotoma viridis, Smintfyums viridis, Bourletiella hortensis, Sphoeridia* sp., *Onychiurus* sp., *Onychiurus armatus,* and *Lepidocyrtus* sp. The order Orthroptera represented by *Nemobtus silvestris, Acheta domesticus, Chorlophoga viridifasciate* and *Melonoplus sanguinipes.* The Hymenoptera order represented in

Monomorium indicum, Monomorium atomum, Monomorium criniceps, Crematogaster rothneyi, Crematogaster sp., *Componotus pennsylavanices, Pochycondyla tesserinoda, Occophylla smaragdina, Wasmannia aleropunctata* and *Diacammon ceylonense.* In Coleoptera three families were recorded. The family Tenebrionidae contains four species *Mesomorphus* sp., *Pachycera pondicheryna. Pelopids angnamooe, Gonocephalum sp., Notocorox nervosus.* In Carabidae family *have five* species they are *Coleolissus* sp., *Scaritesendus oliver, Scarites bengalenis, Amblystomusmangnus bates, Oryzacphilus acuaninatus.* Erotylidae family recorded *Lasiodactyus chevrolali.* Acarina (Mites) represented *Cosmolaelaps* sp., *Tramhidium* sp.. *Sligmaeus* sp., *Eremulus avenifer, Lamellobates palustris, Lancetoppia willmanm and Annectacarus lonoisetosus* Araneida represented two families. Family Gonaphosidae represented *Thanetus sp*. and *Storena sp*., whereas Lycosidae represented *Hongna carolinensis. Rabidosa punctulata, schizocosa saltatrbc,* and *Pholcus phalangiodes.*

During the study period more than 7000 individuals specimens were collected, belonging to 49 species. The insect orders and number of species identified in *Capsicum* field presented (Table 1) over ninety percent of soil fauna individuals were included within these taxa-nominal groups. Collembola represented highest number of individuals (1721) followed by Hymenoptera (288), Acari (275), Coleoptera (159), Orthroptera (133), and Araneida (83).

The percentage of different soil arthropods in *capsicum* fields are given in Figure 1, 2 and 3. The results revealed that the percentage of Collembola was recorded highest percentage of 64.72 followed by Hymenoptera 10.83 per cent, Acarina 10.34 per cent, Coleoptera 5.98 per cent, Orthoptera 5.00 per cent and Araneida 3.12 per cent in 2009 (Figure 1). In 2010, Collembola percentage was 61.34 per cent followed by Hymenoptera (Formacidae) 16.93 per cent, Acari 9.69 per cent, Coleoptera 4.19 per cent, Orthoptera 4.12 per cent and Araneida 3.72 per cent (Figure 2), while in 2011, Collembola representing 65.98 per cent followed by Hymenoptera (Formacidae) 13.55 per cent, Acari 7.36 per cent, Arneida 5.67 per cent, Coleoptera 4.34 per cent and Orthoptera 3.09 per cent (Figure 3).

The results presented in Table 1 revealed that among the insects, Collembola was the dominant group in all the three cropping seasons followed by Hymenoptera, Coleoptera, Orthroptra. Other than insects, Araneida (Spiders) and. Acari (mites) were also recorded during study period. The abundance of ground-dwelling arthropods is considered to be important for insect management and also for managing weeds and other organism competing with cultivated crops (Stinner and House, 1990, Ball and Bousequat, 2001 and Tooley and Brust, 2002). The 3 years data showed that *capsicum* fields sustained abundance and species richness of ground dwelling arthropods of agronomic interest for *capsicum* pest management at different fields. In the study, abundance and diversity of ground-dwelling arthropods in *capsicum* fields were not affected during 3 successive years of growing *capsicum* using standard grower practices.

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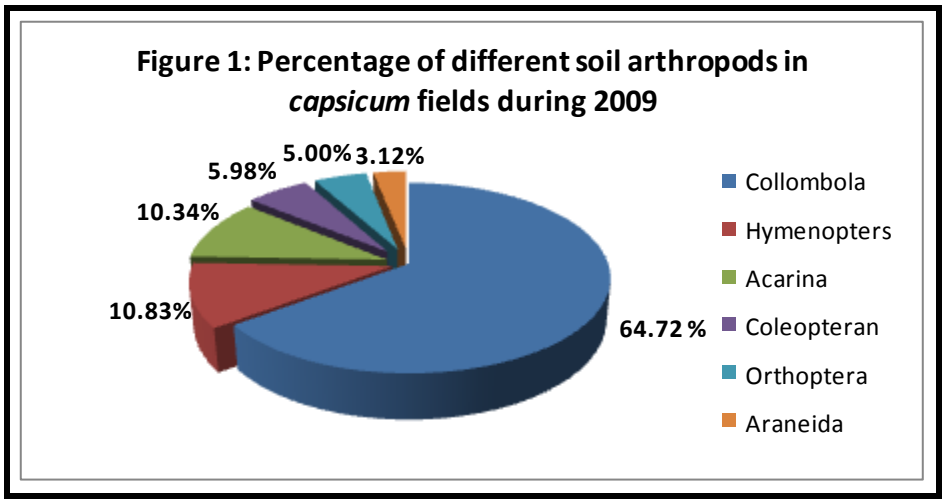
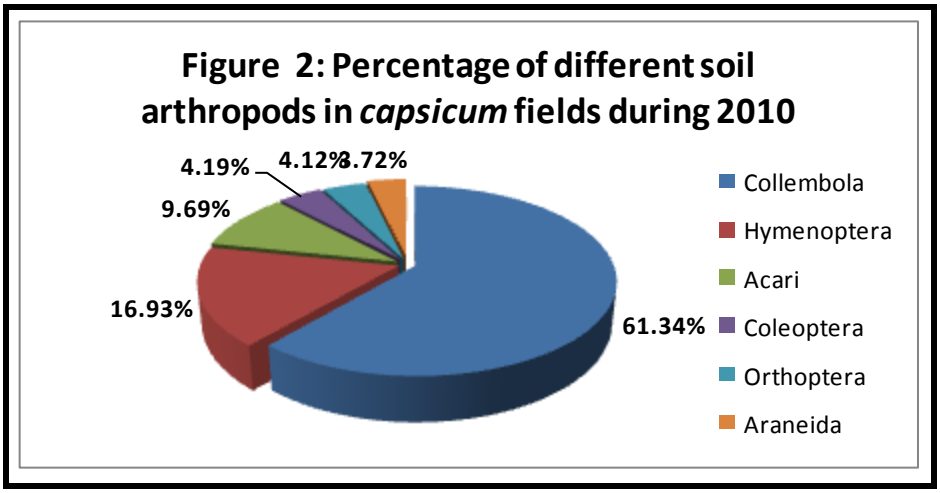
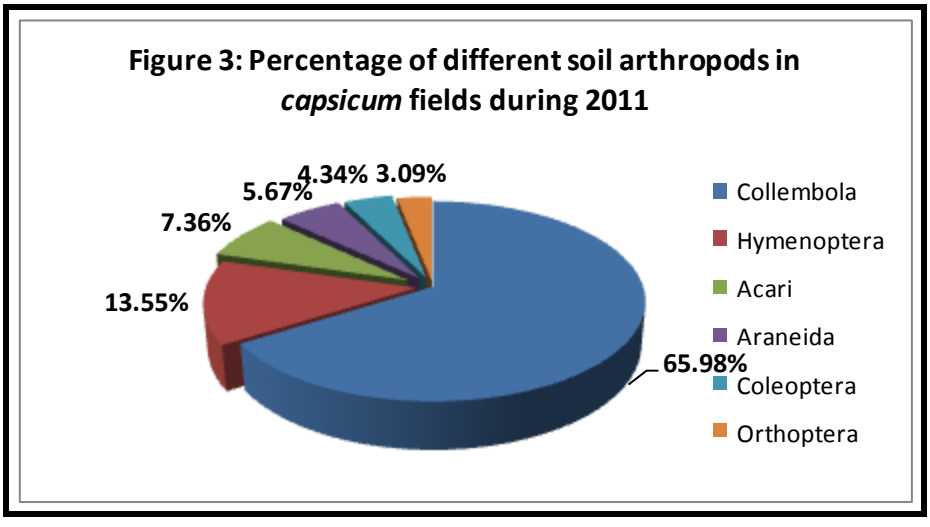
Table 1: Diversity of soil arthropod groups in *Capsicum* fields (Jun.,2009 to Dec., 2011)

ORDER	FAMILY	SPECIES	ORDER	FAMILY	SPECIES
Collembola	Entomobrydae	*Entomobrya Sp*	**Coleoptera**	Tenebrionidae	*Mesomorphus sp.* *Pachycera pondicheryna*
		Pseudosinella sp			*Pelopidas angnamooe*
	Isostomidae '	*Isotoma trispinata*			*Gonocephalum sp.*
		Isotoma nigrifrons			*Notocorox nervosus*
		Isotoma viridis		Carabidae	*Coleolissus*
	Sminthuridae	*Smintfyums viridis*			*Scaritesendus oliver*
		Bourletiella hortensis			*Scarites bengalenis*
		Sphoeridia sp.			*Amblystomusmangnus bates*
	Onychiridae	*Onychhtrus sp.*			*Oryzacphilus acuaninatus*
		Onychiurus armatus		Erotylidae	*Lasiodactyus chevrolali*
		Lepidocyrtus sp.			
Orthoptera	Gryllidae	*Nemobtus silvestris*	**Acari (Mites) Mesostigmata**	Mesotidae	*Cosmolaelaps sp.* *Tramhidium sp.*
		Acheta domesticus	**Acari (Mites) Prostigmata**	Stigmacidae	*Sligmaeus sp.*
	Acrididae	*Chorlophoga viridifasciate*	**Acari (Mites) *Cryptostigmata***	Crypoteidae	*Eremulus avenifer* *Lamellobates palustris*
		Melonoplus sanguinipes			*Lancetoppia willmanm*
Hymenoptera	Formicidae	*Monomorium indicum*			*Annectacarus lonoisetosus*
		Monomorium atomum	**Araneida (Spiders)**	Gonaphosidae	*Thanetus sp.*
		Monomorium criniceps			*Storena Sp*
		Crematogaster rothneyi			
		Crematogaster sp.		Lycosidae	*Hongna carolinensis*
		Componotus pennsylavanices			*Rabidosa punctulata*
		Pochycondyla tesserinoda			*Schizocosa saltatrbc*
		Occophylla smaragdina			*Pholcus phalangiodes*
		Wasmannia aleropunctata			
	Ponerinae	*Diacammon ceylonense*			







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