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Biodiversity of ants in lady's finger and brinjal agroecosystems under natural conditions

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Abstract
Biodiversity of ants were investigated in lady's finger, *Abelmoschus esculentus* and brinjal, *Solanum melongena* agroecosystems under natural conditions. Twelve ant species were found in lady's finger fields and nine ant species were found in brinjal fields by all-out search. By pit fall traps ten & nine ant species recorded respectively. Abundant ant species belongs to sub-family formicinae.

Keywords: Ants, lady's finger, brinjal, pit-fall traps

1. Introduction
Within the diverse class of insecta, Ants (Formicidae) are the largest family under the order Hymenoptera which is the most diverse group of social insects with an estimated of 25,000 species, is a dominant taxon of the terrestrial fauna accounting for large percentage of the total animal biomass, and occupy almost every continent except polar region (Wilson 1987, Hölldobler & Wilson 1990) [14, 7]. Current phylogenetic analyses group ants into 21 extent subfamilies and estimate that ants originated in the cretaceous, approximately 120 million years ago (Brady *et al*. 2006, Moreau *et al*. 2006) [2, 10].

Ants are considered as superorganisms (Gillooly *et. al*. 2010, O'Shea-wheller, *et. al*. 2015) [6, 11] as they play vital role in agroecosystems through the recycling of soil, competitive exclusion, seed dispersal and mutualisms with plant predators (Hölldobler & Wilson 1990, Frouz & Jilková, 2008, Lundgren, 2009, Toro, et.al. 2012 & Shukla *et. al*. 2013) [7, 5, 9, 13, 12]. Ants act as ecosystem engineers, and influence ecosystem structure and function through processes that provide habitat for other species or modulate other ecosystem functions (Frouz & Jilkova 2008, Bharti *et. al*. 2011) [5, 1].

In the present study, ant diversity was examined in lady,s finger and brinjal agroecosystems as no exclusive work has been done so far in this region.

2. Materials & Methods
2.1 Study Site
Janjgir-Champa: Situated in the centre of Chhattisgarh so it is called as heart of Chhattisgarh.

2.2 Scientific location of district

Table 1

Attribute	Details
Longitude:	21.6 degree to 22.4 degree towards North
Latitude:	82.3 degree to 83.2 degree towards East
Height from the sea level:	294.4 Meter

2.3 Climatic conditions of the district

Table 2

Attribute	Details
Average rain fall	1157.1 mm
General rain fall	1478.0 mm
Average Maximum Temperature	49^0 Centrigrade
Average Minimum Temperature	08^0 Centrigrade

Study was performed in farmers' fields in Ghutiya village, Baloda block, Champa (C.G.) from March 2018 to February 2019. Ants were gathered from five fields (Area= 100 m^2) by two general methods : (1) All-out search method- Whole of the field area was scanned by unaided eyes to collect worker ants of each ant species seen from 6-10 a.m. & 2-6 p.m. twice a month throughout the crop seasons. Forceps and nets are most common tools used to collect ground foraging and plant visiting ants. (b) Pit-fall traps: 25 pit fall traps (five in each field) were placed during pre-flowering, flowering and fruiting stages of each crop. The trap consisted of plastic jars placed at ground level (Diameter 15 cm and height 12 cm) each jar contains 5% formaline solution. Jars were placed randomly at selected areas within boundary limits of fields. Jars were placed between 7a.m. to 8 a.m. and removed next day after 24 hours to trap both diurnal and nocturnal ant species.

2.4 Ant cleaning and sorting
Any dirt or debris adhered to the body of the ant is cleaned with the help of soft camel brush dipped in water. After cleaning ants were preserved in vials having 70% of ethyl alcohol. Separate vials were used for different ant species.

2.5 Identification of ants
Ant specimens were identified to family, genus level using the identification guide of Holldobler and Wilson (1990) [14] and Bolton (2002) [3]. Some ant species which were not identified up to species level had sent to various myrmecologists in India.

3. Results
Ant species which are recorded/seen 16-20 times, 11 to 15 times, 6-10 times and 1-5 times throughout the year denoted

as abundant, common, occasional & rare ant species. *Camponotus compressus*, *C. sericeus* & *Paratrichina* sp. are abundant; *Crematogaster* sp. was found common; *Pachycondyla* sp., *Tetraponera* sp.1, *Tetraponera* sp. 2, *Oecophylla smaragdina*, *Lapisiota* sp., *Tapinoma melanocephalum* & *Monomorium* were occasionally found while *Dorylus* & *Cardiocondyla* were rare ant species. Pit-fall traps data justified the all-out search results as *Camponotus compressus*, *C. sericeus* & *Paratrichina* sp. were numerically dominant (11.29 % to16.29 %), *Crematogaster* sp. was found numerically high as 9.09 % to 9.68 %, *Pachycondyla* sp. *Tetraponera* sp. 1, *Tetraponera* sp. 2, *Oecophylla smaragdina*, *Tapinoma melanocephalum* & *Monomorium* sp. were found numerically less as nil to 6.45% while *Dorylus* sp. *Cardiocondyla* sp. were not found in pit fall traps in both agroecosystems.

By all-out search method, twelve ant species belonging to ten genera and five subfamilies were collected from lady finger fields. In the brinjal fields nine ant species belonging to eight genera and five sub-families were collected. By pit-fall traps ten ant species belonging to eight genera and five sub-families in the lady finger fields were collected. On the other hand traps from the brinjal fields provided nine ant species belonging to eight genera and five sub-families.

Table 1: Ants collected by all-out search & pit-fall trap methods from lady, s finger and brinjal agroecosystems

Sub-families & ant species	Abundance	All-out search method		Pit-fall trap method (%)	
		In lady's finger field	In brinjal field	In lady's finger field	In brinjal field
Ponirinae *Pachycondyla* sp.1	Occasional	+	+	8.06	11.36
Psedomyrmicinae *Tetraponera* sp.1	Occasional	+	+	8.06	11.63
Tetraponera sp. 2	Occasional	+	-	8.06	9.09
Dorylinae *Dorylus* sp.1	Rare	_	+	0	0
Formicinae *Oecophylla smaragdina*	Occasional	+	+	6.45	4.54
Camponotus compressus	Abundant	+	+	16.12	15.91
Camponotus sericeus	Abundant	+	+	17.74	15.91
Paratrichina sp.	Abundant	+	+	11.29	15.64
Lapisiota sp.	Occasional	+	-	6.45	0
Dolichoderinae *Tapinoma melanocephalum*	Occasional	+	-	8.06	6.82
Myrmicinae *Crematogaster* sp.	Common	+	+	9.68	9.09
Monomorium sp.	Occasional	+	+	0	0
Cardiocondyla sp.	Rare	+	-	0	0

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4. Discussion

In this preliminary study, diversity of ants within ecosystem is depicted. This is probably the first report of the ant fauna for this area. Ants remain least disturbed and maintain their numerical strength under normal agricultural practices performed by the farmers. Ant performs many ecological roles, which are beneficial to a human being, including the suppression of insect populations but these organisms are highly responsive to human impact, which obviously reduces its richness (Folgarait, 1998) [4]. The present study will yield valuable information on ant species availability in this region. Finally to sum up, this study provides a significant contribution in the field of ecology.

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