



Contents lists available at NCBI

The American Journal of Science and Medical Research

Journal homepage: <https://ajsmrjournal.com/>



Research Article

Diversity of Arthropods in Narsampet Mandal of Warangal District, Telangana State, India

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<https://dx.doi.org/10.5281/zenodo.20492600>

Received: 21 April 2026

Revised 25 May 2026

Published on 31 May 2026

ISSN: 2377-6196© 2025 The Authors.

Published by AIRA

Keywords: Pitfall, Arthropod, Diversity, Pesticide And Collumbola

ABSTRACT

The Arthropod fauna was collected by pit fall trapping for estimating the abundance and diversity of the fauna obtained during the period 2024-25. The observed orders are Aranea, Diptera, Orthoptera, Collembola, Hymenoptera (Red ants), Hymenoptera (Black ants), Isoptera, Hymenoptera (wasp), Coleoptera and Hemiptera. The dominance order is Aranea and followed by Collumbola, Orthoptera, Diptera, Hymenoptera (Red ants), Hymenoptera (Black ants), Isoptera, Hymanoptera, Coleoptera and Hemipterain throughout the study period. The highest number of Arthropods were recorded in cotton field and followed by chilli field respectively. Agricultural intensification reduces taxonomic richness and diversity across taxonomic groupings, having the greatest negative impact on soil biota. When compared to the natural landscape, agricultural management operations such as tillage, fertilizer, pesticide and reduced crop diversity have a negative effect on biotic composition and abundance. In the present results the reduced number of arthropods in the cotton field is because of greatest application of pesticides.

1. Introduction

Soil arthropods play an important role in maintaining and sustaining soil health and ecosystem productivity. Acari, collembolan, symphylan, millipedes, termites and ants are the main organisms involved in decomposition, comminution, and activation of microbial activities, bioturbation, humification and regulation of nutrient losses. Arthropods also provide provisional, supporting and regulating services. Soils represent the fundamental organizing units within terrestrial ecosystems and the Soil arthropods range in size from microscopic to several centimetres long. They include insects like beetles, ants, and termites; arachnids, such as spiders and mites; crustaceans, such as sowbugs, myriapods, like centipedes and millipedes, scorpions and springtails.

Arthropods were represent as much as 20% of the soil fauna and capacity to define soil quality and soil health has become extremely important in recent years due to the dramatic increase in soil degradation. The fertility of soil depends on its ability to provide plants with vital nutrients needed for their growth and reproduction. Additionally, soil acts as a physical medium that facilitates root growth and respiration while also maintaining its structural integrity against erosive forces (Kishore et al., 2024). Different land use methods, especially forest plantations and intensive agriculture practices (Keenan et

al. 2015), affect soil processes (Bini et al. 2013). Introduction of some exotic tree species are known to cause soil acidification, and to use high quantities of water and nutrients. When the organic matter increases the soil arthropod population also increases (Meitiyani and Dharma 2018).

2. Materials and Methods

2.1. Study area

This research was conducted between February 2024 - January 2025 in two different location at Narasampet mandal, Warangal rural district. The locations include: 1. Agricultural field of Chilli, Madannapeta Village, 2. Agricultural field of Cotton, Rajapally Village.

2.2. Pitfall trap method

A pitfall trap is designed to catch ground dwelling invertebrates. It's a pit that invertebrates fall into. Hence pitfall. The trap consists of a plastic cup, jam jar, drink bottle with top cut off or some other suitable open topped container. Half fill the container with water, and add a few drops of detergent (e.g. dish washing liquid) to break the surface tension. Otherwise, smaller insects may land on the surface of the water and fly off.

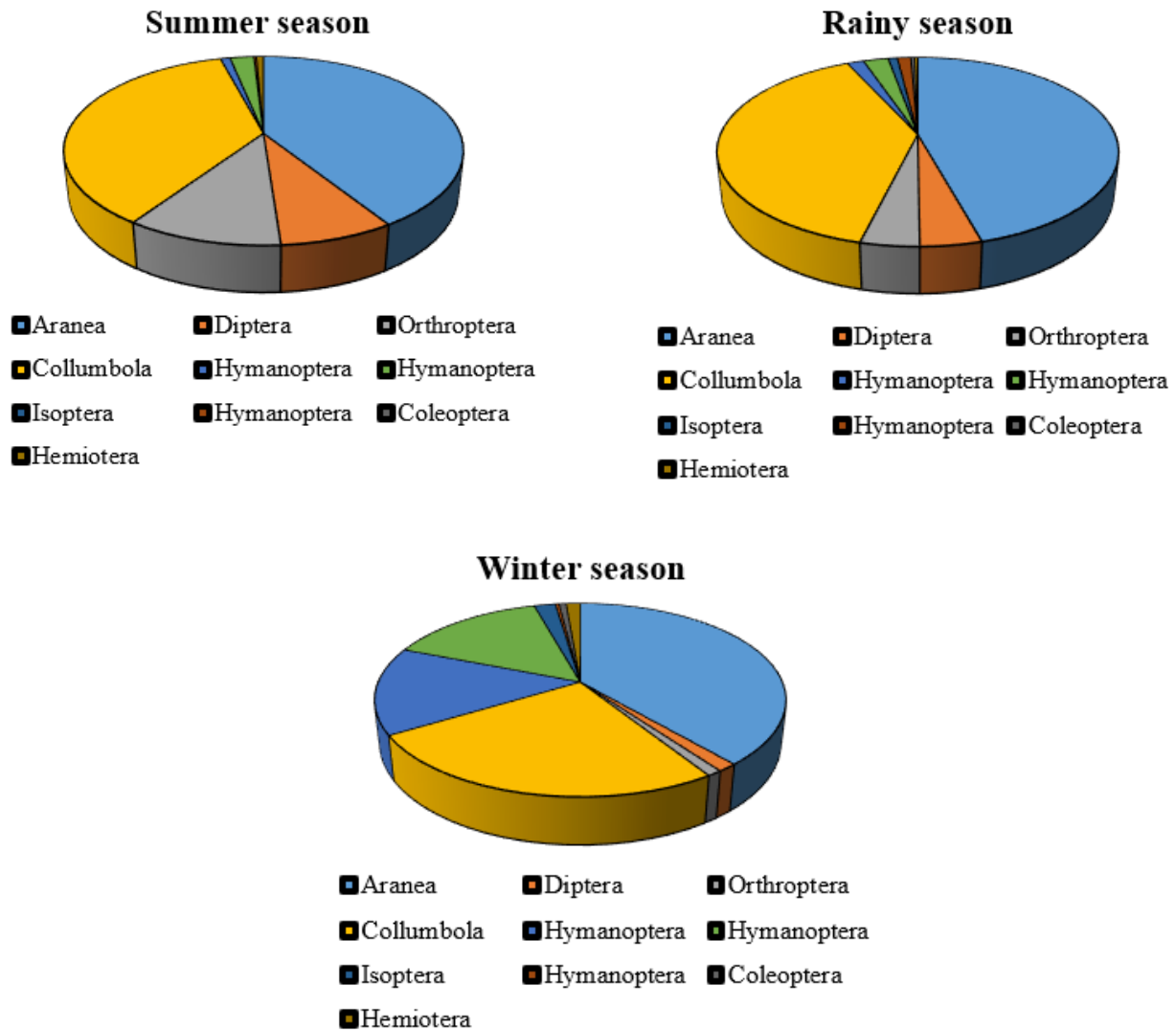


Fig 1. Seasonal variation of chilli field Arthropod fauna of Madannapet village of Narsampet Mandal during the year 2024-25 (Summer, Rainy and Winter seasons)

Table-1. Seasonal variation of chilli field Arthropod fauna of Madannapet village of Narsampet Mandal during the year 2024-25

| Name of the species | Species name | Summer | | | | Average | Rainy | | | | Average | Winter | | | | Average |
|---------------------|--------------|--------|--------|--------|--------|---------|--------|--------|--------|--------|---------|--------|--------|--------|--------|---------|
| | | Feb-24 | Mar-24 | Apr-24 | May-24 | | Jun-24 | Jul-24 | Aug-24 | Sep-24 | | Oct-24 | Nov-24 | Dec-24 | Jan-25 | |
| Aranea | Spider | 36 | 43 | 55 | 43 | 44.25 | 62 | 66 | 53 | 32 | 51.45 | 26 | 20 | 34 | 36 | 29 |
| Diptera | Fly | 8 | 10 | 6 | 10 | 8.5 | 6 | 4 | 4 | 1 | 4.7 | 1 | 0 | 1 | 2 | 1 |
| Orthoptera | Crickets | 10 | 12 | 11 | 13 | 11.5 | 4 | 4 | 3 | 0 | 4.5 | 0 | 1 | 1 | 1 | 0.75 |
| Collumbola | Spring Tail | 30 | 39 | 49 | 39 | 39.25 | 59 | 55 | 48 | 20 | 44.25 | 18 | 12 | 22 | 24 | 19 |
| Hymanoptera | Red Ant | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 1 | 4 | 1.8 | 8 | 10 | 12 | 14 | 11 |
| Hymanoptera | Black Ant | 2 | 4 | 2 | 2 | 2.5 | 1 | 3 | 4 | 3 | 2.7 | 6 | 12 | 14 | 12 | 11 |
| Isoptera | Termites | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 1.5 |
| Hymanoptera | Wasp | 0 | 0 | 1 | 0 | 0.25 | 2 | 1 | 2 | 2 | 1.45 | 0 | 0 | 0 | 1 | 0.25 |
| Coleoptera | Beetle | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.4 | 0 | 1 | 1 | 0 | 0.5 |
| Hemiptera | Bugs | 0 | 1 | 1 | 1 | 0.75 | 0 | 0 | 0 | 1 | 0.35 | 0 | 1 | 2 | 1 | 1 |

Dig a small hole, just bigger than the container. Place the container in the hole (without the lid).

Carefully fill in the remaining space around the beaker with earth. Make sure the top is flush with the ground (or a few millimetres below) and firm and smooth the soil so that it is level leading into pot. Even the slightest lip above the ground can stop invertebrates falling in to the pit. It's a good idea to

make a cover to keep rain, leaves and birds from eating your catches. The cover should be open on the sides, but covered above. That way, ground dwelling invertebrates are free to fall in, but rain (and birds) coming from above are blocked. For sorting out the extracted arthropods soil arthropods according to their groups in separate vials with eighty percent alcohol for further identification. The number in each group was identified

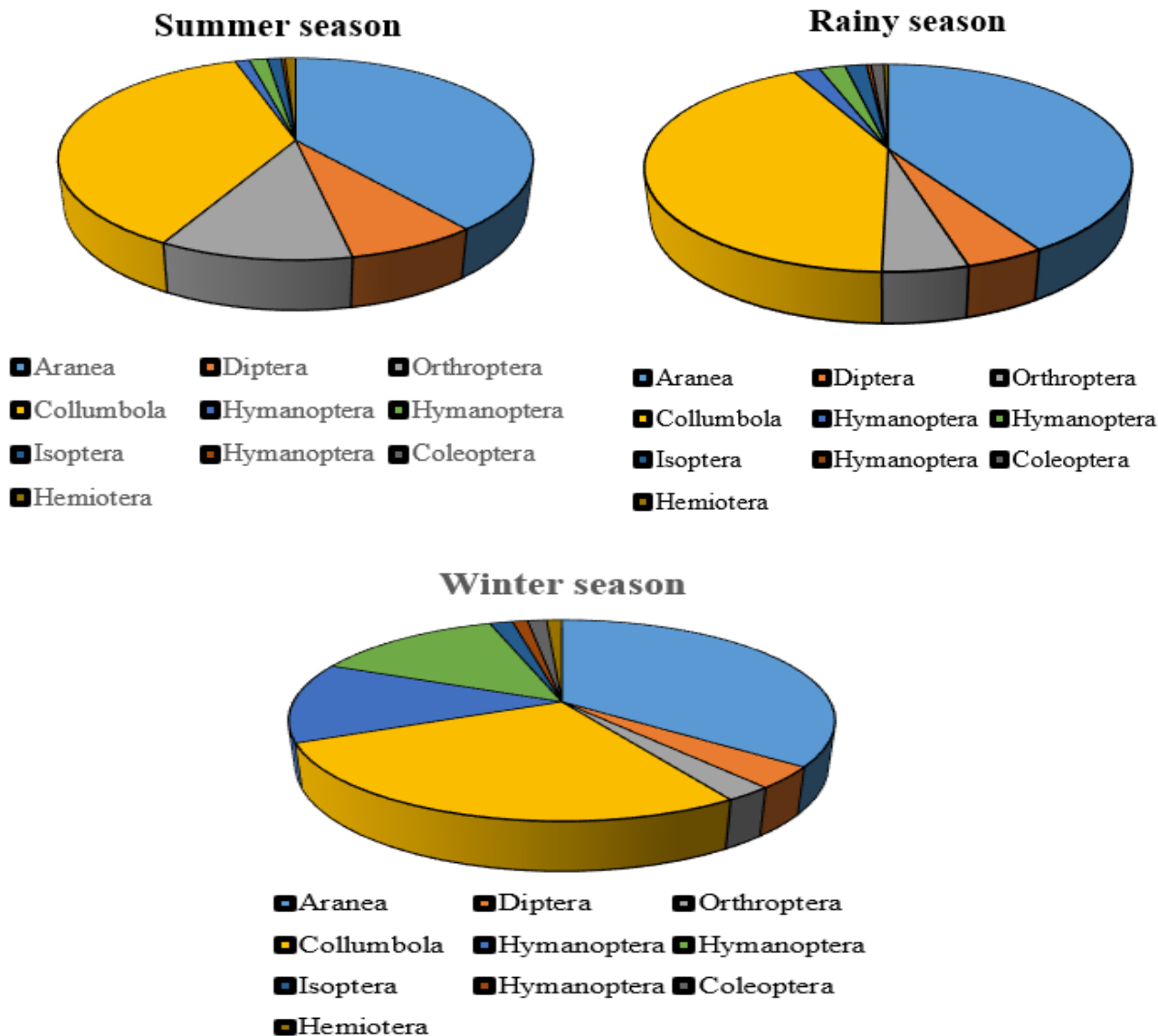


Fig 2. Seasonal variation of cotton field Arthropod fauna of Rajapally village of Narsampet Mandal during the year 2024-25 (Summer, Rainy and Winter seasons)

Table-2. Seasonal variation of cotton field Arthropod fauna of Rajapally village of Narsampet Mandal during the year 2024-25

| Name of the species | Species name | Summer | | | | Average | Rainy | | | | Average | Winter | | | | Average |
|---------------------|--------------|--------|--------|--------|--------|---------|--------|--------|--------|--------|---------|--------|--------|--------|--------|---------|
| | | Feb-24 | Mar-24 | Apr-24 | May-24 | | Jun-24 | Jul-24 | Aug-24 | Sep-24 | | Oct-24 | Nov-24 | Dec-24 | Jan-25 | |
| Aranea | Spider | 43 | 46 | 24 | 22 | 33.75 | 50 | 24 | 26 | 20 | 30 | 18 | 28 | 43 | 42 | 32.75 |
| Diptera | Fly | 10 | 8 | 4 | 4 | 6.5 | 8 | 3 | 2 | 0 | 3.25 | 2 | 3 | 4 | 4 | 3.25 |
| Orthoptera | Crickets | 12 | 14 | 8 | 4 | 9.5 | 6 | 6 | 2 | 0 | 3.5 | 0 | 4 | 2 | 3 | 2.25 |
| Collumbola | Spring Tail | 36 | 40 | 34 | 18 | 32 | 58 | 33 | 24 | 8 | 30.75 | 8 | 18 | 36 | 40 | 25.5 |
| Hymanoptera | Red Ant | 2 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 3 | 1.5 | 2 | 14 | 18 | 14 | 12 |
| Hymanoptera | Black Ant | 2 | 2 | 1 | 0 | 1.25 | 2 | 2 | 2 | 0 | 1.5 | 2 | 18 | 20 | 10 | 12.5 |
| Isoptera | Termites | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1.25 | 1 | 2 | 2 | 1 | 1.5 |
| Hymanoptera | Wasp | 1 | 0 | 0 | 0 | 0.25 | 1 | 0 | 0 | 0 | 0.25 | 0 | 1 | 1 | 2 | 1 |
| Coleoptera | Beetle | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.75 | 0 | 2 | 2 | 1 | 1.25 |
| Hemiptera | Bugs | 0 | 1 | 1 | 1 | 0.75 | 0 | 0 | 0 | 1 | 0.25 | 1 | 1 | 1 | 1 | 1 |

and recorded (Borror and Delong 1964, Burges and Raw., 1967; Eesenbeis and Wichard., 1989).

1. Results and Discussion

The seasonal variation of Madannapet village and Rajapally village of Narsampet Mandal during the year 2024-25 is depicted Table-1,2 and Figure-1,2. During the year 2024-25 the total 10 number of arthropoda species groups were observed. In the madannapet village araneae species were dominated in the rainy season and followed by summer and winter seasons

respectively. The dipteran, Orthopterans species were dominated in summer and followed by rainy and winter seasons, Collembolan species were dominated in rainy season and followed by summer and winter seasons, Hymenoptera group species dominated in winter season and followed by rainy and summer seasons, whereas Isoptera, Coleoptera and Hemiptera species were dominated in winter season and followed by summer and rainy seasons in the same village. The highest number of species were identified in rainy and summer seasons and lowest in winter seasons is due the application of various pesticides to the growing crops. Similar results were made by Suresh et al., 2017.

In the present investigation the total 10 number of arthropoda species groups were observed in the year 2024-25. In the Rajapally village araneae species were dominated in the summer season and followed by winter and rainy season respectively. In the same village the dipteran, Orthopterans species were dominated in summer and followed by rainy and winter seasons, Collembolan species were dominated in summer season and followed by rainy and winter seasons, Hymenoptera group species dominated in winter season and followed by rainy and summer seasons, whereas Isoptera, Coleoptera and Hemiptera species were dominated in winter season and followed by rainy and summer seasons in the same village. Similar findings were made by Raut et al., 2023.

2. Conclusion

The present results were indicated the quantitative dominance of soil arthropods were observed in summer and rainy seasons and lowest number is recorded in winter season is depend on the application of pesticides.

Competing interests:

The authors declare that they have no competing interests

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From National Conference on Advances in Life Sciences: Present & Future (NCALS-2026) | 24-25 March 2026 | Organized by: Department of Zoology, Kakatiya University, Warangal-506 009, Telangana State, India