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RESEARCH ARTICLE

TAXANOMYOF SOIL MICROARTHROPODS OF THE STEPPE ZONE OF MONGOLIA.

Ariunaa Jugder, Bayartogtokh Badamdorj.

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Corresponding Author

Ariunaa Jugder.

Abstract

The one of the organisms that has important role for the formation of the ecological system in all different zones of the Mongolia are microarthropods. The microarthropods such as Collembola, Thysanura, Diplura, Protura, that are poor developed and preliminary non-wing insect, and Oribatei are the important component of the soil fauna.

This study is the first study of micro arthropods of the Dariganga plane sub region of the Eastern Mongolia steppe region.Main objective of the study is to determine taxonomical characteristics of the soil microarthropods in Eastern Mongolian steppe ecosystem. From our investigations we attained the following conclusions:
During the study we have identified 90 species of soil microarthropods that belongs to the 64 genera, 43 families, 9 order and 2 classes.

The main part of the identified soil microarthropods or 70 species that belongs to the 48 genera, 30 families was species of Acari:Oribatida. The species were composing 78% percent of total identified species. Rest parts were consisting of species of Acari:Mesostigmatida(5 species or 5.6%), Insecta: Collembola(4 species or 4%), and other species of microarthropods (11 species).

Species of Nothrusbiciliatus, Anachipteriadeficiens, Eniochthoniusminutissimus were recorded first in the fauna of Mongolia.

Introduction:-

Founder of the modern soil science. Dokuchaev (1949) were reporting about the high importance of the live organisms in the formation of soil cover. He wrote, “Soil will be formed due to the combined activities of the live and non-live natural factors in the surface of the rocks”.

The one of the organisms that has important role for the formation of the ecological system in all different zones of the Mongolia are microarthropods. The microarthropods such as Collembola, Thysanura, Diplura, Protura, that are poor developed and preliminary non-wing insect, and Oribatei are the important component of the soil fauna. Average body size of the micro arthropods is 50-900 µm and their density per unit area is relatively high. For example, in soil surface layer or in the moss layer of the forest zone, 200-300 thousand individual / $m^2$of micro arthropods can be found (Gilyarov, Krivolutskii, 1975).

There are some published materials that belong to the microarthropods of the central dry steppe, andDegee and Numrug river basin of the Eastern Mongolia. However, there are no any specific publications and studies that belong to our study area. Therefore, this study is the first study of micro arthropods of the Dariganga plane sub region of the Eastern Mongolia steppe region.

Main objective of the study is to determine taxonomical characteristics of the soil microarthropods in Eastern Mongolian steppe ecosystem.

Ecological condition of the Study area:-

Territory of Eastern Mongolian steppe characterize by their hilly plane surface that rare with mountains. Total area of the Eastern Mongolia is 300157.0 km^2 which is the 19.2 percent of the total territory of Mongolia. Our study area is involves the above mentioned characteristics of the Eastern Mongolian steppe and belong to the Dariganga plane sub region. Samples were collected from different biotopes, such as mountain steppe, meadow, and desert steppe that involve plane area, and hills.

Objectives of the study, materials, methods and previous studies:-

Objectives of the study:-

A main goal of the study was to reveal taxanomy of the microarthropods of the Eastern Mongolian steppe.
To achieve the goal, we had following objectives:

- Identify species composition and ratio of the main taxanomic groups
- Determine distribution and location of the habitats

Study materials:-

Study samples were collected in September 2014, from different biotopes such as steppe, mountain steppe, meadow, and grove of birch. Location of this area is Baruun-Urtsoum of the Sukhbaataraimag that belong to the Dariganga, sub region of the Eastern Mongolian steppe. 16 samples were collected from the area and 1105 individuals of the micro arthropods were identified and 126 slides were prepared. In addition, for the comparison purposed we have added another 1387 individuals of 17 samples that were collected from the Erdenetsagaan and Darigangasoums, in July 2014. The territory of the Erdenetsagaan and Darigangasoums belongs to the same sub region as previous samples locations.

Taxonomy and distribution of the steppe microarthropods:-

Ratio of taxonomic groups and species:-

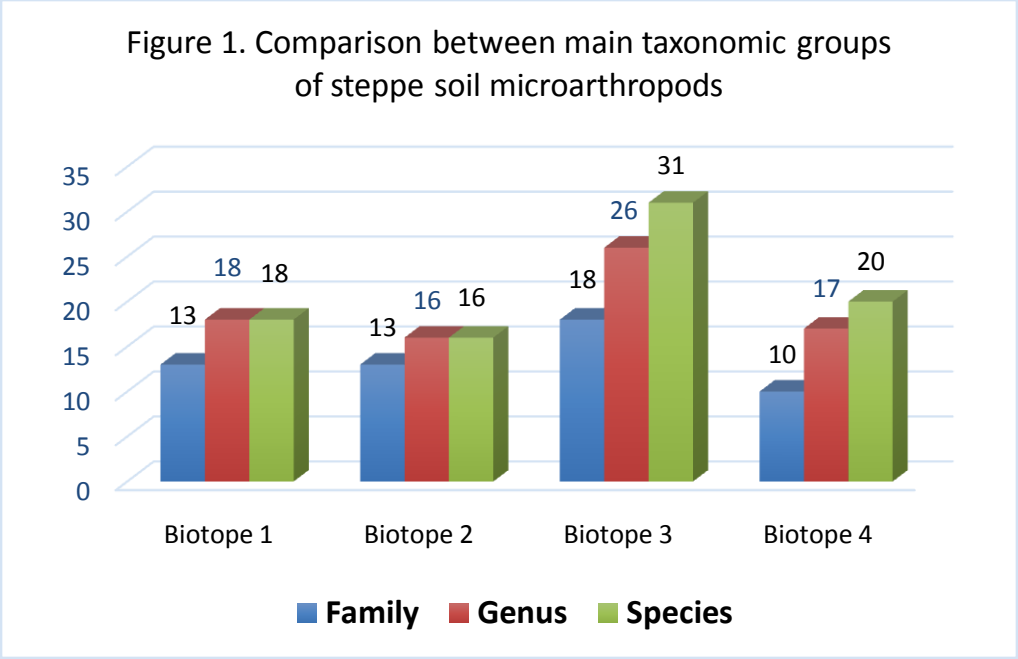
Compositionof the steppe soilmicroarthropods:-

There were identified 90 species of microarthropods that belongs to 2 classes, 9 order, 43 families and 64 genera. The dominating group of the microarthropods in the identified organisms was species of the classAcari:Oribatida(70 species), and rest of the organisms was species of the class Acari:Mesostigmatida (5 species) and orderInsecta: Collembola(4 species), other insects, arthropods, and nymphs (Table 1).

Table 1:- Species richness ratio of the main groups of steppe soil microarthropods.

№	Soil microarthropods	Species number	Percentage
1	Acari:Oribatida	70	78%
2	Acari:Mesostigmata	5	5.6%
3	Insecta:Collembola	4	4.4%
4	Insecta:Coleoptera	6	6.6%
5	Insecta:Thysanoptera	1	1.1%
6	Insecta:Homoptera	1	1.1%
7	Insecta:Hemiptera	1	1.1%
8	Insecta:Diptera	1	1.1%
9	Arachnida:Aranei	1	1.1%
	Total	90	100%

Comparisons of the microarthropods composition of the different biotops shows that in the steppe biotops with sedge, grass and forbs vegetation community found 18 species of 18 genera and 13 families. In the mountain steppe biotopes with grass and forbs vegetation community 16 species of microarthropods that belongs to 16 genera and 13 families was found. In stream meadow biotopes that have vegetation of birch grove, 31 species that belongs to the 26 genera and 18 families were recorded. From the meadow biotopes, there were recorded 20 species of the 17 genera and 10 families (Figure 1).

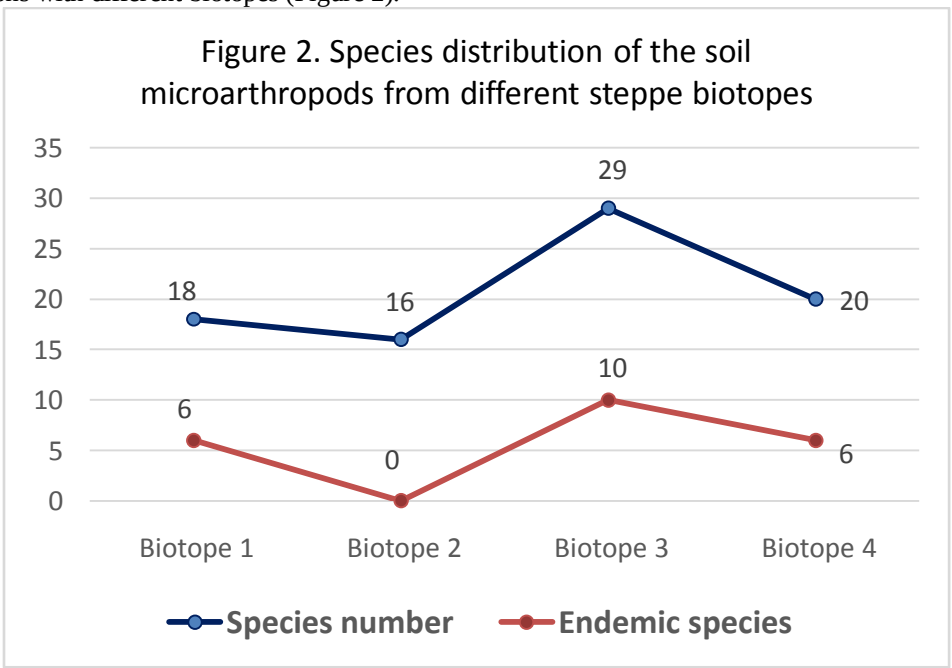


Explanation:Biotope 1 - Steppe with sedge, grass and forbs
Biotope 2 - Mountain steppe with grass and forbs
Biotope 3 - Birch grove of the river meadow
Biotope 4 – River meadow with sedges and grasses

During the study following new species of the microarthropods were recorded in the fauna of Mongolia: Northrusbiciliatus C.L.Koch, 1984, Abachipteria, deficiens Grandjean, 1932, EniochthoniusminutissimusBerlese, 1900. The firth two species abundant in the region of Palaearctic and the last one were cosmopolitanspecies.

Distribution and dispersal of soil microarthropods:-

In the study area we have selected several biotopes with different ecological condition and comparisons shows that species compositions with different biotopes (Figure 2).



Explanation: Biotope 1 - Steppe with sedge, grass and forbs

Biotope 2 - Mountain steppe with grass and forbs
Biotope 3 - Birch grove of the river meadow
Biotope 4 – River meadow with sedges and grasses

Distribution type of the steppe soil microarthropods was determined using Morisita index and Morisita standardized index (Table 2).

Table 2:- Soil micro arthropods distribution of the steppe zone

№	Biotopes	Moristia index (Id)	Moristia standardized index (Ip)
1	Steppe with sedge, grass and forbs	3.775	0.845
2	Mountain steppe with grass and forbs	1.622	0.79
3	Birch grove of the river meadow	1.08	0.508
4	River meadow with sedges and grasses	2.604	0.766

The table above shows that Ip or Morisitastandardized index is lower than 0 in each biotope, that means the organisms have distribution that forms families.

Table 3:- Distribution index of oribatid mites in the steppe.

№	Biotopes	Moristia index (Id)	Moristia standardized index (Ip)
1	Steppe with sedge, grass and forbs	4.35	0.918
2	Mountain steppe with grass and forbs	2.0	1.0
3	Birch grove of the river meadow	1.75	0.59
4	River meadow with sedges and grasses	3.54	0.922
5	Steppe with Potentilla, Carex	1.558	0.553
6	Needle grass steppe	1.896	0.947
7	Sand dunes	2.0	1.0
8	Mountain steppe with Caragana	2.0	1.0

The table above shows that distribution of the soil oribatid mites in 8 biotopes was lower than 0 and Oribatei have colony dispersal (Table 3).

Conclusion:-

1. During the study we have identified 90 species of soil microarthropods that belongs to the 64 genera, 43 families, 9 order and 2 classes.
2. The main part of the identified soil microarthropods or 70 species that belongs to the 48 genera, 30 families was species of Acari:Oribatida.The species were composing 78% percent of total identified species. Rest parts were consisting of species of Acari:Mesostigmatida(5 species or 5.6%), Insecta: Collembola(4 species or 4%), and other species of microarthropods (11 species).
3. Species of Nothrusbiciliatus, Anachipteriadeficiens, Eniochthoniusminutissimuswere recorded first in the fauna of Mongolia.

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