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Habitat of soil mites in irrigated lands of Karakalpakstan

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Abstract
The article discusses the main habitats of soil mites in the irrigated lands of the Republic of Karakalpakstan. In this work, of particular interest were acariform mites (*Acariformes*), belonging to the groups of armored (*Oribatei*) and acaridia (*Acaridiae*) mites. During the study period, 60 soil samples were taken with a layer depth of 20 cm, the soils of the cotton rhizosphere, apple orchard, vineyard and rice field were studied. It has been established that the populations of soil mites on the irrigated lands of the Darsan and Shortanbay farms are distinguished by species diversity. In the soils of a cotton field and an apple orchard, 10 species of shell sticks were found, in the soil of a vineyard, 8 species, among which the mite *Epilohmannia* cylindrica prevailed, and among the ubiquists *Oppiella nova*. The watered soils of rice crops were characterized by the least species diversity, where habitats of such shell mites as *Tectocepheus alatus*, *Oppiella nova*, *Hydrozetes amudariensis*, as well as the presence of *Bakerdanis centriger* from the *Scutacaridae* family were noted.

Keywords: soil, irrigation, cotton, rice, salinization, ecosystem, desert, fertilizer, pesticide, oribatids, acarids, mite

Introduction
The specific features of the natural conditions of Uzbekistan, including the Republic of Karakalpakstan, lead to the fact that the cultivation of rice, cotton, alfalfa, wheat, corn and melons on irrigated lands require a special approach to solving environmental problems in relation to agriculture. The development of irrigation agriculture is the main way to increase agricultural production in the arid zone of the Republic of Karakalpakstan, in this regard; ecological processes occurring in the ecosystems of irrigated lands are of particular interest. Therefore, uncharacteristic ecological conditions for soil animals are created in the fields of agricultural crops, such as the change of soil moisture in different seasons of the year, the application of large doses of mineral fertilizers, pesticides and desiccants. In addition, a significant part of the land is susceptible to chloride-sulfate salinization due to its proximity to the surface of groundwater, to eliminate this, almost all irrigated lands are washed with water in spring and autumn, which greatly changes the conditions of existence of most groups of soil animals, and this was noted by M.S. Gilyarov in 1952 [1]. The consequences of these measures lead to the death of the surface inhabitants of predatory invertebrates, and therefore, the mechanisms of regulation of the number of herbivorous forms are disrupted in the ecosystem and the degree of these changes is directly related to the intensity and duration of irrigation.

Materials and Methods
The material for the work was the collection of ticks in the lower reaches of the Amu Darya River. The research was carried out from April to November 2018-2019 in the Darsan farm on cotton crops, apple orchard, vineyard and in the soil of the rice field of the Shortanbay farm in the Nukus district of the Republic of Karakalpakstan. During the study period, 60 soil samples were taken with a depth of 20 cm of the layer, the soils of the rhizosphere of cotton, apple orchard, vineyard and rice field were examined. During the work, methods of soil zoology studies were used (Gilyarov, 1985) [2].

Results and Discussion
In this work, acariform mites (*Acariformes*) belonging to the groups of oribatid (*Oribatei*) and acaridium (*Acaridiae*) mites were of particular interest.
Oribatid mites (*Oribatei*) are one of the main components of the soil fauna, play an important role in the processes of soil formation, and in the life of soil biocenoses. They are common in all desert soils of Central Asia and inhabit all types of irrigated lands (Krivolutsky,1966) [3].

Table 1: Biotopic allocation of oribatid mites of irrigated lands of the Nukus district

Species of mites	Cotton field	Vineyard	Apple Orchard	Rice field
Family Epilohmanniidae Oudemans, 1923 Epilomannia cylindrica Berlese, 1904	+++	+++	+	-
Family Notridae Berlese,1896 Nothrus silvestris Nicolet, 1855	+	-	-	-
Family Damaeolidae Grandjean,1965 Damaeolus ornatissimus,Csiszar,1962	+	+++	+	-
Family Microzetidae Grandjean,1936 Microzetes arenarius D. Krivolutsky,1966	-	-	+++	-
Family Tectocepheidae Grandjean,1953 Tectocepheus alatus Berlese, 1913	+	-	+	+
Family Suctobelbidae Grandjean,1954 Suctobelbella dargoltsiana D. Krivolutsky,1966	+	+++	+	-
Family Oppiidae Grandjean,1954 Quadroppia quadricarinataMichael, 1885	+++	+	+	-
Family Oppiidae Grandjean,1954 Oppiella nova, Oudemans, 1902	+++	+++	+	++
Family Oppiidae Grandjean,1954 Oppia nukusia, Shtanchaeva, 1984	+	+	+	-

Family Oppiidae Grandjean,1954 Oppia sadbinia, Shtanchaeva, 1984	+	+	+	-
Family Hydrozetidae Grandjean,1954 Hydrozetes amudariensis Koshchanova, 1984	-	-	-	+++
Family Haplozetidae Grandjean,1936 Protoribates capucinus, Berlese, 1908	+++	+	+++	-
Total:	10	8	10	3

The habitation of 10 species of oribatids was recorded in the soil of the cotton field of the Darsan farm. The most numerous in terms of species composition were mites of the families: *Suctobelbidae*, *Oppiidae*, living in deep layers of soils, and they find favorable conditions almost everywhere. *Quadroppia quadricarinata* and *Epilohmannia cylindrica* were the dominant species in the cotton soil; the latter species has a huge range, occupying the entire desert-steppe belt of the Palearctic. *Protoribates capucinus* and ubiquist *Oppiella nova* were noted as mass species, and the remaining types of oribatid mites were found in single specimens.

In the soils of the vineyard and apple orchard, 8 and 10 species of oribatids were noted, respectively. In these agrocenoses, there is a qualitative difference in the species composition. If the *Epilohmannia cylindrica*, *Oppiella nova*, *Suctobelbella dargoltsiana*, *Damaeolus ornatissimus* mites were identified as mass species for the vineyard, then in the apple orchard, *Microzetes arenarius*, *Protoribates capucinus* were marked with mass species. The ticks *Suctobelbella dargoltsiana*, *Quadroppia quadricarinata*, *Tectocepheus alatus* were found in single specimens. It should be noted that mites *Oppia nukusia*, *Oppia sadbinia* from the family *Oppiidae* have also been identified in the soils of a cotton field, vineyard and apple orchard, they belong to an insufficiently studied group of microfauna.

The rice fields of the farm "Shortanbay" were distinguished by the smallest species diversity of oribatid mites; this is due to the fact that rice fields have been under water for a long time, which has a detrimental effect on the entire animal population of these soils. *Tectocepheus alatus*, *Oppiella nova* and *Hydrozetes amudariensis* ticks have been recorded on rice bays. Determinate variation was observed in the dominance of the mite *Hydrozetes amudariensis*, which is a hydrobiont form of oribatids. These ticks fell into rice fields together with irrigation water, and in natural conditions they live in reed thickets along the banks of the Amu Darya River.

Acaridium mites (*Acaridiae*) are serious pests of agriculture, industrial production and are present in all agrocenoses. According to A. Boczek (1958) [5], acaridium mites, together with oribatid mites, are especially active in relation to the formation of humus in the soil.

Table 2: Distribution of acaridium and scutacarid mites by biotopes

Species of mites	Cotton field	Vineyard	Apple Orchard	Rice field
Family Acaridae Leach,1816 Tyrophagus perniciosus Zachvatkin,1940	+	+	+	-
Family Acaridae Leach,1816 Rhyzoglyphus echinopus Fumouze et Robin 1868	+++	++	++	-
Family Scutacaridae Oudemans, 1916 Bakerdanis centriger, Cooreman, 1951	-	-	-	+
Total:	2	2	2	1

The dominance of two species of acaridium mites *Tyrophagus perniciosus*, *Rhyzoglyphus echinopus* was noted in the soils of cotton, vineyard and apple orchard. In all soils, the most common was *R. Echinopus*, a serious pest affecting seeds, processing products of many agricultural crops, mainly bulbous and root crops. In the family *Scutacaridae*, only one species, *Bakerdanis centriger*, has been found in the soil of a rice field.

In the works of V.D. Sevastyanov el at (1977) [4] it was shown that mites of the *Scutacaridae* family are mass inhabitants of the soils of agrocenoses of grain crops, but intensive watering, prolonged flooding of the lands are unfavorable to these mites. In the examined soils, *Tyrophagus perniciosus* and *Bakerdanis centriger* mites were found only once, with the exception of *Rhyzoglyphus echinopus*, which was found in almost all the biotopes studied, these species were inferior in number to oribatid mites.

Conclusion

The population of soil mites in irrigated lands of farms “Darsan” and “Shortanbay” differ in species diversity. In the soils of the cotton field and apple orchard, 10 species of oribatids were found, in the soil of the vineyard 8 species, among which the *Epilohmannia cylindrica* mite predominated, and *Oppiella nova* among the ubiquists. The least species diversity was distinguished by water-flooded rice culture soils, where the habitats of such oribatid mites as *Tectocepheus alatus*, *Oppiella nova*, *Hydrozetes amudariensis* were recorded, as well as the presence of *Bakerdanis centriger* from Scutacaridae family.

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