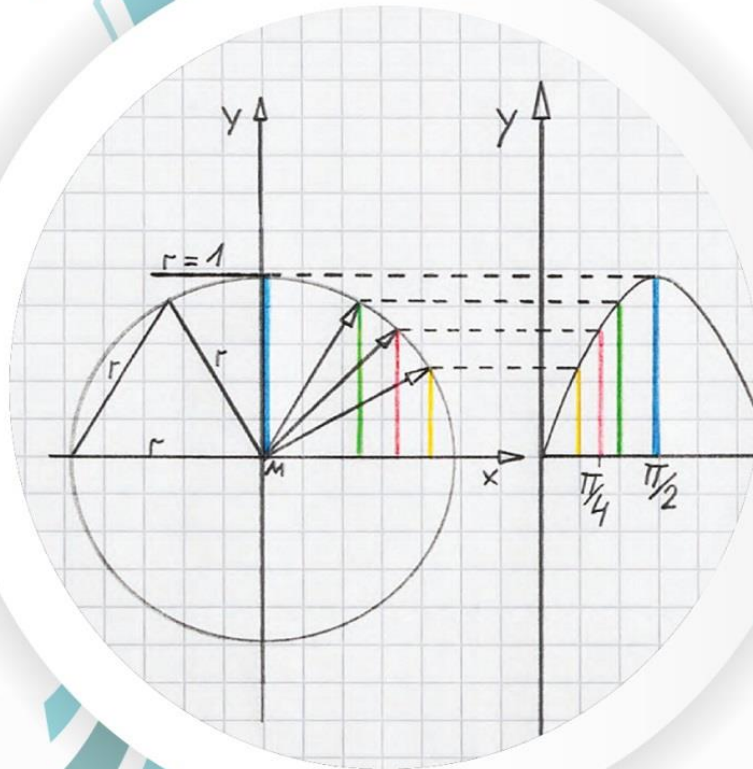


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## SPECIES COMPOSITION AND ECOLOGICAL FEATURES OF STAPHYLINIDS (COLEOPTERA, STAPHYLINIDAE) IN VEGETABLE CULTURES OF KARAKALPAKSTAN

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**Abstract.** The data on the species composition and ecological characteristics of vegetable rove beetles in the conditions of Karakalpakstan are given. There is a peculiar, ecologically different fauna of rove beetles than in other landscapes. Rove beetles are distributed in a mosaic pattern over biotopes and habitats with sufficient moisture. In the arid conditions of the region. Here we can encounter some representatives of the subfamily Staphylininae (*Philonthus*). They predominate in moist biotopes and play an important role in the extermination of pests of vegetable crops and in soil formation.

**Keywords:** staphylinidae, fauna, Karakalpakstan, species composition, vegetable cultures, ecological future.

### INTRODUCTION

Staphylinids belong to the most numerous representatives of soil fauna in cultural biocenoses. Possessing a wide range of nutrition and large numbers, they play an important role in natural and ecosystems modified as a result of human activities. The structure of the staphylinid fauna in various crops is determined by the agricultural technology carried out and depends on the previous crops (Kashcheev, 2002). Staphylinid beetles live in shaded damp places [10, p.1498-1505; 11, p. 84-86.], and



on vegetable crops, where they have most favorable environment. Data on species diversity and ecological characteristics of rove beetles in agrocenoses were fragmentary and incomplete. On the agrobiocenoses of the territory of Karakalpakstan, from 16 to 49 species of rove beetles are registered, indicated in the works of some researchers [1, p. 97; 2, p. 43-46; 3, p. 42-45; 4, p. 38-44; 7, 22-25]. After analyzing the literature data on the species diversity of staphylinids in Karakalpakstan, associated with the degradation of the natural environment, it can be noted that the researchers did not give enough data on the encountered staphylinids.

### MATERIAL AND METHODS OF RESEARCH

The studies were carried out in 2011-2019 y. in the fields and household plots of agricultural crops sown in the agrobiocenoses of the Republic of Karakalpakstan (in the areas: Beruni, Ellikkala, Khodjeyli, Shumanai, Kanlykul, Nukus, Kegeyli).

**Table 1**

**Criteria for changes in abiotic factors during the growing season of agrobiocenosis in Karakalpakstan (Meteorological station of the Republic of Karakalpakstan, 2016-2019)**

Indicators	Maximum	favourable	Minimum
Air temperature, °C	42-45	24-27	8-12
Sum of effective temperatures at 10°C threshold	2486-2235	1985-2013	1793-1901
Relative humidity, 10°C	74-82	55-68	15-18
Wind speed, m/s	11-16	5-6	2-3
Precipitation, m/m	52,3-69,5	14,3-16,2	1,6-2,1
Soil salinity, %	2,1-1,9	0,3-0,4	0,01-0,02

When the study was held: winter, spring and summer months, the average long-term temperature increased by 1-8°C, and in the autumn of 2016, 2018 and 2019 years it was quite lower. This process had a significant impact on the development of these beetles, and mild winter weather allowed adults to completely overwinter. The researchers of these beetles noted that for the life of most species of rove beetles, the favorable temperature is 22-28°C [11, p. , and the maximum temperature was within 33-35°C, when it rose above this level, they migrated to the nearest near-water stations, and diurnal species were active only in the daytime from 06:00 to



10:00, changing from 19:00 to dusk, and crepuscular and night views are active from about 21h to 00h. In 2015, 2018 and 2019 years, there was an increase in the maximum air temperature up to 40-44°C, with an average relative humidity of up to 30-35% and a minimum humidity level of up to 10-13%, which turned out to be the main factors in reducing the number of these beetles.

## RESEARCH RESULTS

In the regions of the Republic of Karakalpakstan, various vegetable crops are actively cultivated using irrigation. Some researchers note that in the region on different field crops, the number of these beetles become much larger after the irrigation of the crop [13, 118.p]. Irrigation of fields creates favorable conditions for the existence of staphylinids, as a result, during the growing season, a favorable hydrothermal regime is available, which is very important for the survival of most staphylinids in agrocenoses. As a result of research, 20 species of staphylinids belonging to 13 genera, 5 subfamilies were identified on vegetable crops in the Republic of Karakalpakstan, of which representatives of the Staphylininae subfamily have the largest number (Fig. 1).

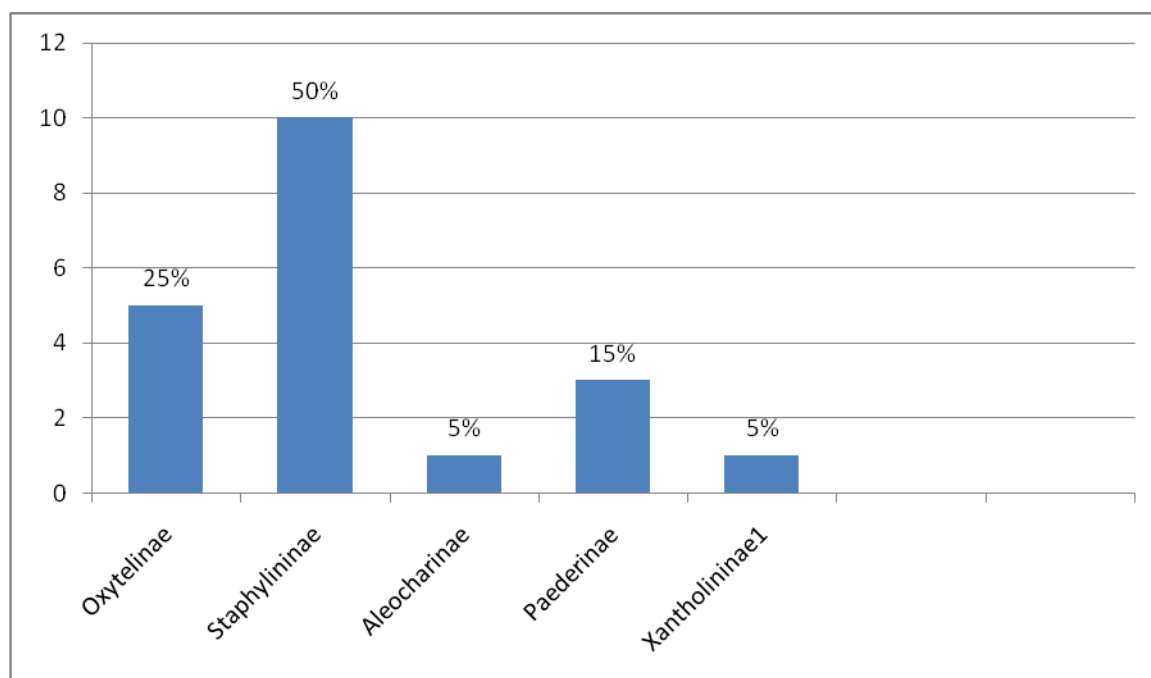


Fig. 1. Composition of the population of staphylinids on vegetable crops of Karakalpakstan by subfamilies

In the region, vegetable crops are intensively watered (especially in the southern regions) and the hydrothermal regime of vegetable fields is more favorable for rove beetles, and here a relatively diverse fauna (from the total) of staphylinids (table 2) reaches a high abundance (28-34 ex./m<sup>2</sup>).

**Table 2**

**Species composition and density of staphylinids in vegetable crops of Karakalpakstan**

Vegetable cultures	Species composition	Dominant species	Density
Onion field	<i>Paederus fuscipes</i> , <i>Xantholinus longiventris</i> , <i>Philonthus splendens</i> , <i>Aleochara bilineata</i> , <i>Platystethus nitens</i>	<i>Paederus fuscipes</i>	4-6 sample/m <sup>2</sup>
Carrot field	<i>Platystethus cornutus</i> , <i>Paederus fuscipes</i> , <i>Scymbalium anale</i> , <i>Rabigus tenuis</i> , <i>Philonthus coruscus</i> <i>Ph. concinnus</i> , <i>Ph. splendens</i> , <i>Dolicaon biguttulus</i>	<i>Philonthus concinnus</i>	3-7 sample/m <sup>2</sup>
Cabbage field	<i>Xantholinus longiventris</i> , <i>Aleochara bilineata</i> , <i>Paederus fuscipes</i> , <i>Philonthus coruscus</i>	<i>Aleochara bilineata</i>	5-6 sample/m <sup>2</sup>
Tomato field	<i>Paederus fuscipes</i> , <i>Aleochara bilineata</i> , <i>Philonthus dimidiatipennis</i>	<i>Paederus fuscipes</i>	7-8 sample/m <sup>2</sup>
Beetroot field	<i>Philonthus coruscus</i> , <i>Ph. politus</i> , <i>Ph. dimidiatipennis</i> , <i>Ph. rectangulus</i> , <i>Ph. coprophilus</i> , <i>Rabigus tenuis</i> , <i>Ontholestes murinus</i> , <i>Creophilus maxillosus</i>	<i>Philonthus dimidiatipennis</i>	1-4 sample/m <sup>2</sup>
Cucumber field	<i>Oxytelus laqueatus</i> , <i>Platystethus cornutus</i> , <i>Paederus fuscipes</i>	<i>Platystethus cornutus</i> ,	1-3 sample/m <sup>2</sup>
Potato field	<i>Paederus fuscipes</i> , <i>Aleochara bilineata</i> , <i>Philonthus coprophilus</i> , <i>Ph. politus</i> , <i>Ph. concinnus</i> , <i>Ph. dimidiatipennis</i> , <i>Xantholinus longiventris</i> , <i>Coprophilus pennifer</i> , <i>Aleochara jacobsoni</i>	<i>Paederus fuscipes</i> ,	3-4 sample/m <sup>2</sup>



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On vegetable crops (Kegeyli district, Farm "B. Karimberdieva" Nukus district, Farm "Darbent" in 2011-2018 y) have species like: *Platystethus cornutus*, *Xantholinus longiventris*, *Ph. splendens*, *Rabigus tenuis*, *Paederus fuscipes*, *Aleochara bilineata*. This can be explained by the fact that favorable conditions are created here for the habitat of these staphylinids and the availability of food; they feed on cabbage and onion flies (onion field, carrot field, cabbage field), as well as, on the potato field, eggs and larvae of the Colorado potato beetle [8, p.40-43]. Staphylinids (from the subfamily Aleocharinae) are used to moving the natural openness of the soil or ready-made moves of burrowing invertebrates. Representatives of the subfamily Staphylininae (*Philonthus*) and Xantholininae (*Xantholinus*). Most representatives of the Staphylininae subfamily collected in potato fields belong to the genus *Philonthus*, which are most closely associated with wells, where they spend most of their time - *Ph.dimidiatipennis*, *Ph.concinnus* in potato fields and other vegetable crops only with loose humus (rich soil).

In the vegetable fields, where there is always a lot of organic matter, plant detritus (Ellikkala district of the farm "Taza Amirabad", Khodzheyli district of the farm "P. Khalmuratova", Beruni district "K. Dzhumaniyazova"), live coprobionts *Oxytelus laqueatus*, *Philonthus politus*, *Ph. rectangulus*; saprobionts *Philonthus dimidiatipennis*, *Ph.coprophilus*, *Ph. coruscus*, *Creophilus maxillosus*, *Ontholestes murinus*, as well as interesting findings (Nukus district, Nukus farm, Kanlykul district, SaryAltyn farm) of botrobiont species (probably from nearby rodent burrows) *Coprophilus pennifer*, *Aleochara jacobsoni* about rice field. In infrequently irrigated fields occupied by crops, there are no staphylinids, which is associated with aridity characteristic of the Southern Aral Sea region. Quite a few species of rove beetles have been found under various shelters in the wet area of vegetable crops, but most of them are also found in other types of habitats. The occurrence of these beetles in many biotopes is due to the fact that here most species find refuge, staying there, in an inactive state and waiting for more favorable conditions.



Favorable factors for staphylinids in this biotope are: irrigation, application of organic fertilizers (manure) on crops, and tillage (cultivation).

## DISCUSSION

At present, due to the drying of the Aral Sea, the balance of the ecosystem of the Southern Aral Sea region is disturbed, the pressure on natural complexes here reaches extreme scope, anthropogenic desertification and aridization are taking place everywhere. The most vulnerable elements of the regional fauna are usually animal species living in humid areas, as well as, under the conditions of the region, irrigated soils has diverse degrees of salinity. In the Southern Aral Sea, soil salinization (mainly sulfate and chloride) is widespread and in progressive process. The soils of the lower reaches of the Amudarya annually accumulate more than 1 million tons of salts. Changes in the flood regime and reduction in the water content of rivers disrupt the composition, structure, and functioning of ecotone systems, floodplains, and river deltas and significantly affect the life of hygrophilous plants and animals, including the staphylinids. The modern fauna of staphylinids in this biotope is relatively poorer compared to neighboring countries [6, pp. 18-20; 9, pp. 178-191], in addition, most of the eco-plastic species or random species expect favorable factors from neighboring biotopes.

Thus, under the conditions of Karakalpakstan, on vegetable crops, the largest number of staphylinids prevails in humid biotopes of carrot, beet, potato fields and near the coasts of irrigation canals. In the region which is under study, the limiting factors for rove beetles in the above biotopes are: moisture deficiency, frequent processing by machinery, plowing, high salinity and chemical treatment with insecticides, all of which has a detrimental effect on rove beetles. Moreover, a decrease in humus and plant residues leads to a significant depletion of the population of these beetles. Based on the above said, vegetable crops in the study region have a peculiar, ecologically different fauna of staphylinids than in other agricultural landscapes. In the arid conditions of the region, staphylinids are distributed in a mosaic pattern over biotopes and habitats with sufficient moisture, the largest number of representatives





of the Staphylininae (*Philonthus*) subfamily prevails in humid biotopes, and they play an important role in the extermination of pests of vegetable crops and in soil formation.

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