



## BIOECOLOGY OF THE YELLOW WORM (*Spermophilus fulvus* L.)

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### Annotation

The yellow ground squirrel is widespread in the deserts and semi-deserts of the southern Trans-Volga region, Kazakhstan and Central Asia, including Volsk in the North, the lower reaches of the Ili River, Iran and Afghanistan in the east, almost the entire plain region of Central Asia in the south, as well as the Aral Sea islands. The most important factor in adaptation to the living conditions of the yellow ground squirrel in regions where hot weather prevails, dry deserts and semi-deserts is summer hibernation. It is one of the few species that has survived a long period of evolutionary process, consuming moisture and dewdrops on green plants to satisfy their needs in the absence of water. In most regions where the yellow ground squirrel is widespread, the growing season of plants is very short, they grow quickly and dry out completely in early summer under the influence of severe drought and high temperatures. Thus, the yellow ground squirrel lives on the moisture of the plant fiber.

**Keywords:** agricultural landscape, habitat, ecosystem, landscape, anthropogenetic, rodent, adaptive, alluvial, vegetative, morphological.

### Introduction

Many species of yellow ground squirrels or sandstone ground squirrels (*Citellus*) belong to the genus of medium-sized rodents of the squirrel family. To live in hot and arid desert and semi-desert regions, the yellow gopher is undergoing a difficult adaptation. It can be said that this is one of the few species that has survived a long period of evolutionary process, like satisfaction with moisture and dew drops on green plants to satisfy their needs in the absence of water.

The body length of the largest ground squirrel is 26-40 cm, the tail is 4 times shorter than the body. Their short-toed, sturdy, strong legs are flexible enough to dig holes in solid ground. The color of the fur varies greatly depending on the place of distribution.

In regions where yellow ground squirrel is common, the growing season of plants is very short. The bark of plants develops quickly and well in spring, and dries up completely in early summer under the influence of severe drought and high





temperatures. Thus, the yellow ground squirrel loses its food source, and survives thanks to the dew and moisture of the plant fiber.

The most important factor in adaptation to the living conditions of the yellow ground squirrel is summer hibernation. During sleep, all the vital functions of his body are sharply reduced.

The range of the yellow ground squirrel covers the deserts and semi-deserts of the southern Trans-Volga region, Kazakhstan and Central Asia, including Volsk in the North, the lower reaches of the Il River, Iran and Afghanistan in the East, almost the entire plain region of Central Asia in the South. And here you can find it on the islands of the Aral Sea.

In the northwest and southeast, it occurs in loamy sands, steppes, river banks, on foothill areas 1200 m high, in sand dunes, in abandoned places in cultural landscapes, old arable lands left out of circulation.

On the territory of the Republic of Karakalpakstan, on the Ustyurt Plain, it is rarely found, more often in open areas of burgunniks and wormwoods, less often in salt marshes. It is more often found on elevations, especially in high places, so that minks do not suffer from snow and rain in spring, and is more densely found in the area (R. Reimov, 1972, 1987; Paluaniyazov, 1972). According to the authors, in 1962-1963, the number of yellow ground squirrels in the territories of Aydabol, Churuk, Kosbulak, Assake-Audan was 1–3 per hectare.

In the observations of Assenov, a schumologist who conducted research against the plague disease in Ustyurt and Kyzylkum, the yellow ground squirrel in Ustyurt is distributed unevenly.

In Kyzylkum, the yellow ground squirrel is more common in introzonal soils, and is also often found on the Ustyurt plateau and at the foot of sandy hills. On the alluvial plain of Akshadarya, it is rare and uneven, the number and density of settlement are different in different places.

In the conditions of Ustyurt, the yellow ground squirrel is found in sandstones that border on the sandy massif - Matai-kum, which is of great industrial importance, occurs evenly and in large numbers - 5-20 and 10 per hectare. For example, in 1957, 50 people are known to catch 25,000 yellow ground squirrels a month. Mostly yellow ground squirrel is often found in sandy hills and inter-sandy plains.

M.I. Ismagilov (1947) and G.A. Assenov (1964) noted that the yellow ground squirrel is rarely found on the Barsa - Kelmes island in the Aral Sea on open areas of burgun and wormwoods, in large numbers in sandy hills, and is widespread in biotopes where different plants grow randomly, such as: saxaul, ittisiygek, bayalych, cherkez, biydayik, arpagan.



In the Muynak Peninsula (Tokpak-Ata), the number of yellow ground squirrels is 5-10 per hectare. In the agricultural landscape ecosystem of the Lower Amu Darya, the yellow ground squirrel is widespread, occurs in large numbers in various biotopes, and is considered one of the species that bring not only benefits, but also harm.

On the plains of the agrolandscape zone bordering the Kyzyl Kum and the Sultan-Uiz-Dag lowlands, the yellow ground squirrel is evenly distributed and ranges from 1 to 5 heads per 1 ha, and even more in some meadows.

In the zone of agrolandscape ecosystems, the habitat of the yellow ground squirrel is biotopes, meadows with clover and wheat; it is found in large numbers in places left out of circulation, empty arable land, where wild plants grow, which serve as food for them. In these places, the yellow gopher causes great damage to crops. In addition, it is found on the outskirts of arable land near the Kyzylkum desert, on flat plains, in open areas, at the foot of sandy hills, even in fortified sands. Examples are the Bes Tobe region and the Aryk Balyk territory. The yellow gopher is very common in the rocky plains of the Berdakh and Bestobe farms, bordering the Kyzyl Kum desert. In the village of Nazlymkhan (Berdakh farm), the number of yellow ground squirrels reaches 5 per hectare.

On the 19 hectares of land we observed, where alfalfa grows, the number of yellow ground squirrels that have completely risen after hibernation reaches 5-10 heads per hectare in April.

In Karakalpakstan, it is very rare in agricultural fields, for example, in potato fields. Also very rarely found in orchards where apricots, apples, pears, etc. grow.

The Central Asian yellow ground squirrel systematically and morphologically differs from other subspecies in its small body size and short hair, which has a light yellow, sandy color.

The yellow ground squirrel, widespread in Central Asia and South Kazakhstan, belongs to the genus of the Turkestan subspecies (*p. fulrusoxianus* Tohos) and is called the Central Asian yellow ground squirrel. The habitat of ground squirrels is indicated on the map and data on the shores of the Aral Sea are given.

Just as gophers breathe during sleep, body temperature drops, heart rate slows, and metabolism decreases. The body gets the water it needs through the oxidation and breakdown of fat, which accumulates in the body before hibernation. Summer hibernation coincides with the drying up of important plants, and awakening with the appearance of green plants, which are the main food for gophers.

The fall of the gopher into summer hibernation in regions with high humidity is explained by its dependence on moisture. N.I. Kalabukov substantiated this by how quickly a yellow ground squirrel falls asleep when fed in a cage with dry food, without



giving green parts of grasses. If you feed him with herbs and give him water, you can postpone his bedtime for several months.

Since these biotopes (artificial) are constantly irrigated, due to the high humidity and the presence of green plants, the hibernation of the ground squirrels that live in these places will come later than that of the ground squirrels common in deserts. This fact must be borne in mind, since it can find its place in the changes that have occurred in modern nature under strong anthropogenic influence, and in its importance for the survival of gophers.

In some regions, drought changes with rainy weather, and plants begin to sprout again, then summer hibernation is interrupted, they begin to come to the surface. In most regions, hibernation is immediately followed by hibernation.

The hibernation time of the yellow ground squirrel varies from region to region. The yellow ground squirrel that grew in the southern part of the distribution areas, that is, in deserts with very dry and hot weather, for example, in the vicinity of the city of Nukus, goes into hibernation in late May, early June, when ephemeral and ephemeral plants dry up.

This corresponds to the data of D.N. Koshkarov (1936) (for Tashkent).

According to the author's data, the period of hibernation of the yellow ground squirrel inhabiting the northern part of the range begins a month later, that is, at the end of June. According to B.A. Kuznetsov (1948), in Kyrgyzstan, on the shores of the Chu River, a yellow ground squirrel rarely appears on the surface at the end of May and goes into hibernation in the first half of June. The adult male goes into hibernation on June 1, the female - after 2 weeks and juveniles after a month.

According to this author, in 1940, the time of hibernation of yellow ground squirrels, common in fields with very dry grasses, falls on the end of May and the beginning of June, in places with high humidity they are in an active state and do not go into summer hibernation.

In the Aral Sea regions, according to S.P. Naumov and E. Spangenberg, summer hibernation began in late June - early July. M.I. Ismagilov (1947) shows that the time of falling into summer hibernation falls on the end of May - mid-June. In temperate climates, ground squirrels were most active in August.

The rest period is 8-9 months. Spring awakenings vary with the weather. In some cases, they emerge from the burrow on warm winter days.

Males are the first to wake up and come out to the surface of the earth, and females in our conditions come out in 10-15 days. This is especially important during the fishing season, when more males are caught and females are more likely to survive, and it plays an important role in the breeding process to maintain the population.





Juveniles born last year wake up later. Mass awakening and exit from the burrow of yellow ground squirrels in the zone of agrolandscape ecosystems of Karakalpakstan, in the vicinity of the city of Nukus, occurs at the end of March - April. In convenient years for life, for example, in 2019 and 2020 (the winter was very warm), the massive awakening took place in the second half of February. This situation was observed in the vicinity of Tashkent (Koshkarov, 1932). In Kyrgyzstan, it was observed in the second half of March, in the Karsakpay region of Kazakhstan (Kuznetsov, 1948), the awakening and emergence from the burrow of yellow ground squirrels occurred at the end of February, and the mass awakening at the beginning of March.

The awakening of yellow gophers in the Karakum and Kyzylkum deserts along the Aral Sea was recorded from March 1 to 15, and on the Barsa-Kelmes island in the Aral Sea - in late February - early March. In the first days after waking up, the accumulated fat is deposited in a significant amount, which is of great importance in the period of nutritional deficiency, i.e. in the absence of green vegetation. In adult obese ground squirrels, fat makes up 10 percent of their body weight.

In the spring, body fat decreases rapidly and body weight decreases significantly. Awakened during this period, gophers again climb into the hole because of the cold. A.A. Sludokiy (1934) writes about their mass disappearance in the West Kazakhstan region. G.A. Assenov recalls that in field observations during depression in the great sandy ground squirrel, the number of yellow ground squirrels and voles decreased.

In the spring, after waking up after hot and rainy days, as a result of the prolonged cold, yellow ground squirrels died en masse in their burrows. Also, there was a massive emaciation and death of ground squirrels on the island of Barsa-Kelmes (MI Ismagilov, 1955).

In the first days of mass release from the burrow, ground squirrels are not very active, they only briefly leave their burrow to feed. Only a few days later, with the onset of warm and clear weather, they come to the surface of the earth. When the weather worsens, they re-enter their burrows, waiting for the warm season. Gophers are good weather forecasters, sensitive to changes in weather, on hot days they come to the surface only early in the morning and in the evening in order to eat.

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