

BIOECOLOGICAL CHARACTERISTICS OF SOME FLORA, FAUNA AND FUNGI SPECIES OF THE SPECIALLY PROTECTED AREA (ILISU, AZERBAIJAN) BASED ON ITS BIOGEOGRAPHIC COMPOSITION

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Abstract. The paper deals with the information obtained from the biogeographical analyzes conducted in the specially protected Ilisu State Nature Reserve in the northwestern region of the Republic of Azerbaijan. Based on the biogeographic composition of the research area, the bioecological characteristics of certain species of flora, fauna, and fungi are studied as an example. The problem of the continuous study of the biodiversity of these specially protected areas. It is important to collect scientific information related to this topical issue and publish it in the form of articles in both local and international journals. We studied some of the fauna, flora, and fungi that spread in this area, and bioecologically analyzed some of their representatives (*Dendrocopos major*, *Coccinella septempunctata* L., *Chelidonium majus* L., *Rosa arvensis* Huds., *Polyphylla fullo*, *Mantis religiosa*, *Iecanora garovaglioii*, *Xanthoria parietina*, *Phylactinia guttata* wallr.). All systematic, phytogeographical, zoogeographical analyzes are given in the paper.

Keywords: ecosystem, anatomical, biogeographic, autoecology, faunistic, floristic.

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1. Introduction

In general, biogeography combines many fields of biology as it is related to the ecology, systematics, and physiology of organisms. Modern biogeography examines general physical geography and biological geography, as it has a connection with geomorphology, hydrology, climatology, geobotany, ecology, zoology, autoecology, soil science, etc. The main research methods of biogeography do not mean geographical and biological methods separately. Thus, biogeography as a part of biology is geographical biological, and at the same time biological geographical location of organisms – animals, plants, microorganisms, fungi, etc. (Abdullayev, 2004). From a geographical point of view, it investigates the regularities of distribution in different regions of the earth. From the point of view of autecology, biogeography examines the ecological geography of organisms.

The area that we are conducting a biogeographical analysis is the Ilisu State Nature Reserve, which is specially protected in the northwestern region of our republic (Naymark, 2006). The area is located on the slopes of the Greater Caucasus (Gakh region) between the Zagatala and Ismayilli reserves at an altitude of 700-2100 m. Ilisu State Nature Reserve was established in 1987 in the Gakh district of Azerbaijan on an area of 93 km. Its purpose is to protect the natural complexes of the southern slopes of the Greater Caucasus, protect and reproduce rare and endangered flora and fauna, restore forests, prevent soil erosion and floods (Vtorov, 2001). About 500 species of plants grow in the reserve, 60 of which are endemic. There are many medicinal,

endemic, rare and endangered plant species in Ilisu reserve. Oriental beech, Caucasian hornbeam, Caucasian oak, Litvinov maple, Trautvetter maple, Litvinov birch, rose hip, wild rose, blackberry, wild cherry and cornel, yews listed in the Red Book and other plants are spread in the area. Plants with high spores are also found in the area. Here, 8,670 hectares of the area covered by forest are made up of three main tree species – oriental beech (50 percent), Caucasian hornbeam (25 percent), Caucasian oak (20 percent) (Mammadov, 2004). The areal composition of the area includes Litvinov maple, aspen, etc. There are also forests consisting of species of trees.

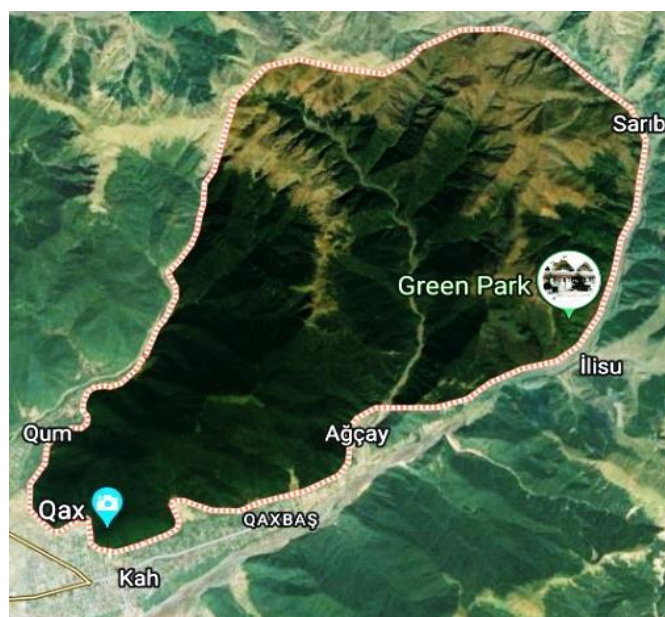


Fig. 1. Biogeographic map of Ilisu State Nature Reserve

35 species from 5 groups of mammals live in the territory of Ilisu State Nature Reserve. Here, ungulates (goat, red deer, roe deer, wild boar, etc.), predators (lynx, brown bear, wolf, fox, badger, raccoon, forest cat, etc.), rodents (rabbit, squirrel, mouse, etc.), insectivorous animals (grouse, harrier, porcupine, etc.) can be found here (Sultanov *et al.*, 2007). There are about 90 species of birds concentrated in 11 groups. There are about 60 species of ferns. 5–6 species live in the reserve. 12 species of reptiles live in the area, including lizards, turtles, snakes, and corals. While we were in the territory of the reserve, we observed the spread of many species of fauna, flora, and fungi. Here, 8,670 hectares of the area covered by forest are made up of three main tree species – oriental beech (50 percent), Caucasian oak (25 percent), Iberian and oriental oaks (20 percent) (Sardarova *et al.*, 2023). The areal composition of the area includes Litvinov birch, aspen, etc. There are also forests consisting of species of trees.

35 species from 5 groups of mammals live in the territory of Ilisu State Reserve. Here, ungulates (goat, red deer, roe deer, wild boar, etc.), predators (lynx, brown bear, wolf, fox, rock and forest squirrel, badger, raccoon, forest cat, etc.), rodents (rabbit, squirrel, mouse, etc.), insectivorous animals (bat, hedgehog, etc.) can be found here. There are about 90 species of birds concentrated in 11 groups. There are about 60 species of passerine. There are 5-6 species of reptiles in the reserve and 12 species of reptiles in the area, including lizards, turtles, snakes and slowworms. While we were in

the territory of the reserve, we observed the spread of many species of fauna, flora, and fungi.

2. Materials and methods

The main objects of biogeography are areas, biota (flora, fauna) and biomes. The study of faunistic, floristic and environmental biogeography issues is carried out biologically in areas and in laboratory conditions. In terms of the natural classification of organisms, biogeography includes zoogeography, phytogeography, etc. Some sections are included. These biogeographic studies were carried out according to the methods of R.B. Abdullayev, P.P.Vtorov, and N.N.Drozdo (Abdullayev, 2002) Phytocenological route research method was performed according to V.S. Novruzov methodology for phytogeographic research in our research area (Novruzov, 2010). Here, the purpose of this study consists of visual observations of the role of the species in the plant grouping of the area. During the next route studies, geobotanical indication of the vegetation of Ilisu State Nature Reserve and preparation of a geobotanical landscape map were planned. Zoogeography and phytogeography methods of research are similar in principle. Despite the taxonomic and ecological diversity of animals, more important issues of zoogeography are related to the nature of vegetation. In the research sections of biogeography, the study of the geography of fungi, the geography of vegetation and the geography of animal populations occupies an important place. In turn, the results of biogeographic studies are very useful for systematics and evolutionary studies. Phytogeographical and zoogeographical studies were conducted here according to the methodology of A. Humboldt and A.G. Voronov. The anatomical structure of the plant sample taken from the area was studied according to the methods of Z.I. Humbatov and A.S. Sardarova. The plant was preserved by placing it in 70% alcohol, and anatomical sections were prepared from its vegetative organs (Pandey, 2012). Micro-preparations were prepared from the sections and studied in MOTIC, ZENS, modern microscopes with digital monitors.

3. Results and discussion

Great Spotted Woodpecker (*Dendrocopos Major*). In the area that we have studied, there is a Great spotted woodpecker called *dendrocopos major* L. in Latin. The woodpecker we observed in the area was trying to make a hole on the Maple tree with its sharp and straight beak. The size of the bird was relatively small, and its body length was noticeably smaller than the unit of measurement given in the literature (23-26 cm). The wing part was dominated by black and white tones. The dark red color on the nape of the head attracted attention. Even after we observed the woodpecker for 40 minutes, it was clear from the sound that it continued to pierce the tree with its sharp beak, as we moved away from the area. In general, many species of woodpeckers are common in the world, including seven species in our country. The genera to which these species belong to the family of woodpeckers called picidae in Latin. The physical structure of the bird is adapted to its lifestyle. Their beaks are long and quite hard. This gives them mechanical support to pierce the tree bark. Special adaptations in their skull skeleton protect the brain from damage when pecking at a tree.

They have four toes on their feet. Two fingers point forward and the other two points back (Heptner, 1936). This pincer-like structure, together with the hard claws,

enables the bird to cling to the tree. Males have red spots both on the back of the head and under the tail, while females have red spots only on the tail. In addition, there are white spots on the upper part of the back side of the wings, around the eyes, under the beak and on the abdomen, which are separated from each other by black feather covers. They are usually found in wooded areas, especially forests. They are diurnal animals. They are active during the day and spend the night in their nests. They are usually sedentary, meaning they usually don't leave their habitat.

Depending on different species and environmental conditions, the food ration of woodpeckers can change. They are mainly predatory animals and can pierce the bark of trees with their sharp beaks and feed on various invertebrates hidden under it, beetles, their larvae, caterpillars, spiders, etc. Since animal food is hard to come by in the autumn and winter months compared to the warm months, they can feed on various vegetable foods, for example, seeds, fruits, nuts, hazelnuts, etc. Individuals of the species are adapted to lead a solitary lifestyle, not in groups.

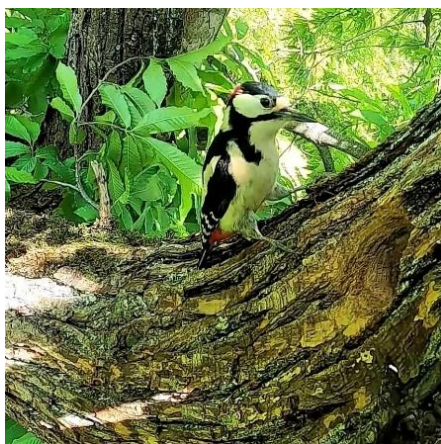


Fig. 2. Great spotted woodpecker. Photo taken in the area

Breeding periods and spawning coincide with the warm season, when insects are abundant. This is an adaptation that increases the probability of survival of the young in the period of abundant food. Nests are usually built in hollows on dry trees. Females can lay 2–5 eggs here. The eggs are white. The incubation period can last 11–18 days. During this period, male and female individuals alternately lie down. After about 18–30 days, the hatchlings will leave the nest and reach a level of development where they can continue their lives on their own.

As in all forests, woodpeckers are very important for Ilisu forests. This can be both positive and negative. First, woodpeckers have a positive effect by feeding on harmful insects and their larvae that live under the bark of plants and damage the plant. Since they reduce the number of pests in the forest, they are called “forest doctor”. Secondly, the hollows they open and leave in tree trunks can serve as nests for other groups of tree creatures.

As for the harmful characteristics of woodpeckers, first of all, they can cut the bark down to the wood in the form of a ring that surrounds the tree. It disrupts the transport system of substances in the plant, that is, the transport of nutrients through the phloem, disrupting the nutrition of the plant roots in particular, and finally causes the

plant to dry up. Woodpeckers can damage infrastructure by piercing certain parts of houses and buildings. Furthermore, it can damage the farm by cutting fruit trees and feeding on fruits in orchards.

Seven-spot Ladybird (*Coccinella Septempunctata* L.). *Coccinella septempunctata*, which is a faunal element, is also found in the territory of Ilisu State Nature Reserve. As the weather warms up in the spring, the types of insects hidden in tree trunks and other hidden places for wintering begin to appear. One group of them is ladybird. Many types of them are spread in the territory of our country and in the world in general. *Coccinella septempunctata* L. In Latin is a species included in the coccinella genus, found in the territory of Azerbaijan.



Fig. 3. Seven-spot ladybird. Photo taken in the area

Their head, thorax, and legs are black. The abdomen is bulging and covered with a chitinized forewings. The forewings are red and have the black spots that give the species its name. They are located symmetrically. The forewings protect the hind wings from external influences. In other species, the number and symmetry of points, as well as the color, can vary from yellow to red. When it senses danger – when it is touched or when it is hunted by any bird, it can imitate the dead. At this time, it presses its legs to its body and becomes immobile. When the danger is over, it starts moving again. In addition, to protect itself, the ladybird secretes a light yellow liquid with a strong smell and taste, which can be toxic to some animals (Kuzyakina, 2008). Experiments have shown that if this liquid falls into a bird's mouth while hunting an insect, the bird will try to stay away from the red objects for a while.

It is a cosmopolitan species. In the spring, individuals wake up from hibernation and begin to spread around. This is also due to the active growth of aphids and other small arthropods, which are their main food, during this period. Food is important for reproduction and propagation.

Their development goes by metamorphosis. There are egg, larva, pupa and adult stages. In the spring, adults wake up from hibernation and lay eggs in groups. The number of eggs in groups is variable and can be between 20-80 or more. A female can lay up to 1,000 eggs in one breeding season, usually in sheltered areas. The hatching of the larvae takes about a week. The larva has an elongated and segmented body. In general, it is dark and has yellow spots symmetrically located on it. Nutrition is the

same as in an adult. As the larva grows the shell changes. After about a month, the pupa stage begins. The larva attaches to the leaf surface through its back and turns into a pupa. In about 3–5 days, metamorphosis is complete, and the young adults leave the pupa.

Ladybirds can breed twice a year. In summer, due to unfavorable hot weather conditions and lack of food, individuals spend a period of summer rest. At this time, they hide in shady, sheltered places. The second breeding season begins in late July, early August. After the second generation, individuals begin intensive feeding. At the end of October, at the beginning of November, they go to the wintering period. As the beetles feed on plant pests, especially leaf aphids, they are used as a biological control method by gardeners, etc., to control the number of these pests. They are propagated in laboratories and released into gardens or greenhouses. Larva are also considered beneficial because they feed in the same way as adults.

Greater Celandine (*Chelidonium Majus L.*). The Greater celandine has spread in the area we took to investigate. The Latin name of this plant is *chelidonium majus L.* And it belongs to the *Chelidonium* genus. The plant is perennial and can grow up to 1 m or more. The erect stem is straight branched. When the branch is broken, a juice of light yellow to orange color flows from inside. That is why it is also called yellow milker. Seeds have special areas called elyosomes. Special nutrients in these areas attract ants. (Gurbanov, 2009). Thus, ants can spread the plant by transporting these nutrients and seeds to different areas.



Fig. 4. Greater celandine. Photo taken in the area

The plant is native to Europe and Western Asia. The plant is also widespread in North America. It can be found in gardens, forests, bushes, etc.

Flowering begins at the beginning of spring and continues throughout the summer. Fruit ripening is completed in September.

Anatomical structure of the root of *Chelidonium majus* species. The root of the plant *Chelidonium majus* has a secondary structure based on the formation of the cambium, which is taken as the inducing cause. There are vascular bundles in the vascular cylinder of the stem. As can be seen from the microscopic structure, the root seems to have been formed in a similar way to the stem. This is an adaptation to ensure

the transfer of water and mineral matter taken from the root tip to the upper stem. In the root of *Chelidonium majus*, which undergoes a second thickening, formed by the cambium, which is the reproductive tissue, the bark is well developed (Sardarova, 2022). Biologically active substances are collected in this part of the plant, which is the main important feature of the plant. The root is covered with periderm from the outside.

The plant contains several alkaloids and is therefore considered a moderately poisonous plant. Due to its chemical composition, it is used in the medical industry for the preparation of various medicinal products. Although this plant is also used in folk medicine, it should be used in the right dose in terms of the toxic substances it contains.

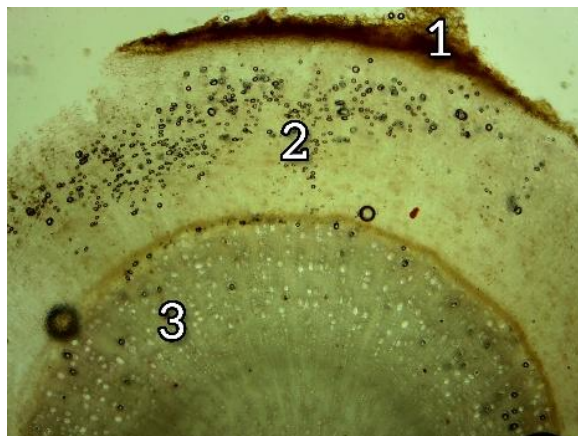


Fig. 5. Anatomical structure of the root of *Chelidonium majus* species.
1- periderm, 2- cortex, 3- vascular cylinder

The plant can have an anti-inflammatory effect, so it can be used in the treatment of a number of skin diseases and warts (Humbatov, 2017). The plant also has many other pharmacological effects, such as choleric. In this regard, the treatment of diseases with the ingestion of infusions made from it is one of the cases found in folk medicine. Celandine is extremely poisonous to animals. Eating this plant by cattle or birds results in their poisoning.

Field Rose (*Rosa Arvensis*). In the area we have taken, the Field rose hip species, which belongs to the rose hip genus and is called *Rosa arvensis* Huds.

Field rose hip forms large bushes, as can be seen from here, it is a shrub plant. The leaves are compound and single pinnate. The number of leaflets varies between 3-5. The leaves are covered with hairs, the petiole, and the stem are covered with spines. The flowers are large and white-pink in color. The flower petals of *Rosa arvensis*, distributed in the Ilisu State Nature Reserve, are bright white.

The flowers are concentrated in a cluster of flowers (Voronov et al., 1999). The fruits are oblong and contain many densely packed seeds covered with hairs. The color of the fruits is reddish or dark red.

The plant leaves in early spring and begins to bloom in May-June. Fruits ripen in August-September and remain healthy on the plant until the first frost. Under the influence of frost, the outer skin-like part of the fruit that covers the seeds loses its structure and softens. The plant can be propagated by seeds. But the seeds must

undergo a period of rest and cooling to germinate. It has even been found that seeds can sometimes germinate effectively after two consecutive winters of dormancy.



Fig. 6. Field Rose. Photo taken in the area

The fruits of the plant are widely used both in folk medicine and in the medical industry (Sardarova, 2022). Thus, the fruit contains antioxidants such as vitamin C, vitamins E and K, flavonoids, pectins, carotenoids, etc. In folk medicine, the plant is collected, dried and taken in the form of tea after being brewed in the winter months. (Kobzar, 2004). At the same time, the petals of the plant are collected and jam is made from them. Compote is prepared from the fruit of the plant. The outer skin-like part of the fruit can be eaten raw. But at this time, the hairs inside it should be cleaned well.

Polyphylla Fullo. *Polyphylla fullo* is one of the insect species we encountered during the expedition in the area. The main characteristic of the species is its appearance. So, the body of the insect is covered with black and white spots that form a velvet-like pattern from the outside.



Fig 7. *Polyphylla fullo*. Photo taken in the area

Insects are active at night and fly around. We also met a representative of these insects in the evening after returning from the expedition. Like many other insect species attracted by man-made light sources, this beetle flew around the light. When analyzing the insect, we measured its length to be approximately 4 cm. When we touched the insect or tried to catch it, it made a strange sound of its own (Abdurakhmanov *et al.*, 2001). Furthermore, during our expedition in the forest area, we

found beetle larvae, which we thought belonged to this species, inside a fallen and decaying tree stump.

These insects have metamorphosis during their life cycle. Adult individuals perform mass flight in late June and early July. This period is also their reproductive period. Male individuals, having larger plate-shaped antennae than females, can sense and locate the pheromones emitted by females through these organs. Females can lay up to 40 eggs. In about 25 days, young individuals in the larval stage emerge from the eggs. Larvae have 3 hibernation periods. During this period, they feed and grow. The main food of young larvae is decay and mainly the roots of cereal plants, while the food of relatively old larvae is the roots of trees and shrubs, especially acacia, maple, etc. The size of relatively mature larvae can reach up to 8 centimeters.

After three wintering periods, the old larvae descend to a depth of about 15 cm in the soil and pupate here. In 3–4 weeks, adults emerge from the pupae.

The larvae of this species are considered pests because they can feed on plant roots. Furthermore, individuals of the species participate in the formation of the food chain by entering the diet of a number of insectivorous predatory species, such as birds.

Mantis Religiosa. Mantis is another common creature in the territory of Ilisu State Nature Reserve (Bobrinsky, 1951). While observing in the area, we found its species ***Mantis religiosa.*** We observed the representatives of this species both among the leaves in the trees and on the grass. In addition, we witnessed a mantis catching and eating an ant experimentally.



Fig. 8. Mantis religiosa. Photo taken in the area

Representatives of the species are green according to the environment. The first pair of limbs is adapted to hunting by changing its shape. These limbs are quite strong and spined. The mantis is a predatory animal that can hunt arthropods and small creatures belonging to other types. During hunting, the mantis usually lies in wait, and when the prey approaches it, it grasps the prey with its front limbs and immediately begins to eat it.

One of the main distinguishing features of the mantis is its triangular head. He can turn his head sideways. So if you walk around it or move your finger from one side to the other, you will see that it turns its head in the right direction. When moving, the

mantis sways back and forth. This adaptation acquired in the process of evolution makes the insect indistinguishable among the leaves shaking in the wind.

Breeding often takes place in September-October. The length of the female individual can be up to 9 centimeters, the male individual is relatively smaller than the female individual. Perhaps the most well-known information about the praying mantis is that the female eats the male after mating. This process, which also happens in spiders, is thought to have evolved in order for the female individual to obtain the necessary nutrients. A female can lay 100–200 eggs. But at this time, along with the eggs, it also secretes a foam-like liquid. The special proteins contained in this liquid harden around the eggs and form a special structure called ootheca.

This structure is located on the substrate in such a way that it partially covers it and thus firmly adheres to it. The ootheca has a very strong structure, and it is not easy to tear it off the branch. The creation of such a structure results from the advantage obtained during evolution. It protects the eggs inside the ootheca from drying out, attack by predators and other unfavorable conditions. The eggs undergo a winter-long period of dormancy within the ootheca. Young individuals hatch from eggs in spring. This process is particularly affected by temperature and humidity. In this regard, mantis usually lays its eggs in warm and sunny areas, especially on branches. At first glance, young individuals that have just hatched look like worms. They crawl outward through the pores of the ootheca. Hatching usually begins simultaneously in all eggs within the ootheca. Young individuals hang down and begin to change their shell in a short time. After the first molt, they have a similar appearance to the adult, but smaller in size. Mantis molts 8 times in its lifetime and eventually becomes adult with wings.

The Mantis is a harmless insect that is also considered beneficial because it can feed on some harmful insects. They also participate in the formation of the food chain by organizing the food of some predators.

Lecanora Garovaglioi. In the territory of the Ilisu State Nature Reserve, we came across the *lecanora garovaglioi* from the primitive plant group. *Lecanora garovaglioi*, which is impossible to separate from the substrate on which it was formed without damage, belongs to shell-like edges.



Fig. 9. *Lecanora garovaglioi*. Photo taken in the area

Algae cells are located at the bottom of the bark in this species, which is formed from the coexistence of algae and fungus, which firmly adheres to the substrate (soil, rock, tree bark, etc.). The upper layer of lichen thallus differs from the lower part in terms of its pigment content. Basically, the lichen is more strongly attached to the substrate in the central part, which is also composed of fungal hyphae. Since we conducted expeditions in different seasons, we observed that the morphological surface of *Lecanora garovaglioii* stipule completely covers the substrate and is more alive in response to climate changes such as alternate humidity and drought regimes, or partitions are formed in the stipule on the substrate it covers, and the thallus is relatively pale.

These lichens also have different types according to their lifestyle. But more common are endolytic and endophloid. Endolithic lichens are often formed in the outer layer of rocks. Endophloids are formed on plants, mainly on bark tissue, that is, on it. They are found in different colors like yellow, orange, red, gray, and green. Epiphytic algae are found in this shell-like lichen. It is more common in carbonate-rich areas. In nature, shell-like lichens are mainly involved in the weathering of rocks. At the same time, they participate in the corrosion of carbonate rocks.

Xanthoria Parietina. *Xanthoria parietina* belonging to the primitive plant group in Ilisu State Nature Reserve. While walking in the forest area, we came across orange scaly, circularly spread on the surface on dead branches and live tree trunks. This is a fungus that lives as a symbiosis of algae cells and belongs to the *Xanthoria* genus.

The color of the lichen varies between orange and yellow. The middle part is orange, turning yellow towards the edges. Furthermore, since it forms a symbiosis with green algae, the outer parts of the lichen can turn green. Lichen grows circularly from the center to the edges. The outermost parts are leaf-shaped. In the center there are many small bowl-shaped protrusions. These are the parts where fungal spores are formed.



Fig 10. *Xanthoria parietina*. Photo taken in the area

The single-celled algae involved in symbiosis in lichen are green algae of the genus *Trebouxia*. Two types of algae – *trebouxia arboricola* and *trebouxia irregularis*

– were found here. They are located in the lower part of the fungal thallus spreading along the surface. With its thallus, the fungus protects these algae cells from the sun's ultraviolet rays and also from dehydration. The symbionts instead carry out photosynthesis and provide the fungus with organic matter.

The species *Xanthoria parietina* is widespread. It is found in North America, Canada, Europe, Africa, Asia, and Australia. It can be found in forests, gardens, on trees and fallen branches, on coastal cliffs, etc. It is highly resistant to pollution and is used as a biomonitor in this respect. In addition, its aqueous extract has antiviral properties.

Phyllactinia Guttata Wallr. We also observed the *Phyllactinia guttata* fungus, which is a parasite mainly on the hazelnut tree, in this area where we made a short-term expedition to research. In the summer months, white powder-like spots begin to appear on the leaves of hazelnut bushes in the main hazelnut orchards, as well as on the leaves of some other plants, such as quince trees and ornamental plants, etc. These then cover the leaf as a whole layer and damage the plant. It is called powdery mildew and its causative agent is *phyllactinia guttata* Wallr. It is a microscopic, parasitic fungus.

This fungus is found in America, Canada, Europe, and Asia. The coating formed by fungal hyphae on the leaf is visible from the outside in the form of white, circular spots. This coating, formed on both the upper and lower layers of the leaf, disrupts the exchange of gases in the leaf and weakens the process of photosynthesis. The development of the parasite causes the leaves to yellow and fall prematurely. Also, the parasite makes the plant unresisting to other pathogens.

Fungus can reproduce sexually and asexually. Since favorable weather conditions prevail in spring and summer, the fungus reproduces asexually. At this time, structures called conidia are formed at the tip of fungal hyphae. They can break off and be carried by the wind to other areas and start new fungi on the leaves. Sexual reproduction takes place in autumn when unfavorable weather conditions begin to form (Petrov, 2001). At this time, structures with star-like protrusions, called cleistothecia, appear on the leaf surface as black dots when viewed with the naked eye. Asci are formed inside them, and ascospores are formed inside them. These structures spend the winter inside of fallen leaves. In the spring, when the ascospores reach the new leaves by the wind, they germinate and start a new generation here.



Fig. 11. Powdery mildew disease and its causative agent

Different chemical fungicides can be used to fight the disease. In addition, it is important to collect and burn the fallen leaves in the diseased area.

4. Conclusion

Summaring the study it can be noted that the morphological characteristics of representatives of the flora, fauna and fungi, such as *Dendrocopos major*, *Coccinella septempunctata* L., *Xanthoria parietina*, *Phyllactinia guttata* wallr, which are common in the Ilisu State Nature Reserve adapted. In the case of *Dendrocopos major*, can be noted that the body size is relatively smaller than in the literature data. During the expeditions to the area in different seasons, we observed that the thallus of *Lecanora garovaglioi* lichen has a relatively different morphological structure due to climatic factors. Even the color was different.

Photographs of these animal, plant, and mushroom species in the area were taken, and a herbarium was prepared by taking samples. At the same time, it is planned to collect samples from representatives of plants distributed in the area (with official permission, limited number) and carry out anatomical studies. A microscopic analysis of the vegetative organ of *Chelidonium majus* L. Was carried out. As a result, in the internal structure of the root of the plant, compatibility with the area was determined. We will continue our research in the area.



Fig 12. A part of the herbarium. 1-The ootheca of the mantis. 2-Fruits of field rose



Fig. 13. A part of the herbarium. Stem and leaves of *Chelidonium majus*



Fig. 14. A part of the herbarium. Thallus of *lecanora garovaglioii* growing on stone



Fig. 15. A part of the herbarium. *Xanthoria parietina* growing on tree branches and bark

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