

Study of the Distribution and Use of Spiny Capers (*Capparis Spinosa*) In Karakalpakstan

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1. Introduction

With the development of science and technology - since the second half of the 20th century, as a result of increasing anthropogenic impact on natural ecosystems, many of them have been destroyed and replaced by anthropogenic landscapes. Due to the drying up of the Aral Sea, severe drought (water shortage) and desertification in the areas of Karakalpakstan, accelerated soil salinization led to the extinction of a number of wild plant species in the country. Some rare plant species have disappeared, some are under the threat of extinction. Especially in recent years, difficult climatic and soil conditions have developed in Karakalpakstan. As a result of the drying up of the Aral Sea, many adverse weather changes have been observed in recent years. Frequent occurrence of salt and dust storm in the spring months leads to saturation of soil and air with various toxic salts. This-drought, soil salinity, air pollution-interferes with the normal growth of many plants. The dynamics of reduction of natural vegetation in recent years can be traced according to scientific literature: in 1978 (Yerezhepov, 1978) on the territory of Karakalpakstan 1200 species of higher plants grew. According to B. Sherbaev (1988) 1110 species of higher plants of Karakalpakstan. According to T.Otenov (2004), the number of higher plants in Karakalpakstan and Khorezm province is 979 species (Otenov, 2004).

The Republic of Karakalpakstan is a special natural complex covering the north western part of the Karakums, the eastern part of the Ustyurt Plateau, the valley and delta of the Amu Darya, and the southern shores of the Aral Sea. Its area is 165.5 thousand km², which is about 40% of the territory of Uzbekistan (Bakhiev et al., 1983). The flora of Karakalpakstan, located in the zone of ecological destruction of the Aral Sea, undergoes great changes under its influence. Nevertheless, Karakalpakstan has a distinctive plant biodiversity.

Karakalpakstan is characterised by a variety of soil and climatic conditions. This results in the growth of various medicinal plants and contributes to the accumulation of a variety of biologically active substances in them.

There are wild medicinal plants in the republic, which can fight many diseases. In this connection it becomes actual to define their area of distribution, resources, study of bio-ecological features, development of cultivation technology, industrial procurement of medicinal raw material of local origin, most applied with therapeutic and preventive purposes in scientific and folk medicine, as well as used in other branches of the national economy. The study of medicinal plants is particularly important nowadays, when special attention is given to herbal medicines. Therefore, it is necessary to identify resources and distribution areas for further cultivation of some sought-after wild medicinal plants.

2. Object and Location of Study

One of the species for which there has recently been a significant increase in economic and commercial interest is the spiny caper (*Capparis spinosa* L.) of the caper family (Capparidaceae). The relevance of the study of the current state of *Capparis spinosa* in Karakalpakstan is due, above all, to the change and reduction of growing areas and the solution of problems of complex development of territories of valuable medicinal and food plant.

Capers are poorly studied and rarely cultivated, but promising plants both economically and pharmaceutically. In Karakalpakstan, there are 2 species of capers (kavar, kovul, geul) - spiny capers (*Capparis spinosa* L.) and Rozanov capers (*Capparis rosanoviana* B.Fedtsch.) (Bondarenko, 1964; Erezhepov, 1978). These species have not been thoroughly studied or cultivated under our conditions.

The research was conducted in two districts of Karakalpakstan: the northern district of Bozatau and the southern districts of Amudarya and Beruni. Bozatau is the northern region of Karakalpakstan, where the effects of the desiccation of the Aral Sea and climate change are acutely felt. It is characterized by a sharply continental climate, intense insolation, increased dryness of atmospheric air and low precipitation (Kabulov, 1990).

The Amu Darya and Beruni districts are monotonous plains with low hills covered with fine rubble and low

hilly and ridge sands (Yerezhpov, 1978). The Amu Darya River located near the sea reas makes the climate milder than in the areas to the north. One of the few tugai massifs, the Lower Amu Darya Biosphere Reserve (Badai Tugai), is located here.

3. Results of the Study and Discussion

Capers are perennial herbaceous climbing or stalking plants. The main species of the genus capers (*Capparis*) is of the caper family. Capers have a strong root system stretching down to 15-20 m. In nature it grows on stony heaths and dry clay soils, occasionally on sands (photo 1). The plants are able to draw water from the lower horizons thanks to the irroot system. The stems are numerous, prostrate and up to 1.5 m long.



Figure 1. Spiny capers on rocky ground

The leaves of the caper are rounded, obovate or elliptical, with short petioles. The flowers are solitary (5-8 mm), white or with yellowish petals, turning pink after flowering (photo 2). The flowers are on long pedicels and are located in the leaf axils. Calyx and corolla quadruple, with many stamens and a single pistil, with an ovary on a long (3-5 cm) stalk. Flowering lasts from May until fall. An insect- pollinating plant. In capers, the buds that have not had time to open, called capers, are the most valuable.



Figure 2. A flowering plant

Fruits are obovate or round-long, berry-like, 2-4 cm long, fleshy, multi-seeded bolls, green outside, bright red inside, with brown seeds. They are also quite varied, not only in shape and size, but also in colour. The fruits ripen from June to October.



Figure 3. A fruiting plant

It propagates by seeds. Under natural conditions, animals play a major role in seed dispersal. The green fruits of this plant open at maturity (they are brightly coloured on the inside). Numerous seeds are contained in the fleshy tissue of the unfolded fruit. Ants also help spread the seeds.

The life expectancy of a single plant can reach 50 years (Gubanov et al., 1976). Capers are valuable as medicinal raw materials as they possess many useful substances: thioglycosides, saponins, rutin (upto 0.32%), vitamin C (upto 136 mg%) are found in them. Roots contain glycosides and alkaloids, seeds contain fatty oil (upto 35%). Leaves contain stachydrin alkaloid and lipids (Khalmatov, 1964, Asilbekova et al., 2009).

The medicinal raw materials are roots, which contain alkaloids – stachydrin and kapparidin, glucocapparin flavonoids, sterols, terpenes. Buds contain 0.32% rutin, seeds contain 30% fatty oil (Zakirov et al., 1936; Khalmatov, 1964).

Capers are known to be used in Asian medicine (Zakirov et al., 1936; Zakirov et al., 1972; Yerezhepov, 1978). The roots are used in some European countries as a tonic, analgesic, diuretic. A decoction of the roots is used to treat jaundice. Decoction of fruits is used in hemorrhoids, gum diseases, has a styptic property (Yerezhepov, 1978). Capers are used as an analgesic and an anthelmintic. They are also used for asthma and gastrointestinal diseases (Canon of Medicine, 1996).

Foreign authors (Yaniv Z. et al., 1987) also note the use of capers in the treatment of many diseases. Caper root extracts have anti-diabetic properties - (Kazemian M. et al., 1985). Antitumor properties of capers have also been identified

- (Kulic-Bilusic T. et al., 2012; Ji Y.B., Yu L., 2014; 2015; Nabavi S.F. et al., 2016).

Capers are also widely used in Mediterranean cuisine. Their widespread use in food in other countries is due to their antitumor, antioxidant properties and is therefore recommended (Tlili N. et al., 2016).

This plant is also suitable for landscaping parks in southern regions. The flowers are melliferous and the roots are used to make green and brown silk dyes, which can be used as a source of organic dye (<http://bio.niv.ru/doc/encyclopedia/life-of-plants/articles/759/semestvo-kapersovye-sarraraseae.htm>).

In addition to the well-known medicinal qualities of capers, they are also used in the food diet in many countries. The unopened, hard buds of the flowers are used as a condiment in various dishes, either pickled or salted. Boiled, pickled or pickled they are spicy and vitamin-bearing vegetables. Therefore, given the versatility of their useful qualities, the demand for raw materials of this plant and their prevalence in the natural conditions of our region makes it necessary to carry out work on their cultivation.

On an industrial scale, the Caucasus and Western Europe have experience of growing capers as a delicacy. In Uzbekistan, capers are cultivated in the Ferghana Valley and Jizzak (Karomatov, 2012).

Capers grow on slightly saline, rubble and sandy soils. According to literature data, capers in Karakalpakstan are found in the Amu Darya delta and on the Ustyurt plateau (eastern part, chink strips) (Bakhtiev et al., 1983).

The authors of this article found caper bushes in Bozatau district in the vicinity and bottom of the former Lake Dautkul, on the southern coast of the Amudarya River (Nukus district), on rocky-rocky places near Karatau, in the Amudarya River valley (Amudarya district), near the Lower Amudarya Biosphere Reserve Baday-togai (Beruni district), and in the north-western Kyzylkums (Karakalpak part).

We surveyed the natural phytocenoses of spiny caper in the dried bed of Lake Dautkul (Bozatau district).

During observations it was found that spiny capers do not occur in the freshly dried part of the lake bed. But on

the old dried parts of the lake bed, they grow, the projective cover reaches 45 %. During the period of observations, numerous regrowths of young sprouts were recorded.

In addition to these, the phytocoenosis consists of the following plants: crested grass (*Támarix hispida* Willd.), Caspian karelinia (*Karelinia caspia* (Pall.) Less.), common reed (*Phragmites australis* Trin.), narrow-leaved cattail (*Typha angustifolia*), camel's thorn (*Alhági pseudalhagi* VD. Desv.), Russian dereza (*Lycium ruthenicum*), rugged kender (*Apocynum scabrum* Russan.), common parsley (*Zygophyllum oxianum* (Boriss.) Kitam.), Oriental crowberry (*Clematis orientalis* L.), Climacoptera *crassa*, *Cynanchum sibiricum* (*Cynanchum sibiricum* Willd.), *Bassia hyssopifolia* (Pall.) Volk.

In mid-May, the plants are powerful shrubs with stems rising 10-15 cm above soil level, with a woody root system that becomes thinner deep into the soil. The plants have 17-24 buds (photo) and are in the flowering phase; no fruit was found.



Figure 4. A plant with buds

Another place of caper growth was recorded on rocky sites around low mountains of Karatau, in the Amudarya river valley (Amudarya district), near the Lower Amudarya Biosphere Reserve Baday-togai (Beruni district). In the course of investigations, it was found that the plants are a stalky form, with flexible stems reach in

gupto 1.5m (Photo 5). Each plant bush is in the phase of budding, flowering, and fruiting (25-30 pieces).



Figure 5. A crumpling shrub of capers

It grows on rubbly rocks and loess clays where the Amu Darya River used to flow. Projective cover is 12-15%. The vegetation of the area consists of the following plants: spiny caper (*Capparis spinosa*), white earth wormwood (*Artemisia terrae-albae*), Turanian wormwood (*A. turanica*), prickly turpentine (*Atraphaxis spinosa*), *Cistanche salsa*, *Camphorosma monspelliaga*, *Anabasis tringata* (Schrenk) Bunge, *Anabasis woolly-footed* (*A. eriopoda* (Schrenk) Benth. ex Volkens), *kachimovitch* (*Acanthophyllum pungens*), *siberian saltwort* (*Nitraria sibirica*), *bush creeper* (*Convolvulus fruticosus* Pall.), *comb* (*Tamarix hispida* Willd.), (*Jurinea algida* Iljin), *garmala* (*Peganum harmala*), *camel's thorn* (*Alhagi pseudalhagi* V.D. Desv.), *eastern mercury* (*Eremopyrum orientale*).

A comparative analysis of the vegetation of the two areas shows that the vegetation of the northern area is predominantly mesophilic while that of the southern area is xerophytic (desert) due to edaphic and climatic factors. The authors will continue the cultivation studies for the establishment of trial plantations in the following works.

4. Conclusions

1. Despite harsh climatic conditions, prickly capers grow in different areas of Karakalpakstan.
2. With the onset of spring, all plants go through a full growing cycle.
3. We have recorded that the northern caper population (Bozatau) differs morphologically from the southern population (Amu Darya valley).

4. The resource potential allows work to be carried out for cultivation.
5. The demand as a medicinal and culinary raw material dictates the need for cultivation and the establishment of plantations.
6. Research is needed to develop techniques for the cultivation and breeding of spiny capers.

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