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The Scientific Basis of Cultivation of the Medicinal Plant Caperbush (Capparis Spinosa L.)

Abdullaeva Khuriyatkhon Zafarbekovna[1], Bo'stonov Zokirjon Tojiboyevich[2], Homidov Jasurbek Jamoldinovich[3], Ismatullaeva Malikahon[4], Parpiyeva Makhmudakhon[5]
[1]PhD agricultural sciences, associate professor, Andijan institute of agriculture and agrotechnologies
[2]PhD agricultural sciences, associate professor, Andijan institute of agriculture and agrotechnologies.
[3]Director of the Andijan branch of the Research Institute of Forestry
[4]Junior researcher, Andijan branch of the Research Institute of Forestry
[5]Doctoral student, Andijan institute of agriculture and agrotechnologies
Email: xuriyat2686@mail.ru

Abstract: In the regions and districts of our republic there are many steppes, deserts and lands that do not have a water supply, and such lands are practically not used. The use of such territories for agriculture and increasing their economic efficiency is one of the pressing problems of agriculture; ensuring the purity of the ecological environment, nature, breeding and protecting rare plant species is a requirement of the time.
In this article, it is written that one of the urgent tasks of the Andijan State Forestry Fund, which is not being used, is the efficient use of steppe and hilly zones of the forest fund, as well as the proper organization of medicinal plant plantations. This article describes the characteristics, cultivation and organization of the plantation of the medicinal plant caperbush (*Capparis spinosa L.).*
It was stated that for the establishment of the Caperbush plantation, work was carried out to take care of the seeds and seedlings planted in spring and autumn in two different periods, it was stated that instead of ungerminated seeds, planting from additional seedlings, irrigating the sprouted plants with nitrogen and phosphorus fertilizers from mineral fertilizers was carried out.
Keywords: medicinal plant, cultivation, steppe and hilly zones caperbush, seed, seedling, plantation.

1. Introduction:

In the regions and districts of our republic there are many steppes, deserts and lands that do not have a water supply, and such lands are practically not used. The use of such territories for agriculture and increasing their economic efficiency is one of the pressing problems of agriculture; ensuring the purity of the ecological environment, nature, breeding and protecting rare plant species is a requirement of the time.
On April 27, 2011, a briefing was held at the Academy of Sciences of Uzbekistan on the issue of the production of medicinal preparations from medicinal plants growing in the conditions of Uzbekistan. Based on the goals and objectives of the briefing, the application of the technologies of research and cultivation of medicinal plants is of great economic and social importance today.
One of such types of plants is caperbush, all of its products can be used to prevent and treat various diseases. Its fruit is used in the processing industry as a raw material for the preparation of medicinal and iodine-rich canned products and various medicines for the pharmaceutical industry. Prepared products serve to supply the domestic and foreign markets and increase the export potential and economic efficiency of the industry. Today, this type of plant grows wild in the desert and steppe regions of some provinces and districts of our Republic. The technology of cultivation and processing of cultural varieties of the plant has not been studied.
During a visit to the Namangan region on July 8, 2017, the President of the Republic of Uzbekistan Mirziyoyev Sh.M. recommended to reduce the sown areas under cotton and grain in areas with losses from cotton, and replace them with high-yielding fruits and vegetables, gourds, and in some areas to start growing caperbush.
In recent years, consistent reforms have been implemented in the republic regarding the protection of medicinal plants, the rational use of natural resources, the establishment of plantations for the cultivation of medicinal plants and their processing.
Of the more than 4.3 thousand plants belonging to the local flora, 750 species are considered medicinal, of which 112 species are registered for use in scientific medicine, of which 70 species are actively used in the pharmaceutical industry.
In 2019, processed medicinal plants were exported worth US$48 million.

At the same time, analyzes show the need to protect medicinal plants, establish their plantations, and create an additional value chain through processing.
Decree of the President of the Republic of Uzbekistan dated April 10, 2020 No. PP-4670 "On measures for the protection, cultural cultivation, processing of wild medicinal plants and the rational use of available resources" was signed in order to create favorable conditions for the further development of the cultivation and processing of medicinal plants, increase export potential of the industry, as well as the integration of education, science and production processes:
The proposals of the Ministry of Agriculture of the Republic of Uzbekistan, the Ministry of Innovative Development, the State Committee for Forestry, the Agency for the Development of Pharmacy Network under the Ministry of Health of the Republic of Uzbekistan on the cultivation and storage of medicinal plants, the creation of clusters (hereinafter - the cluster of medicinal plants) for primary or deep processing, as well as the specialization of regions in the cultivation of medicinal plants have been approved from May 1, 2020.
This resolution recommends the cultivation of caperbush in the Bostonlyk, Okhangaron districts of the Tashkent region, Zomin, Bakhmal, Gallaorol, Forish of the Jizzakh region, Pop, Chust of the Namangan region, Asaka, Bulokboshi, Andijan, Korgontepa and Jalaguduk districts of the Andijan region, in all districts of Bukhara, Navoi regions, since the prickly caper (Capparis spinosa L.) is a drought-resistant (xerophytic) plant in the form of seeds and seedlings, its mechanical composition is suitable for light soils, mountainous and flat areas of these lands.
Capperbush is healing from root to leaf. Therefore, it is highly valued as a valuable raw material in the pharmaceutical industry. The fruit contains saponins, alkaloids, carbohydrates, ascorbic acid, oil, stahydrin alkaloid in the root bark. In early spring, the root dug up is dried, and medicine is prepared for allergy sufferers. Even before the flowering season, an anti-allergy decoction is made. Freshly cut and brewed as a tea, the branches are a good antiseptic. Arabs and ancient Greeks used such properties. In our country, Ibn Sina, the sultan of medicine, wrote down the methods of preparing medicines from this type of plant, which are useful in the treatment of many diseases.
It is noted that the tincture obtained from the root part of the plant is a cure for hepatitis, the stem and leaves are a cure for skin diseases, and the iodine contained in the fruit is beneficial to people suffering from goiter. In the world pharmaceutical industry, the preparation of drugs based on these recommendations is widely established.
Caperbush has been used in folk medicine. Mainly, it was used in the treatment of purulent wounds, angina pectoris, thyrotoxicosis, gout, and diabetes.
Capers are also used in the food industry. While Hindus eat dishes made with its fruit, marinated capers are a very important spice in French cuisine. In our country, before, capers "watermelons" were dried and used instead of sugar in winter.
The effective use of the steppe and hilly zones of the forest fund, which are not used in the steppe and hilly soil-climatic conditions, as well as obtaining economic benefits from these lands, is one of the urgent tasks of the proper organization of plantings of medicinal plants. The cultivation of prickly capers is the most promising industry, and its creation does not require excessive funds and resources. The reason is that the thorn bush, which grows freely in the ground, does not choose a place, it is very resistant to dehydration. Wild species grow and produce crops from May to October.
As an implementation of this decision, scientists from the Andijan branch of the Research Institute of Forestry and the Andijan Institute of Agriculture and Agrotechnology are conducting research on a practical project on the topic "Organization of a plantation of prickly caper (capparis spinosa L.)".

2. Materials and Methods:

For high yields of vegetable crops, depending on the type of crop and soil cartogram, 25-30 t / ha of organic fertilizers and 100-120 kg of nitrogen, 200-300 kg of phosphorus and 50-60 kg of potassium fertilizers are applied. During the growth and development stages of plants, various chemicals are used to control pests, diseases and weeds. As a result of the chemicals used, the beneficial microflora and microorganisms that actively participate in the life of plants and ensure the natural fertility of the soil are destroyed and they are not regenerated. The resulting organic fertilizer does not turn into humus. Mineral fertilizers are only 45-50 percent beneficial to the plant, and the rest form salt cations in the soil, gradually leading to salinization or secondary salinization of the soil. Under such conditions, the quality of the products is low, and during storage, vegetable products can lose up to 55-60% due to various diseases. The use of biological fertilizers, including biohumus fertilizer, to improve soil reclamation, increase soil fertility and increase productivity is advisable to ensure the production of relatively environmentally friendly products. Organic fertilizers and compost used in agriculture can increase yields by 1.2-1.3 s / ha. Biohumus fertilizer increases the yield by 15-20 s / ha. This relative difference is explained by the fact that biohumus fertilizer is prepared using California worms by processing organic fertilizers, plant residues, various product wastes, and soil mixtures. It poisons the worms, nematodes, microbes and fungi in the mixture by releasing various enzymes and gases during the recycling process, and enhances the antibiotic properties of the

recycled fertilizer. As a result, the plant absorbs it more easily and increases its productivity. In the soil, the exchange of air, moisture and heat is activated, and fertility begins to grow naturally. Due to the fact that biohumus contains 30% humus, 1-3% nitrogen, 1-5% phosphorus, 1.2-1.4 potassium and 2-5% calcium, the need for plant mineral fertilizers is not felt. Biohumus fertilizer significantly increases the yield of vegetables as it ensures normal growth and development of the plant [6]

The experimental system and scheme for creating a nursery is as follows.

The research consists of 3 options with 4 returns, and the seeds of the caperbush (Capparis spinosa L.) is planted in the 70×30×1 scheme in the 1st option, in option 2, it is planted in a scheme of 70×50×1, in option 3 it is planted in a scheme of 70×70×1.

In this case, it is necessary to study the development of the caperbush when it is planted and cared for in different schemes, by timely watering and feeding with fertilizers, and to analyze its importance in the establishment of a plantation.

3. Results

Within the framework of this project, in January, 2 kilograms of seeds of the Uzbekistan-20 variety of the Capers prickly plant, planted by scientists from the Namangan Institute of Engineering Technologies, were stratified under laboratory conditions. After these seeds germinated, on April 13 they were planted on 1 ha of hilly terrain of the Bobur forest area of the Andijan State Forestry.

This year, phenological monitoring of the sown seeds will be carried out, and data and reports will be prepared for each result obtained.

Prickly capers (lat. Capparis spinosa) - a herbaceous plant; type species of the genus Capers (Capparis) of the family Capers. Vegetable culture: unblown flower buds are pickled, which contain proteins, oil, vitamins. The leaves are rounded, obovate, with prickly stipules and short petioles. The leaf arrangement is alternate. Flowers solitary, 5-8 cm in diameter, with white, pink or yellowish petals, located in the leaf axils on long pedicels. Calyx and corolla four-membered, many stamens, one pistil, with an ovary on a long (3-5 cm) stem. Blooms from May to autumn.

Fruits are oblong, 2-4 cm long, fleshy berry-like multi-seeded capsules, green outside, bright red inside, with brown seeds. Fruit ripening is extended from June to October.

The calyx has 4 leaves and the crown has 4 diagonally arranged. Paternity is infinite or 4-6, the 4 in the middle are derived from the division of 2. Mother has 1-2 or several fruits with leaves. The node is superior, with one or more cells and many seed pods. The seed pod is bent, the fruit is coccine-like or rhizophorus-like, and when it bursts, it is a tulip-shaped fruit, and it is pollinated by insects.

One of the characteristic signs of the family is that the end of the flower band grows into a long banded gynophore that supports the mother. Such a tumor is also formed in fathers. They are similar to the flowers in their flower structure, but they differ from them in the absence of side leaves [1].

Chemical composition and importance of kavar plant product.

Capers (Capparis spinosa) grows wild in steppe and desert regions of our republic. Although this plant has a history of 2700 years, no detailed information about it is given in the literature. The use and processing technologies of its cultivation products in the processing industry have not been studied.

It is known from some sources that this type of plant can be found in small areas in France, Spain, Italy and North America, in the countries of the commonwealth, Georgia and Azerbaijan, and various products are made from them. In folk medicine, all parts of this plant have been used to treat various diseases.

Because the chemical composition of the plant is poorly studied, there is little information about it. Its chemical composition is being studied by scientists of the Namangan Institute of Engineering Technologies and the leading scientific research institute of our republic. According to some sources, it contains 0.32-0.35% rutin, 130-150 mg% of S, R, E and other vitamins, 12% sugar, 18-20% flavonoids, 29-30% glycosides, 35-36% fat in the seed, 25% protein in the bud, and 27-30 mg of iodine in the fruit. If it is analyzed on the basis of these properties, it has become clear that it is necessary to use it widely for the purpose of prevention and treatment of various diseases (table 1).

At present, in January, 2 kilograms of seeds of the caper plant of the Uzbekistan variety - 20, planted by scientists of the Namangan Institute of Engineering Technologies, have been stratified under laboratory conditions. These seeds were removed from stratification when the soil temperature increased to 14-16 0C after 30% germination and swelling. On April 13, it was planted on the prepared, plowed and cultivated 1 hectare field of the national recreation park named after Z.M. Babur belonging to Adijan State Forestry. The results of agrotechnical measures and phenological observation are being recorded in this mother nursery.

Table: 1Common chemical in caper fruit extract amount of substances, mg %

Chemical substances	Average amount (mg)	When grown naturally	When grown in culture
Routine	0,32	0,29	0,35
Vitamin C	150	147	154
P	136	131	140
E	128	126	130
Quarzetin	043	039	0,48
Sugars	8,12	8,0	12,0
Glycosides	21-29	21,0	29,0
Seed oil	36	34,0	37,0
Оқсил	25	24,0	26,0
Iodine (in 100 grams of dry mass)	27	24,0	29,0

On April 15-18, seeds are watered. Caper is a thorny plant with a taproot systemBut in the first year, until the root system was well developed, we carried out irrigation, and the effectiveness of this experiment was recorded on the first day of each month by phenological changes. On April 30, irrigation is carried out again.
By May 19, the seeds planted in the 70×30×1 scheme in option 1 began to sprout. In the second 70×50×1 and third 70×70×1 schemes, sprouts appeared after 2-3 days. On May 27, the germination rate of the first option was 90%. In the second and third options, the germination rate was 80-85% on May 30. The rate of seed germination in irrigated fields was shown to be 80-90%. On June 15, we found out that the number of leaves was 2-3 in phenological observations (pic. 1,2).
On June 20, the mother nursery of prickly caperbush was cleared of weeds. All participants of the project were involved in this process. Feeding with mineral fertilizers is one of the agrotechnical activities carried out for the plant to grow well. After weeding, watering and feeding with mineral fertilizers at the rate of $N_{30}P_{90}K_{50}$ were carried out on July 1. On July 25, the nursery was once again cleared of weeds and favorable conditions were created for plant growth. (Table 2-4).

Image 1. The process of preparing capers seeds for sowing

Image 2. nursery stock planted with capers

Due to sufficient moisture and nutrition in the mother nursery, the growth and development of the seedlings differed sharply from the development of the caperbush in the normal boharic areas. Even the sprouts that sprouted on May 27 began to bloom by August 10. It was observed that the germination rate of plants was 60-65%, and the height was 15-20 cm by the end of September in the parts of the nursery with low humidity, where the water did not reach well. On September 15, the nursery was once again cleaned of weeds and favorable conditions were created for plant growth (pic. 3).

Image 3. capers seedlings growing in a nursery nursery

4. Conclusion:

During the research, phenological monitoring of variants and returns was carried out, and the results were analyzed. In the established nursery, it was also determined which option has the best growth and development efficiency of seedlings.
All agrotechnical measures and plant growth and development monitoring and phenological observations are being carried out.
In short, caper seedlings in irrigated fields can start harvesting in the first year if irrigation is carried out 4-5 times. In non-irrigated dry areas, their height can grow up to 15-20 cm in the first year.
The results of agrotechnical measures and phenological observation are being recorded in this mother nursery.
Currently, fields are being prepared for sowing seeds in Andijan district for the establishment of caperbush plantations.

Table: 2 Duration of plant development in the experimental area

Returns	Options	Planting period	Planting scheme	First germination date	Full germination date	First leaf grow date
I	Option 1	13.04.2022	70x30-1	17.05.2022	27.05.2022	14.06.2022
	Option 2	13.04.2022	70x50-1	18.05.2022	29.05.2022	15.06.2022
	Option 3	13.04.2022	70x70-1	18.05.2022	30.05.2022	16.06.2022
II	Option 1	13.04.2022	70x30-1	17.05.2002	26.05.2022	14.06.2022
	Option 2	13.04.2022	70x50-1	19.05.2022	29.05.2022	15.06.2022
	Option 3	13.04.2022	70x70-1	19.05.2022	30.05.2022	16.06.2022
III	Option 1	13.04.2022	70x30-1	17.05.2022	27.05.2022	15.06.2022
	Option 2	13.04.2022	70x50-1	18.05.2022	30.05.2022	16.06.2022
	Option 3	13.04.2022	70x70-1	19.05.2022	30.05.2022	16.06.2022
IV	Option 1	13.04.2022	70x30-1	17.05.2022	27.05.2022	15.06.2022
	Option 2	13.04.2022	70x50-1	18.05.2022	30.05.2022	16.06.2022
	Option 3	13.04.2022	70x70-1	18.05.2022	30.05.2022	17.06.2022

Table 3Indicators of plant development in the experimental area

Returns	Options	Growth and development of plants											
		30.06.2022		10.07.2022		20.07.2022		30.07.2022		10.08.2022		20.08.2022	
		Height, cm	Number of leaves, pcs	Height, cm	Number of leaves, pcs	Height, cm	Number of branches, pcs	Height, cm	Number of branches, pcs	Height, cm	Number of branches, pcs	Height, cm	Number of branches, pcs
I	Option 1	7	5	15	9	37	8	44	16	77	18	82	18
	Option 2	6	4	13	8	35	7	42	14	64	15	74	16
	Option 3	6	4	13	8	32	7	40	11	62	14	70	15
II	Option 1	8	6	16	10	38	9	58	19	78	20	89	20
	Option 2	7	5	14	9	37	8	48	16	67	17	78	18

	Option 3	7	5	14	9	33	8	46	14	66	15	72	16
III	Option 1	8		15	11	39	7	62	14	89	18	96	19
	Option 2	7	6	13	10	38	8	52	16	71	17	79	18
	Option 3	7	5	12	9	35	9	47	17	70	17	77	17
IV	Option 1	8	5	16	12	43	8	68	16	81	18	94	18
	Option 2	7	6	14	10	39	9	65	14	77	16	82	17
	Option 3	6	5	13	10	36	10	59	13	73	15	73	16

Table: 4Indicators of the formation of flowers and fruits in the experimental area

Returns	Options	Planting period Spring 13.04.2022	Planting scheme 70x30-1 70x50-1	**Flowering and fruiting of the plant**									
				10.08.2022		20.08.2022		30.08.2022		10.09.2022		20.09.2022	
				Number of flowers	number of fruits	Number of flowers	number of fruits	Number of flowers	number of fruits	Number of flowers	number of fruits	Number of flowers	number of fruits
I	Option 1	13.04.2022	70x70-1	4	6	7	12	4	15	4	16	2	18
	Option 2	13.04.2022	70x30-1	3	4	6	8	3	9	4	11	2	13
	Option 3	13.04.2022	70x50-1	3	3	4	6	2	8	3	10	2	11
II	Option 1	13.04.2022	70x70-1	3	5	6	11	3	14	3	15	2	15
	Option 2	13.04.2022	70x30-1	2	3	5	9	3	11	3	12	1	14
	Option 3	13.04.2022	70x50-1	2	2	4	7	2	9	3	11	1	13
III	Option 1	13.04.2022	70x70-1	4	7	6	14	3	17	4	18	2	20
	Option 2	13.04.2022	70x30-1	3	6	5	13	3	15	3	16	1	18
	Option 3	13.04.2022	70x50-1	2	5	4	9	2	11	2	13	1	14
IV	Option 1	13.04.2022	70x70-1	3	6	7	13	4	16	4	17	2	19
	Option 2	13.04.2022	70x50-1	3	4	6	11	3	14	3	15	1	17
	Option 3	13.04.2022	70x30-1	2	3	5	10	2	13	3	15	1	16

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