Technologies of cultivation and processing of *Lycium chinense* Mill. and *Lycium barbarum* L. fruits in the conditions of Uzbekistan

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Abstract. The scientific article presents the study results of the effectiveness production of Goji berries in the conditions of Uzbekistan. The agrobiological features and cultivation technology of *L. Chinense* Mill and *L. barbarum* L. were studied. Planting of 2-3 year old seedlings is effective compared to annual plants. After planting of seedlings, irrigation was carried out 400-450 m^3. Improving the efficiency of plant development depends on the introduction of humus, phosphorus and potash fertilizers. The fruit of *L. chinense* is 2 nested, syncarpous. The walls of the outer epidermis are thickened and cutinized. This explains that the plant can be grown in arid conditions. The yield is determined by the increase in soil quality, you can get 540 kg/ha. The amino acid composition of the fruits of *Lycium barbarum* L. is represented by 16 amino acids, including 9 essential ones. The technology of drying Goji fruits in the shade is considered the most acceptable, as it does not lose taste and juiciness. Introduced environmentally friendly methods of production and storage of products. The preparation of compote, conserve, jam and dried products is recommended. The plants were fed. Economic efficiency and production volume on plantations are shown.

1 Introduction

Uzbekistan has developed economic mechanisms for the introduction of resource-saving technologies, as evidenced by the government's programs for the development of the agricultural sector of the economy. Uzbekistan is an agrarian country that needs water savings when irrigating agriculture. One of the reserves for increasing the production of berries is the use of high-quality planting material for laying plantations [12].

Tangible results have been noted with the introduction of modern agricultural technologies, new varieties and their regionalization have been created. Production of vegetables was increased by 111.3%, melons - by 110.4%, fruits and berries - by 110.8% [1, 2]. Fruits and berries are biologically valuable and technological raw materials [20]. The production of berries plays an important role in providing the population with fresh, high-

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quality products. The process of dehydration or drying, as the most effective type of preservation of fruit and berry raw materials, is the process of removing moisture under the influence of heat, which suppresses the activity of water in fresh raw materials [21, 22, 23].

Fruit products are one of the most important types that are in high demand among the population and consumers outside the region: China, Kazakhstan, Russia and Turkey. More than 50% of Uzbekistan's fruits are sent to Kazakhstan, and more than 23% - to Russia. Similarly, Kazakhstan receives over 57% of Uzbekistan's fruit and nut exports, while Russia's share is 20%. India's share of vegetable exports is also significant (over 13%), with over 11% of its fruit and nut exports going to Turkey.

In Uzbekistan, issues related to the regulation of food safety, it is important to consider that food safety and quality are best ensured by an integrated multidisciplinary approach, taking into account the entire food chain. The Food Security Policy (FAO/UN) implies land reform whereby farmers will have physical access to land where they can grow a variety of crops that meet people's needs. This implies access to imported products that are not grown or produced in our country, this is necessary to achieve “diversity” in nutrition. The economic development of the republic for the period up to 2030 is aimed at ensuring sustainable economic growth. Targets for economic development provide for an increase in GDP by at least two times by 2030, based on an increase in the competitiveness of the national economy, which will be achieved primarily by increasing productive employment [2].

The yield of berry plantations requires a modern development of measures system to develop the production of Goji berries. The development of berry production implies the following: the use of high-quality healthy planting material, the use of high-yielding species with good taste and transportable qualities of berries, the use of protection of berry plantations from diseases and pests, the use of rational and efficient irrigation [13, 14, 15, 16]. The development of Goji berries production on an innovative basis should be carried out with the state support of the industry [17, 18, 19].

The cultivation of Goji berries was chosen because of the value of the vitamins, trace elements, essential amino acids, proteins and many other biologically active substances contained in it. Complex carbohydrates and fiber of berries ensure the normalization of blood sugar levels and reduce the risk of developing diabetes [6].

In Namangan region, plants of Lycium chinense Mill., Lycium barbarum L. belonging to the Solanaceae Juss. family were studied in experimental and farm plots. Goji differs from other berry plants in its useful and medicinal properties - such as, for example, Lycium ruthenicum, which grows in the Aral Sea region and is of local origin. The fruit is bright orange-red, edible, with a sweet and pungent taste that has antioxidant, anti-inflammatory and anti-tumor properties, and is also used for various circulatory disorders and diabetes. These plants are rich in polysaccharides, flavonoids, carotenoids, betaine, sitosterol and other compounds. Berries are rich in natural antioxidants such as zeaxanthin, omega 3 and 6 fatty acids, beta-sitosterol, and sugars. Lycium berries contain 18 amino acids (more than in bee pollen), 8 of which are essential and 4 essential Lycium polysaccharides (LBP) - LBP-1, LBP-2, LBP-3, LBP-4, which are not present in any one food item. Polysaccharides are complex carbohydrates. They are the main source of energy resulting from metabolism. Polysaccharides have great biological activity: antibiotic, antiviral, antitumor, antidote [28].

There is a growing demand for high quality Goji and products made from the fruit, both raw and dried. So far, there is limited information available on genetic resources, breeding activities and the main varieties of Goji. We studied the morpho-anatomical structure of leaves, cuttings, fruits, seeds of plants Lycium chinense Mill., Lycium barbarum L. We studied ontogeny, anatomy, physiology and ecology, as well as plant growing technology [5, 6, 27].

At present, Goji (Lycium) fruits have become very popular abroad and in the CIS countries. Lycium is native to Central China, found in wastelands, roadsides, and grown as hedges. Genus Lycium L. is widely used in medical practice.

2 Study objects and methods

Scientific research was carried out in the Botanical Garden named after N.F. Rusanov in 2021-2022. The objects of the study are ripe berries of a plant of the genus *Lycium* (Goji). To create a Goji plantation in the conditions of the Namangan region, a number of scientific studies were carried out in relation to soil, moisture and organic fertilizer. In accordance with the conditions, in autumn 20-25 tons of organic fertilizers were applied, 200 kg of phosphorus and 300 kg of potash. After that, plowing was carried out, the leveled soils were prepared according to the 3x2 m^2 scheme for planting seedlings in early spring or late autumn.

The work used morpho-anatomical, biological, phenological, agrotechnical methods, chromatographic, as well as the method of statistical, mathematical (performed using the Excel program), economics (the entrepreneur makes a rational decision with the tasks set) (Methods - SSt - 7009-71 and SSt - 1811273), field studies according to B.A. Dospekhov, G.F. Lakin.

Simultaneously with the morphological description of the generative organs for diagnostics, the anatomical structure of the Goji fruit was studied. The fruits are fixed in 70^0 ethanol. To prepare sections of generative organs, a manual method was used. Cross sections of the fruit were prepared manually using a safety razor. Cross sections of fruits are made serially. Sections were stained with methylene blue and safranin followed by gluing in glycerin [8]. Descriptions of the main tissues and cells are given in C.R. Metcalfe, L. Chalk [9], K. Esau [10], E.A. Sokolov [11], epidermis – according to S.F. Zakharevich [12]. Microphotographs were taken with a computer microphotographic attachment with a *Canon* A123 digital camera under a *MoticB1-220A-3* microscope. Some images were processed on a computer using “Photoshop CS5”.

The amino acid composition of *Lycium barbarum* L was determined. The studies were carried out in the laboratory of the Tashkent Pharmaceutical Institute. For analysis, we used a highly specialized automated liquid chromatograph - an amino acid analyzer - AAA 400 INGOS with computer control and a post-column detector system, using Polymer 8 ion-exchange resin as a stationary phase; mobile phase - buffer solutions with different eluting strength.

Drying of berries was carried out by the shadow method. Dried under a canopy in an open room at a temperature of 30-35^0C for 1 day, then at room temperature for 3 days. The next drying method was carried out in a special cabinet "PG 80" at a temperature of 70^0C. The chemical composition of the finished product was determined by biochemical methods, the physical properties were determined by the physical method, in particular the boiling point, porosity, density. Color, taste, smell were determined by sensory (organoleptic method).

The recipe for making compote, jam, jam from Goji berries is developed in accordance with a methodology based on the physical properties of the fruit, its chemical composition and consistency. On the basis of the technology and recipe worked out in the industry, compote, jam, and jam were prepared from Goji berries. According to the Interstate standard SSt 31712-2012 Jams. Jam quality indicators according to SSt 34113-2017. General specifications and SSt 816-2017 Canned food. Compotes. Sensory analysis was carried out (tasting method, consumer evaluation, control sample evaluation, analytical methods of organoleptic analysis).

The quality of the jam was determined by density, well-cooked by taste and smell, by repeated boiling (3-4 times), it contributed to uniform soaking with syrup, the shape, natural color, taste and aroma are preserved. Jam is packaged in glass jars hermetically sealed with

metal lacquered lids, and in containers made of thermoplastic polymeric materials and packed with metal lids. The indicators are: appearance - boiled, evenly distributed in a thick sugar syrup, not shriveled, consistency - thick syrup, non-jawed, allowed - easy gelation of the syrup - the presence of hard or boiled berries is not more than 15% by weight. Candied product is not allowed. The taste and smell should be pleasant, sweet or sweet and sour. The color must be uniform. Products were measured on an analytical balance (VT-500 brand). The methods for determining the quality indicators of finished products are as follows: total carbohydrates, including mono, di- and polysaccharides, were determined with a refractometer, and a saccharometer was used to determine the amount of sugar in syrup.

In the production of jam, compotes, the control of fruit cleaning is of great importance. By 13 pH meter - acidity and alkalinity. It is necessary for the chemical cleaning of the skin of the fruit. As the peel of the fruit peels, the alkalinity of the solution decreases, and the quality of cleaning becomes worse, the laboratory monitors the concentration of alkali and, if necessary, indicates the addition of a concentrated NaOH solution. Finished products were stored at the "Billur Arkon" plant in unlit warehouses at a temperature of 22^0C - 24^0C and at a relative humidity of 65-70%, the time to transportation covers from 7 to 10 days. Products were stored in dry, clean, well-ventilated warehouses on wooden racks.

3 Results and discussion

The study of this unique plant began in the Botanical Garden named after N.F. Rusanov. Prepared cuttings and seedlings of Goji, which in 2021 were grown on an area of 2.5 hectares in the farms of the Namangan region of the Chust district named after Rustamali Karimov and in the Chartak district of the private enterprise "Billur Arkon" for the production of fruit and vegetable juices. Agrobiological features, reproduction methods and chemical composition, as well as the technology of growing *L. chinense* and *L. barbarum* were studied. Plant growth reaches from 200 to 350 cm. The fruits have their own characteristics, the weight of 1000 g of the fruit is 230-300 g. The fruits are small 1.5-2.5 cm, coral-red in color, the number of seeds in the fruit is 20-40. The formation of fruits begins in the conditions of the Namangan region in the first decade of the month of June. Ripening is in the month of July, fruit ripening takes a long time until November, so the fruit is harvested every 10 days (Table 1, Figure 1).

Table 1. Phenophase of Goji in the conditions of Namangan region.

Phenophases	Months																				
	03			04			05			06			07			08			09		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Budding																					
Flowering																					
Fruit formation																					
Beginning of fruit maturation																					
Maturation																					

a b c

Fig. 1 Development phase of Goji generative organs: a - flowering; b - fruit formation; c - fruit maturation.

The fruit of *L. chinense* is a berry, syncarpous, bright red, 2-celled. On the paradermal section, the outlines of epidermal cells are rectilinear, the projection is rounded. The nucleoli are clearly visible in the cell membranes of the epidermis.

In cross section, the pericarp consists of several layers of large rounded parenchymal cells. The walls of the outer epidermis are thickened and cutinized. The cells of the outer epidermis are elongated in the radial direction, gradually losing their contents, while their walls thicken and lignify. In the fruit of mesocarps there are multi-row large parenchymal cells, which are slightly elongated in the tangential direction in the outer layers, and rounded in the inner ones. There is a conducting bundle between the parenchymal cells. Parenchyma cells around the vascular bundles, especially in the inner part, are small and elongated in the radial direction. The endocarp consists of rather small irregularly shaped cells (Figure 2), [28, 31].

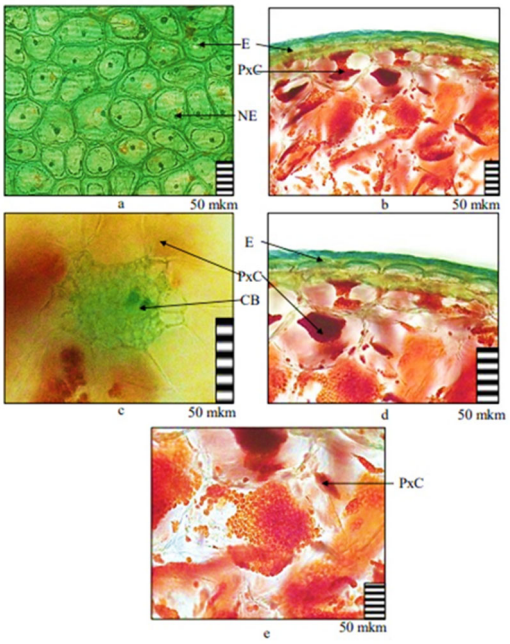

Fig. 2. Anatomical structure of the pericarp of the fruit of Lyciumchinense Mill:a – the epidermis of the fruit on the paradermal section; b, d, e – epidermal and parenchymal cells in a cross section; c – conducting beam.Symbols: CB - conducting bundle, PC - parenchymal cells, E - epidermis,NE - nucleolus of the epidermis. Magnification - 50-100 micron.

The years of research proved to be favorable for the plants. Studies have shown that planting 2-3 year old seedlings is effective compared to annual plants. After planting seedlings, irrigation was carried out 400-450 m^3. In April - 1 time, in June and July - 2 times and September - 1 time. During the growing season, it is recommended to irrigate 2000-2500 m^3.

The cultivation of fruit crops using intensive technologies in the region, depending on soil and climatic conditions, is often problematic when carrying out technological methods that are not always used in accordance with the physiological and biological needs of plants. This is due to the fact that the application of various fertilizers in practice is not always maintained by the term of their application, which reduces the quality of products. At the same time, many operations for the production of fruit crops are not sufficiently mechanized, which reduces labor productivity [24, 25, 26,31].

In autumn, pits were prepared for planting seedlings for unfertilized soils and 2-3 kg of humus and 100 g of phosphorus and 50 g of potash fertilizer were introduced, which contributed to the improvement and rapid fruiting of plants, 5-6 year old plants bore fruit from 1500 to 2000 kg. Increased efficiency in plants where old branches are pruned to get as much young growth as possible. Mainly shoots are cut at a height of 1 m.

Around seedlings with low water supply and conditionally irrigated soils, pits are dug around the seedlings in autumn, which ensures the preservation of moisture, which makes it possible to reduce the rate of irrigation. Goji can also grow moderately in dry conditions.

To assess the yield of *L. barbarum* fruits, soil fertility and soil-climatic conditions were studied in the control variant on an area of 0.10 ha in different variants (stony (St), adyr and irrigated soils) in triplicate.

To determine the yield, 10 model plants were taken from each variant, the weight of fruits from one bush, the weight of 1000 fruits, the number and yield per hectare were determined.

According to observations, it was determined that in the control variant, 300 g can be obtained from one bush of a plant, 320 g in adyr conditions, up to 400 g in irrigated soils, and 510-640 kg/ha in the control variant 4.8 in the experimental variant.

The analyzes showed that Goji can be grown in various soil and climatic conditions of the Namangan region, and the yield is determined with an increase in soil quality, it was determined that an average yield of 540 kg/ha can be obtained (Table 2).

Table 2. Influence of soil fertility on the yield of Goji (L. Barbarium).

Options	Soil quality, score	Planting area, ha	Harvest from one bush, g	Harvest per sown area, kg	Possibility of obtaining a crop from one hectare, kg	Difference compared to control,±
In rocky soil conditions	35-40	0.10	300	48.0	480.0	
In adyr soil conditions	45-50	0.10	320	51.2	512.0	±32.0
In irrigated soil conditions	60-70	0.10	400	64.0	640.0	±160.0
Average indicator		0.10	340	54.4	544.0	

The need for water in three repetitions and four variants was ascertained: the volume of irrigation was 900, 1200, 1500 and 2000 m^3; during the growing season, the growth and development of plants, the effect of irrigation rates on productivity were studied.

Low growth rates and plant yield were determined in the control (St) variant per 0.10 ha of area with three-time irrigation of 300 m^3 - 48.0 kg. On the plot allocated for the experiment in the variant 1200 m^3 - 56.0 kg, and on the irrigated area of 1500 m^3 - 64.0 kg, as well as in the growing season of 2000 m^3, 66.0 kg of crop was obtained from the irrigated areas.

In 2021, to determine the economic efficiency of the product (the effect is characterized by an absolute value showing the result of production activities, i.e. the volume of net production, the volume of sales, financial result or net profit). The fruits from the Goji plantation grown on the experimental area of the "Billur Arkon" industrial enterprise were studied.

During the timing of 8 hours in one working day, it was determined that it is possible to collect fruits up to 8-10 kg. According to the data in accordance with the forecast program, 1.8-2.0 tons can be grown from one hectare of plantation within 2-3 years based on the biological characteristics of plants, from June to November, continuously for 6-7 days, you can collect the product. The period of fruitfulness of the harvest is the months of August-September. According to the applied agrotechnical measures, 0.8-1.3 kg of fruits can be obtained from one plant.

According to the analyzes received, the organization of the plantation and the implementation of agrotechnical measures in the first year require a total of 10.0 million soums. Required costs for collection, transport and additional work are 15.0 million UZS, in total 25.0 million UZS. The cost of grown products per kg is 12500.0 soums, the sale price is 30.0 thousand soums, agriculture during the year from one hectare receives a total income of 60.0 million soums and a net income of 35 million soums.

In 3-4 years, due to cost reduction, net income is 70.0 million soums on the example of the farm named after Rustamali Karimov, Chust district and "Billur Arkon", Chartak district (Table 3).

Table 3. Economic efficiency and production volume in Goji plantations (2020).

Economic indicators	**Unit of measurement**	**Units**
Planting area	Ha	1.0
Product volume	Ton	2.0
General expenses	million soums	25.0
Product cost	kg/soum	12500.0
Product selling price	kg/soum	30 000.0
Total profit	million soums	60.0
Net profit	million soums	35.0 - 70.0*
Damage	million soums	-
Degree of profitability	%	140.0

Note: *Subsequent years by reducing the cost of seedlings and their planting, expected net income of 70 million soums.

The composition of Goji includes more than 20 biologically active substances and 18 amino acids, which have a healing feature for the human body. When analyzing the fruits of Lycium barbarum L., the amino acid composition was established. According to our data, the amino acid composition of Lycium barbarum L. fruits is represented by 16 amino acids, including 9 essential ones (valine, threonine, methionine, isoleucine, leucine, phenylalanine, histidine, lysine, and arginine). It was revealed that the fruits of Lycium barbarum L. are rich in such amino acids as aspartic acid (2.1%), as well as very little methionine (0.11%). The total content of amino acids (12.16%). The total content of essential amino acids is 4.9%

[30]. At the beginning of fruiting, L. chinense plants had a sweetness level of 8.8 points, and the amount of carbohydrates was 14.0%, when Lycium barbarum had a sweetness level of 5.8 points and the amount of carbohydrates was 15.1% [29, 31,32].

The drying technology of Goji fruits is carried out in various ways. But the method of drying in the shade is considered the most acceptable. The fruits of *Lycium chinense* are characterized by early ripeness and *Lycium barbarum* by late ripening. Drying of Goji products was obtained as follows: 1.0 kg was taken from 2 species in triplicate and dried. The selection of the obtained samples was washed first in cold water 2-3 times and then blanched with boiled water at intervals of 1-1.5 minutes. For cleaning, the alkali was repeatedly washed with cold water. The washed products are dried under environmental conditions at a temperature of 30-350C, then at room temperature for three days. The mass fraction of moisture of the dried product was provided at the level of 18%. Color, taste and smell (organoleptic properties) were preserved. According to the results of laboratory analysis, 320-350 g of dry product was obtained from 1.0 kg of juicy fruits (Figure 3).

a b

Fig. 3 Drying Goji berries in the shade and samples of the finished product: a - product prepared for drying; b- view of the finished product.

3.1 Technology and recipe for preparing compote from Goji berries

The Goji berry compote recipe is developed in accordance with a methodology based on the physical properties of the fruit, its chemical composition and consistency. In industry, for the production of 1000 kg of products in relation to the total volume, 25% of raw materials, 8% of sugar, 0.1% of citric acid, 50% of dyes and flavoring juices, as well as the required amount of process water are calculated. The boiling point, duration and time of pasteurization of the product were studied.

For the preparation of 1000 kg of compote, 250 kg of Goji berries, 80 kg of sugar, 1.5 kg of citric acid and 50 kg of coloring fruit juices such as raspberry, cherry, pomegranate were used. Using a refractometer, the mass fraction of dry substances, the general appearance of the finished product, smell and taste were determined. For the preparation of compote, dry matter in the composition of the taken product is 124.5 kg. 1000 kg of the mass of the finished product contains the remaining dry ingredients 124.0 kg, respectively, with a refractometer index of 12.4%. The difference between the indicators of 0.5% is considered a natural decline. The boiling point of the finished product is 100^0C, the boiling time is 20 minutes, and the pasteurization time, depending on the capacity of the container, is 25 minutes. The

prepared products were packaged in glass jars with a capacity of 0.5 l, turned over, at room temperature, cooled and stored for control (Table 4, Figure 4).

Table 4. Technological recipe for preparing compote from Goji fruits (product volume per 1000 kg).

Raw material type	Unit of measurement	Raw material consumption	Amount of soluble solids %	Product share of total production, kg
Fruits	Kg	250.0	15.0	37.5
Sugar	Kg	80.0	99.5	79.5
cherry juice	Kg	50.0	12.0	6.0
water	L	620.0	-	-
Total		1000.0		124.5

a b

Fig. 4 Prepared Goji berry compotes: a-prepared product with the addition of pomegranate juice; b-prepared product with the addition of cherry juice.

Technology and recipe for preparing conserve from Goji berries. For the preparation of Goji berry conserve, a product grown at the “Billur Arkon” industrial enterprise was used. The types and quantities of products needed for the production of 1000 kg of conserve in the industry were prepared according to the developed recipe and technology. For the preparation of 1000 kg of conserve, 550.0 kg of Goji, 360 kg of sugar, 0.5 kg of citric acid and 100 kg of cherry or pomegranate juice were obtained. Boiled at 100 degrees for 30-35 minutes. The smell, color and taste of the finished product was analyzed by the sensory method, the amount of solids in it was analyzed using a refractometer. During cooking, due to the diffusion process, soluble substances and water are extracted from the fruit, which evaporates, the concentration of solids in the sugar syrup increases. The readiness of jam is determined by the content of dry substances in it. Boiling time and jam temperature were set depending on the volume of the product, its consistency. The analysis showed that the amount of dry matter in the finished product was 52%. (Table 5, Figure 5).

Table 5. Technological recipe for preparing conserve from Goji fruits (product volume per 1000 kg).

Type of product	**Unit of measurement**	**Raw material consumption**	**The amount of soluble dry matter in the product, %**	**Amount of dry matter in the finished product, kg**
Fruits	kg	550	15.0	52
Sugar	kg	360	99.5	35,5
Lemon acid	kg	0.5	90.5	0.5
Fruit juice	kg	100	12.0	12.0
Total				100

Fig. 5 Prepared Goji berry conserve.

3.2 Technology and recipe for preparing jam from Goji berries

For the preparation of jam, based on the industry-proven technology and recipe, Goji berries were used to make jam. According to the Interstate standard SSt 31712-2012 Jams. General specifications. Jam was made using 55% Goji berries, 25% sugar, 15% apple juice and 5% citric acid. In the manufacture of jam, the laboratory controls the content of pectin in fruits (should be at least 1%). If there is little pectin in fruits, then add fruit juice containing pectin in large quantities. When cooking jam, protopectin should completely pass into pectin. In case of insufficient acidity (pH more than 3.6) of raw materials, it is allowed to add citric acid to it in the form of a 50% solution to achieve optimal gel formation conditions. Jam making technology is based on jam making technology. The prepared jam sample was analyzed by sensory-organoleptic method, the amount of dry matter was analyzed using a refractometer. 550 kilograms of fruit, 250 kilograms of sugar, 150 kilograms of apple juice and 0.5 kilograms of citric acid were used as raw materials for the preparation of 1000 kilograms of jam. The amount of solids in the prepared jam was 55% (Table 6, Figure 6).

Table 6. Technological recipe for preparing jam from Goji fruits (product volume per 1000 kg).

Type of product	Unit of measurement	Raw material consumption	Amount of dry matter in the product, %	Amount of dry matter in the finished product, kg
Fruits	kg	550	15.0	55
Sugar	kg	250	99.5	30

Lemon acid	kg	0.5	0.05	0.05
Apple juice	kg	150	12.0	15
Total		1000	-	100

Fig. 6. Prepared Goji berry jam.

3.3 Economic efficiency of Goji processing

In order to determine the efficiency of processing Goji fruits and obtaining various products in the processing industry, the manufacturing enterprise "Billur Arkon" in Chartak district determined the production of products according to the developed technologies and recipes. It has been ascertained that at the processing plant during drying, up to 33-35% of dried products can be obtained, and from 2000 kg of raw fruits, 700 kg of dried quality products can be obtained. Packaging in a container of small capacity of 10 grams of the product gives a quick and high efficiency. For production, the enterprise will purchase 700 kg of pure product for 60.0 million soums, and additional costs will amount to 3.0 million soums, the total cost will be 63 million soums. The cost of one kilogram of dried product was 90.0 thousand soums, its selling price (market price abroad) - 300.0 thousand soums, gross income - 210.0 million soums, net income - 147.0 million soums.

The total cost of production of 1000 kg of jam in the industry is 38.0 million soums, the cost of 1.0 kg of jam is 38.0 thousand soums, the average selling price is 50.0 thousand soums, gross income is 50.0 million soums, net profit 12.0 million soums, and the profitability is 31.6%.

The enterprise has a total cost of preparing 1000 kg of jam 40.0 million soums, the cost of 1.0 kg of jam 40.0 thousand soums, selling price 60.0 thousand soums, gross income 60.0 million soums. Net income amounted to 20.0 million soums, and the profitability of the enterprise for the production of this type of product was 50% (Table 10).

If an industrial enterprise needs to make 1000 kg of compote from Goji fruits, then the total expense of the enterprise is 56.0 million soums, the cost of 1.0 kg of compote is 56.0 thousand soums, and the selling price is 65.0 thousand soums. It was revealed that the gross income of these products is 65.0 million soums and the net profit reaches 9.0 million soums (Table 7).

Table 7. Economic efficiency of Goji fruit processing (at the production enterprise "Billur Arkon" of Chartak region).

Type of product	Finished product, kg	General expenses, million soums	Price for 1 kg of product		Gross income, million soums	Net profit, million soums	Damage, mln/sum	Profitability, %
			Cost price, thousand sums	Sale price, thousand UZS				
Dried product	700.0	63.0	90.0	300.0	210.0	147.0	-	169.8
Jam	1000.0	38.0	38.0	50.0	50.0	12.0	-	31.6
Conserve	1000.0	40.0	40.0	60.0	60.0	20.0	-	50.0
Compote	1000.0	56.0	56.0	65.0	65.0	9.0	-	16.0

On the basis of these economic analyses, it was studied that the processing plant can achieve high economic efficiency from all types of products produced in accordance with the needs of consumers.

4 Conclusion

In order to increase the rationality and efficiency of the production of berry crops in the Republic of Uzbekistan, productive orchards of an intensive type have been created on various soils in favorable agro-climatic zones. The plantation area under perennial plantings has been increased.

Under the conditions of introduction, phenology was carried out: budding begins in the second decade, and flowering: in the third decade of April. The formation of the fetus begins in the first decade of May and ends in the first decade of September. The beginning of fruit ripening begins in the second decade of May until the second decade of September, and fruit ripening begins in the first decade of June and ends in the third decade of September. Thus, the cycle of the phenophase is not uniform, it depends on climatic conditions.

The morpho-anatomy of the generative organs of Lycium was studied. Diagnostic signs for the identification of plant materials have been identified. On the paradermal section, the outlines of epidermal cells are rectilinear, the projection is rounded. In cross section, the pericarp consists of several layers of large, rounded parenchymal cells. In the fruit of mesocarps there are multi-row large parenchymal cells, the endocarp consists of rather small irregularly shaped cells.

Fertilizers with agro-climatic and biological loads were used in order to improve the quality of the crop. Introduced environmentally friendly methods of production and storage of products. It was revealed that the species of Lycium chinense and Lycium barbarium grow well, develop at the age of 5-6 years.

Based on the intensive technology prepared for growing seedlings, it is advisable to plant in a 3 x 2 m pattern in autumn or early spring to establish Goji plantations.

High productivity has been achieved on Goji plantations, so it is advisable to choose irrigated gray soils. Organic fertilizer or vermicompost is applied to feed plants, which ensures rapid development, fruiting and productivity.

The amino acid composition of the fruits of Lycium barbarum L. is represented by 16 amino acids, including 9 essential ones. The amount of carbohydrates Lycium chinense was 14%, Lycium barbarum L. 15.1%.

Goji fruits are recommended for making compote, jam, jam and other canned foods, as well as for shade-dried foods. The collection of products dried in the shade in the phase of technical and biological ripening of fruits is recommended according to the degree of their sugar content. The analyzes showed that due to the expansion of the plantation and the use of intensive technologies in the production of Goji fruits and berries, a high yield increase is ensured.

The economic efficiency and production volume of the plantations shows that Lycium chinense and Lycium barbarium species develop well in various soil conditions and produce 1.5-2.0 tons at the age of 5-6 years. Based on the intensive seedling growing technology, up to 3.5-4.0 million seedlings per 1 hectare were obtained. During the year, from one hectare, the total gross income is 60.0 million soums and net income is 35 million soums. When processing Goji berries, the industrial enterprise received a net profit of up to 147.0 million soums.

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