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INFLUENCE OF IRRIGATION RATES, FERTILIZERS AND STIMULATORS ON THE YIELD OF GOJI BERRIES (LYCIUM BARBARUM L. AND LYCIUM CHINENSE MILL.) IN UZBEKISTAN

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Abstract
The article presents the results of a study aimed at assessing the efficiency of Goji berry cultivation in Uzbekistan. To date, there is a limited amount of data on genetic resources, selection methods, phytotechnologies and modern approaches to rapid plant propagation using stimulants to increase their productivity. The study examined various irrigation regimes, methods of fertilization, and the effect of biostimulants on crop yield and productivity. Optimal irrigation rates were determined, including volumes of 900, 1200, 1500, and 2000 m³ of water. The best results were achieved with irrigation volumes of 1500 and 2000 m³. Organic fertilizers were applied at a rate of 6.0 t/ha and biohumus fertilizers at a rate of 1.7 t/ha. Biohumus fertilizers demonstrated the greatest efficiency among them. To improve the quality of Goji fruits, growth stimulants were used - Gibberellin and "Ghana Plus", which contributed to the improvement of their quality characteristics.

Keywords: Lycium chinense Mill., Lycium barbarum L., productivity, yield, irrigation, fertilizers, growth stimulants, irrigation rates.

Introduction

In the conditions of reduction and depletion of natural medicinal plant reserves, there is a need to solve the problem of providing medicinal raw materials. This requires the development of new approaches based on bioecological, physiological and chemical directions, as well as the creation of industrial plantations. Lycium chinense Mill. and Lycium barbarum L. (Goji) belong to the Solanaceae Juss family. These plants are rich in polysaccharides, flavonoids, carotenoids, betaine, sitosterol and other compounds that have antioxidant, anti-inflammatory and antitumor properties. They are used to treat a variety of conditions, including circulatory disorders and diabetes. In folk medicine, L. barbarum and L. chinense are valued for their rejuvenating properties, as well as for

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supporting the health of vision, kidneys, and liver. Extracts of these plants have biological activity, including rejuvenating, antitumor, immunostimulating and cytoprotective effects, and also help reduce stress. Goji berries help improve metabolism, remove toxins and are used as stimulants for asthma, diabetes, ulcers, hypertension and some allergic diseases [3, 8, 9, 11].

Literature Review on the Topic

There is currently a high demand for high-quality Goji berries and products based on them, which are becoming increasingly popular in the global market**.** China remains the main producer and supplier of Goji globally. However, information on genetic resources, breeding work, as well as phytotechnologies and breeding methods using stimulants to increase yields remains limited.

In Uzbekistan, taking into account the soil and climatic conditions, socio-economic factors, population growth, development of the agricultural sector, characteristics of regional territories and availability of natural resources, it can be argued that in order to ensure food security for the population, it is necessary to expand the technology of cultivation and introduction of new plants. For the effective development of Goji berry production, it is necessary to develop a set of measures aimed at increasing the yield of berry plantations. Key aspects include the use of high-quality planting material, selection of high-yielding varieties with good taste and transport characteristics, as well as the introduction of rational irrigation methods and the use of growth stimulants, which contributes to increased yields and accelerated fruit ripening.

The use of plant growth regulators and micronutrients helps to provide the necessary macro- and microelements during critical phases of plant development. The effectiveness of fertilizers increases significantly when they are used within the framework of a comprehensive, scientifically based system that takes into account the characteristics of soil and climatic conditions, the needs of different crops for nutrients, agricultural practices, as well as the properties of the fertilizers themselves and other important factors. To improve soil fertility, it is necessary to apply both mineral and organic fertilizers, which create optimal conditions for the growth and development of plants, improving their nutrition [6,10,12,13,14].

Phenological features, morpho-anatomical structure of leaves, cuttings, fruits and seeds of L. chinense and L. barbarum plants were carefully studied in various natural and climatic conditions [1,2,4,5].

The Aim and Objectives of the Study

To assess the impact of different irrigation rates, types of fertilizers and biostimulants on the yield of L. barbarum and L. chinense plants. The objectives include determining the optimal timing and volume of irrigation, as well as studying the effect of fertilizers and stimulants on the productivity and development of these plants.

Objects and Methods of the Study

The objects of the study were plants of the species L. barbarum and L. chinense. Experimental work was carried out in the N. F. Rusanov Botanical Garden, as well as in the conditions of the Namangan Region, where, as part of the creation of a Goji plantation, the reactions of these plants to the level of humidity, the use of various fertilizers and the impact of biostimulants were studied.

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Field observations, agronomic methods, and statistical and mathematical approaches were used for the analysis, and the data were processed using the Excel program. The effect of stimulants on the growth and development of fruits was also studied in detail [7,15]. To organize the Goji plantation, conditions for the application of organic fertilizers were established in accordance with generally accepted methods. The water requirement was determined in three replicates and at four irrigation volumes: 900, 1200, 1500 and 2000 m³. During the growing season, plant growth and development were monitored, and the impact of different irrigation rates on the final yield was analyzed.

Analysis and Results

In the Namangan region, 20 to 25 tons of organic fertilizers were applied in the fall, as well as 200 kg of phosphorus and 300 kg of potassium fertilizers. After applying the fertilizers, plowing was carried out, and the soil was leveled and prepared for planting seedlings according to the 3x2 m² scheme, with planting planned for early spring or late fall.

According to the research results, planting two- and three-year-old seedlings was more effective than using annual plants. After planting the seedlings, irrigation was carried out with a water volume of 400-450 m³: once in April, twice in June and July, and once in September. During the entire vegetation period, the total irrigation volume was from 2000 to 2500 m³.

It was found that in the control variant (St) on an area of 0.10 ha with three-fold irrigation with a volume of 300 m³, the yield was 48.0 kg. On the area allocated for the experiment, with irrigation with a volume of 1200 m³, the yield reached 56.0 kg, and with irrigation of 1500 m³ - 64.0 kg. Under irrigation conditions with a total irrigation volume of 2000 m³ during the growing season, the yield on irrigated areas was 66.0 kg.

Research has shown that Goji plants, unlike other berry crops, are highly resistant to drought. Under optimal water supply conditions, a significant harvest was obtained. Under moderate conditions, the most effective results are the growth and development with irrigation volumes of 1500-2000 m³ (Table 1).

Table 1 The effect of different irrigation volumes on the yield of Goji plants

№	Options	Planting area	In one bush there are plants, g	Productivity from 0.10 ha of area, kg	Difference compared to control, ±
1	900 м³ (St)	0,10	300,0	48,0	
2	1200 м³	0,10	350,0	56,0	±8,0
3	1500 м³	0,10	400,0	64,0	±16,0
4	2000 м³	0,10	410,0	66,0	±18,0

For normal growth and development of berry crops, as well as for increasing their yield over a long period of time, it is important to regularly add organo-mineral fertilizers, as well as macro- and microelements, to the soil.

To create the Goji plantation, a study was conducted that examined various rates of application of organomineral fertilizers necessary for plant growth. The experiment included a control variant (without fertilizers) and experimental variants in which 6.0 t/ha of organic fertilizers and 1.7 t/ha of vermicompost were used. When planting seedlings, 3.0-3.5 kg of organic fertilizer and 0.8-1.0

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kg of vermicompost were added to each hole. Biometric indicators of plant growth and development were also studied.

The results of the research showed the following yield: in the control variant, 28.0 kg were collected on an area of 0.10 hectares, 33.0 kg on the plot with the addition of organic fertilizers, and 42.0 kg on the plot with vermicompost.

According to the research results, in order to obtain higher yields it is necessary to use organic and biohumus fertilizers, which provide high efficiency and promote the cultivation of environmentally friendly products. Such products can be used to produce exportable food and pharmaceutical products.

Over time, the plants on the plantations become less dependent on fertilizers and can regularly produce a qualitative and quantitative harvest without their use. From 480 to 640 kg were collected from each hectare of Goji plantations, and in conditions without fertilizers - 249 kg of harvest (Table 2).

Table 2 Effect of different rates and types of fertilizers on the productivity of Goji plants

Options	Cultivation area, ha	Fertilizer rate, t/ha	Possibility of obtaining a harvest from the sowing area, kg	Possibility of obtaining a harvest from one hectare, kg	Difference compared to control, ±
Without fertilizers (St)	0,10	-	24,0	249,0	
Organic fertilizer t/ha	0,10	6,0	38,0	480,0	±231,0
Biohumus t/ha	0,10	1,7	42,0	640,0	±391,0

To increase the yield, the stimulants Gibberellin and "Ghana Plus" were used. These growth regulators contributed to the improvement of soil fertility, as well as to the increase in the quality and quantity of fruits. The use of stimulants had a positive effect on the development of plants, ensuring their active growth and development, which, in turn, led to an increase in the yield.

In the experimental plot of the enterprise "Billur Arkon" seedlings of the species L. barbarum and L. chinense were used. In the control group (St) stimulants were not used, and in the experiment on an area of 0.10 hectares a solution of the stimulant Gibberellin with a concentration of 0.5 g per 10 l of water was used. Spraying was carried out twice with an interval of five days on fruits that had reached technical maturity. The stimulant "Gana Plus" was also applied at a concentration of 20 g per 10 l of water. The results, such as the number and weight of technically mature fruits, were recorded in laboratory conditions and displayed in the figures showing the effect of the stimulant Gibberellin. The effects of these stimulants have also been investigated in the context of improving the quality characteristics of Goji fruits.

The studies showed that in the control group (St) the yield for both species was from 38.4 to 40.0 kg. With the use of stimulants, the results were significantly higher: with the use of Gibberellin, the yield varied from 41.6 to 51.2 kg, and with the treatment with the stimulant "Ghana Plus" - from 44.8 to 56.0 kg (Table 3). According to the table data, the fruits of L. barbarum treated with

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the stimulant Gibberellin have a weight of 320 g, while when using "Gana plus" their weight is 350 g. For L. chinense, when treated with Gibberellin, the weight of the fruits reaches 260 g, and with the use of "Gana plus" - 280 g.

Thus, from an area of 1 hectare, for L. barbarum, treated with the stimulants Gibberellin and "Gana Plus", the yield varies from 512.0 to 560.0 kg. For L. chinense, when using the same stimulants, the yield is from 416.0 to 448.0 kg.

Table 3. The effect of stimulants on improving soil fertility when growing Goji

Types of Goji	Options	Cultivation area, ha	In one bush, g	Fruit weight treated with stimulants, g	Yield from experimental area, kg	Productivity per hectare of area, kg	Difference compared to control, ±	Increase in yield	
								кг	Compared to (St), ±
L.Barbarum	Control(St)	0,10	200	250	40,0	400,0		+50	
	Gibberellin	0,10	210	320	51,2	512,0	±112,0	+110,0	±60,0
	Ghana plus	0,10	215	350	56,0	560,0	±160,0	+135,0	±85,0
L.chinense	Control(St)	0,10	180	240	38,4	384,0		+60,0	
	Gibberellin	0,10	200	260	41,6	416,0	±32,0	+60,0	
	Ghana plus	0,10	200	280	44,8	448,0	±64,0	+80,0	±20,0

Conclusions and Suggestions

Research conducted in the Republic of Uzbekistan showed that L. chinense and L. barbarum species successfully develop in various soil conditions. Our results confirm that with a water supply of 2000 m³ in irrigated areas, a high yield of up to 66.0 kg can be obtained.

The use of organic and biohumus fertilizers helps to increase the yield. In the area where organic fertilizer was applied, the yield was 33.0 kg, and in the area with biohumus - 42.0 kg. The biohumus variant showed the greatest results compared to the organic and control variants.

Treatment of technically ripe fruits with the stimulants Gibberellin and "Gana Plus" resulted in a high yield: 41.6-51.2 kg when using Gibberellin and 44.8-56.0 kg when using "Gana Plus". These results significantly exceed the yield obtained in the control group.

References

1. Alikarieva D.M., Kamalova M.D. Morphological and anatomical study of Lycium halimifolium Mill. / Pharmaceutical journal. - 2020. - No. 4. - P. 24-30.
2. Alikarieva D. M., Merganov A. T., Kamalova M. D. Scientific and practical foundations of the technology of cultivation and processing of fruits of Lycium chinense Mill. and Lycium barbarum L // Actual problems of ecology and nature management. - 2022. - P. 295-302.

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webofjournals.com/index.php/8

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3. Ali M. C., Chen J., Zhang H., Li Z., Zhao L., & Qiu H. Effective extraction of flavonoids from Lycium barbarum L. fruits by deep eutectic solvents-based ultrasound-assisted extraction //Talanta. – 2019. – Т. 203. – С. 16-22.
4. AlikarievaD.,M,Merganov A.T., Kamalova M. J.//European Journal of Agricultural and Rural Education (EJARE) Available Online at: Vol. 2 No. 12, December 2021, ISSN: 2660-5643 96-103.https://scholarzest.com/index.php/ejare/article/view/1589
5. B.T.Jobborov, D.M. Alikarieva, M.D. Kamalova, N.A. Adilova. The Ecological State and the Problems of Recultivation of Man-Made Disturbed Irrigated Soils//Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 4477 – 4492.
6. Vetrova O. A., Roeva T. A. Influence of mineral fertilizers on the biochemical composition and quality of fruits // Contemporary horticulture. - 2019. - No. 3. - P. 48-69.
7. Dospehov B.A. Metodika polevogo opyta (s osnovami statisticheskoj obrabotki rezul'tatov issledovanij) / B.A. Dospehov. – M.: Agroproizdat, 1985. -351 s.
8. Dumont, D., Danielato, G., Chastellier, A., Hibrand Saint Oyant, L., Fanciullino, A. L., & Lugan, R. Multi-targeted metabolic profiling of carotenoids, phenolic compounds and primary metabolites in goji (Lycium spp.) berry and tomato (Solanum lycopersicum) reveals inter and intra genus biomarkers //Metabolites. – 2020. – Т. 10. – №. 10. – С. 422.
9. Jarouche M., Suresh, H., Hennell, J., Sullivan, S., Lee, S., Singh, S., Khoo, C. The quality assessment of commercial Lycium berries using LC-ESI-MS/MS and chemometrics //Plants. – 2019. – Т. 8. – №. 12. – С. 604. Стр 1-17.
10. Ivanenko E. N., Dronik A. A. Influence of foliar nutrition on the yield and commercial qualities of apple fruits in arid conditions // Niva Povolzhya. - 2018. - No. 2 (47). - P. 94-98.
11. Koleva M., Tzvetanova V. The magic fruit Goji Berry //ECOLOGY AND ENVIRONMENT. Bulgaria, Shumen 2018. c. 160. - С. 59-65
12. Kuzin, A. I. The influence of different methods of fertilizer application on the development of individual components of apple tree productivity / A. I. Kuzin, Yu. V. Trunov, A. V. Soloviev // Bulletin of Michurinsk State Agrarian University. - 2015. - No. 3. - P. 26-35.
13. Roeva T. A. Mineral nutrition as a factor in the productivity and quality of cherry and sweet cherry fruits // Contemporary horticulture. - 2018. - No. 2 (26). - P. 48-69.
14. Skorina V. V. Influence of complex mineral fertilizers on the yield and quality of apple varieties // Bulletin of the Belarusian State Agricultural Academy. - 2021. - No. 4. - P. 64-68.
15. Turetskaya, R.Kh. Vegetative propagation of plants using growth stimulants / R.Kh. Turetskaya, F.Ya. Polikarpova. - M .: Publ. "Science", 1968. - 94 p.

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