

Cultivation of Goji (*Lycium Barbarum*) Plant on Irrigated Gray and Meadow Soils

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Annotation: This article provides a detailed study of the cultivation of goji (*Lycium barbarum*) under irrigated conditions on gray and meadow soils in Uzbekistan. Attention is given to the climatic and soil requirements of the goji plant, and scientifically based recommendations are provided regarding irrigation regimes, soil preparation, seed selection, fertilization, and care methods. Additionally, information is presented on the advantages of growing goji on gray and meadow soils, harvesting technologies, as well as measures for controlling diseases and pests. The research results demonstrate the potential for successful development of goji cultivation in Uzbekistan and can be applied in the development of agronomically and economically efficient technologies in this field. The article serves as a valuable resource for agricultural specialists, researchers, and producers.

Keywords: Goji (*Lycium barbarum*), gray soil, meadow soil, irrigated land, irrigation regime, soil preparation, fertilization, diseases and pests, harvesting technology, medicinal plants.

Introduction. Uzbekistan has very favorable natural conditions for agriculture, particularly wide opportunities for cultivating various crops on gray and meadow soils. In recent years, due to the growing global demand for health-promoting and nutritious foods, increasing attention has been paid to the production of medicinal and functional food products. One such product is the goji plant (*Lycium barbarum*). Goji berries have gained worldwide popularity due to their antioxidant, immune-boosting, and many other beneficial properties.

The goji plant is well adapted to arid and semi-arid climatic conditions and demonstrates high yield potential on irrigated gray and meadow soils. This crop is considered a new and promising direction for Uzbekistan's agriculture, as it is economically efficient and also possesses soil-conserving and climate-adaptation characteristics. This article examines in detail the technology of cultivating goji on irrigated gray and meadow soils, including irrigation regimes, soil preparation, and crop management practices [1].

Soil and climate requirements. Although the goji plant is adapted to hot and dry climatic conditions, it produces higher yields under irrigated conditions. It can be cultivated even on gray soils characterized by sandy-loamy texture and relatively low nutrient content. Meadow soils, on the other hand, have a good moisture-retention capacity, which promotes proper development of the plant's root system.

Goji requires soils with a neutral or slightly acidic reaction (pH 6.5–7.5). The salt content in the soil should be low, as increased salinity negatively affects plant growth and development.

Irrigation regime. Water management plays a crucial role in cultivating goji on irrigated gray and meadow soils. Although goji is drought-tolerant, it requires sufficient moisture during the fruiting period. Adequate irrigation during flowering and fruit ripening significantly improves yield and fruit quality. Irrigation intensity is determined by the soil's water-holding capacity and climatic conditions. Typically, irrigation intervals range from 7 to 10 days; however, under high temperature conditions, this period may be shortened [2].

Soil preparation and planting material. Prior to planting goji, the soil is deeply tilled and enriched with organic matter. On gray soils, the application of nitrogen, phosphorus, and potassium fertilizers is mandatory. These nutrients are essential for proper root development and improvement of fruit quality. Special attention should be paid to the quality of planting material. To ensure high productivity, it is recommended to use high-quality, disease-free goji seeds or seedlings.

Crop management and disease control. Although goji is considered a low-maintenance crop, under irrigated conditions it requires proper watering, fertilization, and weed control. Weeds slow down plant growth and reduce yield. It is also important to implement preventive measures against diseases and pests. In particular, rot diseases may develop due to excessive moisture during irrigation; therefore, careful control of the irrigation regime is essential [3].

Table 1. Growth and yield indicators of goji plants cultivated on irrigated gray and meadow soils.

Indicators	Gray soil (low irrigation)	Gray soil (over-watering)	Grassland soil (low irrigation)	Grassy soil (over-watering)
Plant height, cm	85	102	95	120
Number of leaves (average)	45	65	50	78
Flowering period, days	35	32	33	29
Fruit yield, kg/ha	1500	1900	1700	2300
Average fruit weight, g	2.8	3.3	3.0	3.7

Literature Review.

In recent years, the cultivation of goji (*Lycium barbarum*) has been widely studied in global agronomy and agricultural sciences. International research provides in-depth information on the bioactive components of goji berries and their health benefits (Zhang et al., 2017; Wang et al., 2019). At the same time, the adaptation of goji as a crop to various climatic and soil conditions,

as well as technologies aimed at increasing yield, have also been extensively investigated [4].

Although scientific studies on goji cultivation in sierozem (gray) and meadow soils are relatively limited, available research indicates that the plant is well adapted to arid and semi-arid climatic conditions and is capable of producing high yields with relatively low water consumption (Li et al., 2020). For example, experiments conducted in China analyzed the impact of irrigation regimes on goji yield and demonstrated that irrigation timing and water volume significantly affect fruit quality (Chen et al., 2018) [5].

In the context of Uzbekistan, scientific research on goji cultivation remains limited; however, existing data provide valuable insights into the effects of irrigation and fertilization technologies on crop productivity in sierozem and meadow soils (Islomov et al., 2021). In addition, recommendations are being developed regarding the improvement of soil chemical properties, weed control, and disease prevention [6]. Experimental studies conducted in the Tashkent and Bukhara regions have also examined the adaptability of goji to local soil and climatic conditions, yield stability, and economic efficiency (Karimov, 2022). These studies contribute to the further improvement of goji cultivation technologies in irrigated sierozem and meadow soils. Overall, the existing scientific literature emphasizes the importance of efficient irrigation and soil management practices in cultivating goji under irrigated arid soil conditions [7]. Ongoing research in Uzbekistan creates a foundation for developing innovative technologies adapted to local climatic and soil characteristics.

Research Methodology.

This study employed experimental methods to assess the effectiveness of goji (*Lycium barbarum*) cultivation technologies in irrigated sierozem and meadow soils. The research was conducted in agricultural regions of Uzbekistan characterized by these soil types.

The experiment was established on two soil types—sierozem and meadow soils. Each experimental plot was equipped with an irrigation system, and irrigation regimes and fertilization levels were investigated. The physical and chemical properties of the soils (pH, moisture content, and nutrient levels) were measured prior to the experiment.

High-quality, selected goji seeds were used for the trial. The seeds were pre-soaked for 5 hours before sowing. Planting was carried out in the spring season when soil temperature reached +10 °C. Seeds were sown with a spacing of 70 cm between rows and 50 cm between plants. During the experiment, the effects of irrigation regimes on plant growth and yield were studied. Three irrigation treatments were established: low irrigation, optimal irrigation, and excessive irrigation. The amount of irrigation water was controlled based on soil moisture levels and crop water requirements [8].

Fertilization and Crop Management.

For soil fertilization, complex fertilizers containing nitrogen (N), phosphorus (P), and potassium (K) were applied. Fertilization was carried out twice: during the early stages of plant growth and at the flowering stage. Weeds were removed manually or using mechanical methods. Plant growth dynamics, including the number and size of leaves, as well as flowering and fruiting periods, were regularly observed. Yield volume and quality indicators—such as fruit weight, shape, and degree of red coloration—were measured. Experimental data were analyzed using statistical methods, specifically the ANOVA test, and the results were presented in the form of graphs and tables. During the experiment, the main diseases and pests affecting goji plants were identified, and preventive measures were implemented to control them. Pest monitoring was conducted once a week.

Discussion of Results.

The research findings indicate that the efficiency of cultivating goji plants in irrigated sierozem and meadow soils is directly dependent on soil type, irrigation regime, and crop management

conditions. In sierozem soils, due to their low water-holding capacity, an optimal irrigation regime had a significant impact on plant growth and yield formation. Under insufficient irrigation, plants experienced water stress, which led to a reduction in fruit yield. This result is consistent with the findings of Chen et al. (2018), who emphasized that irrigation intensity has a significant effect on the quality and quantity of goji fruits.

In meadow soils, however, better moisture retention ensured more stable plant growth, and yield levels were higher compared to those obtained in sierozem soils. This observation confirms the data reported by Li et al. (2020), who highlighted that meadow soils provide more favorable conditions for plant growth [9].

Fertilization and weed control had a positive effect on plant development. In particular, nitrogen fertilizers increased soil fertility and contributed to greater leaf biomass and fruit mass in goji plants. These results are consistent with studies conducted under Uzbekistan's conditions by Islomov et al. (2021). Monitoring of diseases and pests showed that maintaining an appropriate irrigation regime is a key factor in protecting plants from rot and other moisture-related diseases [10]. Excessive irrigation, on the other hand, increases the risk of rot, indicating that irrigation should be maintained at an optimal level. Overall, improving cultivation technologies for goji plants in irrigated sierozem and meadow soils contributes to increased yields and improved crop quality. The research results demonstrate the potential for successful cultivation of goji plants in various regions of Uzbekistan and provide a foundation for developing economically efficient production technologies.

Conclusion.

The results of this study demonstrate that cultivating goji (*Lycium barbarum*) in irrigated sierozem and meadow soils under Uzbekistan's conditions makes it possible to obtain high yields and high-quality fruits. Soil type and irrigation regime have a significant influence on plant growth, development, and fruiting. Due to their superior water-holding capacity, meadow soils ensure more stable plant growth and higher yields. Optimal irrigation management, proper fertilization, and effective weed control play a crucial role in increasing productivity and protecting plants from diseases.

In goji cultivation, special attention should be given to the physical and chemical properties of the soil, the proper organization of irrigation systems, and strict adherence to agrotechnical practices. The widespread adoption of these technologies can create a new profitable direction in Uzbekistan's agricultural sector. In the future, further research should focus on optimizing irrigation and fertilization systems, breeding new high-yielding varieties, and improving disease and pest control methods to enhance the efficiency of goji cultivation in irrigated sierozem and meadow soils.

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