

**ECONOMIC EFFICIENCY OF BLACKBERRY PLANTATION AND DEEP  
PROCESSING TECHNOLOGIES BASED ON A SUSTAINABLE AGRO-INNOVATIVE  
MODEL**

*Idrisova Mayramxon Anarboy qizi*

*Ergashova Dilshoda Ulug'bek qizi*

*Student of Termez State Pedagogical Institute*

*Khayitova Shahlo Davlatovna*

*Associate Professor of Termez State Pedagogical Institute*

[mayramxonidrisova@gmail.com](mailto:mayramxonidrisova@gmail.com)

**Abstract:** This scientific article presents an integrated agro-cluster model based on a 1-hectare intensive blackberry plantation combining advanced agro-technology, processing (tea, syrup, extract production), and agro-tourism. The annual yield reaches up to 20 tons. Economic analysis demonstrates annual revenue of 900 million UZS with a net profit of 356 million UZS. The project achieves payback within three years and establishes a sustainable high value-added agricultural model.

**Keywords:** Blackberry, intensive plantation, agro-innovation, extraction, agro-tourism, profitability, value added.

**Introductuon:** Globally, the agricultural sector is transitioning from a model focused on simple raw material production to one oriented toward processing and generating higher added value. The demand in the global market for functional food products, natural antioxidants, and pharmaceutical raw materials is steadily increasing. Blackberry (*Rubus fruticosus* L.) is considered a plant rich in biologically active compounds and serves as an important source of polyphenols, anthocyanins, flavonoids, ascorbic acid, and vitamin K.

Plantations established on the basis of intensive agrotechnology enable efficient use of water resources, increased productivity, and preservation of soil fertility. The drip irrigation system can reduce water consumption by up to 40% and ensures the precise delivery of mineral nutrients to the root zone.

The climatic conditions of Uzbekistan (continental climate, a high number of sunny days, and a long vegetation period) create favorable agroecological conditions for blackberry cultivation. The aim of this study is to develop an integrated model based on blackberry plantations that ensures economic, environmental, and social efficiency.

**Main Part:** The EcoEjevika Plantation project represents an integrated agro-cluster model that combines intensive agrotechnology, deep processing, and agrotourism into a single economic system. The project envisages planting 4,000 blackberry seedlings on an area of 1 hectare (10,000 m<sup>2</sup>) using a planting scheme of 2.5 × 1 meters. Such density is considered optimal for maximizing light utilization, ensuring proper air circulation, and facilitating mechanized maintenance processes.

Blackberry plants demonstrate high productivity in fertile soils rich in organic matter with an average pH of 6.0–6.5. When drip irrigation is applied, water consumption is reduced by 35–40% compared with traditional irrigation methods, while the efficiency of fertilizer uptake increases. During the vegetation period, balanced application of nitrogen-phosphorus-potassium fertilizers, pruning of vegetative shoots, and the use of vertical support structures make it possible to obtain an average yield of about 5 kg per plant. Thus, obtaining approximately 20,000 kg, or up to 20 tons, of annual yield from 4,000 plants is considered an agronomically justified indicator.

Selling the harvest solely as raw material results in relatively low added value; therefore, the project proposes product diversification. Of the annual 20-ton harvest, 6 tons are sold through the agrotourism “Pick-Your-Own” model. In this model, consumers visit the plantation, harvest the berries themselves, and pay for the collected fruit. This approach allows the product to be sold at prices 30–40% higher than wholesale market prices and also generates additional income from service activities. During the season, the plantation can receive an average of about 3,000 visitors, contributing to the development of regional tourism and increasing environmental awareness among the population.

Three tons of fruit are allocated for extract production. The extraction process is based on the separation of biologically active compounds using aqueous or hydroalcoholic solutions. By optimizing the temperature and time parameters in the extraction apparatus, the maximum yield of polyphenols and flavonoids can be achieved. On average, about 2,000 liters of concentrated extract can be obtained from 3 tons of raw material. This product can be used in the pharmaceutical, dietary supplement, and cosmetic industries. Due to its high added value, the extract plays a key role in generating net income.

Leaves and vegetative parts are dried to produce tea products. Drying is carried out at a temperature of 40–50 °C, which helps preserve bioactive components, particularly tannins. Approximately 1,000 kg of finished tea products can be produced annually. Blackberry leaf tea possesses anti-inflammatory, antioxidant, and general strengthening properties and is in demand both in domestic markets and export segments.

According to the economic analysis, the project generates approximately 900 million Uzbek soums in total annual revenue. Annual operating costs (labor, energy resources, additional raw materials, marketing, transportation, and agrotechnical maintenance) amount to 544 million soums. As a result, the net profit reaches 356 million soums. The profitability level exceeds 60%, which is considered a high efficiency indicator for the agricultural sector. Given an initial investment of 1.09 billion soums, the project is expected to achieve full payback within three years.

From an ecological perspective, the project complies with the principles of sustainable development. Drip irrigation conserves water resources, organic waste is recycled through composting, and the minimal use of chemical agents is ensured through an integrated plant protection system. Socially, the project creates 5–7 permanent jobs, increases seasonal employment, and promotes the development of entrepreneurship in rural areas.

Thus, the EcoEjevika Plantation model represents a comprehensive system capable of ensuring economic efficiency, environmental sustainability, and social development as a high value-added agro-cluster combining intensive agrotechnology, deep processing, and agrotourism. This model can also be replicated in other regions of the republic and may play an important role in modernizing the agricultural sector and increasing export potential.

**Conclusion:** The EcoEjevika Plantation project represents an innovative model that integrates intensive agrotechnology, product processing, and agrotourism. It enables the production of up to 20 tons of yield per hectare, the commercialization of products with high added value, and the recovery of investment within three years. The model ensures economic efficiency, environmental sustainability, and social development, and it has strong potential for replication under the conditions of Uzbekistan.

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