

ECONOMIC EFFICIENCY OF CULTIVATING CUMIN (CUMINUM CYMINUM L.) VARIETY SAMPLES

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Abstract: This article analyzes the economic efficiency of cultivating cumin (*Cuminum cyminum* L.) variety samples under the conditions of the Tashkent Experimental Station of the Research Institute of Vegetable, Melon Crops and Potato Growing during 2022–2024. The yield ranged from 385 to 455 kg/ha, with the highest indicators recorded for the Ch-1 and In-1 varieties. Economic calculations showed that net profit amounted to 21.4–30.2 million UZS/ha, while the profitability level ranged from 80.4% to 113.3%. A very strong correlation was identified between yield and net income ($r = 0.97$). The results prove that cumin cultivation is an economically efficient production area under the conditions of Uzbekistan.

Keywords: cumin, variety sample, economic efficiency, production cost, profitability, net profit, yield, essential oil.

Introduction

Essential oil crops, including cumin (*Cuminum cyminum* L.), are not only valuable medicinal and food products but also strategic agricultural crops with high export potential. In Uzbekistan, expanding cumin cultivation areas, selecting varieties adapted to local climatic conditions, and increasing economic efficiency are among the priority tasks. For this purpose, biological yield and economic efficiency were analyzed for different cumin varieties.

Research Methodology

The research was conducted during 2022–2024 under the conditions of the Tashkent Experimental Station of the Research Institute of Vegetable, Melon Crops and Potato Growing. The experimental procedures were carried out in accordance with the principles and statistical analysis methods described in B. A. Dospekhov's "Methodology of Field Experiment" (Moscow: Agropromizdat, 2011, 351 p.).

Research Results

Cumin cultivation is considered one of the economically valuable branches of agriculture among essential oil crops. Under market economy conditions, determining the economic benefit of each new variety or technology is of great importance. If a new variety does not provide a high net profit to a farm, its introduction into production cannot be considered justified.



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The calculations were carried out on a one-hectare basis. Production costs, yield, product price, net income, production cost, and profitability levels were determined.

Therefore, assessing the economic efficiency of cumin cultivation, analyzing the structure of production costs, and determining the profitability level of each variety are of both scientific and practical importance. Within the framework of the study, economic indicators were analyzed for six cumin variety samples: Ch-1, In-1, Pt-1, Sd-1, Zn-1, and Ir-1.

According to the data obtained, the economic efficiency of cumin varieties differed to a certain extent. The main production costs for all varieties were almost the same and mainly included seed, mineral fertilizers, fuel and lubricants, and crop care operations.

Harvesting and transportation costs were approximately 115–122 thousand UZS. Taking into account overhead costs (25%) and unforeseen expenses (20%), total production costs amounted to 26.67–26.68 million UZS/ha for all varieties. This indicates that production costs were stable across varieties and that economic differences were mainly associated with yield and product quality.

When costs remain almost constant, an increase in yield leads to a significant rise in gross income, net profit, and profitability. According to the calculations, every 10% increase in yield raised net income by an average of 18–20% and profitability by 10–12%.

In the study, the yield of cumin varieties varied from 385 to 455 kg/ha. When the product was sold on the market at 125,000 UZS/kg, every 10 kg/ha increase in yield increased gross income by 1.25 million UZS/ha, while every 100 kg/ha increase raised gross income by 12.5 million UZS/ha. A very strong positive relationship was found between yield and gross income ($r = 0.97$).

The increase in yield simultaneously reduced the production cost per 100 kg of product, thereby improving production efficiency. The lowest production cost was recorded for the Ch-1 variety (5.860 million UZS), while the highest was recorded for the Ir-1 variety (6.928 million UZS).

The profitability level ranged from 80% to 113% depending on the variety. The highest indicators were observed in the Ch-1 (113.3%), In-1 (111.0%), and Pt-1 (106.0%) varieties. The Sd-1 and Zn-1 varieties were considered economically stable (92–99%), while the Ir-1 variety showed a relatively lower profitability level (80.4%), which is explained by its lower yield and higher production cost.

In addition to yield, the essential oil content also influenced economic efficiency. Among the varieties, essential oil content ranged from 2.8% to 3.7%. It was determined that each 0.1% increase in essential oil content increased net profit by an average of 2.5–3.0% ($r = 0.86$). This shows that varieties with higher essential oil content are economically superior not only in terms of yield but also in terms of product quality.

Overall, at a market price of 125,000 UZS/kg, cumin cultivation can be regarded as a highly profitable and economically efficient agricultural sector. The Ch-1, In-1, and Pt-1 varieties were found to be the most economically efficient and are recommended for wider introduction into production.



Conclusions

1. The profitability level of cumin varieties ranged from 80.4% to 113.3%. All varieties were economically efficient; however, Ch-1 and In-1 showed the highest profitability.
2. The highest net profit was recorded for the Ch-1 variety (30.2 million UZS/ha), while the lowest was recorded for the Ir-1 variety (21.4 million UZS/ha).
3. A very strong correlation was found between yield and net income ($r = 0.97$). Every 10% increase in yield increased net income by an average of 15–18%.
4. Essential oil content had a significant effect on economic efficiency ($r = 0.86$). Each 0.1% increase in oil content increased net profit by 2.5–3.0%.
5. When production costs remain the same, increasing yield significantly improves profitability. By improving agrotechnical measures and irrigation systems, increasing yield by 10–15% may raise economic efficiency by at least 20%.

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