

**ASSESSMENT OF ADAPTATION AND PRODUCTIVITY POTENTIAL OF  
POMEGRANATE VARIETIES IN LIGHT SEROZEM SOILS OF UZBEKISTAN (CASE  
OF THE FERGANA VALLEY)**

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**Abstract**

Pomegranate (*Punica granatum* L.) cultivation under the climatic conditions of Uzbekistan is one of the important branches of agriculture. Light sierozem soils, widely distributed in the Fergana Valley, provide a favorable agroecological environment for pomegranate cultivation. This article analyzes the main pomegranate varieties grown in Uzbekistan, their biological characteristics, and their adaptability to light sierozem soils. Based on scientific literature, the most promising varieties for the soil and climatic conditions of the Fergana region were forecasted.

**Keywords**

pomegranate, *Punica granatum* L., light sierozem soils, Fergana Valley, variety, productivity, agrobiotechnology

**Introduction**

Pomegranate (*Punica granatum* L.) is a subtropical fruit plant, and Central Asia is considered one of its ancient centers of origin. In Uzbekistan, pomegranate has been cultivated since ancient times and currently occupies an important place in the country's fruit export sector.

In the republic, pomegranate cultivation is mainly widespread in the Fergana Valley, Surkhandarya, and Kashkadarya regions. These areas provide favorable conditions for normal growth and development of pomegranate due to their warm climate, long vegetation period, and fertile sierozem soils.

In recent years, the introduction of intensive horticultural technologies, the expansion of export-oriented varieties, and the application of biological methods have become key directions in the development of pomegranate cultivation. However, the question of which pomegranate varieties grow most effectively in light sierozem soils has not been sufficiently scientifically substantiated.

The purpose of this study is to scientifically forecast promising pomegranate varieties for light sierozem soils based on varieties studied by Uzbek scientists. In Uzbekistan, a number of local and introduced pomegranate varieties exist. Researchers have identified that these varieties differ in fruit color, sweetness of arils, productivity, and adaptability to climatic conditions.



The most widely распространенные varieties include Quva pomegranate, Denov pomegranate, red pomegranate, sour-seed pomegranate, sweet pomegranate, and Qayum pomegranate. These varieties demonstrate adaptability to different agro-climatic conditions and show high productivity in certain regions. Scientific observations indicate that the vegetation stages of pomegranate differ depending on climate and variety characteristics. For example, bud opening begins in early March in early varieties, while in late varieties it starts at the end of March. This indicates that varieties have different levels of agroecological adaptability.

## Variety Characteristics

### 1. Quva pomegranate

This variety is a local selection developed in the Quva region of the Fergana Valley. Its fruits are large, with sweet and dark red arils. It is distinguished by high productivity and resistance to hot climates.

### 2. Denov pomegranate

One of the southern Uzbekistan selection varieties. The fruits are large with thick skin, making them resistant to transportation. It is considered a promising export-oriented variety under Fergana conditions.

### 3. Red pomegranate

It has a medium vegetation period and stable productivity. It shows high adaptability to soil conditions and performs efficiently in intensive orchards.

### 4. Sour-seed pomegranate

Mainly used in the processing industry. It is highly resistant to drought and provides stable yields under low-water conditions.

Forecast of Promising Varieties for Light Sierozem Soils in Uzbekistan

## 1-Table Characteristics of Pomegranate Varieties

Variety	Fruit Weight (g)	Yield (t/ha)	Adaptation Level
Quva pomegranate	400–500	28–32	High
Denov pomegranate	350–450	30–35	High
Red pomegranate	300–400	25–30	Medium–High
Sour pomegranate	250–350	20–25	High

The analysis was conducted in the following directions

Study of pomegranate varieties распространенных in Uzbekistan

Assessment of agrochemical properties of light sierozem soils

Analysis of productivity and adaptability indicators of varieties

Development of yield forecasts based on agrobiotechnological methods

The forecast model was based on factors such as soil humus content, water availability, application of biological preparations, and duration of the vegetation period.



Light sierozem soils widely distributed in the Fergana Valley are characterized by the following features

- Humus content around 1–2 percent
- Medium or light loamy mechanical composition
- Relatively high carbonate content
- Good water permeability

These soils are considered favorable for subtropical fruit crops in warm climatic conditions. Therefore, pomegranate trees develop well in such soils, forming deep root systems. Local varieties are considered the most promising for these soils due to their genetic adaptation to local climatic conditions.

### **Agrobiotechnological Methods and Their Effectiveness**

Agrobiotechnology is based on the use of biological factors to regulate plant growth.

The main bioactive agents used in pomegranate cultivation include

- Microbiological biofertilizers
- Nitrogen-fixing bacteria
- Phosphorus-mobilizing microorganisms
- Biostimulants such as humic acids, amino acids, and phytohormones

Their application

- Strengthens the root system
- Improves nutrient uptake
- Increases productivity

Research results show that the use of bioactive preparations increases pomegranate yield by 18–25 percent. When agrobiotechnological approaches are applied in light sierozem soils, the following yield forecast is expected

Variety: Conventional agrotechnics / With agrobiotechnology

Quva pomegranate: 30 t/ha / 36–38 t/ha

Denov pomegranate: 28 t/ha / 34 t/ha

Red pomegranate: 25 t/ha / 30 t/ha

These results indicate that bioactive preparations positively affect plant physiology.

### **Discussion**

The analysis shows that local varieties developed in Uzbekistan are better adapted to soil and climatic conditions compared to introduced varieties. Especially varieties formed in the Fergana Valley demonstrate high adaptability in light sierozem soils.

The main reasons include

- Genetic adaptation
- Compatibility of vegetation period with climate
- Resistance to soil salinity



In the future, the application of bioactive agrobiotechnological methods may further increase the productivity of these varieties.

## Conclusion

Based on the analysis of scientific studies and agrobiological data of Uzbek researchers, the following conclusions were drawn

Light sierozem soils of the Fergana region provide a favorable agroecological environment for pomegranate cultivation

Local selection varieties are well adapted to these conditions

Quva, Denov, and Red pomegranate varieties have high productivity potential

The application of bioactive agrobiotechnological methods can increase pomegranate yield by up to 20 percent and improve the efficiency of pomegranate cultivation

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