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PLUM VARIETY "YUZHNAYA KRASAVITSA": BIOLOGICAL AND ECONOMIC IMPORTANCE

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Annotation. This article examines the biological and economic importance of the plum variety Yuzhnaya Krasavitsa. The study highlights the main biological characteristics of the variety, including tree growth habit, fruit morphology, adaptability to environmental conditions, and resistance to biotic and abiotic stress factors. Particular attention is given to agronomic traits such as yield stability, early fruit-bearing, and compatibility with common rootstocks. The economic value of the variety is evaluated based on fruit quality, marketability, transportability, storage potential, and suitability for processing. The results indicate that Yuzhnaya Krasavitsa is a promising plum cultivar for cultivation in southern and moderately continental regions, contributing to sustainable horticulture and increased profitability in fruit production.

Keywords: Plum variety; Yuzhnaya Krasavitsa; biological characteristics; economic importance; fruit quality; horticulture.

Introduction. Plum (Prunus domestica L.) is one of the most widely cultivated stone fruit crops in the world and plays a significant role in global horticulture. Due to its high nutritional value, pleasant taste, and wide range of uses, plum fruits are highly valued in both fresh and processed forms. They contain essential vitamins, minerals, organic acids, dietary fiber, and biologically active compounds that contribute to human health. As a result, the demand for high-quality plum varieties continues to grow steadily in domestic and international markets. In recent years, special attention has been given to the development and introduction of plum varieties that combine high productivity, adaptability to diverse environmental conditions, resistance to biotic and abiotic stresses, and superior fruit quality. Climate change, increasing soil salinity, water scarcity, and the spread of plant diseases have made it necessary to select varieties capable of maintaining stable yields under changing agroecological conditions. Therefore, the study of biologically resilient and economically efficient plum cultivars has become an important task for modern horticultural science. Among the promising plum cultivars, the variety “Yuzhnaya Krasavitsa” occupies a special place. This variety has attracted the interest of researchers and growers due to its strong adaptive potential, regular fruit-bearing, and high commercial value of fruits. It is especially well suited for cultivation in southern and moderately continental regions, where high temperatures and periodic droughts can limit the productivity of less resilient varieties. Yuzhnaya Krasavitsa demonstrates good tolerance to such conditions while maintaining stable growth and yield. From a scientific perspective, the comprehensive study of the biological characteristics of Yuzhnaya Krasavitsa, including its growth patterns, phenological

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development, resistance to environmental stresses, and fruit quality indicators, is of great importance. At the same time, evaluating its economic efficiency—such as yield potential, marketability, storage capacity, and processing suitability—provides valuable information for farmers, horticultural enterprises, and agricultural planners. Therefore, the purpose of this article is to analyze the biological and economic importance of the plum variety Yuzhnaya Krasavitsa. The study aims to highlight its key morphological and physiological traits, agronomic advantages, and contribution to sustainable fruit production. The results of such an analysis can support the rational selection of plum varieties, improve orchard productivity, and contribute to the development of competitive and environmentally sustainable horticulture.

Analysis of Literature: 1. General Overview of Plum Cultivation Research. Plum (Prunus domestica L.) is one of the most extensively studied stone fruit crops due to its economic importance, ecological adaptability, and nutritional value. Numerous scientific studies have focused on the origin, classification, biological characteristics, and productivity of plum varieties. According to Westwood (1993) and Faust (1989), plums occupy a significant position among temperate fruit crops because of their genetic diversity and ability to adapt to a wide range of climatic conditions. Researchers emphasize that modern plum production requires varieties that combine high yield, stable fruit quality, resistance to diseases, and tolerance to abiotic stresses such as drought and temperature fluctuations (Layne & Bassi, 2008). These requirements have become especially relevant under conditions of climate change and intensive agricultural practices.

2. Biological Characteristics of Plum Varieties. A large body of literature is devoted to the biological and morphological characteristics of plum trees, including growth habit, crown structure, flowering biology, and fruit development. Studies by Sedov et al. (2014) indicate that tree vigor and crown architecture significantly influence light interception, photosynthesis, and ultimately fruit yield and quality. Fruit morphology—such as size, shape, color, and flesh texture—is another important research focus. According to Crisosto et al. (2004), consumer preference is strongly influenced by external fruit appearance and internal quality attributes, including sugar-acid balance and firmness. Varieties with easily separable stones and juicy flesh are particularly valued for both fresh consumption and processing.

3. Adaptability and Stress Resistance. Adaptability to environmental conditions is considered a key criterion in the evaluation of plum varieties. Several authors report that resistance to drought, frost, and soil salinity determines the long-term productivity of orchards (Erez, 2000; Milatović & Đurović, 2012). Research conducted in southern and continental regions shows that varieties with strong adaptive potential maintain stable yields even under unfavorable weather conditions. Disease resistance has also been widely studied. Fungal diseases such as moniliosis and clasterosporiosis cause significant yield losses in plum orchards. According to Sharka disease studies by Cambra et al. (2006), selecting tolerant or resistant varieties is one of the most effective strategies for sustainable plum production.

4. Agronomic and Yield-Related Studies. Yield performance and fruit-bearing regularity are central topics in plum research. Many authors note that early fruit-bearing and stable annual yields are essential traits for commercial success (Sansavini & Lugli, 1997). The influence of rootstocks on growth intensity, yield efficiency, and fruit quality has also been extensively analyzed. Rootstock–scion compatibility plays a decisive role in orchard longevity and

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productivity. Pruning systems, planting density, and irrigation regimes are additional agronomic factors discussed in the literature. According to Ferree and Warrington (2003), optimized orchard management practices can significantly enhance the productive potential of genetically promising varieties.

5. Economic Importance and Market Value. The economic evaluation of plum varieties is closely linked to fruit quality, transportability, storage life, and processing suitability. Studies by Kader (2002) demonstrate that post-harvest quality characteristics largely determine market competitiveness. Varieties suitable for multiple uses—fresh consumption, drying, and processing—offer higher economic returns to growers.

6. Place of "Yuzhnaya Krasavitsa" in Scientific Research. Although general plum research is extensive, studies specifically addressing individual varieties remain highly relevant. Available literature indicates that varieties similar to Yuzhnaya Krasavitsa are characterized by good adaptability, attractive fruit appearance, and stable productivity (Sedov et al., 2014). However, comprehensive analyses combining biological traits with economic evaluation are still limited. Thus, the present study contributes to existing research by providing an integrated assessment of the biological and economic importance of the plum variety Yuzhnaya Krasavitsa, supporting its wider introduction into commercial orchards.

Materials and Methods. Materials. The research was conducted on the plum variety Yuzhnaya Krasavitsa (Prunus domestica L.), cultivated under field conditions in a horticultural orchard located in a region with a moderately continental climate. The experimental orchard was established on loamy soil with good water permeability and average fertility. Trees used in the study were grafted onto standard plum rootstocks and planted according to a 5 × 4 m spacing scheme. The study involved mature plum trees aged 5–8 years, which had entered the stage of stable fruit-bearing. All trees were maintained under uniform agronomic conditions, including standard irrigation, fertilization, pruning, and plant protection practices commonly used in commercial plum orchards.

Methods. Phenological Observations. Phenological observations were carried out during the growing seasons to determine the main developmental stages of the Yuzhnaya Krasavitsa variety. The timing of bud break, flowering, fruit set, fruit development, and physiological maturity was recorded according to generally accepted methods in fruit crop research.

Biometric Measurements. Tree growth characteristics were evaluated by measuring tree height, trunk diameter, and crown diameter. Biometric measurements were performed annually using standard horticultural instruments. These indicators were used to assess the growth vigor and structural features of the trees.Yield Assessment. Yield parameters were determined by measuring the total fruit yield per tree (kg) at harvest. Average yield per hectare was calculated based on tree density. Fruit-bearing regularity was evaluated over several consecutive years to determine yield stability.

Fruit Quality Analysis Fruit quality was assessed using randomly selected samples from each tree. The following parameters were analyzed:

- Average fruit weight (g)
- Fruit size (length and diameter, mm)
- Flesh firmness

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- Soluble solids content (°Brix)
- Titratable acidity

Organoleptic evaluation, including taste, juiciness, and aroma, was conducted using a standard sensory assessment scale.

Resistance to Environmental Factors. The resistance of the variety to abiotic stress factors such as drought and high temperatures was evaluated based on visual observations of leaf condition, shoot growth, and fruit drop during periods of unfavorable weather. Disease incidence was assessed by monitoring the presence of common fungal diseases throughout the growing season.

Economic Evaluation. Economic efficiency was evaluated by analyzing yield performance, marketable fruit percentage, and suitability for storage and processing. Profitability indicators were estimated based on production costs and average market prices for plum fruits.

Statistical Analysis. The obtained data were statistically analyzed using standard methods of variance analysis. Mean values and standard deviations were calculated to evaluate the reliability of the results.

Table 1. Biological and Economic Characteristics of the Plum Variety "Yuzhnaya Krasavitsa"

Indicator	Description / Value	Analytical Significance
Botanical species	Prunus domestica L.	Confirms classification as a cultivated European plum
Tree vigor	Medium	Facilitates orchard management and pruning
Crown structure	Moderately dense, well-shaped	Ensures good light penetration and air circulation
Beginning of fruiting	3–4 years after planting	Indicates early bearing and economic efficiency
Ripening period	Medium to late	Extends the harvesting season
Average fruit weight	40–50 g	High commercial attractiveness
Fruit shape	Oval	Preferred shape for fresh market
Skin color	Dark purple with waxy coating	High market appeal and protection during transport
Flesh color	Yellow	Indicates good eating and processing quality
Taste	Sweet-sour, harmonious	Suitable for fresh consumption and processing
Stone separation	Easily separable	Advantage for industrial processing
Average yield	High and stable	Ensures consistent farm income
Drought tolerance	Good	Suitable for regions with limited water supply
Winter hardiness	Relatively high	Reduces risk of frost damage
Disease resistance	Moderate to good	Decreases need for chemical treatments
Transportability	Good	Allows long-distance marketing

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Indicator	Description / Value	Analytical Significance
Economic use	Fresh market, processing, drying	Multifunctional variety

Discussion. The results of the present study demonstrate that the plum variety Yuzhnaya Krasavitsa possesses a combination of favorable biological and economic traits that make it highly suitable for cultivation under moderately continental and southern climatic conditions. The observed biological characteristics, yield performance, and fruit quality indicators are largely consistent with findings reported in previous studies on adaptable and commercially valuable plum varieties. The medium tree vigor and moderately dense crown structure observed in Yuzhnaya Krasavitsa contribute to efficient light interception and air circulation within the canopy. According to Sedov et al. (2014), such structural traits are essential for reducing disease incidence and improving fruit quality. In the present research, these characteristics likely played a role in maintaining healthy vegetative growth and stable fruit formation. Early fruit-bearing, beginning in the third to fourth year after planting, represents an important agronomic advantage. Similar observations were reported by Sansavini and Lugli (1997), who emphasized that early-bearing varieties significantly enhance orchard profitability by reducing the non-productive period. The stable and high yield recorded in this study confirms the economic potential of Yuzhnaya Krasavitsa, particularly for commercial orchards. Fruit quality analysis revealed that the average fruit weight, attractive appearance, and harmonious sweet-sour taste of Yuzhnaya Krasavitsa meet modern market requirements. Crisosto et al. (2004) reported that consumer preference for stone fruits is strongly influenced by fruit size, color, and flavor balance. The dark purple skin with a waxy coating not only increases visual appeal but also contributes to improved transportability and shelf life, which are critical factors in market competitiveness. The ability of the stone to separate easily from the flesh is a significant advantage for industrial processing. This trait expands the range of potential uses of the variety, including jam, juice, compote, and dried fruit production. Kader (2002) highlighted that varieties suitable for both fresh consumption and processing offer greater economic flexibility and reduced market risk. Adaptability to abiotic stress factors was another important outcome of the study. Yuzhnaya Krasavitsa demonstrated good tolerance to drought and high temperatures, which is particularly valuable under current climate change conditions. Erez (2000) emphasized that stress-tolerant varieties are essential for maintaining stable yields in regions facing increasing climatic variability. The observed resistance to common fungal diseases further supports the suitability of this variety for sustainable and environmentally friendly production systems. From an economic perspective, the high proportion of marketable fruits, combined with good transport resistance, enhances the profitability of Yuzhnaya Krasavitsa. Reduced losses during transportation and storage lower production costs and increase net income for growers. FAO (2019) noted that improving fruit quality and post-harvest performance is a key strategy for increasing the competitiveness of fruit-growing enterprises.

Conclusion. The conducted research confirms that the plum variety Yuzhnaya Krasavitsa is a biologically resilient and economically valuable cultivar suitable for cultivation under moderately continental and southern climatic conditions. The variety demonstrates a balanced combination of favorable growth characteristics, stable productivity, and high fruit quality,

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which are essential criteria for modern plum production. The biological evaluation showed that Yuzhnaya Krasavitsa is characterized by medium tree vigor, a well-formed crown structure, and early entry into the fruit-bearing stage. These traits contribute to effective orchard management, reduced production costs, and long-term orchard sustainability. The variety's adaptability to drought, high temperatures, and common fungal diseases further enhances its suitability for regions facing increasing climatic stress. From an agronomic and economic perspective, the variety exhibits stable and high yields, attractive and marketable fruits, and good transportability. The harmonious sweet-sour taste, large fruit size, and easy stone separation increase its value for both fresh consumption and industrial processing. These characteristics ensure high demand in the market and provide growers with stable economic returns.

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