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Analysis of Quality Indicators of Tomato Plants (Yegana and Saribash Cultivars) Grown in Greenhouse Conditions on the Absheron Peninsula

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Abstract. *Background: In the Absheron Peninsula, tomato is one of the most widely consumed vegetable crops due to its high nutritional value and broad range of uses. In recent years, the application of modern greenhouse technologies and soilless cultivation systems has expanded considerably in Azerbaijan. Objective: The main objective of this research was to study the biological characteristics of the Yegana and Saribash tomato cultivars and compare the quality indicators of the two cultivars. Materials and Methods: The study was conducted in greenhouses at the Scientific Research Institute of Vegetable Growing of the Republic of Azerbaijan. The experiment was initiated in 2025 and completed in July 2026. During the study, total soluble solids, dry matter content, vitamin C content, and titratable acidity were evaluated. Results: According to the results of the biological analyses, the fruit set rate of the Saribash (351y) cultivar was higher (90–92%) than that of the Yegana (398) cultivar (85–90%). In contrast, the vitamin C content was 19.5 mg/100 g in the Saribash (351y) cultivar and 29.0 mg/100 g in the Yegana (398) cultivar. Conclusion: The comparative evaluation of the Yegana (398) and Saribash (351y) tomato cultivars under greenhouse conditions revealed clear differences in their biological and fruit quality characteristics. The results demonstrate that cultivar-specific biological and biochemical traits should be considered when selecting tomato genotypes for greenhouse production. The practical significance of this study lies in identifying cultivar-specific advantages that can support more targeted cultivar selection for different production and market purposes.*

Keywords: *greenhouse, Yegana and Saribash cultivars, coconut coir substrate, Absheron Peninsula, total soluble solids, dry matter, titratable acidity, vitamin C*

Introduction

Greenhouses in Azerbaijan have been observed to develop rapidly since 2010. Tomato plants play an important role in the diet of our country. According to statistical data, Absheron Peninsula is one of the regions where the largest number of greenhouses has been established in Azerbaijan. The main reason for the creation of modern greenhouses on the Absheron Peninsula is considered to be normal climatic conditions. The climate of the peninsula is characterized as dry subtropical, semi-desert and dry steppe, and therefore high productivity can be obtained from the cultivated plants throughout the year. Temperature, relative humidity and other microclimate indicators are regulated in greenhouses and favorable conditions are created for the normal development of tomatoes. The creation of such optimal conditions make it possible to obtain high yields (Jafarov et al., 2025).

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The creation of soilless cultivation environments has developed significantly in modern greenhouse vegetable farming. This method enables more efficient use of water and nutrients, prevention of soil-borne diseases, and improvement of product quality. Currently, coconut coir is one of the most widely used substrate for soilless cultivation in greenhouses. The main reasons for the widespread use of this substrate are its ability to better retain nutrients and moisture, better development of the root system, and optimal water-air balance. According to research, coconut coir significantly increased fruit weight and total yield compared to rock wool and peat (Katsoulas & Hadzilias, 2012). In addition, coconut is distinguished from others by being environmentally friendly susbtrate (Tuckeldoe et al., 2023).

On the Absheron Peninsula, tomatoes are the most consumed fruit plant among vegetable crops on coconut substrate. In greenhouses located on the Absheron Peninsula, temperature and relative humidity are maintained within the required limits for the development of tomato plants.

Researches indicate that tomatoes contain rich compounds with high nutritional value. Tomatoes contain vitamins, minerals and biologically active substances necessary for human health (Habtamu et al., 2016). The nutritional and consumer quality of tomato fruit is evaluated by the amount of soluble dry matter, pH, vitamin C (ascorbic acid) and other biochemical indicators (Ghehsareh et al., 2011). The change in these quality indicators of tomatoes depends on the growing environment, geographical location, types and dosage of nutrients provided for plant development, the region where the greenhouses are located and the greenhouse zones (Peixoto et al., 2017; Samad et al., 2017). Even if the tomato plant is grown on different substrates, it does not have the same quality characteristics (Akparov et al., 2024).

In order to obtain healthy and high-quality tomato seedlings in greenhouses, the temperature regime is adjusted in accordance with the development requirements of the plant (Bajon et al., 2026; Ghehsareh et al., 2011). Maintaining the optimal air temperature in the range of 26–30 °C during the seed germination period in greenhouses creates conditions for accelerating the physiological processes of the seeds and obtaining uniform emergence. After mass germination, the temperature regime is gradually lowered in order to prevent excessive elongation of the seedlings and form strong seedlings. During this period, depending on the level of air illumination, the daytime temperature is maintained at 17–19 °C on sunny days, and at 12–14 °C at night. This temperature regulation allows the development of the root system of plants, strengthening the stem, and obtaining high-quality seedlings for planting (Nour et al., 2014; Babayeva et al., 2026).

The purpose of this study was to evaluate the quantitative and qualitative characteristics of the locally prepared Yegana (398) and Saribash tomato cultivars grown in greenhouse conditions on the Absheron Peninsula on a coconut shell substrate. In particular, the determination of fruit quality characteristics, including total soluble sugars, dry matter, vitamin C, and titratable acidity, is of great scientific and practical importance in terms of meeting consumer demands and producing high-quality products (Aliyeva, 2018; Babayeva et al., 2026).

Materials and Methods

Study Site and Research Material

The study was conducted in a plastic-covered greenhouse complex of the Vegetable Research Institute located on the Absheron Peninsula of the Republic of Azerbaijan. The study was began in 2025, and observations continued from February to the end of July 2026. The object of this study was the Yegana and Saribash tomato cultivars.

Seedling Production and Transplanting
Tomato seeds were initially sown in a peat substrate. During the seedling growth period, regular monitoring was carried out, and after reaching the 14–15 day development stage, tomato seedlings were transplanted to the permanent growing site. Only healthy seedlings with uniform growth characteristics were selected for transplanting.

After seed germination, when the true leaf stage was reached, healthy seedlings with similar development levels were selected and transplanted (pricked out) into nutrient containers measuring 80 × 30 cm.

Irrigation Technology and Greenhouse Conditions
The supply of water and nutrients to plants in the greenhouse was carried out through a drip irrigation system combined with fertigation. In the seedling greenhouse of the Research Institute, maintaining an optimal temperature regime to ensure uniform seed germination and simultaneous emergence is considered one of the important agrotechnical practices (Babayeva et al., 2026; Bajon et al., 2026).

The plants were cultivated in a plastic-covered greenhouse. During the germination period, the air temperature was maintained at 22–24 °C, while after mass emergence, it was maintained at 16–19 °C during the day and 10–12 °C at night. Ventilation and temperature conditions in the greenhouse were regulated according to the vegetative growth stages of the plants.

Experimental Design

The experiment scheme was set up in three replications. Four plants were used in each replication. The distance between plants was 30 cm, while the distance between rows was 90 cm.

Fertilization System

During the vegetation period, additional fertilization was applied to improve the growth and development of tomato seedlings. Supplementary fertilization was carried out twice at 10-day intervals. During the first fertilization, plants were supplied with a nutrient solution containing nitrogen, phosphorus, and potassium at an $N_{10}P_{20}K_{15}$ ratio. During the second fertilization, NPK+ME fertilizer containing both essential macronutrients and a complex of micronutrients was applied (Babayeva et al., 2026).

For the determination of fruit quality parameters, samples were collected from fully ripened and healthy tomato fruits.

Results and Discussion

Based on observations of the Yegana and Saribash tomato cultivars, their biological characteristics were determined. Both cultivars were identified as having an indeterminate growth habit, characterized by continuous stem growth, the formation of successive flower clusters, and sustained fruit set throughout the growing season, indicating their high yield potential.

Table 1
Biological characteristics of Yegana (398) and Saribash (351y) tomato cultivars

Characteristics	Yegana cultivar (398)	Saribash cultivar (351y)
Growth habit	Indeterminate (sp+)	Indeterminate (sp+)
Plant color	Dark green	Light green
Branching type	Sparsely branched	Relatively highly branched
Leaf size	Medium	Medium
Leaf type	Regular	Intermediate
Leaf surface	Moderately wrinkled	Moderately wrinkled
First flower cluster	After the 8th–9thleaf	After the 8th leaf
Fruit set (%)	85–90	90–92
Fruit shape	Round	Smooth round
Fruit color	Red	Yellow
Average fruit weight (g)	90—100	12–15
Average number of seeds per fruit	110—120	70—80
1,000-seed weight (g)	3.84	3.72

The stem of the Yegana cultivar is dark green and weakly branched, whereas the stem of the Saribash cultivar is light green and relatively branched. More intensive branching may have a positive effect on increasing the photosynthetic surface and increasing the productivity potential of the plant (Babayeva et al., 2026).

Although the size and surface characteristics of the leaves are similar in both varieties, better development of the leaf type was observed in the Saribash cultivar.

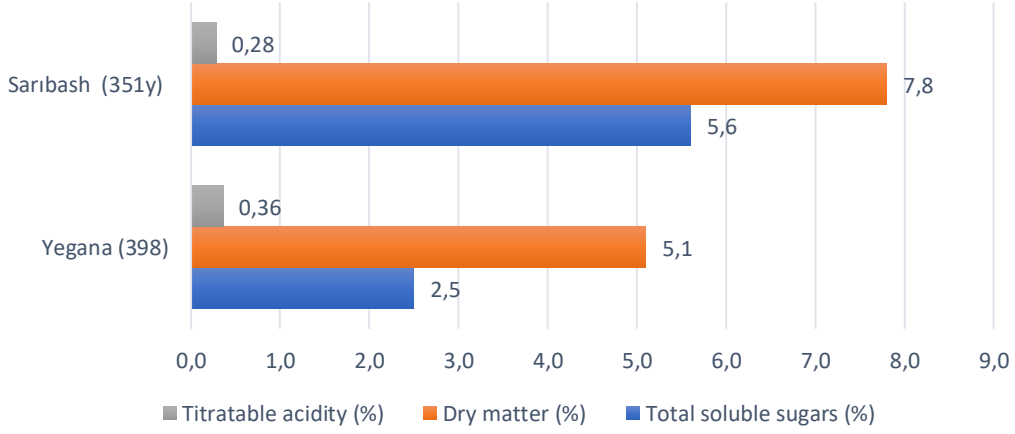

Figure 1
Total soluble sugars, dry matter, and titratable acidity of Yegana and Saribash tomato cultivars

The formation of the first flower cluster after the 8−9th leaf in both cultivars indicates that their vegetation characteristics are similar. In addition, the fruit setting ability of the Saribash cultivar was 90–92%, and 85–90% in the Yegana cultivar. The high fruit set percentage suggests that this cultivar can show more stable productivity in greenhouse conditions (Babayeva et al., 2026).

The analysis revealed a noticeable difference in vitamin C (ascorbic acid) content between the studied cultivars. The Yegana (398) cultivar contained 29.0 mg/100 g of vitamin C, whereas the Saribash (351y) cultivar contained 19.5 mg/100 g. Thus, the vitamin C content of the Yegana cultivar was 9.5 mg/100 g higher than that of the Saribash cultivar. These results indicate that the Yegana cultivar possesses a greater capacity for vitamin C accumulation and, consequently, has a higher nutritional value with respect to ascorbic acid content. The observed variation may be attributed to the genetic characteristics of the varieties as well as their physiological and biochemical properties (Babayeva et al., 2026). A comparison of fruit characteristics showed that the average fruit weight of the Yegana cultivar ranged from 90 to 100 g, whereas that of the Saribash cultivar ranged from 12 to 15 g. These results indicate that the Yegana cultivar can be classified as a large-fruited fresh-market tomato. In contrast, the smaller fruit size of the Saribash cultivar may be compensated for by a higher number of fruits per plant. The average number of seeds per fruit was also higher in the Yegana cultivar (110–120 seeds) than in the Saribash cultivar (70–80 seeds). The weight of 1,000 seeds was similar in both cultivars, measuring 3.84 g and 3.72 g for Yegana and Saribash, respectively, indicating stable seed development in both cultivars.

Conclusion

The comparative evaluation of the Yegana (398) and Saribash (351y) tomato cultivars revealed clear differences in their biological and fruit quality characteristics under greenhouse conditions. Both cultivars exhibited an indeterminate growth habit; however, Saribash showed a higher fruit set rate (90–92%), whereas Yegana demonstrated a substantially higher vitamin C content (29.0 mg/100 g) and greater average fruit weight (90–100 g). These differences highlight the distinct agronomic and nutritional potential of the studied cultivars. The practical significance of the study lies in the possibility of selecting cultivars according to production objectives, with Yegana being more suitable for fresh consumption and Saribash showing potential for production systems requiring high fruit set. The obtained findings provide useful baseline information for cultivar selection and further greenhouse-based evaluation of tomato genotypes. Further studies involving yield per plant, fruit number, and additional quality parameters are recommended to confirm the productivity potential of both cultivars under different greenhouse conditions.

Declaration of Competing Interests

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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