



## SELECTION OF TOMATO VARIETIES AND HYBRIDS FOR CULTIVATION IN HYDROPONIC GREENHOUSES OF UZBEKISTAN

**Kim Dmitry Valentinovich**

**Gulistan State University Syrdarya Region, Gulistan, Uzbekistan**

**Nizomov Rustam Akhralovich**

**Research Institute Of Vegetables, Melons And Potatoes2 P.O. Kuk-Saray.**

**Tashkent Region, Uzbekistan**

**Lyan Ekaterina**

**Research Institute Of Vegetables, Melons And Potatoes2 P.O. Kuk-Saray.**

**Tashkent Region, Uzbekistan**

**ABSTRACT:** - Growing vegetables in a low-volume crop on hydroponics is a modern, convenient and cost-effective way to grow plants. This way to prevent harmful substances from the soil from entering the plants is not to use the soil. Hydroponics is an ancient and at the same time modern and progressive method of growing plants without soil. This technology in the cultivation of vegetables provides equal conditions for all plants, which ensures a high level of production of standard products. There are no problems with soil acidity and agrochemical composition. It is possible to use the same types of fertilizers for different crops, growth is accelerated and yields increase, since physiological processes proceed much faster

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Our article provides data that in low-volume hydroponic greenhouses of Uzbekistan it is quite possible to cultivate from domestic tomato hybrids F1 Saihun, and F1 Zamira, which in terms of yield and quality are not inferior to the foreign hybrid F1 Salmaz.

**KEYWORDS:** Tomato, protected soil, hydroponics, microclimate, vegetable growing, yield.

## INTRODUCTION

In recent years, greenhouse vegetable growing in Uzbekistan has been developing rapidly. Currently, a characteristic feature of the current state of vegetable growing in the protected ground of the republic is the construction and commissioning of hydroponic greenhouses for growing vegetables for fresh products.

Tomatoes in the winter-spring turnover are grown for fresh consumption, so the taste of the fruits and the content of vitamins in them are of great importance. [6].

Requirements for modern tomato hybrids are increasing both from consumers and from producers. Hybrids should be distinguished by high quality fruits, precociousness, have manufacturability, resistance to major diseases, their yield in extended turnover should be at least 60 kg / m<sup>2</sup> [1, 7].

Low-volume hydroponics has a number of advantages. High and high-quality harvest, practically no pests and diseases, minimization of human labor, control over the growth process. Hydroponics allows a person to more easily control the growth of plants, stimulate flowering, lay flowers or pour fruit, help the plant under stress [2, 4].

When growing on low-volume hydroponics, there is practically no human factor. Any errors are minimized. This technology in the cultivation of vegetables provides equal

conditions for all plants, which ensures a high level of production of standard products. There are no problems with soil acidity and agrochemical composition. It is possible to use the same types of fertilizers for different crops, growth is accelerated and yields increase, since physiological processes proceed much faster [3, 5].

Growing vegetables in a low-volume crop on hydroponics is a modern, convenient and cost-effective way of growing plants, which is becoming increasingly common both abroad and in our country. Currently, hydroponic technologies are used in the production of a wide range of agricultural products, including fast-growing leafy, root, green and fruit vegetables, including tomatoes [7].

## MATERIAL AND METHODOLOGY

Studies were conducted on low-volume hydroponic greenhouses for the period from 2020 to 2022 in the winter-spring turnover in the conditions of the Syrdarya region

The material for research was: 7 varietal samples of them F1 Saihun, Gulkand of local selection and five samples of foreign selection: F1 Salmaz, Salmaz 15-95, F1 Pink Paradise, F1 Zamira, F1 Sabina. The standard was the locally zoned hybrid F1 Saihun.

**“SELECTION OF TOMATO VARIETIES AND HYBRIDS FOR CULTIVATION IN HYDROPONIC GREENHOUSES OF UZBEKISTAN”**

Sowing of seeds in seedling cassettes was carried out on December 20, planting in the main place on February 10.

The research was guided by the following materials "Methodology of the State Variety Testing of Agricultural Crops" T IV, Vegetables, Melons and Potatoes (1975); "Guidelines for the selection of tomato varieties and hybrids for open and protected ground." (1986); "Methodological recommendations for conducting experiments with vegetable crops in structures of protected ground". (1976); and "Field Experience Methodology". (Armor B.A.1988); "Methods of experimental work in vegetable growing and melon growing". (1992) "Recommendation for the cultivation of both vegetables and seedlings in protected ground," (1984); " Recommendation for growing vegetables in a protected ground". (2007); "Methods of economic efficiency of using in agriculture the results of research and development work of new technology of inventions and rationalization proposals" (1983);“ Technological maps for the cultivation of seedlings and vegetables in structures of protected ground" (1985).

## RESEARCH RESULTS

We conducted research on varietal testing of local and foreign varieties and hybrids of tomato when grown in hydroponic greenhouses in winter-spring turnover. Seeds were sown on December 20 and planted on February 10. In the experiments, all zoned

local varieties and hybrids were tested. The standard was the locally zoned hybrid F1 Saihun. The evaluation of the tested varietal samples was carried out not only for the standard hybrid F1 Saihun, but also with zoned local varieties and hybrids.

Growing tomatoes on low-volume hydroponics involves technological operations, so the main operations are carried out simultaneously. That is why the number of days from sowing to picking, exhibitions on mats, exhibitions in mats and the end of fruiting coincide Differences in the studied hybrids were observed only during the passage of phenophases. The duration of the periods of passage of phenophases between varieties differed by only a few days.

The appearance of the first true leaf in all tested hybrids (Salmaz, Salmaz 15-95, Pink Paradise) was noted on the 15th day after sowing the seeds, and on the Saihun hybrid, the first leaf appeared on the 16th day. A later appearance of the first leaf was observed in the hybrids F1 Zamira and Sabina F1 (on the 17th day). The appearance of a fifth true leaf in all the hybrids tested. (Salmaz, Salmaz 15-95, Pink Paradise, F1 Sabine) was noted on the 46th day, and on the hybrid F1 Saihun and the Gulkand variety, the fifth leaf appeared on the 47th day after the mass shoots. At the latest (on the 47-48th day) the formation of the fifth true leaf is noted on the hybrid F1 Zamira. (Table 1).

**Table 1.**

**“SELECTION OF TOMATO VARIETIES AND HYBRIDS FOR CULTIVATION IN HYDROPONIC GREENHOUSES OF UZBEKISTAN”**

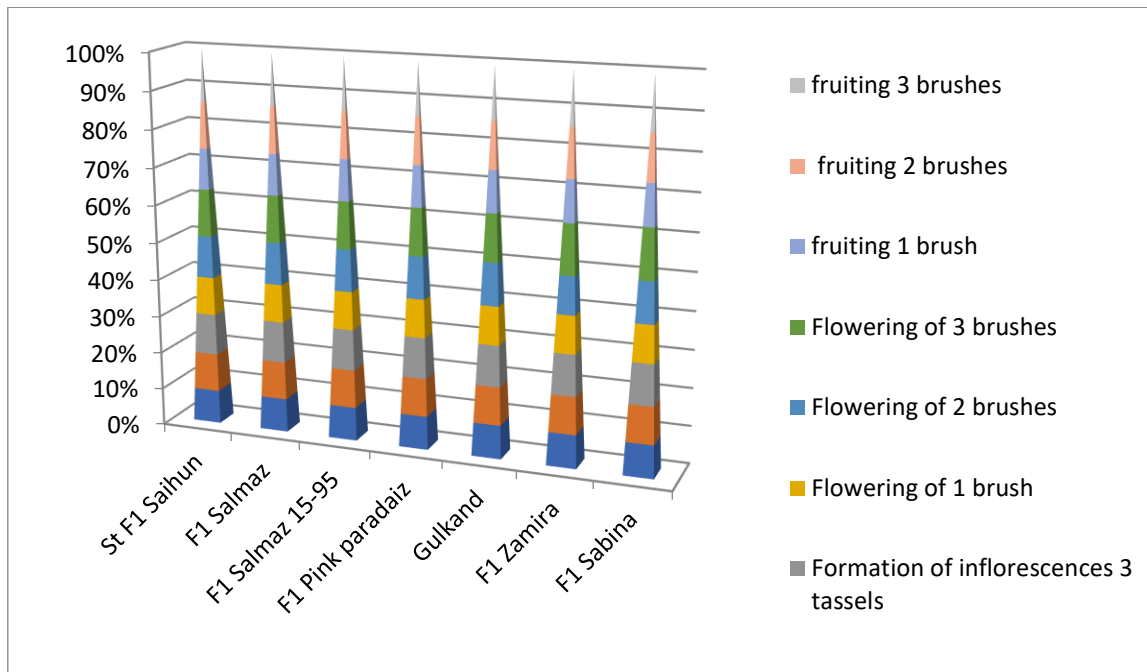
## Resource requirements by component

### Germination of seeds and appearance of leaves of tomato varieties

Varieties	Number of days from sowing to germination		Number of days from mass shoots to leaf appearance	
	unit 10%	mass 75%	of the 1st	of the 5th
St F <sub>1</sub> Saihun	8	10	6	47
F <sub>1</sub> Salmaz	7	9	5	46
F <sub>1</sub> Salmaz 15-95	7	9	5	46
F <sub>1</sub> Pink paradais	7	9	5	46
Gulkand	8	10	5	47
F <sub>1</sub> Zamira	7	9	7	48
F <sub>1</sub> Sabina	7	10	7	46

The duration of the interphase periods in the tested tomato varieties also differed slightly. Our surveys to determine the number of days from mass shoots to the formation of the first three inflorescences on all local varieties and hybrids appeared on the 56th-59th day, the second on the 63rd-67th day and the third on the 69-72nd day after the mass shoots. On the standard hybrid F<sub>1</sub> Saihun, this figure was

respectively; 59, 67 and 72 days. The most recent formation of inflorescences was observed in the gulkand variety, and earlier formation was noted in foreign hybrids F<sub>1</sub> Sabina, and then in the hybrid F<sub>1</sub> Zamira. (Fig. 1).



**Rice. 1. Duration of interfacial periods in tested tomato varieties**

The same pattern is noted in the flowering and fruiting of 1-3 inflorescences.

To determine the growth and development of plants of local tomato varieties in the conditions of low-volume hydroponic greenhouses, we carried out biometric measurements. The conducted accounts and observations in dynamics are given in figures 2, 3.

The highest height of the main stem in tomato cultivars at 123.3, 203 and 283 is noted in the Marvarid variety (respectively; 95, 183, and 240 cm), then in the hybrid F1 Pink Paradaiz. The lowest growth of the main stem was observed in the hybrid F1 Salmaz 15-95 (respectively; 105, 169 and 177.6 cm). In the standard hybrid F1 Saihun, this figure was respectively; 107, 188.8 and 273.3 cm In other varieties and hybrids, the height of the main stem on the 90th day was 101-215 cm. As can be seen, the tested varieties except for the

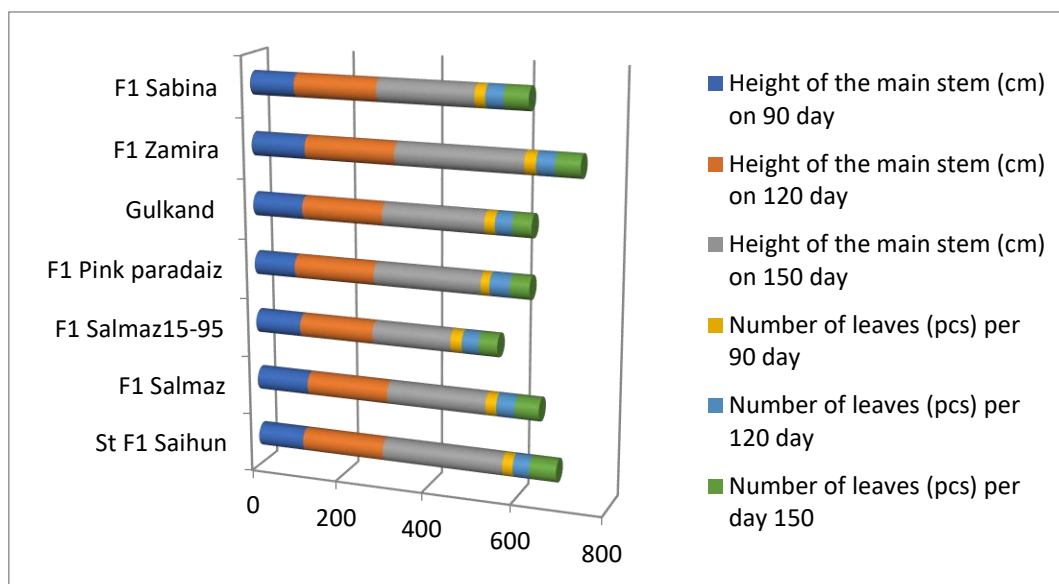
Gulkand variety turned out to be of an indeterminant type and are characterized by vegetative growth and are used in winter greenhouses in various turns and grown in one stem.

An important indicator characterizing the suitability of the variety (hybrid) for growing in hydroponic greenhouses is the number of leaves per plant. What determines the intensity of photosynthesis as a result, productivity grows. The largest number of leaves on the 90th day after mass shoots was noted in the hybrid F1 Salmaz 15-95 and the hybrid F1 Zamira (25 pcs), then in the hybrid Salmaz (24 pcs) and in the hybrid F1 Saihun and the varieties Gulkand, F1 Sabina (23 pcs each). The lowest foliage (19 pcs) is noted on the hybrid F1 Pink Paradaiz.

The same pattern in the foliage of plants when growing tested varieties in low-volume hydroponic greenhouses was observed on days 120 and 150, where the standard hybrid F1 Saihun had the largest number of leaves (37 and 59 pieces), and the smallest amount was noted in the Salmaz hybrid 15-95 (37 and 42

pieces). In terms of the number of leaves, all hybrid samples surpassed the tested varieties

in terms of foliage, except for the F1 Zamir hybrid.



**Rice. 2. The height of the main stem and the number of leaves in tomato varieties**

Tomato plants in greenhouses reach more than 2.0 m in height, form many fruits and are highly productive. Therefore, plants with a strong stem are able to hold a large mass of fruits and provide them with a test.

The largest stem diameter on day 150 was observed in the hybrid F1 Sabina (1.4 cm), then in the variety Gulkand and the hybrid F1 Pink Paradaiz (1.3 cm). In the standard hybrid F1 Saihun and in other varietal samples, this figure was 1.2 cm. Short internodes are a positive sign. The shorter the internodes, the more inflorescences are formed and a powerful bush is created. The shortest internodes were observed in the hybrid F1 Salmaz 15-95 (3.7) and in the Gulkand variety. In other varieties and hybrids, this figure was 4.2-4.5 cm.

The total number of inflorescences on plants, the intensity of their formation provides the value of the early and total yield in greenhouse varieties and hybrids. According to this

indicator, there were no special differences in the tested varietal samples.

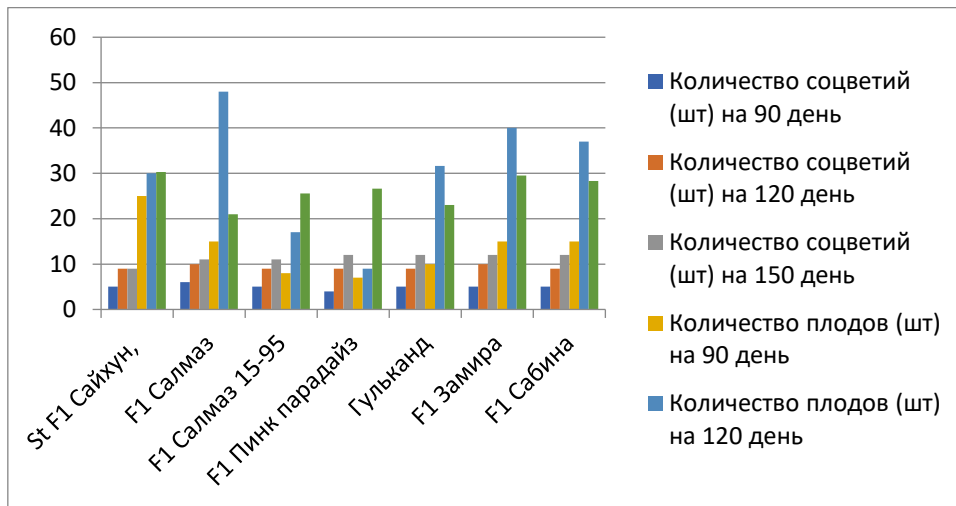
In the future, an increase in the outside temperature and improvements in illumination led to an improvement in the number of inflorescences on the 150th day after mass shoots, the number of inflorescences in the tested F1 Salmaz hybrids was 12 pcs. and on the and Salmaz 15-95 hybrids - 11 pcs.

The number of generative organs and fruits on plants determine the productivity of tomatoes in greenhouses. In the varieties we tested, the formation of fruits on plants at different periods of growth and development differed slightly. In the early phases of development on the 90th day, the number of formed fruits was only 7-8 pcs. per plant. And the subsequent periods (on the 120th and 150th day after the mass shoots) the number of fruits on all varietal samples increased dramatically. On the 120th day from mass shoots, the largest

**“SELECTION OF TOMATO VARIETIES AND HYBRIDS FOR CULTIVATION IN HYDROPONIC GREENHOUSES OF UZBEKISTAN”**

number of fruits was noted on all F1 hybrids including the standard (30-48 pcs. In the F1 Zamira hybrid, 40 fruits formed on the brushes at this time. The same pattern in the formation

of fruits was observed on the 150th day after the mass shoots. However, the number of fruits increased markedly compared to the previous period.

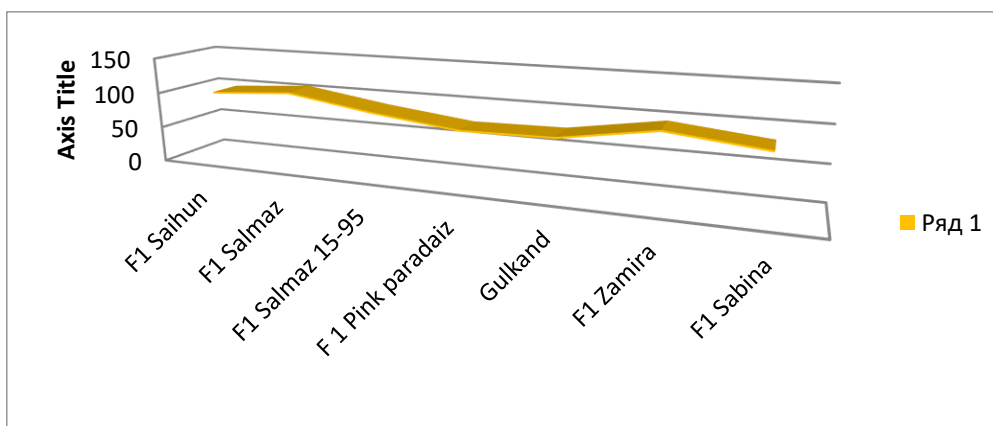


**Rice. 3. The number of inflorescences and fruits in tomato varieties**

The yield of tomato varieties in low-volume hydroponic greenhouses in the winter-spring turnover was significantly influenced by the formation of generative organs. The highest total and marketable yield with 1m2 of the tested tomato varieties was obtained from hybrids F1 Salmaz (30.8), F1 Saihun (st 29.1 kg), F1 Zamira (28.05 kg) and F1 Salmaz 15-95 (25.6 kg) the lowest yield was obtained from the Gulkand varieties (22.1 kg), then from F1

Pink Paradaiz (21.6 kg). Their yield to the standard was 77%.

The morphological features of the tomato (the number of leaves up to the 1st flower brush, the thickness of the stem, the rationing of the ovary, etc.) have a significant impact on the yield of this crop, which is usually expressed in greenhouse vegetable growing in kilograms per 1 m2 (Fig. 4).



**“SELECTION OF TOMATO VARIETIES AND HYBRIDS FOR CULTIVATION IN HYDROPONIC GREENHOUSES OF UZBEKISTAN”**

#### Rice. 4. Yield of tomato varieties in hydroponic greenhouses in winter-spring turnover

Thus, in low-volume hydroponic greenhouses in the winter-spring turnover, it is quite possible to cultivate from domestic hybrids the of F1 Saihun tomato, and the F1 Zamira hybrid, which in terms of yield and quality are not inferior to the foreign hybrid F1 Salmaz.

#### CONCLUSIONS

1. Of all the local tomato varieties tested, earlier single and mass shoots appeared in F1 Saihun hybrids, the most recent emergence of seedlings and 1-5 leaves were noted in the Gulkand variety.
2. The highest growth of the main stem on the 150th day after mass shoots was observed in the Marvarid variety (283 cm) then, in the hybrid F1 Saihun (273.3 cm). The number of leaves on these varieties was also greater.
3. The largest number of inflorescences and fruits was noted in the hybrids F1 Saihun and in the hybrid F1 Zamira.
4. For cultivation in low-volume hydroponic greenhouses from proven local varieties, hybrids F1Saihun can be recommended, and from Gulkand varieties.

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