VARIETAL-ROOTSTOCKS COMBINATIONS USAGE IS A PERSPECTIVE METHOD OF INCREASING THE PRODUCTIVITY AND QUALITY OF TOMATOES USING LOW-VOLUME HYDROPONICS METHOD

Khareba O. V., Postgraduate Student
http://orcid.org/0000-0001-6588-6656
E-mail: kharebaoleksandr@gmail.com
Tsyz O. M., Ph.D. of Agricultural Sciences, Associate Professor
https://orcid.org/0000-0001-7174-7011
E-mail: tsyzom@gmail.com
Khareba O. V., Doctor of Agricultural Sciences
https://orcid.org/0000-0002-6763-1988
E-mail: lena1060725@gmail.com
Khareba V. V., Doctor of Agricultural Sciences, Professor
https://orcid.org/0000-0001-9947-2689
E-mail: vhareba@gmail.com
National University of Life and Environmental Sciences of Ukraine

Tomato grafting has a considerable scientific and practical interest, because it promotes plant resistance to illnesses, pests, stress factors, improves nourishment conditions and as a result increases crop yields and contributes to the greening of cultivation. The study of this issue is actual for the indoor ground conditions, particularly, for growing in glass greenhouses using low-volume hydroponics method. In Ukraine, this area of research began only in 2003, and the study of the effectiveness of varietal-rootstock combinations on new hybrids of tomato F_1 for growing it in greenhouses of the Venlo type was not performed at all. Each rootstock has an individual effect on the hybrid-rootstock, which largely depends on the growing conditions. Therefore, the choice of the optimal varietal-rootstocks combinations for each hybrid is the main agronomic practices that determines the efficiency of growing crops by grafting.

The main goal of the experiments was to find out the efficiency of varietal-rootstocks combinations on the indeterminate hybrids F_1 tomato.

Experiments for studying three indeterminate hybrids of tomatoes Torero F_1, Barteza F_1 and Merlice F_1 with grafting on rootstocks Maxifort F_1, TD-1 F_1 and Emperador F_1 were conducted in the “Venlo” type on Private Joint Stock Company «Combinat «Teplychnyy». Experimental variants were randomized in triplicate. Area

of the observation plot was 5.6 m^2. Seedlings were planted to a permanent place in the phase of 9–11 true leaves. The scheme of placement was 4 plants per 1 mat 100 × 20 × 7.5 cm. The volume of the substrate under one plant was 3.75 liters. The plant density was 2.5 tomatoes per m^2. Fourteen plants were grown on the observation plot. The technology of growing plants in the experiment corresponded to the existing requirements for early-maturing hybrids and was the same for all variants.

The use of rootstocks for growing Torero F_1 hybrids contributed to an increase in early yields on average in 2015–2017 by 4.1–6.4 % compared to non-grafted plants. The best indicator was the varietal-rootstock combination Torero F_1/TD-1 F_1 – 30.4 kg/m^2, which is 1.8 kg/m^2 more for control. The effect of using rootstocks for growing Barthes F_1 hybrid was higher compared to Torero F_1, as early yields increased by an average of 7–10.7 % over 3 years compared to non-grafted plants. The influence of rootstock Emperador F_1 provided a significant increase in yield in all years of research, respectively, this variety-rootstock combination contributed to the formation of the highest average yield – 30.53 kg/m^2, exceeding the control by 2.96 kg/m^2. Varietal-rootstock combinations with the Merlis F_1 hybrid had a medium effect compared to other studied hybrids, which provide a yield increase of 5.1–9 % before control. In this case, also only the rootstock Emperador F_1 created the conditions for a mathematically significant increase in yield over all years of research. The average yield of this varietal-rootstock combination was the highest – 31 kg/m^2, exceeding the control by 2.57 kg/m^2. Mathematically significant difference in early yield between the studied varietal-rootstock combinations was not found.

Thus, we found that the effect of rootstock on the hybrid on the formation of early yields is individual and depends on both the varietal-rootstock combination and the growing conditions of the year.

According to the results of our research, it was found that the grafts affected the rootstocks and, accordingly, the quality of the fruit. The biochemical composition of tomato fruits differed significantly depending on the variety of rootstock combination. The usage of the rootstocks also improves biochemical indicators, particularly, contributes to the increasing the dry matter content in the fruits of all

hybrids by 0.1–0.8 %. Emperador F_1 rootstock causes an increase in the total sugar content in tomatoes by 0.3–0.5% and ascorbic acid by 1–4.7 % for all studied rootstocks. The optimal ratio of sugars and acids, which indicates the balance of taste of tomato fruits, was found in Torero F_1/Emperador F_1, Barteza F_1/Maxifort F_1 and Merlis F_1/Maxifort F_1, the ratio of sugar and acid was 6.9, 7, 3 and 7.4 respectively. It should be noted that the use of grafting significantly increased the ratio of sugar-acid, compared with the control, in all variants except Barteza F_1/TD-1 F_1.

It is recommended to use such grafting options as Torero F_1/TD-1 F_1; Barteza F_1/Emperador F_1; Merlice F_1/Emperador F_1 with a view to increasing the share of early yield (10th July) in modern block hydroponic winter greenhouses of the “Venlo” type at the level of 30,4–31,0 kg/m^2 with high biochemical indicators of fruits.

Keywords: tomato, hybrid, graft, rootstock, varietal-rootstocks combining, yield, biochemical composition.