

RESULTS OF SOME ROMANIAN TOMATO AND EGGPLANT CULTIVARS GRAFTED ONTO INTERSPECIFIC (GENUS *LYCOPERSICON*) ROOTSTOCK

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ABSTRACT

This experience aims at identifying an optimal rootstock for Romanian tomato and eggplant cultivars and the influence on plant yield and growth. These vegetables (tomato and eggplant) are very important crops worldwide and in Romania. Tomato and eggplant plants are very sensitive to climatic fluctuations and can affect fruit yield. Grafting on species from the *Solanaceae* family is a practice that increases productivity, fruit quality, resistance to diseases and pests, abiotic factors. The work was conducted at the Horting Research Institute, Romania. The biological material used was different tomato and eggplant; two scions, Siriana F1 (tomato), Luiza variety (eggplant) and a rootstock, Emperor F1 (tomato). The Emperor rootstock and others are very used in worldwide for ecological and conventional cultures. By comparing the tomato and the eggplant yield of the researched grafted and non-grafted variants it has been shown that grafted cultivars have had very good values, being higher with 19.78% and 29.13% than at non-grafted plants. Following the studies undertaken in the research greenhouse period 2019-2020, a rootstock from genus *Lycopersicum* (Emperor) was tested and some results are in this scientific paper.

Keywords: *grafted vegetables, quality, Solanaceae, yield*

INTRODUCTION

Grafting technology can be employed by farmers that cannot afford soil steaming and pesticides. Today grafting is also being employed to enhance crop response to a variety of abiotic stresses, and improve plant growth, yield and fruit quality.

A study was conducted on the graft compatibility between the eggplant rootstocks and the hybrid tomato cultivars grown in Tanzania [8]. In addition to this, because of the environmental concerns posed by chemical pesticides, proactive cultural practices are often recommended, including crop rotation, solarization, resistant cultivars and the grafting onto resistant rootstocks [6]. There is a need for environmentally sound and economically feasible alternatives [1].



The plants that were grafted onto tomato rootstocks and showed significantly greater vegetative growth, leading to taller, more robust plants than those grafted on eggplant rootstocks, as well as in relation to the non-grafted control [7].

Grafting is a valuable tool for managing problems of tomato soil-borne pathogens and pests, but often generates unpredictable effects on crop yield and product quality. To observing these rootstocks-induced changes, experimental designs including many rootstock-scion combinations are required [5].

Some resistant solanaceous rootstocks are used worldwide (wild species and commercial hybrids as Emperor F1 and other).

This research regarding the identification of an optimal rootstock for tomato and eggplant crops from Romania is important to highlight yield of some scion-rootstock genotypic combinations.

The researches in tomato and eggplant grafting are study field of some horticulture researchers from the Horting Institute, Romania since 2002.

MATERIALS AND METHODS

Biological materials

The work was carried out in a Research and Development Laboratory from the Horting Institute, Bucharest, Romania.

The biological material used was different tomato and eggplant; two scions, Siriana F1 (tomato), Luiza variety (eggplant) and a rootstock, Emperor F1 (tomato).

Siriana F1 (*Solanum lycopersicum* L.) are tomatoes from the Research and Development Station for Vegetable Growing, Buzău, Romania. These tomatoes are tested in grafted and ungrafted cultures in some greenhouses at the Horting Institute. *Siriana* F1 has a great vigor, spherical and red fruit, 150 g/fruit and 4-5 seminal lodges/fruit. This tomato hybrid is early (110-115 days), indeterminate plant and well adapted to greenhouses and field conditions.

Luiza (*Solanum melongena* L.) is a semi-early eggplant variety created in the Research and Development Institute for Vegetable and Floriculture Vidra, Romania. It is a variety with pear-oblong fruit, dark purple color and a fruit with 200-300 g. *Luiza* is an eggplant variety recommended for cultivation in greenhouse and field.

Emperor F1 (*Lycopersicon esculentum* x *L. hirsutum*) is a commercial rootstock created in the Rijk Zwaan Company, Netherlands. It is vigorous and very resistant to the attack of the *Fusarium* sp., *Verticillium* sp. and *Tomato Mosaic Virus*. It is recommended for greenhouse and field.

Experience design

This experience has been implemented in 30 plants (3 replications of 10 plants per every variant). The work scheme was: V1 – grafted *Siriana* tomatoes (20.000 plants/ha);

V2 – non-grafted Siriana tomatoes (27.000 plants/ha); V3 – grafted Luiza eggplants (18.000 plants/ha); V4 – non-grafted Luiza eggplants (24.000 plants/ha).

Biometrical determinations

Biometric determinations were carried out on the tomato and the eggplant fruits (yield per hectare). For total carbohydrate analysis were used using ten fruits/variants and the Bertrand method recommended by some researchers [3], extracting the carbohydrates from the product with the help of water, purifying the plant extract and dosing reducing sugars in the purified extract.

Statistical analysis

The Duncan test has been used to determine some differences between the total tomato and eggplant yield per hectare.

RESULTS AND DISCUSSIONS

Yield

The Emperor rootstock was influence on fruit yield (Table 1).

Table 1. Fruit yield (tomatoes and eggplants)

Variant	Species	Yield (t/ha)	Difference	
			t/ha	%
V1 – grafted Siriana	tomato	55.1 ^b	9.1	119.78
V2 – non-grafted Siriana	”	46 ^a	-	100
V3 – grafted Luiza	eggplant	49.2 ^b	11.1	129.13
V4 – non-grafted Luiza	”	38.1 ^a	-	100

Note: after the Duncan's test; $p < 0,05$

The *Lycopersicon* rootstock (Emperor) has had a positive influence on yield of Siriana tomato and Luiza eggplant cultivars grown in a plastic house from Romania.

In Table 1, there are differences up to 19.78% at Romanian Siriana tomato and 29.13% at Romanian Luiza eggplant compared to the same non-grafted plants.

Some researchers [4], reported a positive effect and at others *L. esculentum* x *L. hirsutum* rootstocks (Beaufort). Other researchers reported a positive effect on yield of some grafted tomato fruits [9] and some grafted eggplant fruits [2], compared to non-grafted plants.

Quality

The Emperor rootstock was influence on carbohydrates content (Table 2).

Table 2. Total carbohydrates in tomato and eggplant fruits

Variant	Species	Total carbohydrates (%)	Difference (+/-)
V1 – grafted Siriana	tomato	3.06 ^{NS}	0.05
V2 – non-grafted Siriana	”	3.01	-
V3 – grafted Luiza	eggplant	2.42 ^{NS}	0.08
V4 – non-grafted Luiza	”	2.41	-

Note: after the Duncan' s test; $p < 0,05$; NS: no significance

The *Lycopersicon* rootstock (Emperor) has had a positive influence on carbohydrates content of Siriana tomato and Luiza eggplant cultivars grown in a plastic house from Romania, but no significance. In Table 2, there are differences up to 0.05% at Romanian Siriana tomato and 0.08% at Romanian Luiza eggplant compared to the same non-grafted plants.

Some researchers [9] reported a significant positive effect of grafting on the sugar content.

CONCLUSION

The Emperor rootstock is used for tomato and eggplant cultures because it is growing fruit yield (differences up to 19.78% at Romanian Siriana tomato and 29.13% at Romanian Luiza eggplant) and it did not influence the quality by carbohydrate content.

The *Lycopersicon* rootstocks (Emperor and others) are used in Romania for ecological and conventional cultures.

Graft research on different rootstocks is recommended to determine compatibility in culture. And other researchers [8] recommend that further studies are required to determine rootstocks that are vigorous enough to carry scions of hybrid tomato cultivars to improve graft success and plant growth

By comparing the yield of the studied grafted and non-grafted plants it has been shown that grafted tomato and eggplant variants have had the best values, higher than at non-grafted plants.

The use of grafted tomato and eggplant plants, the scion x rootstock combinations researched in this paper, can be cultivated in the vegetable cultures from the south-east of Romania.

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