

THE GRAFTING INFLUENCE ON SOME CHARACTERISTICS AT A ROMANIAN EGGPLANTS COLLECTION CULTIVATED IN GREENHOUSE

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Abstract

The experiment was conducted on a Romanian grafted eggplant collection consisting of two varieties, 'Luiza' and 'Rodica' and one hybrid, 'Andra F₁'. Three rootstocks were used to obtain the grafted seedlings: 'Hikyaku', 'Espina', 'Arazy (500294)'. Visual observations and biometric measurements of the fruits were made during the 2013 growing season. The research was carried out at Horting Institute - Bucharest in the Laboratory of Protected Cultures and it was aimed to evaluate some characteristics of several Romanian grafted eggplants. The results show the characteristics of the eggplants that were influenced by the grafting.

Key words: grafted culture, parameters, *Solanum melongena*

INTRODUCTION

Grafting imprints resistance to pathogenic agents and soil pests, tolerance to abiotic stress factors, improves water and nutrient absorption and increases the graft vigor (King et al., 2010, Lee J.M., 1994).

Discrepant results concerning fruit quality provided by grafted plants were reported (Davis et al., 2008).

In protected culture, there are only few results concerning the *Solanum* rootstock effect on fruit production, development and quality for uninfected soils (Çürük et al., 2005, Passos et al., 2005) and for *Verticillium* infected soils (Bletsos et al., 2003).

Many researchers reported that the fruit average weight was significantly influenced by the grafting (Çürük et al., 2009).

Pană (2010) has proposed the improvement of field culture technology for eggplants (Luiza variety), by grafting them on tomatoes (Pontica variety). The results showed smaller and more ovoid fruits, similar to tomatoes, the fruit average weight was much lower compared to the ungrafted plant fruits and the productivity of the grafted plants was much lower.

MATERIALS AND METHODS

The biological material used in this research was a collection of Romanian eggplants (grafted and ungrafted plants).

The Romanian eggplants scions consisted of two varieties, 'Luiza' and 'Rodica' and one hybrid, 'Andra F₁'.

The used rootstocks for the above scions were two commercial hybrids, 'Hikyaku F₁', and 'Arazy (500294) F₁' and one variety, 'Espina'. 'Hikyaku F₁' (*Solanum melongela*), 'Arazy (500294) F₁' (*Lycopersicum lycopersicum*) and 'Espina' (special variety of *Solanum torvum*) determine vigor, increase the production and rise the resistance to low temperature, vascular diseases (*Fusarium* spp., *Verticillium* spp. etc.), soil pests and biotrophic parasites (nematodes *Meloidogyne* spp.).

Ungrafted and grafted eggplant seedlings were obtained in a specialized greenhouse for grafted seedling production, in alveolar trays with nutrient substrate (fertilized peat) and vermiculite, according to classical technology (for ungrafted plants) and according to grafting technology (for grafted plants).

The experimental plots were set up in protected space, greenhouse (Figure 1).

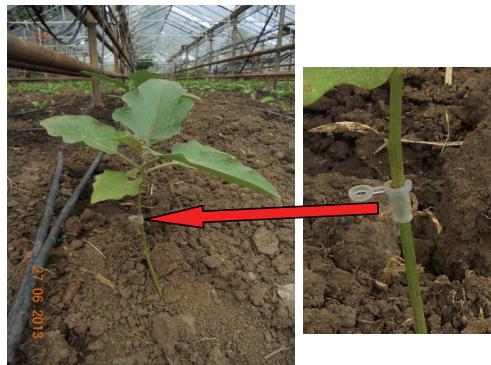


Figure 1. Culture of grafted eggplants - experimental plot

Classical culture technology of the eggplants inside the greenhouse (care works, growth factor guiding, etc.) and a fertilization program was used according to Voican and Lăcătuș (1998) (Table 1).

Table 1. Eggplants culture fertilization (kg/1000 m²)

Eggplant culture	NH ₄ NO ₃	Complex 16-48-0	K ₂ SO ₄	MgSO ₄
after 1 st harvest	100	-	-	-
after 15 days	150	100	150	100
every 15 days	100	-	150	50

The two-factorial experiment (A-scion and B-rootstock factors), placed upon the randomized block method, in 4 repetitions with the experimental plot surface of 10 m², has covered 9 grafted variants ($\rho = 18.000$ grafted plants / ha): V₁, V₂, V₃, V₄, V₅, V₆, V₇, V₈ and V₉, and 3 ungrafted variants ($\rho = 24.000$ grafted plants / ha): V_{C1}, V_{C2} and V_{C3} (Table 2).

Table 2. The organizing of the experience

V*	Grafted plants		No. of plants / variant
	Scions	Rootstock	
V ₁	'Luiza	Hikyaku	90
V ₂	Rodica		90
V ₃	Andra		90
V ₄	Luiza	Espina,	90
V ₅	Rodica		90
V ₆	Andra		90
V ₇	Luiza	Arazy (500294)	90
V ₈	Rodica		90
V ₉	Andra		90
Ungrafted plants (control)			
V _{C1}	Luiza		120
V _{C2}	Rodica		120
V _{C3}	Andra		120

*- variants

The visual observations and the biometric determinations of the eggplant parameters were realized in the Laboratory of Protected Cultures of the Horting Institute Bucharest.

The data represent average values of the determinations on grafted and ungrafted fruit variants during 10 harvests.

The Romanian eggplant collection at commercial maturity have ovoid fruits, black main color and shiny epidermis (Figure 2).

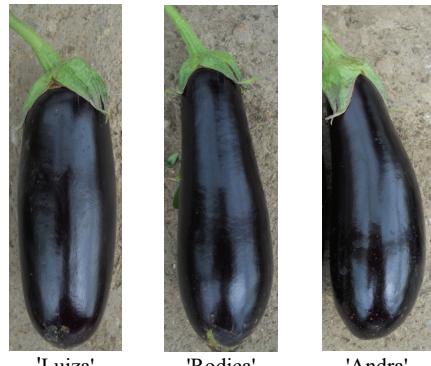


Figure 2. Romanian eggplants

RESULTS AND DISCUSSIONS

The results concerning the characteristics of the eggplant collection are shown in Table 3.

Table 3. Biometrics data of the eggplant fruits

V*	Weight (g)	Length (cm)	Diameter (cm)		Index of shape
			basic	maximum	
V ₁	236	14	5	7	2
V ₂	245	18	4.5	5.5	3.27
V ₃	335	16	4.5	7.3	2.19
V ₄	258	18.5	3.5	5	3.7
V ₅	277	13.5	5	7.5	1.8
V ₆	320	14	4.2	7	2
V ₇	230	14	5	6.9	2.03
V ₈	240	17	4.2	5	3.4
V ₉	330	15	4.3	7.2	2.08
V _{C1}	171	13	4	6	2.17
V _{C2}	129	14	3.2	5	2.8
V _{C3}	176	16.5	3.5	4.8	3.44

*- variants

The average fruit weight was bigger for the grafted eggplants (236-335 g/fruit) compared with the ungrafted eggplants, control (129-176 g/fruit):

-'Luiza' variety - grafted (V_1 , V_4 , V_7) had the average weight/fruit of 241.33 g while the ungrafted one (V_{C1}) had only 171 g;

-'Rodica' variety - grafted (V_2 , V_5 , V_8) had the average weight/fruit of 254 g while the ungrafted sample (V_{C2}) had 129 g;

-'Andra F₁' hybrid - grafted (V_3 , V_6 , V_9) had the average weight/fruit of 328.33 g while the ungrafted (V_{C3}) had 176 g;

The average length of the fruit has varied but not significant, with small differences between the grafted variants (13.5-18.5 cm) and the ungrafted variants (13-16.5 cm):

-'Luiza' variety had the average length/fruit for grafted (V_1 , V_4 , V_7) and ungrafted (V_{C1}) of 15.5 cm and 13 cm, respectively;

-'Rodica' variety had the average length/fruit for grafted (V_2 , V_5 , V_8) and ungrafted (V_{C2}) of 16.17 cm and 14 cm, respectively;

-'Andra F₁' had the average length/fruit for grafted (V_3 , V_6 , V_9) and ungrafted (V_{C3}) of 15 cm and 16.5 cm, respectively.

The fruits were elongated for all analyzed variants. The grafting has influenced the precocity (Figure 3).

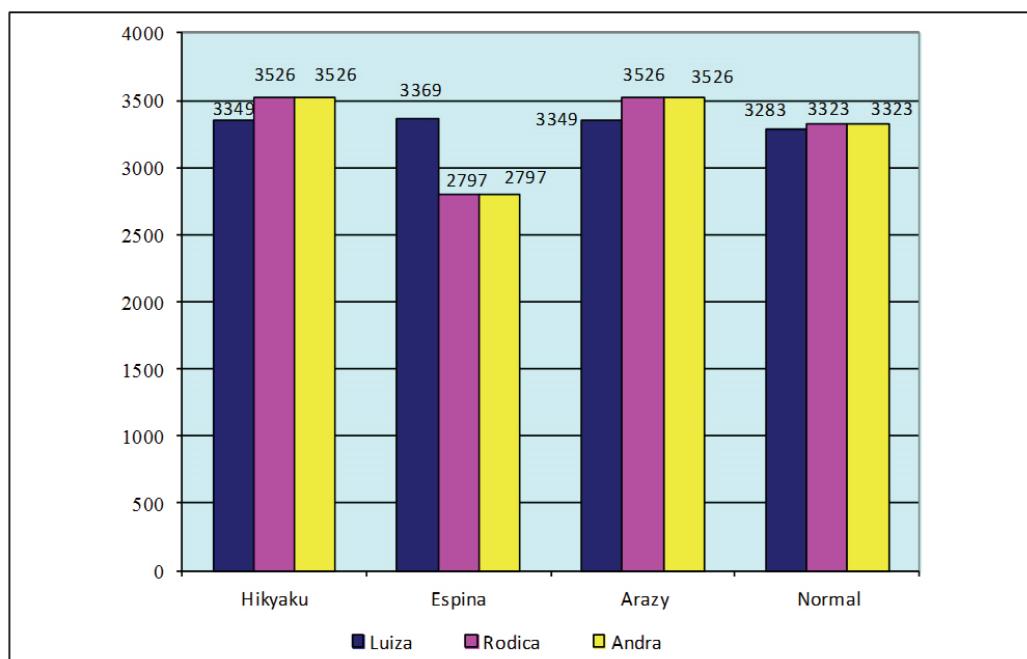


Figure 3. The sum of the degrees of temperature to first harvest at the eggplants collection

It was observed that the rootstocks have induced precocity or tardiness. 'Hikyaku' and 'Arazy (500294)' have determined tardiness while 'Espina' has determined precocity comparative with the ungrafted plants, control. The grafting has influenced the precocity as follows:

- for 'Luiza' variety grafted on 'Hikyaku' (V_1) and 'Arazy (500294)' (V_7) were more precocious compared with the variant grafted on 'Espina' (V_4). All grafted variants were more tardive compared with ungrafted plants (V_{C1});
- for 'Rodica' variety - the variant grafted on 'Espina' (V_5) was more precocious compared

with the variants grafted on 'Hikyaku' (V_2), 'Arazy (500294)' (V_8) and the ungrafted variant (V_{C2});

- for 'Andra F₁' - the variant grafted on 'Espina' (V_6) was more precocious compared with the variants grafted on 'Hikyaku' (V_3), 'Arazy (500294)' (V_9) and the ungrafted variant (V_{C3}). The influence of grafting on the average production is presented in Figure 4.

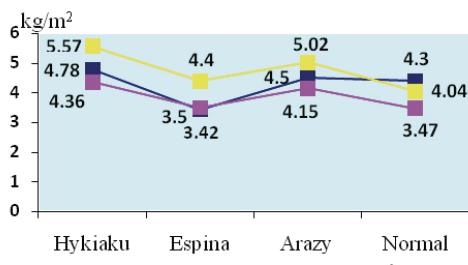


Figure 4. Average production (kg/m^2)

It is observed that the grafted plants had productions of $3.5\text{-}5.57 \text{ kg}/\text{m}^2$, at a density of 18000 plants/hectare compared with the ungrafted plants that had $3.47\text{-}4.38 \text{ kg}/\text{m}^2$ productions, at 24000 plants/ha density.

The plants grafted on 'Hikyaku' rootstock have obtained the highest productions (5.57; 4.78; 4.36 kg/m^2), followed by the plants grafted on 'Arazy (500294)' rootstock (4.4; 3.42; 3.5 kg/m^2) and the plants grafted on 'Espina' rootstock (5.02; 4.5; 4.15 kg/m^2).

The ungrafted plants (control) have obtained the highest production compared with the plants grafted on 'Espina' rootstock.

CONCLUSIONS

Grafting influenced some characteristics of the eggplants (weight, length, diameter). The grafted plants have mainly registered higher values compared with the ungrafted plants.

The fruits were elongated at all analyzed variants (grafted and ungrafted).

The production precocity of grafted eggplants was different from that of ungrafted eggplants. The rootstocks have induced precocity or tardiness by grafting as follows:

- at 'Luiza' variety, the rootstocks ('Hikyaku', 'Espina', 'Arazy 500294') have induced tardiness;

- at 'Rodica' variety and 'Andra F₁' hybrid, the 'Espina' rootstock has induced precocity and the 'Hikyaku', 'Espina', 'Arazy (500294)' rootstocks have induced tardiness;

- the ungrafted plants were more precocious. One exception was some combinations – 'Rodica' x 'Espina' (V₅), 'Andra' x 'Espina' (V₆) – with an important precocity compared with the ungrafted variants, 'Rodica' (V_{C2}) and 'Andra' (V_{C3}).

The plants grafted on 'Hikyaku' rootstock have obtained the highest production, followed by

the plants grafted on 'Arazy (500294)' rootstock and the plants grafted on 'Espina' rootstock. The average production (kg/m^2) was also influenced by grafting. The grafted plants had higher production compared with ungrafted plants, exception was the grafted variant 'Luiza' x 'Espina' (V₄) that has registered a lower production compared with the other variants (grafted and ungrafted).

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