

INFLUENCE OF SOME *SOLANUM* ROOTSTOCKS ON EGGPLANT CROPS FROM ROMANIA

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Abstract

Some results regarding the influence of some *Solanum* rootstocks on eggplant crops from Romania are in this study. Eggplants are popular vegetables all around the world. Among the grafting aims are fruit yield and quality. Eggplant grafting has been a tradition for over 15 years at the Horting Institute from Bucharest. Grafting combinations used have been the *S. melongena* scions (Aragon F1 from Hazera, Israel and Luiza variety from the Research–Development Institute Vidra, Romania), the *S. lycopersicum* x *S. habrochaites* rootstock (Emperador F1 from Rijk Zwaan, Netherlands) and the *S. melongena* rootstock (L23B eggplant hybrid from germplasm collection of the Research Station Buzău, Romania). By comparing the fruit yield and carbohydrates content of the grafted or non-grafted variants, the grafted eggplants have had outstanding results, values higher than at control eggplants. Production increment has been up to 25.44% (Luiza x Emperador). Carbohydrate content has increased up to 0.14% (Aragon x Emperador). Researches on the identification of some rootstocks compatible with eggplant scions continues in Romania.

Keywords: grafting, quality, *Solanum lycopersicum* x *S. habrochaites*, *S. melongena*, yield

1. INTRODUCTION

The eggplants are very popular crops in Romania. These plants are way liable to diseases, pests and climatic vagaries, so their yield may be affected.

The vegetable grafting is an environmentally friendly operation with a similar effect to crop rotation (Blestos and Olympos, 2008), an agronomic technique and an ecological alternative to substitute methyl bromide used to disinfect of soil.

The use of grafted *Solanaceae* plants is very popular, including eggplants (*Solanum melongena*) (Colla et al., 2014).

Among the grafting aims are to fruit yield and quality (Abd El-Wanis et al., 2013).

Grafting is very important for the increase in yields and rootstock selection (Kyriacou et al., 2017) with some genetic properties (increased yield production) (Nyaku and Amisshah, 2018). Different studies and research results have shown the success of grafted crops compared to non-grafted crops (Álvarez-Hernández, 2019; Bogoescu et al., 2021).

Some rootstocks are very used for eggplant grafting, Emperador F1, Hykiaku F1 but and others and the Romanian rootstocks, L1S, L23A, L23B and others. The objective of this paper has been to establish the influence of some *Solanum* rootstocks on the fruit yield and quality of some grafted eggplants.

2. MATERIALS AND METHODS

Biological materials

The study has been conducted on an eggplant collection from a research greenhouse of the Horting Institute in the southeastern area of Romania. Grafting combinations used have been the *S. melongena* scions (Aragon F1 from Hazera, Israel and Luiza variety from the Research–Development Institute Vidra, Romania), the *S. lycopersicum* x *S. habrochaites* rootstock (Emperor F1 from Rijk Zwaan, Netherlands) and the *S. melongena* rootstock (L23B eggplant hybrid from germplasm collection of the Research Station Buzău, Romania). The experiment with eggplants has been set up in a Venlo glass greenhouse (figure 1) in the microclimate conditions from table 1.



Figure 1. Experimental lot with eggplants (different phenophases) in Venlo glass greenhouse

Climate conditions from crop space

The Delta-T meteorological station has been used to monitor the climatic factors. The climate conditions (May–August, 2020) from crop greenhouse have been:

- 25.5 – 27.4°C average temperature,
- 49.4 – 61.3% average atmospheric humidity,
- 20.2 – 25.1°C soil temperature
- 30.8 – 50.6% soil humidity

Nutrition conditions

Some organic and chemical characteristics of greenhouse soil had have medium-big values (pH, EC, anions, some cations and microelemnts) and others had have small small (cations of N-NH₄ and K).

The fertilization used in research, after Doltu et al., 2021: before planting has been used 300 kg/ha Complex 16–16–16 and then 0.1 – 0.15 kg potassium sulphate from the 5th day to the 25th day after planting and the 45th day to the 60th day after planting, 0.1 kg ammonium nitrate from the 5th day after planting to the 55th day, 0.05 – 0.1 kg GL fruit 18-11-59+microelements from the 26th day after planting to the 45th day, Folimax 0.3% at the 10-day intervals (4 treatments).

Experimental design of experience

This research has been realized in a randomized blocks.

The density of plants has been 18000/ha grafted eggplants and 24000 non-grafted eggplants/ha.

Scheme of eggplants experience is in table 1.

Table 1. Scheme of experience

| Variant | Scion | Rootstock |
|---------|-----------------|-----------|
| 1 | Aragon (martor) | - |
| 2 | Aragon | Emperador |
| 3 | Aragon | L23B |
| 4 | Luiza | - |
| 5 | Luiza | Emperador |
| 6 | Luiza | L23B |

Biometrical determinations

The determinations have been realized in fructification period (total yield for each research variant).

Fruit chemical analysis

The soluble dry substance has been determined using the WM-7 digital refractometer with a precision of $\pm 0.1\%$ by ATAGO (Sora et al., 2019).

The total carbohydrate has been determined for five fruits/variant, by the Bertrand method (Hoza et al., 2017).

Statistical analysis

Statistical analysis of results have been by the Duncan test (0.05 significance level).

3. RESULTS AND DISCUSSIONS

Fruit yield of eggplants is in table 2.

Table 2. Fruit yield of eggplants

| Variant | Production (t/ha) | Difference | |
|--------------------|-------------------|------------|-------|
| | | t/ha | % |
| Aragon x Emperador | 61,2c | 3,3 | 5,7 |
| Aragon x L23B | 58,3b | 0,4 | 0,69 |
| Aragon (control) | 57,9a | - | - |
| Luiza x Emperador | 50,3c | 10,2 | 25,44 |
| Luiza x L23B | 48,3b | 8,2 | 20,45 |
| Luiza (control) | 40,1a | - | 100 |

Note: Duncan test - different letters (a, b, c) are significant differences

The superior yields have been obtained for grafted variants compared to control variants; difference of production between 0.69% (Aragon x L23B) and 25.44% (Luiza x Emperador). The combination of a weak scion with a vigorous rootstock (Luiza x Emperador) is more productive comparative with vigorous scion and rootstock (Aragon x Emperador). The results concerning the effect of rootstocks on production in protected culture are only few. The vegetative growth and yield of plants grafted on to tomato was superior to that of the non-grafted control, whereas plants grafted

on to eggplant rootstocks showed similar development and yield to that of the control (Passam et al., 2005).

The soluble dry substance and the total carbohydrate content are in table 3.

Tabel 3. Biochemical components from eggplants

| Variant | Soluble dry substance (°R/20°C) | Difference | Total carbohydrate (%) | Difference |
|--------------------|------------------------------------|------------|---------------------------|------------|
| Aragon x Emperador | 5,2a | -0,1 | 2,42b | 0,14 |
| Aragon x L23B | 5,3b | 0 | 2,40b | 0,12 |
| Aragon (control) | 5,3b | - | 2,28a | - |
| Luiza x Emperador | 5,2a | -0,2 | 2,48a | 0,08 |
| Luiza x L23B | 5,4b | 0 | 2,47a | 0,07 |
| Luiza (control) | 5,4b | - | 2,4a | - |

Note: Duncan test - different letters (a, b) are significant differences

The superior carbohydrate result has been obtained for grafted variants compared to control variants; the difference of production has been between 0.07% (Luiza x L23B) and 0.14% (Aragon x Emperador).

The soluble dry substance content has been slightly lower for the grafted variants (Aragon x Emperador and Luiza x Emperador), a negative difference (-0.1 and -0,2) compared to non-grafted variants, control.

Grafting decreased the soluble dry substance content and increased eggplant weight. The combination of a vigorous rootstock with a weak cultivar is more profitable than that of a vigorous rootstock and a vigorous cultivar (Çürük et al., 2009).

4. CONCLUSIONS

The rootstock has influenced eggplant production per plant: the Emperador rootstock has produced higher production in all variants (Aragon x Emperador and Luiza x Emperador) compared to the control variant (Aragon and Luiza). The combination of a weak scion with a vigorous rootstock (Luiza x Emperador) is more productive comparative with vigorous scion and rootstock (Aragon x Emperador).

The research has shown that grafting on an appropriate Emperador and L23B rootstocks has some positive influences on eggplant yield compared to control eggplants.

The superior carbohydrate result has been obtained for all grafted eggplant variants compared to non-grafted variants, control.

The results has shown that grafting has positive influences on the yield and quality of eggplants compared to control eggplants.

These rootstocks, Emperador and L23B, are recommended for the Aragon and Luiza eggplant grafting and for protected spaces cropping in Romania.

The researches on the identification of some rootstocks compatible with eggplant scions must continue in Romania.

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