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INFLUENCE OF GRAFTING ON PRODUCTION AT SOME GRAFTED EGGPLANTS

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Abstract

The scientific research is concerned continuously of achieving some high value biological creations, resistant or tolerant to diseases and pests, high productivity, high quality fruits; these goals are obtained by grafting. The eggplants are plants that can be grafted onto different rootstocks. The grafted seedlings transmit to crops quality, productivity, resistance to pests and diseases from soil, tolerance to abiotic stress factors, optimal absorption of water and nutrients, vigour. The study was conducted in a greenhouse of the Horting Institute Bucharest and it has followed the rootstock influence on the production quality at some grafted eggplants. The biological material has consisted of import F1 hybrids, eggplant scions (''Black Pearl'' and ''Classic'') and rootstocks (''Emperador'' and ''Torpedo'') commonly used in Romania for grafting of eggplants. It were determined form index (FI), form (F), weight/fruit (W), marketable production (MP), humidity (H) – gravimetric method, soluble dry matter (SDM) by refractometry method using ABBE refractometer, total sugar (TS) by Bertrand method. The results show that the grafting had influenced some aspects of the eggplant production. The conclusions of the researchers from the Horting Institute are in respect with some conclusions of the foreign researchers, but more researches are required in this domain to highlight the grafting effect on some aspects concerning production of grafted vegetables.

Key words*: grafting, yield, Solanum melongena L., quality.*

INTRODUCTION

The scientific research is concerned continuously of achieving some high value biological creations, resistant or tolerant to diseases and pests, high productivity, high quality fruits; these goals are obtained by grafting (Doltu, 2007).

The vegetable grafting has been used since the early decades of the XIX century in the countries from the Far East and it is considered to be an ecological way to reduce the attack of pathogens and pests of soil (fungi, bacteria and nematodes) which, particularly in intensive culture conditions, produce considerable production loss and abandonment of some cultures.

This planting material is a biological alternative for replacing polluting chemicals used to disinfection of the soil (Echevarria et al., 2004). The grafted seedlings print quality, productivity, resistance to diseases (*Fusarium* spp., *Verticillum* spp.) and pests (nematodes) of soil (Bogoescu et al., 2008).

The grafting print resistance to pathogens and pests of soil, tolerance to abiotic stress factors, improves absorption about water and nutrients, increase vigour to scion (King et al., 2010 and Lee, 1994).

Some researchers belive that the results concerning the fruit quality obtained from grafted plants are contradictory (Davis et al., 2008).

Çürük et al., 2009 had investigated the grafting influence on eggplants, noting that the fruit average weight is significantly influenced by grafting.

The results concerning the grafting influence on vegetable crops require more researches in this domain for to highlight the grafting effect on some aspects concerning production of grafted vegetables.

MATERIALS AND METHODS

The biological material used in research has consisted from eggplant scions and rootstocks commonly used in Romania to grafting of eggplants.

The scions were F1 hybrids of eggplants, 'Black Pearl' (Enza Zaden, Netherlands), 'Classic' (Clause Vegetale Seeds, France) and F1 hybrids of rootstocks 'Emperador' (Rijk Zwaan, US) and 'Torpedo' (Ramiro Arnedo Semillas, Spain).

The ungrafted and grafted eggplant seedlings had been obtained into specialized greenhouse for production of seedlings from Laboratory of Protected Cultures, Institute Horting Bucharest.

The grafting technique have consisted in more stages: sowing (scion and rootstock), preparing for grafting, grafting itself, introduction of grafted plants in polyethene tunnel for callus forming, transferring of seedlings in greenhouse for grower and maintenance according with the 'Classic' technology (Bogoescu M. et al., 2008).

The experimental variants were made up from lots of ungrafted (control) and grafted plants:

- ungrafted plants (control):
- 'Black Pearl' (V1)
- 'Classic' (V2)
- grafted plants (scion x rootstock):
- 'Black Pearl' x 'Emperador' (V3)
- 'Classic' x 'Emperador' (V4)
- 'Black Pearl' x 'Torpedo' (V5)
- 'Classic' x 'Torpedo' (V6)

The experimental lots with ungrafted and grafted eggplants were set up at 27/06/2015 at greenhouse of glass and maintained according with the specific technologies (Figure 1, a and b).

The experience was made up of 96 plants/V1 or V2 (24,000 plants ungrafted/ha) and 72 plants/V3 or V4, V5 and V6 (18,000 grafted plants/ha). It was placed by the randomized block method in 4 repetitions (24 plants/ repetition V1, V2 and 18 plants/repetition V3, V4, V5 and V6).

The observations, the biometric determinations and the biochemical analyzes on eggplant fruits were performed in the laboratories of the Horting Institute on biological samples harvested to consumer maturity.

a) After planting

b) During the vegetative period

Figure 1. Experimental lots with grafted eggplants cultivated into greenhouse

It were determined form index (FI), form (F), weight/fruit (W), marketable production (MP), humidity (H) – gravimetric method, soluble dry matter (SDM) by refractometry method using ABBE refractometer, total sugar (TS) by Bertrand method.

The experience was carried out under conditions of extreme temperatures, very high in the summer of 2015; these temperatures were a calamity for vegetable cultures.

RESULTS AND DISCUSSIONS

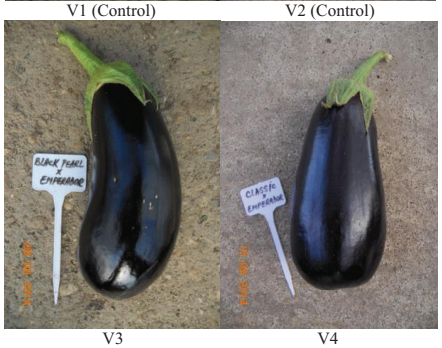
The results concerning some observations, biometric determinations and biochemical analyzes performed on eggplant fruits are shown in Table 1. The grafting did not affect the fruit form.

The grafted and ungrafted plants have had the fruits with same form, elongated eggplants (Figure 2).

Table 1. Data concerning some fruit characteristics from eggplant variants

Variants	Biometric determinations			Biochemical analyzes		
	FI / F	W (g/fruit)	MP (kg/ha)	SDM (ºR)	TS (%)	H (%)
V1 (Control)	2.25 / elongate	353	50,230	4.60	1.50	92.10
V2 (Control)	2.30 / elongate	305	50,200	4.50	1.30	92.10
V3	2.25 / elongate	273	61,400	5.00	1.27	94.17
V4	2.28 / elongate	255	58,120	4.60	1.25	93.90
V5	2.27 / elongate	281	58,390	4.75	1.39	94.05
V6	2.28 / elongate	283	56,980	4.63	1.24	93.98

V1 (Control) V2 (Control)



V3 V4

V5 V6

Figure 2. Eggplant form, elongate, V1,V2, V3, V4, V5, V6

The fruit weight was not significantly influenced by the grafting. At some grafted variants (V3 and V6), 'Emperador' and 'Torpedo' rootstocks had determined obtaining of fruits with weighing less than the ungrafted variants, control (V1 and V2) and another grafted variants (V5 and V4) had determined obtaining of fruits with weighing more bigger than the ungrafted variants, control (V1 and V2).

There is a direct linear correlation between variants and the average marketable production. The determination coefficient shows that for production (kg/ha), the correlation is very significant, $r^2 = 1$ (Figure 3).

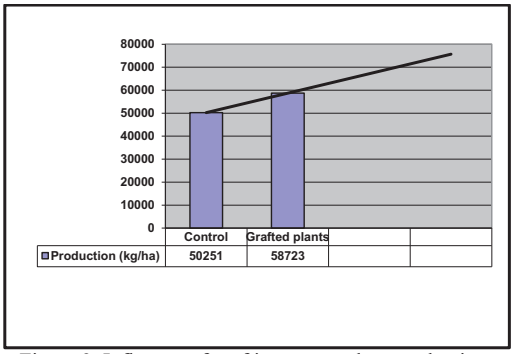


Figure 3. Influence of grafting on eggplant production

The fruit color harvested at consumer maturity was not influenced by the grafting; such as the fruits from grafted plants had same color as the fruits from ungrafted plants, control.

The differences were insignificant about the content some biochemical components.

About SDM, the grafted variants (V2, V3, V4, V5 and V6) have had slightly higher values compared with the ungrafted variants (V1 and V2). The S content was higher in ungrafted variants (V1 and V2) compared with the grafted variants (V2, V3, V4, V5 and V6), but the differences were not significant.
Bogoescu and Doltu, 2015, show in a specialty paper that ungrafted eggplants have a higher carbohydrate content (2.54–2.97%) compared with the grafted eggplants (1.92–2.00%) cultivated under same biotope and technological conditions.
About H, the ungrafted variants (V1 and V2) has had same value and slightly lower than the grafted variants (V2, V3, V4, V5 and V6).
The results obtained by some experts (Moncada et al., 2013) about the yield and the quality of some grafted eggplants are contradictory.

CONCLUSIONS

The extreme temperatures, very high from the summer of 2015, considered a calamity, led to a strong abiotic stress on plants during the vegetable period; thus, the results about eggplant production were inconclusive.
The grafting effect on eggplants it was insignificant in the climatic conditions of 2015.
The fruits of the grafted plants have form, color and weight as the fruits than ungrafted plants.
At the grafted variants, the soluble dry matter content was higher, the sugar content was lower and the humidity was higher than in the ungrafted variants, but the differences were not significant.
The rootstock and scion plants are compatible regarding the fruit quality.
The results obtained by the research in 2015 concerning the grafting effect on the eggplant production are not relevant; thus it requires further researches on these issues.
The conclusions of the researchers from the Horting Institute are in keeping with some conclusions of the foreign researchers, but are required more researches in this domain for to highlight the grafting effect on some aspects concerning production of grafted vegetables.

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