

EFFECT OF *ECKLONIA MAXIMA* EXTRACT IN ACCRETION OF SYMBIONTS AT HETEROPLASMIC GRAFTING OF SOME WATERMELONS

EFFECTUL EXTRACTULUI DE *ECKLONIA MAXIMA* ÎN CONCREȘTEREA SIMBIONȚILOR LA ALTOIREA HETEROPLASMICĂ A UNOR PEPENI VERZI

*DOLTU Mădălina*¹, *SORA D.*¹, *TĂNASĂ Veronica*¹

e-mail: doltu_mada@yahoo.com

Abstract. *The research was conducted to determine the effect of the extracts of Ecklonia maxima specie (sea bamboo) in the symbiots accretion at the heteroplasmic grafting of some watermelons. The experimental variants consisted in grafted plants, combinations between cultivars of species Citrullus lanatus, Cucurbita maxima x C. moschata and Lagenaria siceraria. The scions belong to a Romanian variety, 'Dochița' and three F1 hybrids, 'Baronesa', 'Carol' and 'Sorento'. The rootstocks were two F1 hybrids, 'Cobalt' and 'Emphasis'. The algae extract used contains auxins (11 mg/L) and cytokinins (0.3 mg/L). There were applied two treatments before grafting, foliar on scions and rootstocks, 1 mL/500 mL water and a treatment at grafting, on soil, 5 mL/L water. The control variant was free of hormones extract. There were made determinations, observations and interpretations concerning the algae effect on the symbiots accretion. The best results on E. maxima extract treatment were obtained on watermelons grafted on 'Cobalt', then watermelons grafted on 'Emphasis'.*

Key words: cucurbits, phytohormones, multiplication, vascularization

Rezumat. *Cercetarea a urmărit efectul extractelor speciei Ecklonia maxima (bambusul de mare) în concreșterea simbiionților la altoirea unor pepeni verzi. Variantele experimentale au constat din plante altoite, combinații între cultivare din speciile Citrullus lanatus, Cucurbita maxima x C. moschata și Lagenaria siceraria. Altoii au aparținut soiului românesc 'Dochița' și trei hibrizi F1, 'Baronesa', 'Carol' și 'Sorento'. Portaltoii au fost doi hibrizi F1, 'Cobalt' și 'Emphasis'. Extractul de alge folosit a conținut auxine (11 mg/L) și citochinine (0.3 mg/L). S-au aplicat două tratamente înainte de altoire, foliar asupra altoilor și portaltoilor, 1 mL/500 mL apă și un tratament la altoire, pe sol, 5 mL/L apă. Varianta martor a fost fără extract cu hormoni. S-au realizat determinări, observații și interpretări privind efectul extractului de alge asupra concreșterii simbiionților. Cele mai bune rezultate privind tratamentul cu extract de E. maxima le-au obținut pepenii verzi altoiți pe 'Cobalt', apoi pepenii verzi altoiți pe 'Emphasis'.*

Cuvinte cheie: cucurbitacee, fitohormoni, înmulțire, vascularizare

¹Research and Development Institute for Processing and Marketing of Horticultural Products – Horting, Bucharest, Romania

INTRODUCTION

Grafted seedlings are being progressively adopted by the vegetable industry as propagules of choice for crop establishment, but despite this recent advance, the percentage of grafted plants in the overall vegetable production is still relatively low (Leonardi and Romano, 2004).

Between 2010-2015, the vegetable grafting has seen important developments in Romania. The amount of grafted watermelon seedlings obtained in specialized greenhouse from Horting Institut Bucharest has been growing.

The method is based on the fusion between scion and rootstock (wild variety) (Edelstein, 2004). Grafting can be defined as the natural or deliberate fusion of plant parts so that vascular continuity is established between them and the resulting genetically composite organism functions as a single plant (Yassin and Hussen, 2015).

In symbiots accretion at grafting there are three stages: callusing, welding and vascularization. During this period, the phytohormones have an important role.

Ecklonia maxima (sea bamboo) is a seaweed from the South and West coasts of South Africa which is used for obtaining of organic extracts used as stimulators in horticulture. Its consists the natural plant hormones such as (auxines and cytokines) which have optimal role in cell division, important activity during of the symbiots accretion at the watermelons grafting.

MATERIAL AND METHOD

The aim of our research is to study the accretion effect of extracts of sea bamboo in heteroplasmic grafting of some watermelon cultivars on different rootstocks. The experiment was conducted in 2016, into specialized greenhouse for production of grafted seedlings from Laboratory of Protected Cultures, Institute Horting Bucharest.

The experimental variants were grafted plants, combinations between cultivars from the species *Citrullus lanatus*, *Cucurbita maxima* x *Cucurbita moschata*, *Lagenaria siceraria*. The scions belonged to cultivars from the species *C. lanatus* - Romanian variety - 'Dochița' and three F1 hybrids, 'Baronesa', 'Carol' and 'Sorento'. The rootstocks were the plants of two F1 hybrids, 'Cobalt' (*C. maxima* x *C. moschata*) and 'Emphasis' (*L. siceraria*).

The obtaining of grafted watermelon seedlings has involved some steps:

- ✓ sowing scion and rootstock, in alveolar trays (24 mL/cell volume) with nutritive
- ✓ substrate (peat₃:perlite₁); the peat has grain size 0-10 mm, NPK (1 kg/m³), microelementes: B, Mg, Cu, Mn, Zn, Fe, S (0.050 kg/m³), calcar (4.7 kg/m³), pH 6 and wetting agent 100 mL/m³;
- ✓ preparation for grafting, necessary materials (clips, blades);
- ✓ heteroplasmic grafting - in phenophase of a true leaf for scion, manual cutting with a cotyledon for rootstock, symbiots stitching in clips;

- ✓ forming of callus – in polyethylen tunnel with specific microclimate conditions (temperature of 23-25°C and relative air humidity of 98-100%), closed tunnel for 4 days and ventilated tunnel from 5th day; so, it is realizing a forcing process for the stimulating of the callusing/welding of the symbiontes (scion and rootstock);
- ✓ transferring of grafted seedlings from the space for callus forming in the growing greenhouse.

The algae extract used had auxins (11 mg/L) and cytokinins (0.3 mg/L).

Two treatments were applied before grafting, foliar on scion and rootstock, 1 mL/500 mL water and a treatment at grafting, on soil, 5 mL/L water. Control variant was without hormone extract. A trifactorial type experience was organized; the experimental factors were:

- A factor – scion: a₁ – 'Dochița', a₂ – 'Baronesa', a₃ – 'Carol', a₄ – 'Sorento';
- B factor – rootstock: b₁ – 'Emphasis', b₂ – 'Cobalt';
- C factor – treatment: c₀ – without treatment, control, c₁ – with treatment.

The variants of working were: V₁(a₁b₁c₀), V₂(a₁b₁c₁), V₃(a₁b₂c₀), V₄(a₁b₂c₁), V₅(a₂b₁c₀), V₆(a₂b₁c₁), V₇(a₂b₂c₀), V₈(a₂b₂c₁), V₉(a₃b₁c₀), V₁₀(a₃b₁c₁), V₁₁(a₃b₂c₀), V₁₂(a₃b₂c₁), V₁₃(a₄b₁c₀), V₁₄(a₄b₁c₁), V₁₅(a₄b₂c₀), V₁₆(a₄b₂c₁).

RESULTS AND DISCUSSIONS

The technological stages for producing grafted seedlings at cucurbit cultivars there are in figure 1.

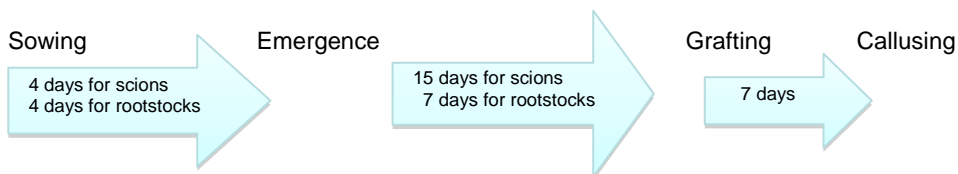


Fig. 1 The technological stages for producing watermelon grafted seedlings

The results of the treatment with *E. maxima* extract on symbiots accretion there are in figure 2.

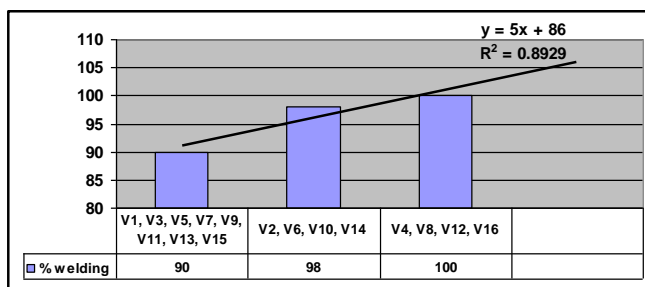


Fig. 2 Influence of treatment with *E. maxima* on symbiots accretion

In figure 2, there is a direct linear correlation between variants untreated and treated with *E. maxima* and the welding of the symbionts (% plants with callus). The determination coefficient value shows that at % of plants with callus, correlation significance is very significant ($r^2 = 0.8929$).

The plants treated with *E. maxima* extract had obtained the best results, 100% plants with callus, vascularized plants at seedlings grafted on 'Cobalt' rootstock (V₄, V₈, V₁₂, V₁₆) and 98% plants with callus, vascularized plants at seedlings grafted on 'Emphasis' rootstock (V₂, V₆, V₁₀, V₁₄) compared to 90% plants with callus, vascularized plants at seedlings grafted from variants without treatment, control (V₁, V₃, V₅, V₇, V₉, V₁₁, V₁₃, V₁₅).

The researchers have studied the influence of the *E. maxima* extract on plants. Cipiela *et al.*, 2016 says that the *E. maxima* extract has biostimulant effect and influence some processes in plants.

CONCLUSIONS

1. The watermelon plants grafted on interspecific rootstock, 'Cobalt' (*C. maxima* x *C. moschata*) had obtained the best results using the treatment with *E. maxima* extract, then watermelons grafted on 'Emphasis' rootstock (*L. siceraria*).

2. *E. maxima* has a biostimulant effect in the symbionts accretion at the heteroplasmic grafting of the investigated cucurbits.

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