# EFFECT OF FUROSTANOL GLYCOSIDE TREATMENTS IN STRAWBERRY (*Fragaria x ananassa L.*) PLANTING MATERIAL PRODUCTION

## EFECTUL TRATAMENTELOR CU FUROSTANOL GLICOZIDE ÎN PROCESUL DE PRODUCERE A MATERIALULUI SĂDITOR LA CĂPŞUN (*Fragaria x ananassa L.*)

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***Abstract.*** *The aim of this paper was to estimate the effect of two furostanol glycoside treatments (G1 and G2) on quality of the planting material in strawberry (Fragaria x ananassa L).The experiments were carried on in U.A.S.V.M. greenhouse and were divided in two sections: the first one was focused on establishing the optimum concentration of treatment solution and its effect on rooting process and the second part has as aim the studying of the influence of furostanol glycoside treatments on foliar apparatus growth and developmentrelated with the treatment application method. The results showed that irrespective of the cultivar, both glycosides had a positive influence on rooting process, while vegetative growth was stimulated rather by G1 than G2 treatments. The treatment application method influenced the growth parameter in relation with the cultivar and glycoside type.*
**Key words:** furostanol glycoside, rooting, strawberry, vegetative growth, application method.

***Rezumat.*** *Lucrarea are ca scop determinarea efectului tratamentelor cu două glicozide furostanolice (G1 şi G2) asupra calității materialului săditor la căpşun(Fragaria x ananassa L). Experimentul s-a desfăşurat în sera U.S.A.M.V. Iaşi şi a cuprins două etape: prima a vizat stabilirea concentrației optime de tratament şi a influenței acestuia asupra procesului de înrădăcinare şi a calității materialului sădior de căpşun, iar a doua a avut în vedere studierea efectului tratamentelor cu glicozide furostanolice asupra creşterii şi dezvoltării aparatului foliarîn funcție de metoda de aplicare. Rezultatele au evidențiat că ambele glicozide au avuto influență pozitivă asupra procesului de înrădăcinare, iar creşterile vegetative au fost stimulate într-o mai mare masură de tratamentele cu G1. Metoda de aplicare a tratamentelor a influențat indicatorii biometrici în functie de soi şi de produsul folosit.*
**Cuvinte cheie:** glicozide furostanolice, înrădăcinare, cãpsun, creşterivegetative, metoda de aplicare.

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## INTRODUCTION

The effect of biostimulators in strawberry have been studied by many researchers showing that some of the products helps in improvement of fruit rot resistance (Washington et al. 1999), others increases the fruits nutrients content (Eşítken and Pirlak 2002), or fruit yield (Rohloff et al. 2002, Prokkola et al. 2003, Masny et al. 2004, Botta et al. 2009) and while others improves the number of runners and daughter plants (Abdel-Mawgoud et al. 2010). It was also demonstrated that some of the biostimulators increase the antioxidant enzymes activity in leaves (Špoljarević, 2010).

Furostanol glycosides are a new class of compounds which has recently being shown having a biostimulator effect on vines (Munteanu et al., 2008) and currants (unpubl. data) and also antioxidant, fungicidal, antiviral, bactericidal, nematocidal effect on tomatoes, cucumbers and potatoes, (Vasil'eva et al., 2000).It seems that furostanol glycoside plays an important role in the rate of pigment biosynthesis as well as in the biochemical systems of plant protection against oxidative damages (Vasileva et al., 2005).

In our paper the influence of two furostanol glycosides (G1 and G2) treatments on strawberry daughter plants rooting process and their furtherer behaviourin relation to the treatment application method.

## MATERIAL AND METHOD

The experiments were carried out in UASVM greenhouse during November 2011- January 2012. Young daughter strawberry plants (central bud and 2-3 leaves) were detached from the runners and maintained in glycoside solution for one hour and then were plantedthem in perlite for rooting. Treatment variants were: control (maintained for one hour in distillate water), and two glycoside solution (G1 and G2) in different concentration: 3 mM (V1), 0.3 mM (V2) and 0.03 mM (V3).G1 is an alcoholic extract from tomato seeds while G2 was obtained by alcoholic extraction of *Digitalis sp.* leaves. Each variant was represented by 10 plants.After one month the effect of treatments on rooting process has been evaluated by quantification of roots number/plant, the roots mean length, the new leaves mean number and their mean length.

For the second part of the experiment, only control plants and glycoside treated ones (G1V2 and G2V2) were kept and for the glycoside treatment waschosen only one variant of concentration (0.3mM). The treatment application method was varied: foliar (f) and foliar + radicular (f+r); so, before planting in pots, some of the young rooted strawberry plants were maintained in glycoside solution for 30 min, while the others were maintained in distillate water for the same period. Strawberries were plantedin a mixture of soil-peat 4:1(v/v), in pots (500 ml capacity) and maintained in greenhouse for two months. During this time, treated variants were sprayed withglycosides solution (G1 and G2) whilethe control was sprayed with distillatewater. After two months the effect of glycoside treatment and its application method was analysed by biometrical determinations such asroots number/plant and their length; the new leaves number/ plant and their mean length.For each variant 10 plants were used.

## RESULTS AND DISCUSSIONS

In both cultivars rooting percentage was 100 % but differences have been seen between roots number/plant. Both in Real and Magic cultivars, glycoside treatments leaded to an increasing roots number/plant by 10-37% (tab.1). Irrespective of cultivar, G2 utilization seems to have a higher influence on rooting process, roots number being 8-10% higher than G1 treated variants. It can be also observed that V2 and V3 concentrations leaded to a better rooting than V1, which make us to suppose that 3mM is too high for root inducing in this specie.

*Table 1*

**Influence of glycoside treatment on rooting process of strawberry daughter plants** (Mean±SE; n = 10)

| Treatment | Cultivar | Roots mean number/plant | Roots mean length (cm) | New leaves number/plant | Leaves mean length (cm) |
|---|---|---|---|---|---|
| Untreated | REAL | 10,60±0,18 | 9,47±0,44 | 3,20±0,14 | 4,38±0,44 |
| | MAGIC | 11,00±1,00 | 8,76±0,53 | 2,33±0,15 | 4,43±0,53 |
| G1V1 | REAL | 12,00±0,47 | 10,68±0,69 | 3,45±0,30 | 4,97±0,89 |
| | MAGIC | 11,67±0,58 | 9,97±0,89 | 2,52±0,58 | 4,95±0,89 |
| G1V2 | REAL | 13,20±0,17 | 11,89±0,38 | 3,94±0,15 | 5,93±0,38 |
| | MAGIC | 13,35±0,53 | 10,90±1,32 | 2,85±0,15 | 5,57±1,32 |
| G1V3 | REAL | 12,87±0,36 | 11,67±0,55 | 3,78±0,26 | 5,19±0,55 |
| | MAGIC | 12,80±0,87 | 10,92±0,29 | 2,77±0,58 | 5,10±0,29 |
| G2V1 | REAL | 11,68±0,61 | 10,79±0,44 | 3,53±0,08 | 4,25±0,44 |
| | MAGIC | 12,29±0,85 | 10,02±0,12 | 2,55±0,20 | 4,22±0,02 |
| G2V2 | REAL | 14,50±0,54 | 12,17±0,66 | 3,75±0,44 | 5,05±0,66 |
| | MAGIC | 14,67±1,04 | 11,06±0,76 | 2,67±0,38 | 4,92±0,76 |
| G2V3 | REAL | 13,55±0,43 | 11,62±0,81 | 3,62±0,46 | 4,80±0,81 |
| | MAGIC | 13,57±1,09 | 10,84±0,61 | 2,65±0,58 | 4,39±0,61 |

Beside roots number, the mean length of the roots is another important indicator used in strawberry plant material production, knowing that a good developed rooting system will provide better water and nutrients absorption, as well as a better drought resistance. Our experiment showed that glycoside treated variants had 25-28% bigger values of roots length that control (tab.1). No major differences between the two glycoside treatments had been observed either Real or Magic cultivar. Regarding the treatment concentration influence on root length the same pattern as in roots number can be observed. The roots were 12-14% longer in V2 and V3 variants than V1.

Another quality parameter of strawberry planting material is the morphological state of foliar apparatus. In our experiments glycoside treatment induced an increasing by 10-20% in the leaves number. In both cultivars, G1 treated variants recorded higher values of this parameter than G2 treated ones, especially when V2 concentration was used (tab.1).

The leaves mean length was also influenced by the glycoside treatments. 20-35 % higher values of this parameter were determined at G1 treated variants, while in those treated with G2 leaves mean length increased only by 10-15 % than control (tab.1). It seems that contrary of G2, G1 stimulates the foliar growth in both Real and Magic cultivar.

Due to the higher values obtained in all studied parameters 0,3 mM was the concentration chosen to be used for studying the influence of glycoside treatment application method on growth and development of strawberry plants.

The young plans behaviour after transplantation in pots has been studied in the aim of determining the influence of furostanol glycoside treatment on vegetative growth after a longer treatment period. Therefore two months after planting, the root and leaves growth parameters were measured again. The results showed an increasing of root mean number only in G2 treated variants (values being 20% higher than control), the G1 treated ones having similar values with control (tab. 2).

*Table 2*

**Influence of glycoside treatment and application method on growth and development of strawberry plants** (Mean±SE; n = 10)

| Treatment | Cultivar | Roots mean number/plant | Roots mean length (cm) | Leaves mean number/plant | Leaves mean length (cm) |
|---|---|---|---|---|---|
| Untreated | REAL | 17,24±0,17 | 7,10±0,07 | 7,43±0,08 | 10,60±0,11 |
| | MAGIC | 20,28±0,21 | 10,14±0,10 | 6,41±0,05 | 10,54±0,11 |
| G1f | REAL | 18,28±0,21 | 7,44±0,10 | 9,62±0,07 | 12,18±0,12 |
| | MAGIC | 19,96±0,26 | 10,49±0,19 | 7,89±0,05 | 13,00±0,12 |
| G1f+r | REAL | 18,09±0,30 | 7,35±0,08 | 9,59±0,09 | 11,61±0,12 |
| | MAGIC | 19,27±0,20 | 10,12±0,12 | 7,90±0,09 | 12,48±0,13 |
| G2f | REAL | 21,01±0,23 | 8,14±0,10 | 7,73±0,07 | 10,27±0,11 |
| | MAGIC | 24,34±0,25 | 11,17±0,10 | 6,40±0,06 | 10,15±0,12 |
| G2f+r | REAL | 20,31±0,15 | 8,02±0,09 | 7,06±0,09 | 9,41±0,11 |
| | MAGIC | 23,34±0,11 | 10,85±0,17 | 5,48±0,08 | 9,67±0,11 |

Comparing the two ways of product application, it has been observed that in both cultivars foliar and radicular application of G2 leaded to a slightly decrease of roots mean number/plant, while in G1 treated variants this fact had been observed only in Magic (tab. 2).

Almost the same trend, but with higher differences between G1 and G2 treatments, has been observed in analysis of roots mean length. G2 treated variants had 12-15% higher values of this parameter than control, while in G1 treated ones the differences were only about 3-5% (tab. 2).

The influence of the application method was observed only in G2 treated variants. In case of themixedtreatments (leaves and roots – G2f+r) a lower increase of roots length has been observed comparing with foliar treatment (G2f). This may be due to an accumulation of the product in plant, in which, above some level, cannot be used anymore or becomes inhibitory for roots growth.

Irrespective of the cultivar and the application methodG1treatments leaded to an increasing of leaves mean number/plant by 20-30% than control (untreated). In case of G2 treatments, foliar application (G2f) did not influenced this parameter (values being scimitar to control), on the contrary it decreased it (by 10-15%), in case of mixted application (G2f+r) (tab. 2). Similar results had been obtained by some other researchers (Kelting et al. 1997) which shown that bio stimulators have not always act an improvement of plant growth.

In both Real and Magic, the leaf mean length was influenced rather by glycoside type than the application method. G1 treated variants had 14-23% longer leaves than control, while in G2 treated variants the values of this parameter were even smaller (9-12%) than control. Moreover, in case of mixed treated variants (G1f+r and G2f+r) the leaves length valueswere a little bit lower than those recorded in foliar treated ones (G1f and G2f).

Taking into account the higher values obtained in Magic cultivar in almost all of the studied parameters we can conclude that this cultivar responded better on glycosides treatments (especially to G1) then Real which is a quite normal behaviour knowing that plantcan react different on the same bio stimulators and this kind of variation has been reported by many other authors at several species (Laugale and Daugavietis, 2009).

## CONCLUSIONS

1. Furostanol glycoside treatments improved the rooting process by increasing of roots number and their length (especially G2) and determined a better growth and development of foliar apparatus (G1).

2. Magic cultivar responded better than Real on glycoside treatments after transplantation in soil, recording higher values in almost all of the studied parameters.

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