INFLUENŢA PRODUSELOR RADISTIM ŞI A ACIDULUI INDOLIL ACETIC ASUPRA PRINCIPALELOR CARACTERISTICI DE ÎNRĂDĂCINARE A BUTAŞILOR VERZI LA UNELE SPECII DE ARBUŞTI FRUCTIFERI
RADISTIM AND INDOLIL ACETIC ACID INFLUENCE ON BERRIES SOFTWOOD CUTTINGS ROTTING CHARACTERISTICS

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Abstract:

The precocity and high fruit quality made the culture of small fruits very important worldwide and in our country as well. For finding more efficient techniques to produce the planting stock for these species, some investigations were carried out at the Research Institute for Fruit Growing Pitesti during 2008-2009. The following experimental scheme was organized: A Factor – Species involved, with the graduations: a_1= chokeberry; a_2 = hip rose (*Rosa canina*); a_3 = thorn blackberry; a_4 = honeysuckle; a_5 = thornless blackberry; a_6 = sea buckthorn; B Factors – rooting biostimulators with the graduations: b_1 = without biostimulators (control); b_2 = Radistim (powder); b_3 = indole acetic acid. The rooting of softwood cuttings was don eon a substratum consisting in 60% peat, 20% manure and 20% sand. This substratum of 8-10 cm thick was placed in plastic boxes put on high beds in a solarium where artificial mist may be applied for a given amount of time at set intervals. On average, in the 3 biostimulator treatments, the percentage of rooted cuttings ranged between 27.8% (choke berry) and 96.75% (sea buckthorn). The cutting length where roots developed was variable from 1 cm (chokeberry) to 9.39 cm (sea buckthorn) and the number of main roots per cutting ranged between, 4.78% (rose hip) and 21.89 (choke berry). The number of main roots emerged from the cutting stem was significantly higher by 116% versus the number of roots emerged from the callus zone. On average, for the 6 species, the application of the 2 biostimulators induced a significant increase (13-15%) of the rooted cutting, of cutting stem length developing roots (19-30%) and of major roots number (34-35%) versus the treatment without biostimulators. Regarding the values of growth characteristics, no significant differences were noticed between the 2 biostimulator treatments in all 6 graduations of A factor.

Cuvinte cheie: aronia, măceş, lonicera, mur cu ghimpi şi fără ghimpi, cătina,
Keywords: chokeberry, hip rose, thorn and thornless blackberry, honeysuckle

1. Introduction

Thanks to their precocity and high fruit quality, the small fruits growing has been highly praised worldwide and our country as well. One of the basic conditions for growing the small fruits into a large extent is to produce large amounts of planting stock by modern and efficient techniques. To achieve this objective, some studies at the RIFG Pitesti - Maracineni were carried out between 2008 - 2009.

2. Material and methods

The season for producing the softwood cuttings and their rooting was late July when the annual shoots of the selected species were enough developed for obtaining the softwood cuttings. The following experimental scheme was organized: A Factor – Species involved, with the graduations: a_1= chokeberry; a_2 = hip rose (*Rosa canina*); a_3 = thorn blackberry; a_4 = honeysuckle; a_5 = thornless blackberry; a_6 = sea buckthorn; B Factors – rooting biostimulators with the graduations: b_1 = without biostimulators (control); b_2 = Radistim (powder); b_3 = indole acetic acid. The rooting of softwood cuttings was don eon a substratum consisting in 60% peat, 20% manure and 20% sand. This substratum of 8-10 cm thick was placed in plastic boxes put on high beds in a solarium where artificial mist may be applied for a given amount of time at set intervals.

That was shortly done in 30 seconds followed by 15 – 30 minute breaks for a 30 day period from the planting of cuttings.

The number of softwood cuttings in a single graduation of B factor was 40. The rooting percentage was recorded for all cuttings placed on rooting beds and the other rooting characteristics were determined per 6 plants in each treatment, regarding each plant as a replication for the variance analysis.

To distinguish the number of major roots developed straight from stem (uncallused zone) or from the callused one at the cutting bottom, the results on the number of major roots were statistically processed according to trifactorial scheme like 2x6x3 with the following experimental factors:

- A factor – zone of cutting stem from where the main roots developed, with the graduations:

a1 = roots emerged from the stem (uncallused zone)

a2 = roots developed from the callused zone at the bottom of cutting stem

- B factor – Species involved, with the graduations: b_1= chokeberry; b_2 = hip rose (Rosa canina); b_3 = thorn blackberry; b_4 = honeysuckle; b_5 = thornless blackberry; b_6 = sea buckthorn;

- C factor – rooting biostimulators with the graduations: c_1 = without biostimulators (control); c_2 = Radistim (powder); c_3 = indole acetic acid.

3. Results and discussions

Influence4 of the biostimulators on the major rooting characteristics of softwood cuttings

On average, for the 3 treatments, where the biostimulators were applied, the percentage of rooted softwood cuttings varied from 27.8% (chokeberry) to 96.75% (seabuckthorn). Under the same conditions the length of cutting stem, where the roots developed varied from 1 cm (chokeberry) to 9.39 cm (seabuckthorn) and the number of major roots per cutting varied from 4.78 (hip rose) to 21.89 (chokeberry – fig. 1a, 1b,1c). Significant differences for all 3 rooting characteristics among the studied species were noticed (fig. 2a,2b,2c).

On average, for all 6 species examined, the radistim and indolil acetic acid application induced a significant rise of the rooting percentage (by 13-15%), an increase of cutting length (by 19-30%) where the roots emerged and of number of major roots (by 34-45%).

No significant rooting differences between the 2 biostimulator treatments were recorded. (Fig. 1a,1b,1c).

Examining the influence of the two biostimulators on the rooting of each species, it is mostly noticed their positive effects, statistically assured. (Fig. 2a,2b,2c)

Influence of rooting zone and biostimulators on the number of major roots in some small fruit species

On average, for all 6 species investigated and the 3 biostimulator treatments, the number of roots emerged from the cutting stem (uncallused zone) was significantly higher by 116% versus the number of main roots in the callused zone (Fig.3). Investigating this difference among the species, it is noticed that the number of main roots emerged from the callused zone was higher than the number of roots emerged from the stem one in case of *Aronia*, hip rose and thornless blackberry, while with thorn blackberry, chokeberry and seabuckthorn was quite conversely (Fig. 4).

The number of main roots emerged in the uncallused zone versus those in the callused zone was practically similar in case of treatment without biostimulators while in the biostimulators treatments was higher by 150-158%, the differences being this time, very significantly (Fig.5). Therefore, it is proved the influence of rooting biostimulators not only on the place of application, meaning the cutting bottom, but also on the cutting length.

Influence of biostimulators on the correlations nature and intensity between some rooting characteristics of the 6 small fruit species

The cutting length where the roots emerged for each species and rooting biostimulators treatment was very significantly positive correlated (r = 0.709***) to the number of main roots. The percentage of rooted cuttings in the untreated treatment was very significantly positive correlated to the rooted cuttings in the two biostimulator treatments. Comparing the two biostimulator involved, the correlations were closer (r = 0.992***) in case of radistim treatment than in the indolil acetic acid (r = 0.980***) – (Table).

The data in tables 1 and 2 underline the great difference among the species regarding the rooting parameters, mainly the rooting percentage. Comparing the values of this percentage with the values recorded with some leafy species (Careţu, 2000) it is noticed a higher rooting percentage in 5 of the 6 species. However, comparing the rooting values recorded with aronia, hip rose and chokeberry listed in table 1 with those recorded with the some species (averages for several selections within the same species) by Mladin et all. (1996), one can see that the values mentioned in this paper are lower. In both studies, the lowest rooting percentage was recorded with the chokeberry. Also, in both studies, the 3 species investigated were similarly ranked for the rooting percentage.

Except for the great variability of the rooting parameters from one species to another, the data presented in table 1 and 2 showed also that the biostimulators application have highly improved the values of these characteristics. Comparing the improvement level of these characteristics, presented in our paper with that in the other papers (Mladin et all., 1996, Careţu, 2000; Oneaţă, 2007, Wooldrige, 2008), the improvement level was lower in our case. Regarding the influence of rooting biostimulators on the size zone where the major roots emerged, it should be mentioned that the biostimulators application enhanced appreciably the spreading zone of roots. That is a positive effect because after the planting of cuttings in the field, the roots spreading on a larger zone can explore from the outset larger soil volumes being favorable to plants nutrition, consequently to their growth. The great variability of the rooting percentage and of major roots number from one species to another emphasizes the need for a deeper approach of these studies to quantify more precisely both the factors and intensity which have on influence an the rooting parameters above mentioned.

4. Conclusions

On average, for all 3 rooting biostimulator treatments, the percentage of rooted softwood cuttings ranged between 27.8% (chokeberry) to 96.75% (seabuckthorn), the cutting length from where the main roots emerged varied from 1 cm to 9.39 cm and the number of main roots per cutting ranged between 4.78 (hip rose) and 21.89 (chokeberry).

Application of the rooting biostimulators versus the untreated control induced a significant increase of the rooting percentage (by 13-15%), of cutting length from where the roots emerged by 19-30% and of main roots number by 34-45%.

On average, over the whole experiment, the number of roots emerged in the uncallused zone versus the roots emerged in the callused one was significantly higher by 116%. This difference was of 9% in case of treatment without rooting biostimulators and of 150 – 158% in case of biostimulator treatments.

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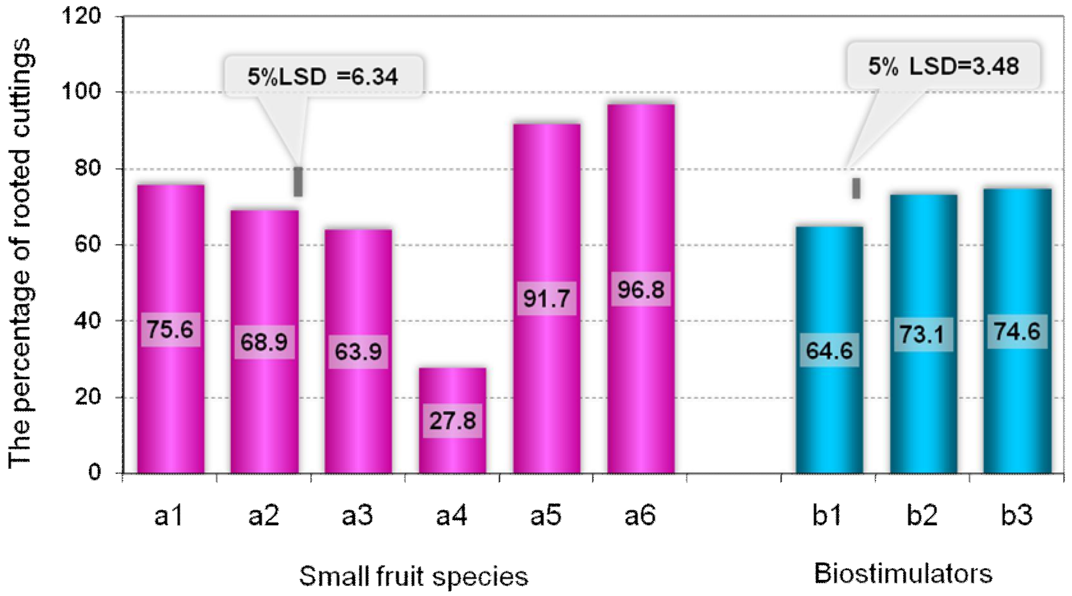
Tables and Figures

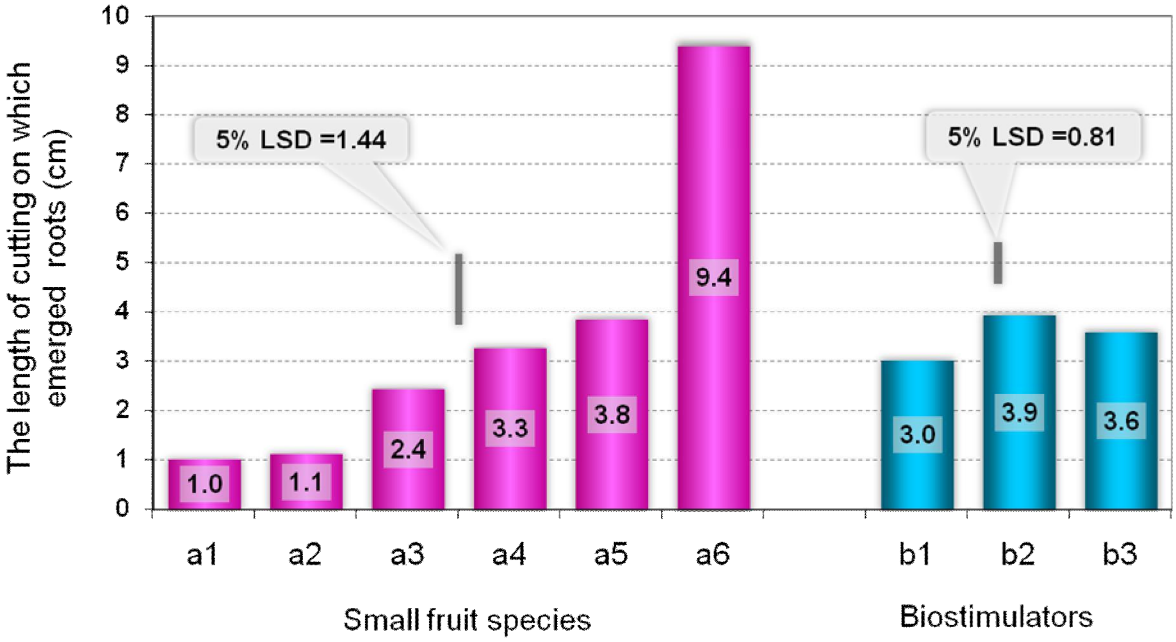
Table 1. **The influence of biostimulators on the correlations nature and intensity between some rooting characteristics of 6 small fruit species**

NO.	CORRELATED VALUES	DEGREE OF FREEDOM (N-2)	REGRESSION EQUATION	CORRELATION - COEFICIENT
1	Soft cutting length where the roots emerged and the number major roots	16	$Y = 7.8342X^{0,4778}$	0.709***
2	The percentage of rooted soft cuttings in the untreated biostimulator treatment and that in the treated one, with:			
	- Radistim;	4	Y = 80.394 Ln (x) – 257.91	0.992***
	- Indole aceti acid	4	$Y = 9,721 X^{1.0407}$	0.980***



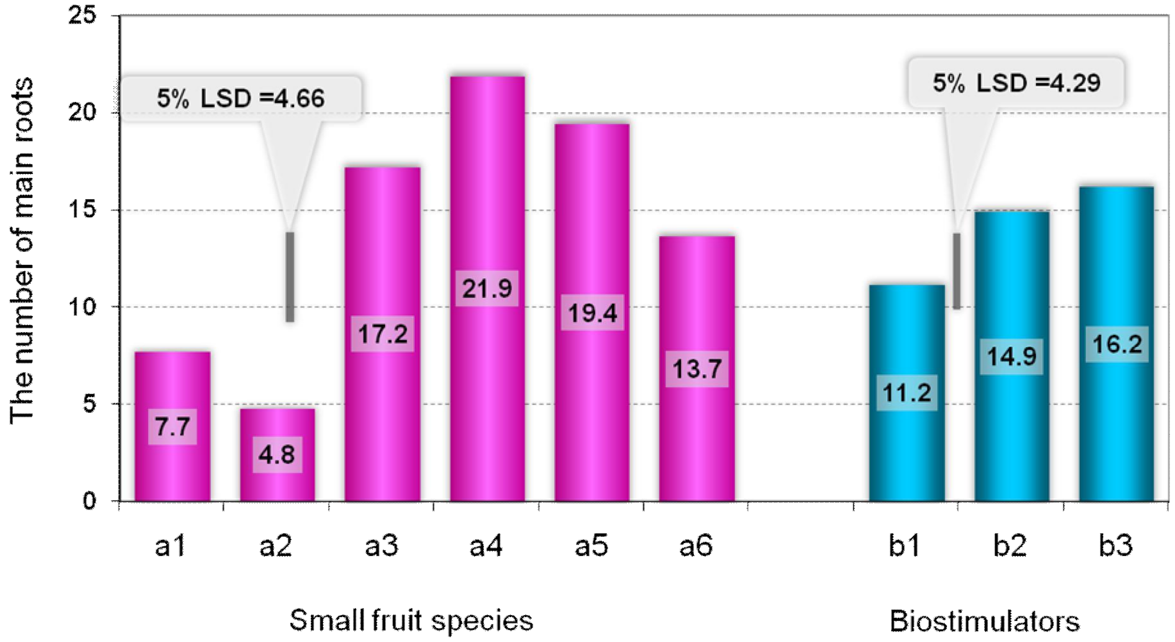
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 1a The influence of the rooting biostimulators on the percentage of rooted cuttings of some small fruit species



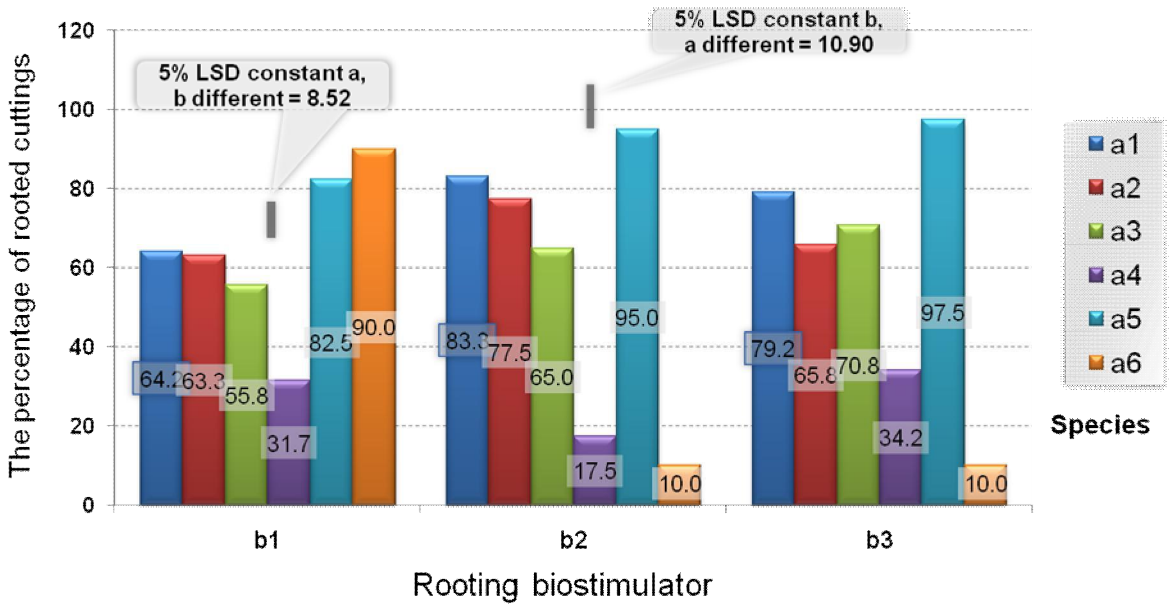
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 1b The influence of the rooting biostimulators on the length of cuttings on which emerged major roots (cm)



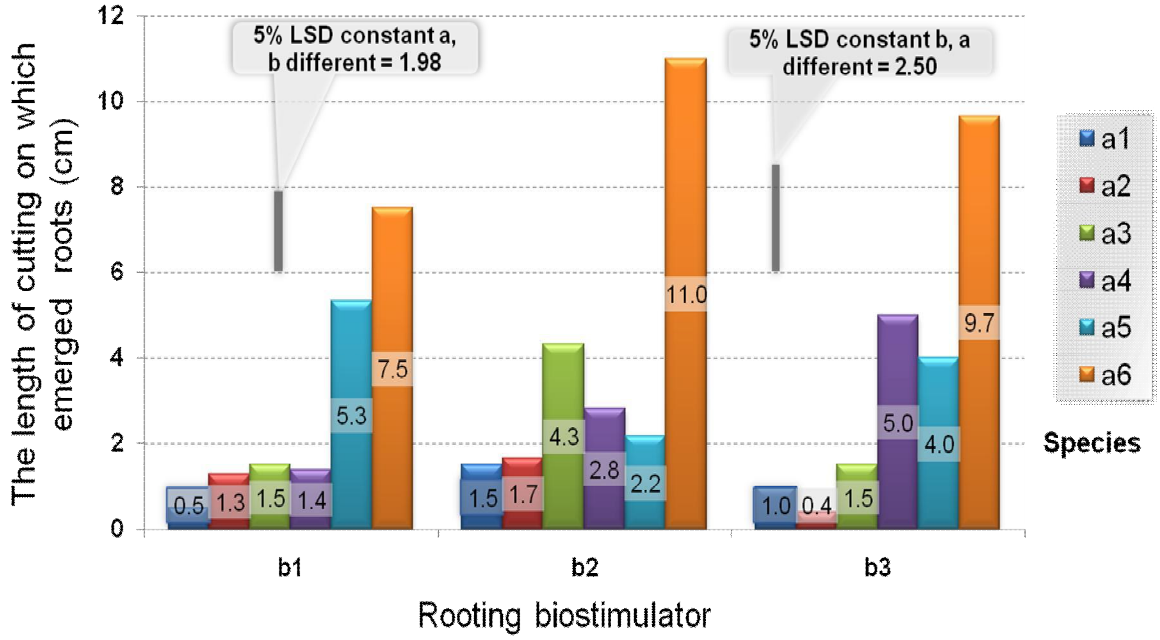
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 1c The influence of the rooting biostimulators on the number of major roots of some small fruit species.



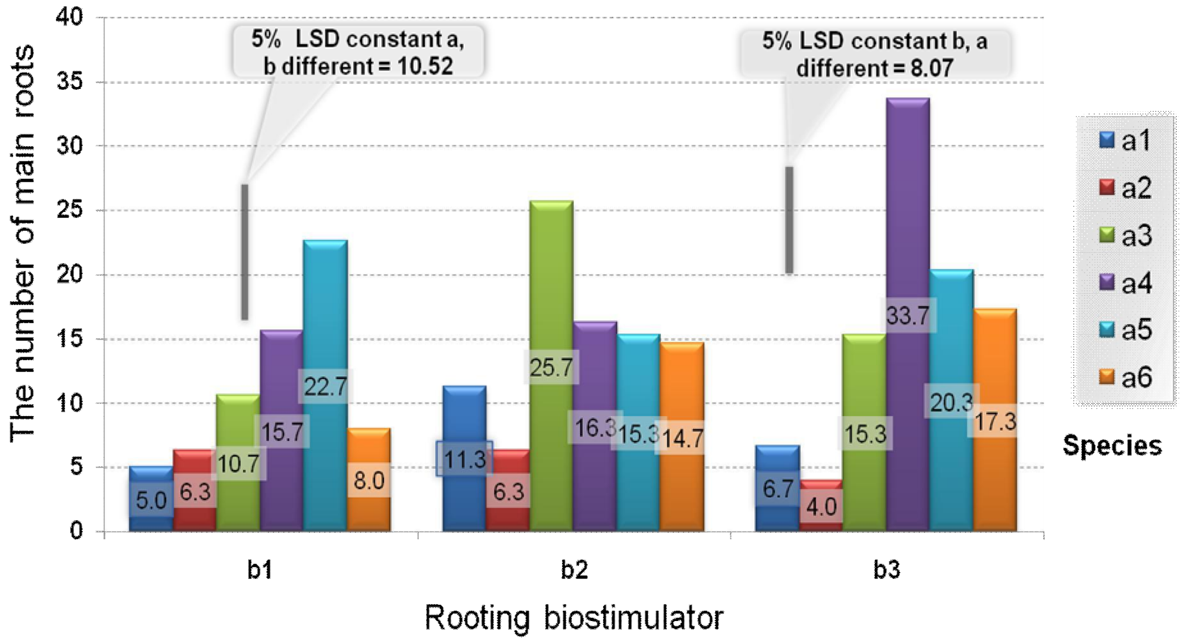
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 2a The influence of the rooting biostimulators on the percentage of rooted of soft cuttings of some small fruit species



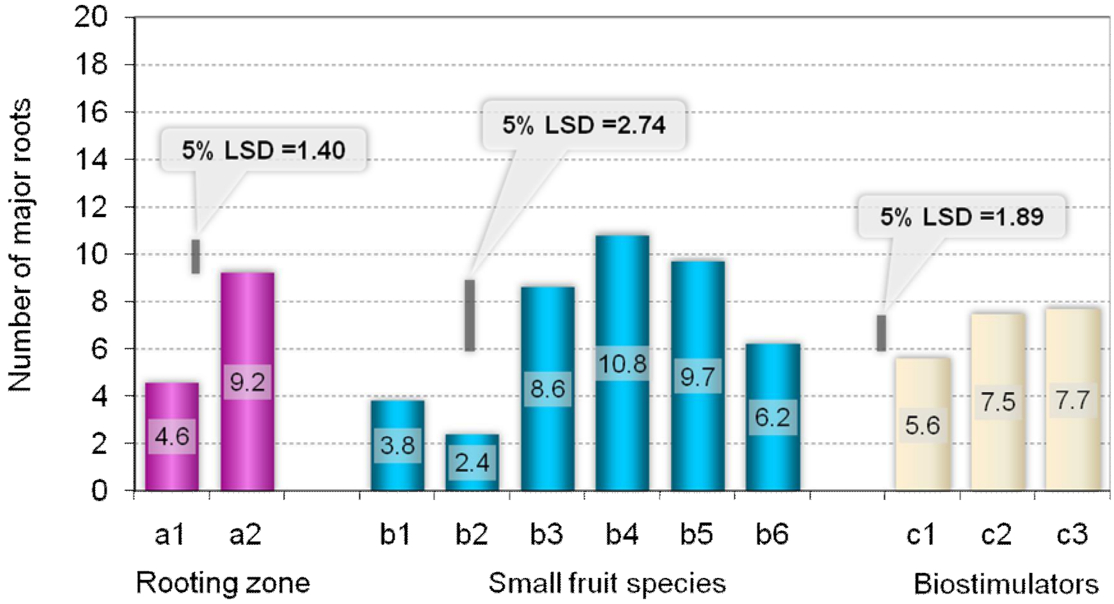
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 2b The influence of the rooting biostimulators on the lenght of cutting on wchich emerged roots (cm) of some small fruit species



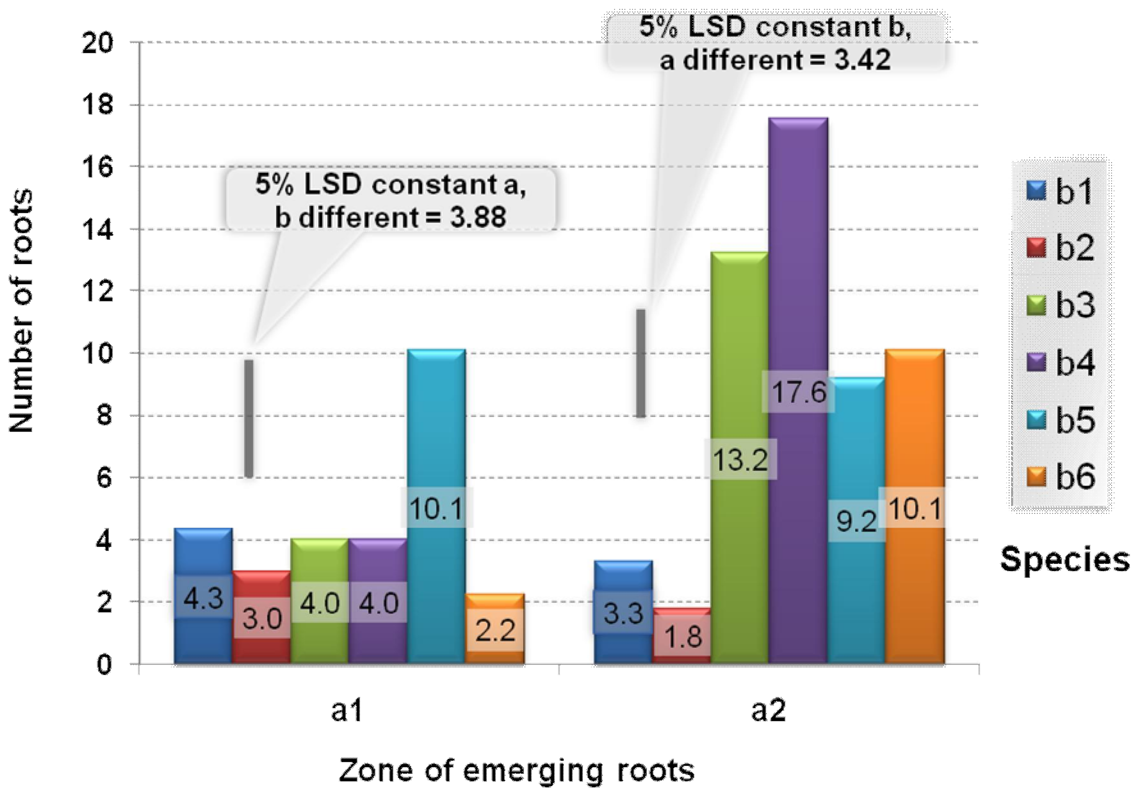
The significance of experimental factors graduations a1-a6; b1-b3 is shown in the text et chapter „Material and methods"

Fig. 2c The influence of the rooting biostimulators on the number of major roots of some small fruit species



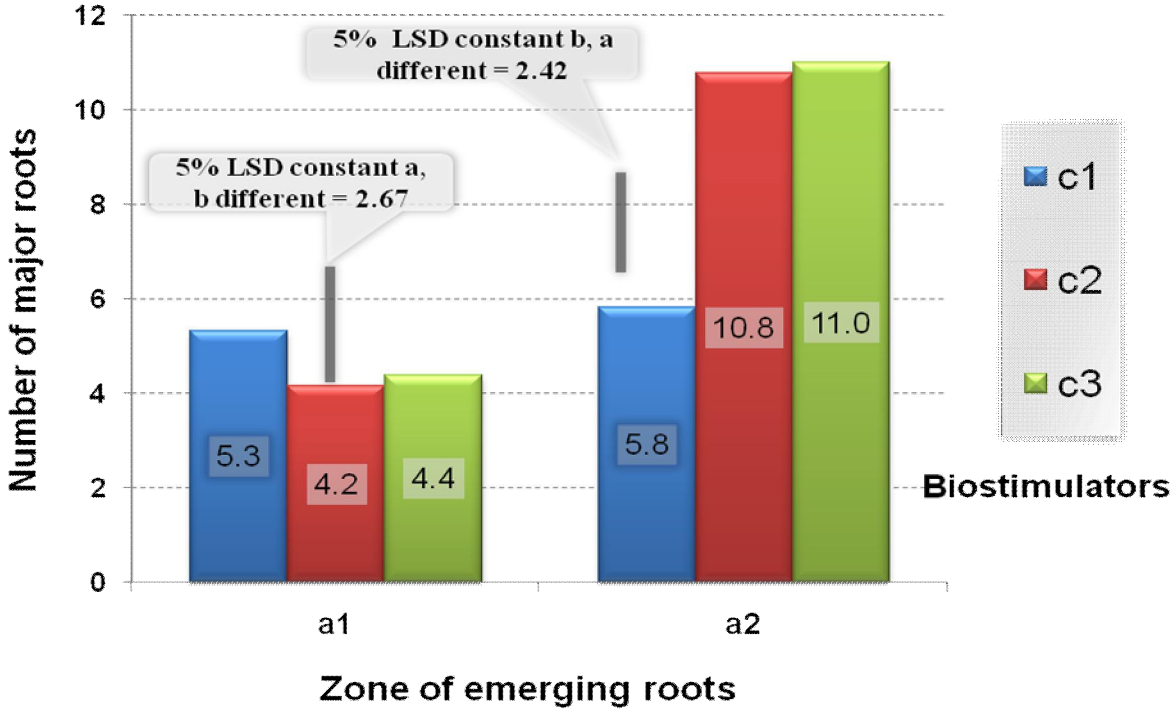
The significance of experimental factors graduations:
a1 = roots emerged from the stem (uncallused zone); a2 = roots developed from the callused zone at the bottom of cutting stem;b_1= chokeberry; b_2 = hip rose (Rosa canina); b_3 = thorn blackberry; b_4 = honeysuckle; b_5 = thornless blackberry; b_6 = sea buckthorn; c_1 = without biostimulators (control); c_2 = Radistim (powder); c_3 = indole acetic acid.

Fig. 3 The influence of rooting zone and biostimulators on the number of major roots in 6 small fruit species



The significance of experimental factors graduations:
a1 = roots emerged from the stem (uncallused zone); a2 = roots developed from the callused zone at the bottom of cutting stem;b_1= chokeberry; b_2 = hip rose (Rosa canina); b_3 = thorn blackberry; b_4 = honeysuckle; b_5 = thornless blackberry; b_6 = sea buckthorn

Fig. 4 The influence of some small fruit species on th4e number of roots emrgend from different zones of softwood cutting.



The significance of experimental factors graduations:
a1 = roots emerged from the stem (uncallused zone); a2 = roots developed from the callused zone at the bottom of cutting stem;
c_1 = without biostimulators (control); c_2 = Radistim (powder); c_3 = indole acetic acid.

Fig. 5 The influence of rooting biostimulator on the number on major emergend from different softwood cutting zone