

ORIGINAL SCIENTIFIC PAPER

Influence of the “6 benziladenin” in shaping the apple sapling

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Summary

This research work presents the results of a field trial with managed saplings of the apple cultivar Gala Galaxy on the two different vegetative rootstocks M9 and MM 106.

In April 2011, the saplings (copulated in March 2011) were planted in a distance of 100 cm x 35 cm. In the second period of vegetations (2012) the trial field separated in a randomized blocks system in five combinations of treatments (Control, GerBA LG -6 benziladenin 1.5%, 1.8%, 2.2% and 2.5%,) with three repetitions (in total 150 saplings for each apple rootstock combination). We examined the following parameters: trunk diameter 10 cm below and above the graft place, diameter of branches, length of apple saplings, number of lateral shots, length of branches and crotch angle of branches. Application of treatments with bioregulator was done three times in a 14 days interval, starting when the main axis reached the length of 15 cm above the cut of the scion (70 cm on the ground). Main parameters have shown differences between treatments compared to the control (untreated). The treatments with GerBA LG (6 benziladenin) 1.5%, 1.8%, 2.2%, and 2.5% resulted in a higher number of branches and with bigger crotch angles compared to the control, for the cultivar of apple Gala Galaxy on two rootstocks, M9 and MM106. Although differences existed between treatments and control, these differences are not uniformly distributed within treatments in relation to the increasing concentration of bioregulator GerBA LG.

Key words: apple saplings, cultivar, rootstock, bioregulator GerBA LG (6 benziladenin)

Introduction

Kosovo has favourable climatic conditions for growing continental fruits especially for apples. However, these favourable conditions are not used at all, and for this reason Kosovo has failed to achieve the economic effects in this field of production. Furthermore, the production of sapling material could not fulfill the needs of contemporary arboriculture productions, even more it is not in harmony with the production in countries with arboriculture development. Nevertheless among a lot of factors that have great impacts in competitive arboriculture productions is the saplings quality, especially the uninfected and developed production according to the standards. Also the arboriculture production depends very much on the combination of rootstock, cultivars, locality and the way of cultivation. Apple cultivars grafted in some conditions and in different rootstocks during the years are grown in a different laurels and thickness dimension (Syilanaj, 2008). This difference is of a high importance in their lifespan. In the past, for intensive apple production the priority has been given to the saplings with the medium growth intensity, without sprigs, but with a lot of gemmates' a long saplings. However, using the saplings in this way fruits start late with bearing and the risk for alternate bearing is high (Cmelik et al., 2005). In order to avoid this and to intermit the growth of saplings in Bulgaria retardants are used (Mitov & Djakov, 1976). Nowadays in the nurseries are “knip” trees that type of saplings production almost dominate in the Holland (Berg, 2003). In order to have the qualitative apple saplings the important parameters are: the production of healthy sapling, with a well developed root

system, a good thickness and a certain length of shoots, as well as a high number of premature sprigs. With the more and more application of high intensity planting system in Kosovo the demand for quantity and quality material has been increased and this will have an impact in improvement of sapling production. Continuously, the productivity of sapling material was a matter of research of scholars here we mentioned only some of them: Sylanaj, 2008 & 2010, Gudmac et al., 2007, Cmelink et al., 2005, Berg, 2003, Hajner, 2000, Brayton, 2000, Volz et al., 1994,.

The main aim of our research was to investigate the way of sapling production and impact of bioregulator for shaping on apple saplings development.

Material and methods

The plant material (grafted saplings with copulation) imported from nursery “Vocni Rasadnik”, in Srebrenik, Bosnia and Herzegovina. The soil in which we plant the saplings were of good quality up to 60 cm deep and in average has: humus 2.36 %, N 0.13 %, P₂O₅ 10.69 mg/100g soil, K₂O 43 mg/100g soil, Ca 101.73 mg/100g soil, Mg 47.14 mg/100g soil,, the value pH in water is 6.8 whereas in KCl 5.8. We used common technology like land preparation, fertilization, irrigation, pests and disease control. The rootstocks were well developed with a length of around 50 cm which stored in a container with sand, later on by the beginning of April were planted in an open area with a distance of 100 x 35 cm. The nursery tree were planted in a randomized system, with 10 saplings in each plot and three repetitions in total 30 plants per cultivar, 2 rootstock combination, and 5 different treatments (1 cultivar, 2 rootstocks and 5 different treatments, in total 300 nursery tree).

After one year in the spring of the second vegetation, the annual trunks of the grafts have been shortened at a height of 50 cm from the graft's place. After that, with the growth of lateral shoots, the clear up of the trunk was made, leaving only the terminal one. To obtain sylleptic shoots on the main axis, after they reached the length of 15-20 cm, we applied the bioregulator GerBA LG (6 benziladenin) in four different doses (1.5%, 1.8%, 2.2%, 2.5 %,). This technological operation is repeated 3 times, at an interval of 14 days. In order to stimulate the growth of sylleptic shoots, more frequent irrigation and fertilization is applied with manures through the drop by drop irrigation system, dominated by nitrogen and supported by phosphorus and potassium +MK.

During the research the following parameters were examined:

- trunk diameter 10 cm below and above the graft place,
- diameter of branches 5 cm above the base,
- length of apple saplings,
- number of lateral shots,
- length of branches,
- crotch angle of branches.

The obtained results were analyzed using “ANOVA” and comparisons for all pairs using Tukey-Kramer HSD 0,05

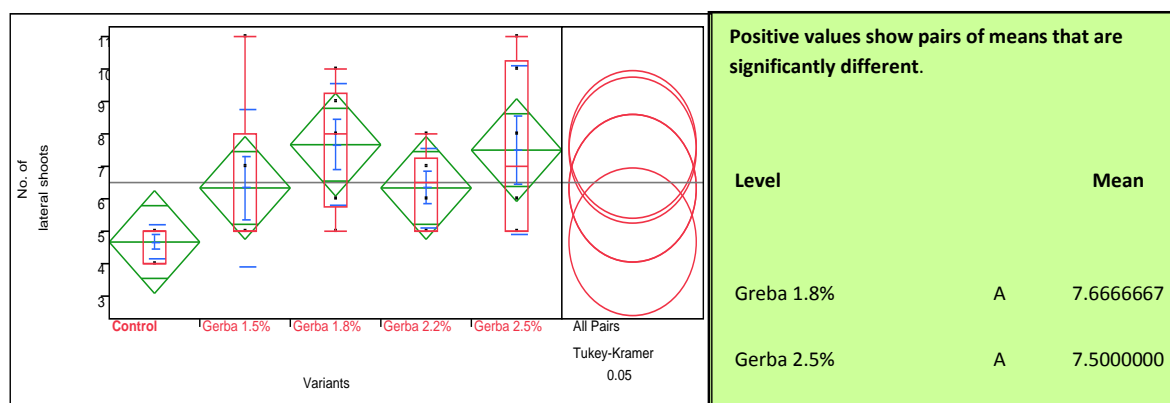
Results and discussions

The results of analysed parameters and the impact of 5 different treatments in the shaping of apple saplings are presented in the following table.

According to the obtained results, we observed differences between the various treatments, some of them as the number of lateral shoots and crotch angle of branches will be presented, processed in statistical way.

Table 1. Results of apple saplings development in 2012 – second year vegetation

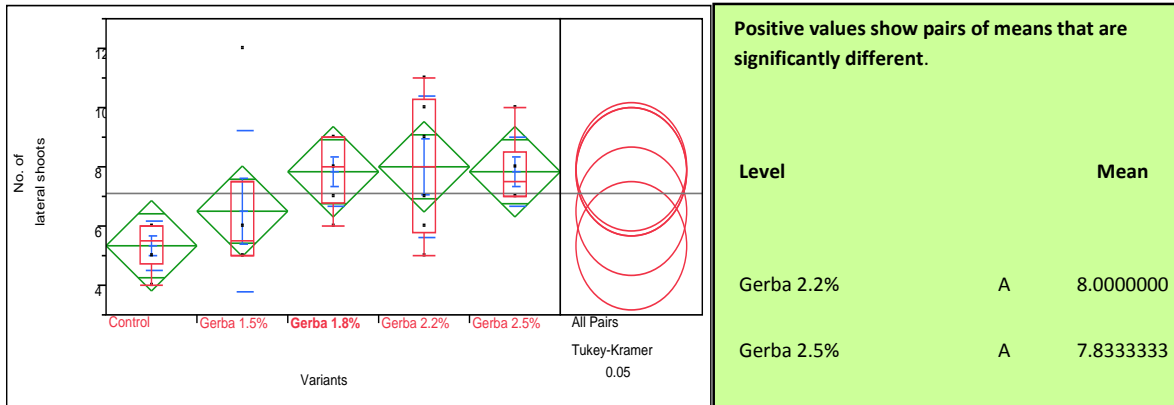
Cultivar	Rootstocks	Treatments	trunk diameter 10 cm below the graft place	trunk diameter 10 cm above the graft place	diameter of branches 5 cm above the base	length of apple tree nursery	number of lateral shots	length of branches	croch angle of branches
Gala Galaxy	MM 106	Control	17.40	16.50	4.29	166.67	4.67	29.50	63.29
		GerBA 1.5%	19.26	16.13	4.36	165.83	7.50	24.39	75.17
		GerBA 1.8%	20.28	16.97	4.58	176.00	7.83	26.54	74.50
		GerBA 2.2%	18.92	15.36	4.49	167.00	8.17	24.06	73.00
		GerBA 2.5%	20.48	16.24	4.85	177.17	7.17	27.26	72.33
Gala Galaxy	M9	Control	20.40	15.27	4.48	160.83	5.33	25.82	70.38
		GerBA 1.5%	22.38	15.25	4.79	164.17	8.00	26.13	77.33
		GerBA 1.8%	21.61	15.68	4.85	157.83	8.67	23.59	75.17
		GerBA 2.2%	17.52	13.09	3.78	130.83	8.83	20.22	74.33
		GerBA 2.5%	18.87	14.20	4.39	148.50	7.50	19.34	74.17



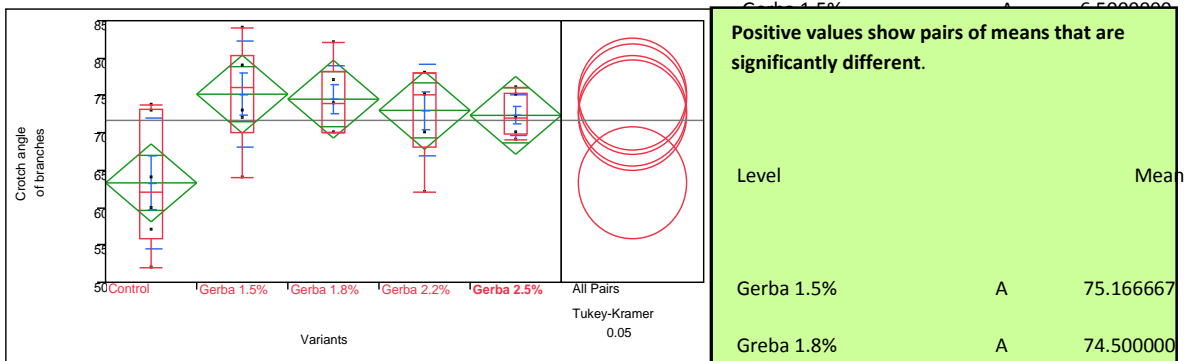
Graph1. Number of lateral shoots, Gala Galaxy MM 106

By the obtained results to the Graphs 1 and 2, the cultivar Gala Galaxy on rootstock MM 106 with treatment GerBA 1.8% had more impact on the stimulation of lateral shoots (7.66 shoots per saplings) whereas the treatment with GerBA 2.2% had more impact to the cultivar Gala Galaxy on rootstocks M9 (8.0 shoots per saplings). However these differences were not enough to give statistically significant results.

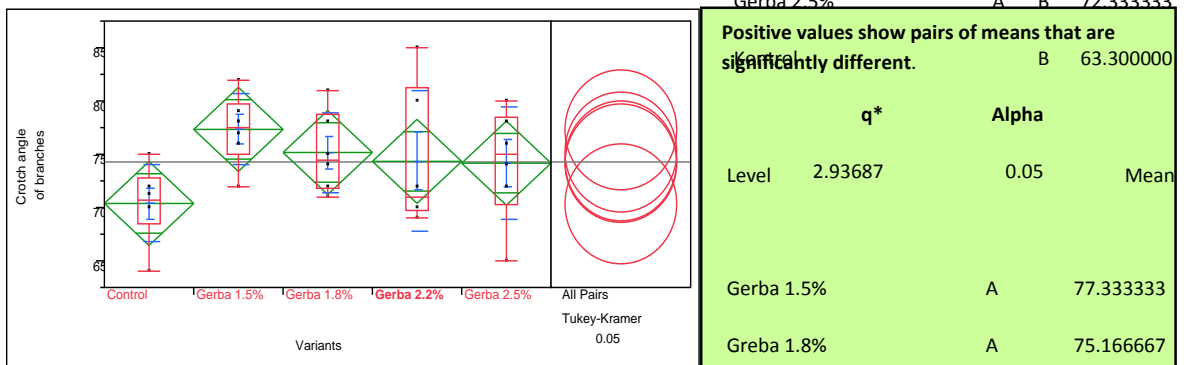
q* Alpha
2.93687 0.05



Graph 2. Number of lateral shoots, Gala Galaxy M9



Graph 3. Crotch angle of branches, Gala Galaxy MM106



Graph 4. Crotch angle of branches, Gala Galaxy M9

As it is shown in the Graph 3., the apple cultivar Gala Galaxy on the rootstock MM106, with treatments (GerBA 1.5%, 1.8%, 2.2%, 2.5%) compared to the control had impact on the crotch angle of branches, where the highest difference had GerBA 1.5% (75.166) compared to the control (63.30). The statistical significant results gave differences between means of the treatments GerBA 1.5%, 1.8%, 2.2%, and 2.5% compared to the control, (13.08, 11.2, 8.86, 8.36). Also statistical significant results gave differences between the low value of the treatments GerBA 1.5% and GerBA 1.8% compared to higher value of the control, (1.37, and 0.7).

As we see in the Graph 4., the apple cultivar Gala Galaxy on the rootstock M9, with treatments (GerBA 1.5%, 1.8%, 2.2%, 2.5%) compared to the control had some differences on the crotch angle of branches but more differences showed between GerBA 1.5% (77.33)

compared to the control (70.38). However these differences were not enough to give statistically significant results.

Conclusions

Based on the investigation of the influence in the shaping of the apple saplings, we can find out that:

The treatment of bioregulator had influence in the shaping of apple saplings.

The bioregulator GerBA with concentration GerBA 1.5%, 1.8%, 2.2%, 2.5% had significant influence on the crotch angle of branches of the apple cultivar Gala Galaxy on the rootstock MM106, where the highest impact had the treatment GerBA 1.5% (75.16) compared to the control (63.30).

Although in some other parameters we didn't get any important statistical results, however some differences have emerged.

Also during the analysis of the results, it is noted that during the application of high doses of bioregulator GerBA (2.5%), the cultivar Gala Galaxy on rootstock MM 106, tends to reduce the vigorous of the saplings

In the end of second vegetation period apple saplings have achieved main parameters of development, according to the contemporary standards for permanent planting.

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