IMPACTUL APLICĂRII FERTILIZANŢILOR FOLIARI ASUPRA CALITĂŢII PRODUCŢIEI DE AFIN

FOLIAR NUTRIENTS IMPACT ON FRUIT QUALITY AND YIELD OF HIGHBUSH BLUEBERRY

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Abstract

During 2003 – 2006 period at the Research Institute for Fruit Growing Pitesti an experiment with foliar nutrients in a 20-year old highbush blueberry plantation (2.8 m x 1.0 m spacing), has been organized. Two experimental factors were used: A – cultivar with a1-Blueray and a2- Bluecrop graduations and B – foliar treatments with the following graduations: b1 – Control (untreated); b2 - Kendal 0.25%; b3 - Megafol 0.3%; and b4 - Microfert U 1.0%. These products were yearly applied on the same plants. The experimental design was linear, with 10 bushes for each treatment in 3 replications. The sprays were manually applied using 2,000 l solution per ha, yearly, at the following moments: 1) before blooming, 2) at the end of blooming, 3) 14 days after the end of blooming and 4)14 days after the third moment. The following data were recorded: yield per bush, berry weight, fruit measurements, and color and berry chemical content (sugar, acidity, tannins, soluble solids, pH). The treatments had a good effect on yield and berry weight of both cultivars, showing significant differences versus the control. These treatments also induced more colored fruits. There were no significant differences between treatments regarding the chemical composition of Bluecrop cv. berries.

Key words: berry weight, chemical content, biological measurements
Cuvinte cheie: compozitie chimică, determinări biometrice

1. Introduction

The blueberry cultivation was started in Europe in 1928 (Strik B., 2004), but this culture has developed as industry in the last 20 years. Highbush blueberry (*Vaccinium corymbosum* L.) culture in Romania started in 1967 (Botez M. et al 1984, Mladin Paulina 2007) but on a commercial scale was developed in the 2000's. This development was due to the implementation of a blueberry-breeding program at the Research Institute for Fruit Growing, Pitesti and of the experiments on propagation. Presently, highbush blueberry is cultivated in Romania on an area of 280 ha and fruit yields vary from 2000 to 2200 tons annually (www.faostat.org). Many growers have been interested in the establishment of blueberry plantations because of high fruit prices and relatively low costs of management and plant protection. But, frequently, plant microelements deficiency is most observed on coursetextured soils with low levels of organic matter (Gupta, 1979; De Moranville 1987; Smagala, 1993; Blevins et al. 1996, Wojcik, P. 2003; Kozinski 2004; Koron 2004.).

The objective of this paper was to determine the effect of foliar nutrients and bio-regulators application on berry yield and fruit quality of two high-bush blueberry cultivars. 'Blueray' and 'Bluecrop'.

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2. Material and methods

The field experiment was conducted at RIFG Pitesti, Small Fruit Laboratory, during 2003-2006. Mature bushes of the blueberry cultivars 'Blueray' and 'Bluecrop', planted at 2.8 m x 1m, were used in this experiment. The soil type is loams heavy clays, with loamy-sand up to loamy-clay texture in the upper side and varying in depths with 5.8-6.0 pH at 0-40 cm depth and 6.0 pH at 20-40 cm, poor in organic matter. Two experimental factors were used: A – cultivar ('Blueray' and 'Bluecrop') and B – foliar treatments with the following graduations: b1 – untreated control; b2 - Kendal 0.25%; b3- Megafol 0.3% b4 Microfert U 1.0%. These products were yearly applied on the same plants. The experimental design was linear, with 10 bushes for each treatment in 3 replications (T1 -untreated control; T2 -Kendal 0.25%; T3 Megafol 0.3 % and T4 -Microfert 1%). The sprays were manually applied using 2000 L solution per ha, yearly at the following moments: 1) before blooming, 2) at the blooming end, 3) 14 days after the blooming end and 4) 14 days after the third moment. The following data were recorded: yield per bush and variant, berry weight, soluble dry matter content (° Brix), pH, and color of fruits.

The fruit yield berry was determined by weighting, the color of fruit was visually analyzed per 100 berries, soluble dry matter and sugar content was determined by Fehlling method, and acidity by

tritrimetric method in case of 'Blueray' cv. For 'Bluecrop' cvs. solid soluble and pH were determined in fruit flesh juice using a digital pH-metter and a digital soluble dry matter content using a laboratory refractometer. The color of fruits was visually evaluated (100 fruits /trials) the experimental data were statistically processed using ANOVA-method.

3. Results and discussions

The effect of foliar treatments using foliar nutrients are presented as follows: in figure 1 the results obtained after products application show the good effect on fruit yield per bush with both cultivars. Analyzing the data presented one can observe that all treatments have statistical differences assured, at both cultivars versus control.. The best influence on yield was recorded in trials treated with Megafol 0.3%(T3). 4277 g /bush versus 1747g /bush of control. in case of 'Blueray' cv and 3037g/bush versus 2557 g/bush in case of Bluecrop cv. at the some trials

In figure 2, one can see that the data recorded show a good effect of products on berry weight, with statistical differences in all trial versus control In the case of 'Blueray' cv. the best results was obtained in trials treated with foliar nutrients Megafol 0.3% (T3) 2.16 g/berry and 2.15g/berry in trial treated with Kendal 0,25% (T2), versus 1.64g/ berry in untreated control). In case of 'Bluecrop' cv. the best berry weight was obtained also in T3 : 2.28 g/berry versus 1.70 g/berry control. Regarding the effect of the products application on the chemical composition of berries, presented in figures 3 and 4.The data presented in figure 3 show the good effects of products on soluble solids with statistical differences between treated and untreated plots .The best result was recorded in the plot treated with Megafol 0,3% in both cultivars with 15.9% with statistical differences between plot treated with Microfert U 14.7 % and 14.1% at control in case of Blueray cv.

Regarding the sugar content, one can see in figure 4 that the best results was recorded in plots T3 treated with Megafol 0.3 % 9,093% /100 g fresh weight versus untreated control 7,547% /100g fresh weight.

Regarding the data presented in those figure, one cane see that in case of 'Blueray' no statistically differences on the acidity content were obtained between treated and control plots, but we recorded differences in case of tannin content in the berry from plot treated with Kendal 0.25% (T2) 0.175% versus 0.149% tannin content in berry from untreated plot. The high content in tannins found in berry from the plot treated with Kendal can be explained by the fact that after the application, product induced a resistance to abiotic factors. In figure 5 and 6 the biometrical measurements of berry (high and diameter for 'Blueray' and 'Bluecrop' cv.) are presented. The results show that in case of 'Blueray' cv., statistical differences were recorded with foliar nutrients Megafol 0.3 % (T3) 11.77 mm berry high, T2 (Kendal 0.25%) 11.70 mm berry height versus untreated control 10.33 mm berry height. The statistically differences were obvious at diameter measurement for both cultivars (fig.6): 15.17mm diameter in T3 versus 12.11 mm diameter in untreated control by 'Blueray' cv. and 15.87mm diameter T3 versus 11.30 mm in diameter control Bluecrop' cv. Regarding the strig size and berries number from experiment plots, after measurement we found that in treated plots in case of 'Blueray cv, the strig size was 7.5 cm in plot treated with Megafol and 5.5 cm strig size in plot treated with Kendal , versus 4.1 cm strig size recorded in untreated plot The number of berries were also high, in the plot treated with Megafol 41no.versus 26 no. of berries in control plot. The berries color was visually determinated. In case of 'Blueray' cv., the best results regarding the berries color was obtained in the trial treated with Megafol 0.3% ,from 100 berries analyzed 56% were intense colored, 35% uniform colored and 9% were colored only one side versus berries color from control with 19% fruit intense colored, 27 uniform colored and 54% berries not uniform colored Regarding the color of berries analyzed in case of Bluecrop cv the best results were obtained from the plot .treated with Kendal:0.25% 40% of berries were intense colored, 30 % were uniform colored and 30% were only one side colored, compared with control with 26% of berries were intense colored, 46% were uniform colored.

4. Conclusions

After the foliar nutrient application one can draw the following conclusions:

The foliar nutrients applications have had a good effect on bush yield and fruit berry weight with both blueberry cultivars versus control.

The chemical composition (sugar, soluble solids, dry matter content, acidity) were improved after nutrient application in case of Blueray cv. with best results in trial treated with Megafol 0.3%. A high percentage of colored berries was recorded in some trial treated with Megafol 0.3% in case of Blueray cv. with 56% fruit intense colored compared with only 19% fruit intense colored by control, 28% was only one side colored.

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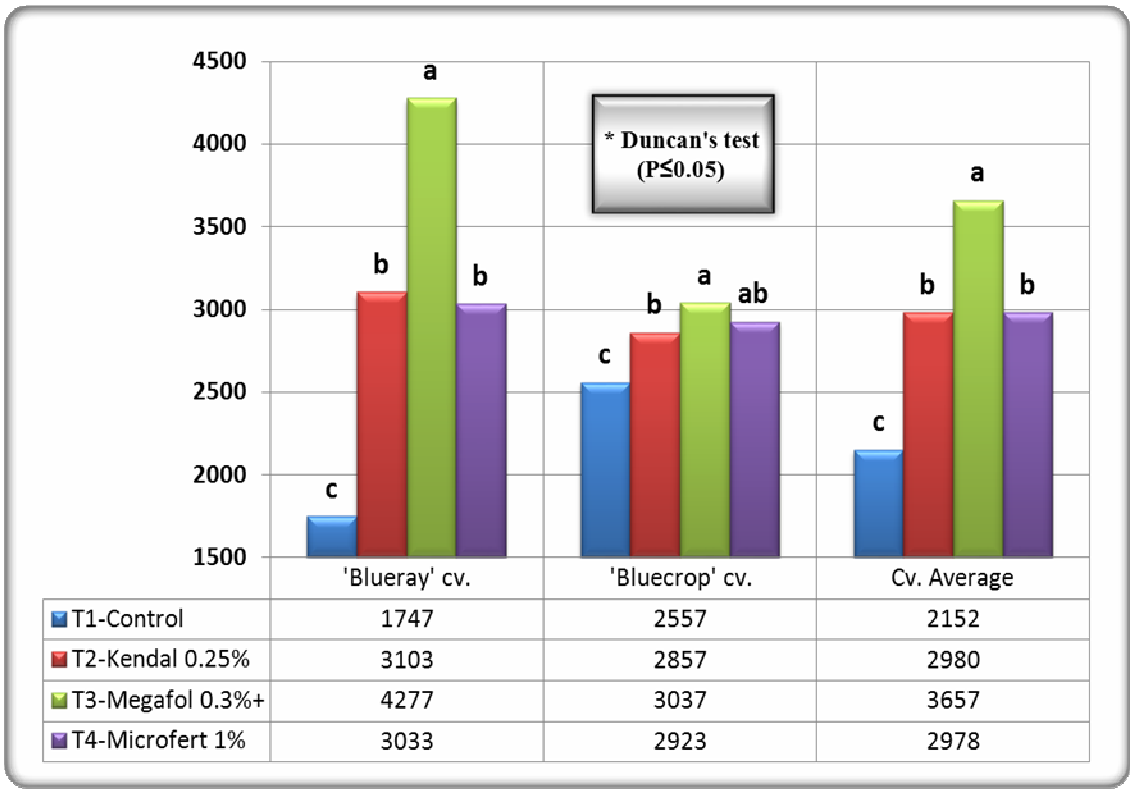
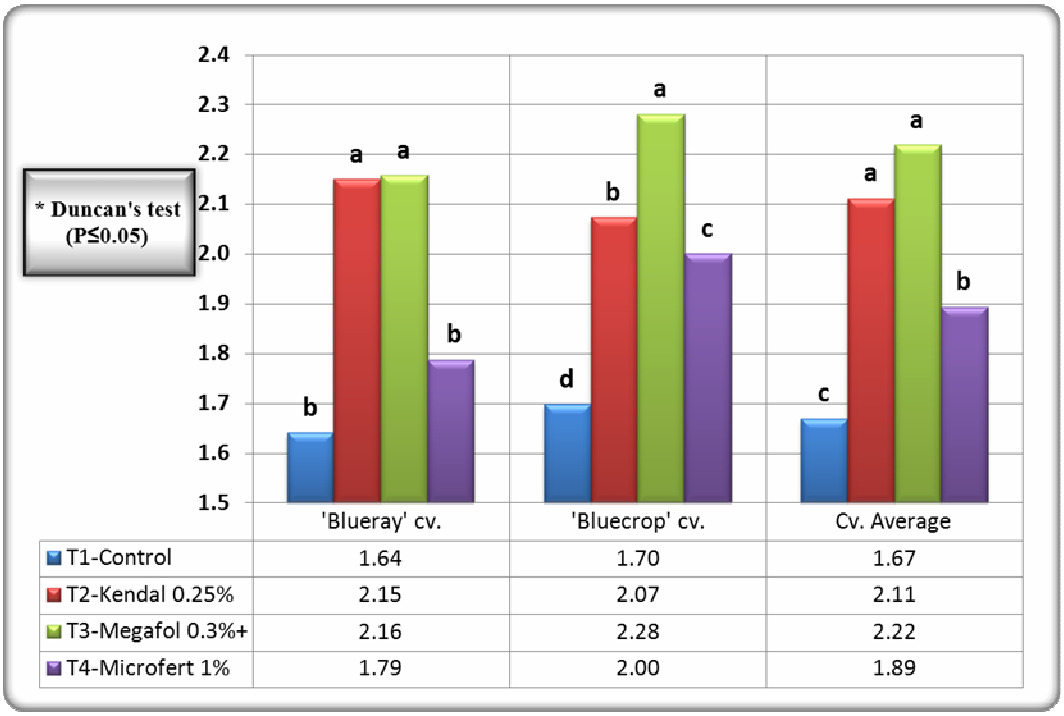
Figures



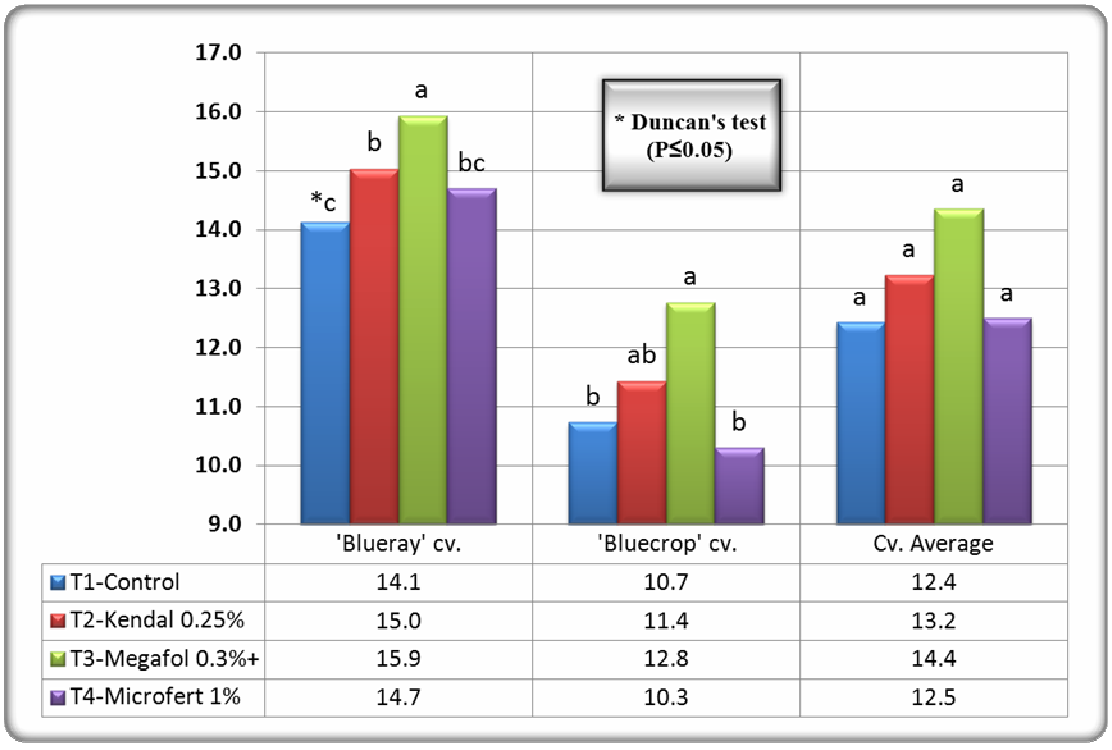
	'Blueray' cv.	'Bluecrop' cv.	Cv. Average
T1-Control	1747	2557	2152
T2-Kendal 0.25%	3103	2857	2980
T3-Megafol 0.3%+	4277	3037	3657
T4-Microfert 1%	3033	2923	2978

Fig.1. Effects of foliar nutrient application on yield /bush (g)



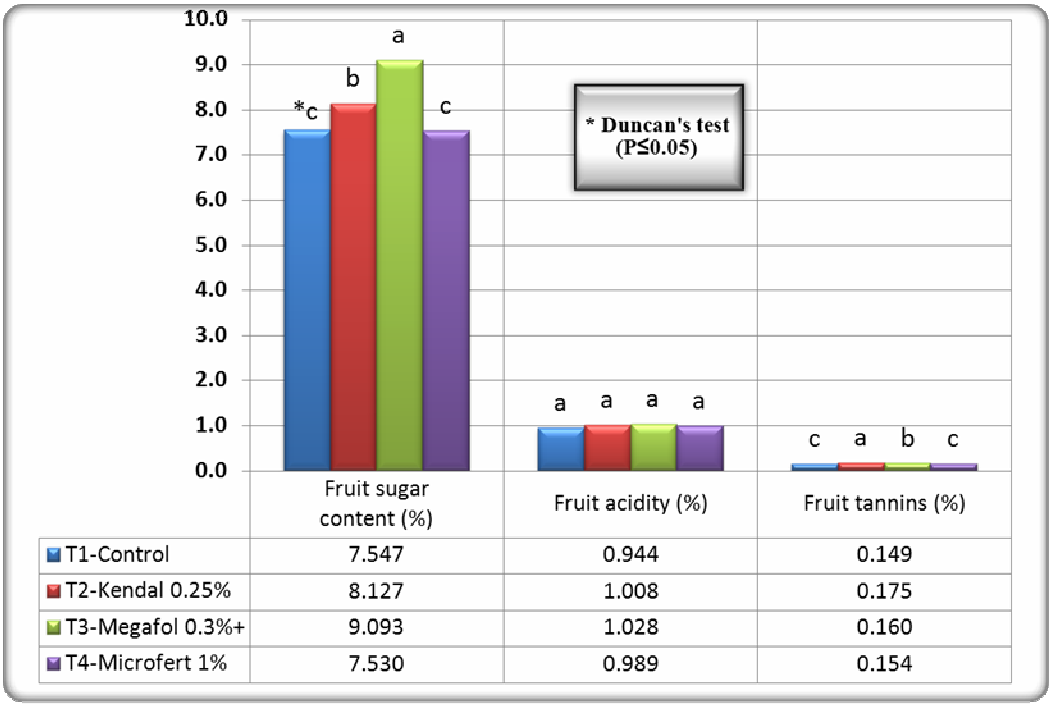
	'Blueray' cv.	'Bluecrop' cv.	Cv. Average
T1-Control	1.64	1.70	1.67
T2-Kendal 0.25%	2.15	2.07	2.11
T3-Megafol 0.3%+	2.16	2.28	2.22
T4-Microfert 1%	1.79	2.00	1.89

Fig. 2. Effects of foliar nutrient application on berry weight (g)



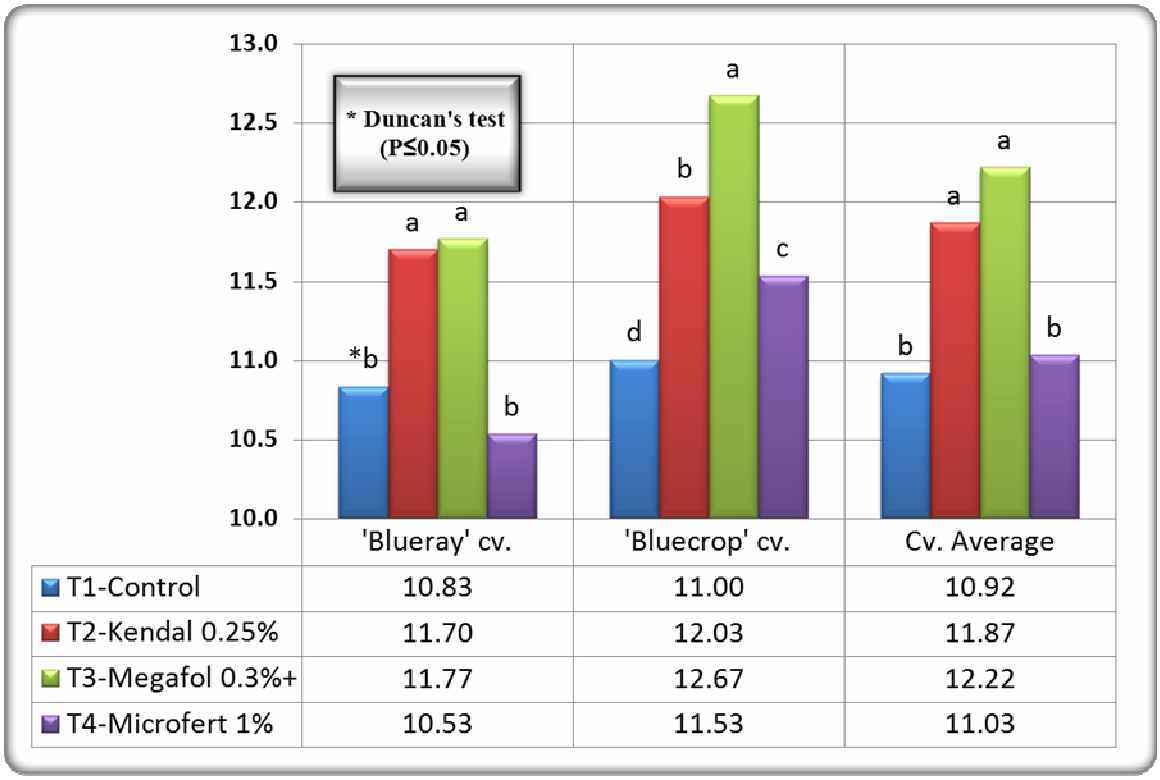
	'Blueray' cv.	'Bluecrop' cv.	Cv. Average
T1-Control	14.1	10.7	12.4
T2-Kendal 0.25%	15.0	11.4	13.2
T3-Megafol 0.3%+	15.9	12.8	14.4
T4-Microfert 1%	14.7	10.3	12.5

Fig. 3. Effects of foliar nutrient application on berry soluble solids (% Brix)



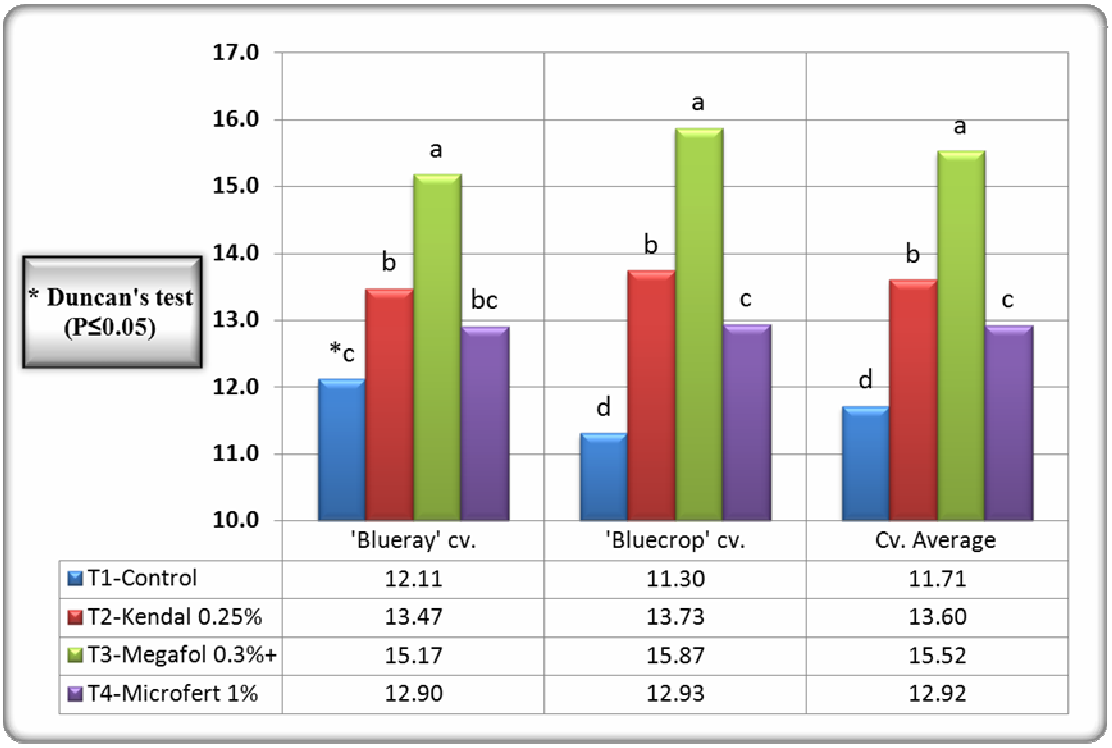
	Fruit sugar content (%)	Fruit acidity (%)	Fruit tannins (%)
T1-Control	7.547	0.944	0.149
T2-Kendal 0.25%	8.127	1.008	0.175
T3-Megafol 0.3%+	9.093	1.028	0.160
T4-Microfert 1%	7.530	0.989	0.154

Fig. 4. Effects of foliar nutrient applicati of berry chemical composition at Blueray cv



	'Blueray' cv.	'Bluecrop' cv.	Cv. Average
T1-Control	10.83	11.00	10.92
T2-Kendal 0.25%	11.70	12.03	11.87
T3-Megafol 0.3%+	11.77	12.67	12.22
T4-Microfert 1%	10.53	11.53	11.03

Fig. 5. Effects of nutrient aplication on berry high (mm)



	'Blueray' cv.	'Bluecrop' cv.	Cv. Average
T1-Control	12.11	11.30	11.71
T2-Kendal 0.25%	13.47	13.73	13.60
T3-Megafol 0.3%+	15.17	15.87	15.52
T4-Microfert 1%	12.90	12.93	12.92

Fig.6. Effects of foliar nutrient application on berry diameter (mm)