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The Influence of Nano-Gro® Preparation on Growth, Development and Yield of Sweet Basil (*Ocimum basilicum* L.)

INTRODUCTION

Sweet basil is a species with high environmental requirements, especially temperature conditions. Therefore, in Polish climate, its cultivation in the field is difficult. Still looking for a modern means of production, which would mitigate the negative effect of the climate on yields of thermophilic plants, making them less sensitive to stress conditions. In order to improve these processes bio-stimulators can be used. They do not affect directly life processes of plants, but the impact on their metabolism. They provide macro- and micronutrients, thereby causing an increase in resistance to diseases and pests. The use of growth stimulants can play an important role in increasing the yield and quality of crops, as well as in improving the health and the overall condition of plants.

The aim of the experiment was to evaluate the effect of the Nano-Gro® on the growth of sweet basil (*Ocimum basilicum* L.). It included the yield and quality of the basil herb. The quality of the above raw material was determined on the basis of chemical analyzes, including the content of essential oil as well as flavonoids and polyphenolic acids content.

MATERIALS AND METHODS

Sweet basil seedlings were planted into a field at a spacing 30x40 cm, on plots of 5 m^2, in the first decade of June 2014 and 2015.

The Experiment factors:

Variants of Nano-Gro® application

- Variant 1 (V1) - seeds/plants were not treated Nano-Gro® - control
- Variant 2 (V2) - seeds were not treated Nano-Gro®. After germination, when the seedlings were reached approximately 2 cm in height, plants were sprayed the above preparation.
- Variant 3 (V3) - seeds were treated Nano-Gro® (soaking for 30 seconds directly before sowing). After quilting seedlings to multipalets, plants were sprayed of Nano-Gro®.
- Variant 4 (V4) - seeds were treated Nano-Gro® (as above). Directly after planting in the field, the seedlings were sprayed Nano-Gro®

Solutions of Nano-Gro® for seed soaking and plants spraying were prepared according to the manufacturer's instructions on the package.

Term of herb harvest

Herb was harvested twice. The first harvest was carried out in the second decade of July, when the plants were at the beginning of flowering, the second harvest was made in the first decade of September (regrowth – the plants were in the vegetative phase).

Raw material from both harvests was dried in drying chamber at 35 °C and air-dry mass of the herb received. The results were calculated per 1 m^2.

In the air-dry herb, the content of essential oil as well as the content of flavonoids and polyphenolic acids were determined according to Polish Pharmacopoeia X (2014).

The presented results (except essential oil composition) are the mean from the two-year experiment.

The results were subjected to statistical evaluation using ANOVA 1 and ANOVA 2 programmes and Tukey's test at the significance level α=0.05.

Sweet basil seedlings (the greenhouse WULS-SGGW)

Sweet basil plants at the beginning of flowering (the experimental field WULS-SGGW)

RESULTS

The influence of Nano-Gro® application and term of harvest on air-dry mass of herb [g×m^{-2}]

Variant of Nano-Gro® application	First term of harvest	Second term of harvest	Mean
V1	125.23 b	314.70 a	219.97 A
V2	122.01 b	308.34 a	215.18 A
V3	119.49 b	306.03 ab	212.76 A
V4	120.93 b	329.67 a	225.30 A
Mean	**121.92**	**314.69***	

*** p. = 0.05**

The influence of Nano-Gro® application and term of harvest on essential oil content [ml×100 g^{-1}]

Variant of Nano-Gro® application	First term of harvest	Second term of harvest	Mean
V1	0.65 a	0.68 a	0.67 A
V2	0.58a	0.65 a	0.60 A
V3	0.68 a	0.73 a	0.71 A
V4	0.73 a	0.70 a	0.72 A
Mean	**0.66**	**0.69**	

The influence of Nano-Gro® application and term of harvest on flavonoids content [g×100 g^{-1}]

Variant of Nano-Gro® application	First term of harvest	Second term of harvest	Mean
V1	0.47 a	0.31cd	0.39 A
V2	0.35 cd	0.29 cd	0.32 C
V3	0.38bc	0.28 cd	0.33 BC
V4	0.37bcd	0.26 d	0.31 D
Mean	0.39*	0.28	

The influence of Nano-Gro® application and term of harvest on polyphenolic acids content [g×100 g^{-1}]

Variant of Nano-Gro® application	First term of harvest	Second term of harvest	Mean
V1	0.52 c	0.80 b	0.66 B
V2	0.44 c	0.83 b	0.63 B
V3	0.49 c	0.89 b	0.69 B
V4	1.35 a	1.61 a	1.48 A
Mean	**0,70***	**1,03**	

*** p.. = 0.05**

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CONCLUSIONS

- The obtained results indicate that the yield of sweet basil and quality of obtained raw material most of all is affected by proper cultivation and optimally chosen term of harvest of raw material.
- Preparation Nano-Gro® used in the sweet basil cultivation not significantly affected yield of herb and its quality.
- Application of the above preparation in the cultivation of basil is not justified.