STUDIES CONCERNING THE INFLUENCE OF BIODEGRADABLE SLOW-RELEASE FERTILIZER USE IN DEVELOPING THE CULTURE OF PETUNIA HYBRIDA SEEDLINGS

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Abstract

Our research on the use of slow-release biodegradable fertilizers were applied to Petunia hybrida seedlings of the variety "White Surfinia". Thus after 10 days subculturing procedure was to apply fertilizers containing NKP24 biodegradable and made in the form of sticks and granules with six concentrations of starch (5%, 10%, 15%, 20%, 25% and 50%) quantaties (4-5 grams/ 1 pot). For each pot with of 8 cm diameter, we prepared a mixture of peat and garden soil in a rate of 1:1. During the vegetation periods, morphological analyses were made regarding the development of Petunia hybrida, cv. "White Surfinia"plants: the length of shoots and number of shoot. Average values recorded from morphological determinations after 1 month of starting experiments on biofertilizers influence on growth and development the seedlings of Petunia was demonstrated that the optimal variant was the fertilizer V5 with -25% WF (wood flour) to 50% concentration of biofertilizers NKP24 (for both form of sticks A-big and B-medium) and for fertilizer form C- granular the V6 variant with -50% concentration of biofertilizers NKP24, the petunia stem was recorded maximum of 58.92 cm length .The research is part of an international project FP7/2008 with the title "Forest Resource Sustainability through Bio-Based-Composite Development" – FORBIOPLAST. Multiple aims of FORBIOPLAST project are the valorization of forest resources for the production of bio-based products.

Keywords: slow- release fertilizers, Petunia hibrida, seedlings, forest biomass

1. INTRODUCTIONS

Sustainability is the ability to maintain a certain status or process in existing systems. The most frequent use of the term "sustainability" is connected to biological or human systems in the context of ecology. The ability of an ecosystem to function and maintain productivity for a prolonged period is also sustainability. Natural resources like land and other raw materials can be found as naturally occurring substances. The value of these deposits is usually dependent on the amount available for extraction.

During the last years the use of vegetal-derived materials (wood flour, plant fibres, reprocessed cotton) has shown continuous growth.

The drivers for this trend are the cost savings, weight reduction and recyclability: in the last years cost efficient technologies has been developed to manufacture vegetal based composite as a result. The forest biomass represents an abundant, renewable, no-food competition and low cost resource that can play an alternative role to petro-resources. The production and use of forest biomass energy is greenhouse neutral while the expansion of plantation forestry is a positive benefit to greenhouse gas reduction through increasing the forests as a carbon sink.

As recommended technology for culture petunias in vegetative pots, the mineral fertilizers administration required for obtaining vigorously plant with a maximum output also for vegetative growing and for flowering.[1-5]

2. MATERIAL AND METHOD

For experience occurred petunia seedlings of the variety "White Surfinia".

Petunia seedlings about 3 weeks old used for experiments described in this paper were previously obtained by seeding and subculturing procedure in greenhouse and after the seedlings have reached 4 to 4.5 cm lenght they when they transplanted in vegetation brown plastic pots with an diameter of 8 cm.

The organic soil mixture used for transplanting it was an combination between of garden soil and peat in 1:1 proportion. Agrochemical characteristics of the substrate mixture used for transplanting seedlings of petunia, before applying the biofertilizers were as follows: pH-7,3, mineral salt-0,3468%, N-NH_4,- 52,58 , N-NO_3-161,5 ppm, P-PO_4, -388,13 ppm and K-225 ppm.

At the transplantation moment of petunia seedling , in every pot was introduced a stick of fertilizer with the similar weight (approximately 5 grams/pot). For samples in which we used granular biofertilizers also given to each a similar weight 5 grams/pot.

For the sticks system of fertilization (**A**-Big Starch and **B** -Starch Medium). were used an variable concentration of fertilizers (5%, 10%, 15%, 20% and 25 %) wood flour: Each experimental variant (V1-V6) was composed of ten repetitions(1 repetition = 1 pot). The six experimental variants of biofertilizers NKP24 are presented in Table 1 and the result are comparing with two control : Ct-unfertilized plants and V0- fertilized plants with control NKP 24 fertilizer-powder which are also prepared in ten repetitions (1 repetition = 1 pot).

Table 1. The scheme of experimental variants (A-Big Starch; B- Medium Starch, C- granules)

Variant	**Specification**
Ct	Unfertilized
V0	Fertilized with control NKP 24 fertilizer-powder
V1	Starch - 5 % WF (wood flour) - 50 % NKP 24 fertilizer
V2	Starch - 10 % WF (wood flour) - 50 % NKP 24 fertilizer
V3	Starch - 15 % WF (wood flour) - 50 % NKP 24 fertilizer
V4	Starch - 20 % WF (wood flour) - 50 % NKP 24 fertilizer
V5	Starch - 25 % WF (wood flour) - 50 % NKP 24 fertilizer
V6	Starch - 50 % NKP 24 fertilizer

During the vegetation biometric observations were made on plant growth and development, they were: length and number of shoots. Also periodically weeks distant samples were harvested plants were weighed and subjected to analysis of solids and minerals total forms. At the same time the plants were harvested and substrate properly collected and passed to the analysis. Biometric measurements were made using the line every week, starting the first week of dosing over two months (February-March 2012).

3. RESULTS AND DISCUSSIONS

Two weeks after administration the biofertilizers, it was applied to the removing the tip of petunia seedlings in order to foster the development of side shoots. In this paper we analyze the dynamics of development of side shoots that was achieved in 20 days by measuring the total length of shoots / plant / repetition the experimental samples (V1-V6) with three commercial forms of fertilizer (high bar, bar small and granules) compared with control plants (Ct and V0) of of the variety “White Surfinia” petunia seedlings.

Measurements varied during the experiment according to added fertilizer as seen in Tables 2-4 and the figure1-3 related drawn to illustrate the results.

*Table 2. Biometric measurements, the total **length of shoots (cm)** in Petunia "White Surfinia" plants during the experiment,*
*A- **Big Starch** (averaged over 10 repetitions/ variant)*

No.	Variant	Total length of shoots/plants			
		16.03.2012	**23.03.2012**	**29.03.2012**	**03.04.2012**
1	**Ct Unfertilized**	4	9,5	25	30
2	**V0 control NKP 24 fertilizer-powder**	14,2	27,5	46	**54**
3	**V1**	25,2	33,33	48.66	44.5
4	**V2**	14,3	26,0	33	40
5	**V3**	26,5	47,0	51.25	51.33
6	**V4**	25,6	37,75	49.25	63
7	**V5**	**28,2**	**49,67**	**54.66**	**64.66**
8	**V6**	**27,5**	**50,25**	**52**	**54**

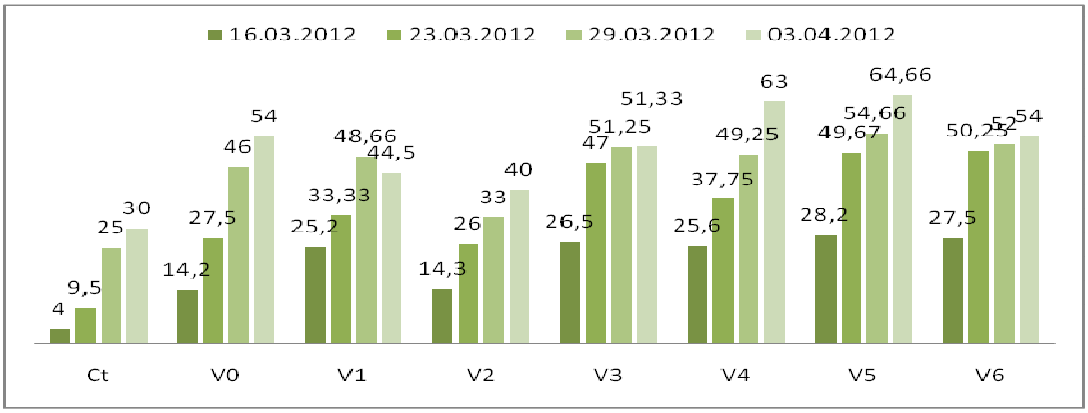

Figure 1. Biometric measurements the length of shoots (cm) Petunia "White Surfinia" plants during the experiment, A-Big Starch, (averaged over 10 repetitions/ variant)

Table 3. Biometric measurements, the total length of shoots (cm) in Petunia "White Surfinia" plants during the experiment,
B- Medium Starch; (averaged over 10 repetitions/ variant)

No.	Variant	Total length of shoots/plants			
		16.03.2012	**23.03.2012**	**29.03.2012**	**03.04.2012**
1	**Ct Unfertilized**	4	9,5	25	30
2	**V0 control NKP 24 fertilizer-powder**	14,2	27,5	46	54
3	**V1**	**31**	36,25	39.5	50.5
4	**V2**	26,1	29,25	39.5	34.33
5	**V3**	28,3	**40,0**	46.25	40
6	**V4**	27,5	53,5	**62**	53.33
7	**V5**	**31,6**	39,5	**65.75**	**70.66**
8	**V6**	**31**	**48,0**	51	**62.5**

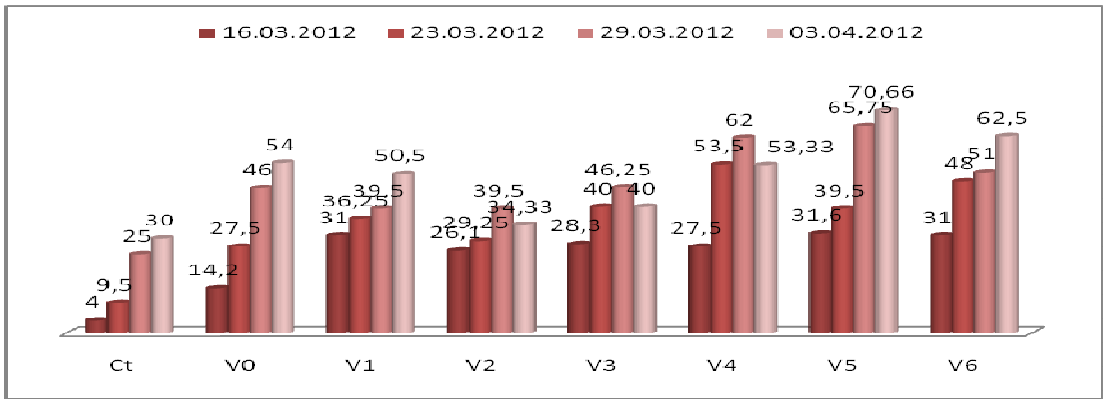

Figure 2. Biometric measurements the length of shoots (cm) in Petunias during the experiment, B- Medium Starch (averaged over 10 repetitions/ variant)

Table 4. Biometric measurements, the total length of shoots (cm) in Petunia "White Surfinia" plants during the experiment
C- biofertilizer forme granules (averaged over 10 repetitions/ variant)

No.	Variant	Total length of shoots/plants			
		16.03.2012	23.03.2012	29.03.2012	03.04.2012
1	**Ct Unfertilized**	4	9,5	25	30
2	**V0 control NKP 24 fertilizer-powder**	14,2	27,5	46	54
3	**V1**	19	38,75	55	58
4	**V2**	19,3	45,0	60.33	70.5
5	**V3**	31,3	41,0	53.5	55.33
6	**V4**	**39,1**	**48,33**	55	45
7	**V5**	26,5	44	**65.75**	**71.5**
8	**V6**	**38**	**49,67**	**61**	**87**

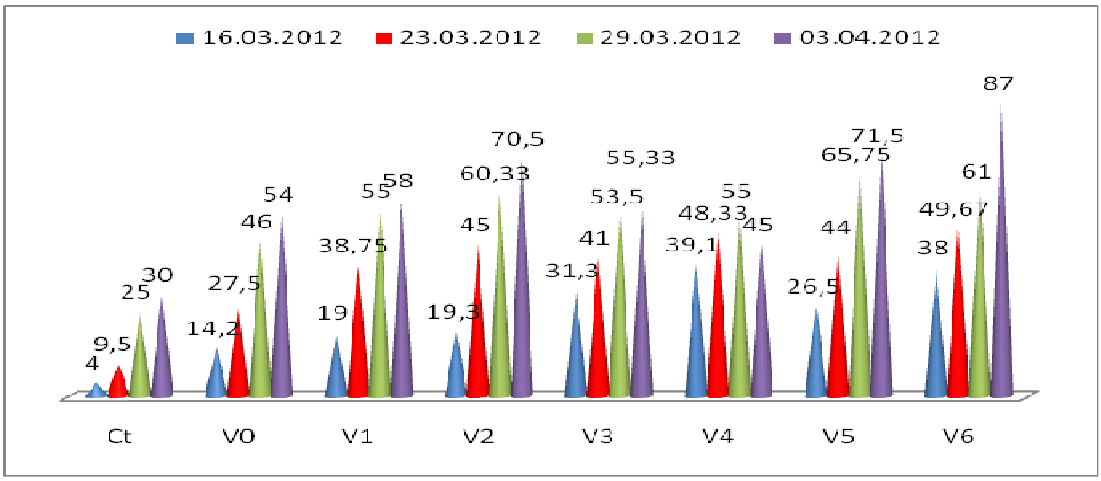

Figure 3. Biometric measurements the length of shoots (cm) in Petunia during the experiment, C- biofertilizer forme granules, (averaged over 10 repetitions/ variant)

After analyzing the results compared with control unfertilized plants variants (Ct control) can be seen that the latter had a downturn because it has available the required amount of N, P, K, their length not exceeding 30 cm (Ct control) and 54 cm (V0 - control fertilized plants with powder NKP fertilizer).

Performing average results recorded to measure the total length of their shoots developed in the period analyzed (figure 1) results also varied according to the respective experimental variants form fertilizers applied (**A**-Big Starch, **B** -Starch Medium, **C**-granules).

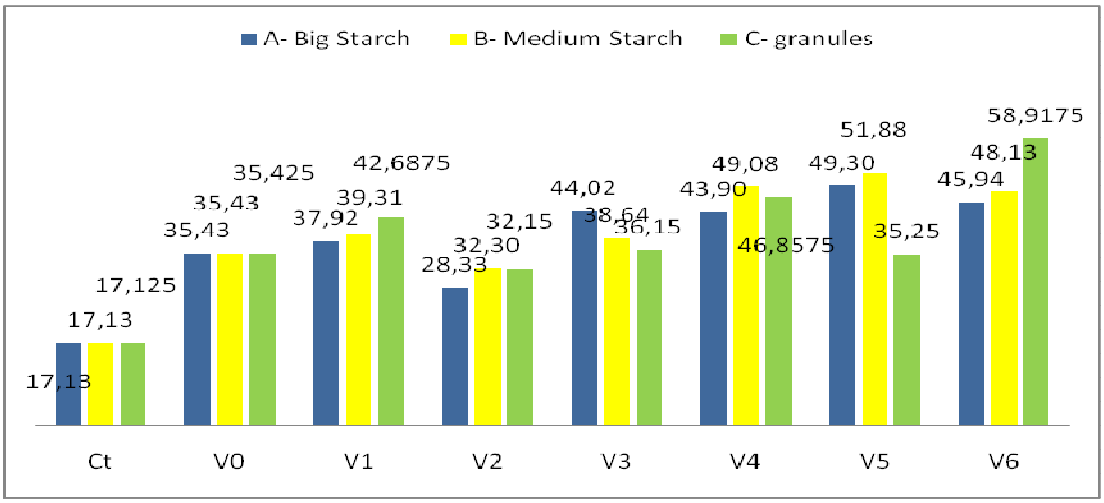

Figure 4. The total length of shoots in Petunia
(medium values on every experimental biofertilizer used type)

Thus, the best results in terms of total length of shoots were recorded (in 20 days time) differently depending on the type of fertilizer:

- for A-Big Starch maximum of 49.30 cm was recorded in the V5 variant-25% WF (wood flour) - 50% NKP 24 fertilizer;
- for B-Medium Starch maximum of 51.88 cm was recorded also in version with V5-25% WF (wood flour) - 50% NKP 24 fertilizer;
- to form C-granules a maximum of 58.92 cm length of shoots was recorded in variant V6- with - 50% NKP 24 fertilizer

However, the results registered version except V2 (Starch - 10% WF (wood flour) - 50% Fertilizer 24 NKP) all amounts recorded in both experimental variants have exceeded the total length of shoots of fertilized control variant (V0) and the unfertilized (Ct).

Examination of comparative experimental variants fertilized with sticks and granules containing starch and flour, sawdust, we clearly demonstrate that unfertilized variant (Ct) and fertilized control variant (V0) had a slower growth. Witness fertilized with 24 Fertilizer-powder NKP has fared worse than the variants fertilized with sticks and granules containing starch and flour sawdust (figure 5).

4. CONCLUSIONS

The number of shoots increased to a lesser extent with a good results and variants are variants fertilized V1 to V5, insignificant differences between them are small.

The parameter determined by the increase in length of shoots developed from seedlings of Petunia best results were recorded from V4 with 20% WF (wood flour) - 50% NKP 24 Fertilizer and V5 with 25% WF (wood flour) - 50% NKP 24 Fertilizer, differences from the witness being fertilized 31.515% (V4) and 43.917% respectively (V6) and the witness from being fertilized by more than 100% (V4 and V6).

In the case of petunia plants the presence of wood flour influenced intense significantly the height of plants and only a positively influence of the development of shoots.

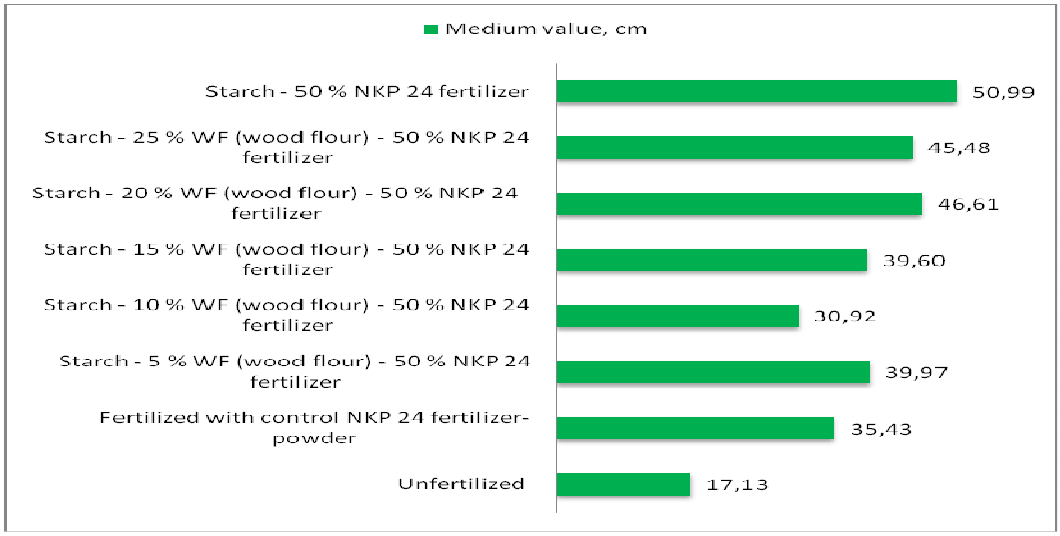

Figure 5. The length of shoots in Petunia,
(medium values on every experimental biofertilizer used type)

5. ACKNOWLEDGEMENTS

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