



Certified translation from the Polish language

[translator's notes are italicised and in brackets]

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**RESEARCH INSTITUTE OF HORTICULTURE
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REPORT

**on tests conducted in 2015, pertaining to the effectiveness of TOTAL HUMUS growth stimulator in the
ground cultivation of bedding plants**

In 2015, in the Ornamentals Cultivation and Fertilisation Laboratory of the Research Institute of Horticulture in Skierniewice research was conducted to determine the effectiveness of TOTAL HUMUS growth stimulator with regard to the ground cultivation of ornamentals.

The stimulator for research was provided in original HDPE bottles, secured additionally with polyethylene film with a label and seal. The stimulator sample was taken by the sample taker from the Regional Chemical and Agricultural Station in Gorzów Wielkopolski on 13.01.2015, sample no.1 taking report.

Material and methods

For the purpose of experiments popular species of bedding plants were used, such as: *Tagetes patula nana* fl.pl. 'Aurora', *Salvia splendens* 'Ramona' and Mexican paintbrush *Ageratum houstonianum*. The seeds of bedding plants were sown on the 16th of March into substrate consisting of a mixture of deacidified peat and sand (6:1). After 4 weeks the seedlings were pricked out to pots with diameter of 7 cm. The transplants were watered preventively with Previcure Energy 840 SL fungicide. The transplants of *salvia splendens* and Mexican paintbrush were topped after the next 4 weeks of cultivation. The plants were fertilised every week with Symfovita A, a compound fertiliser. The tillered and uniform transplants were planted on 23th May in experimental plots prepared earlier (podsolc arable soil - loamy sand).

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The experiment was based on the random blocks method, in 4 repetitions. During cultivation the plants were not fertilised, only cultivation measured were taken, such as weed control and watering.

The following variants - combinations were used:

1. Control batch - no treatment
2. Watering of plants after planting with solution of 0.5 ml per 1 litre of water (concentration of 0.05%).
3. Watering of plants after planting with solution of 1.0 ml per 1 litre of water (concentration of 0.1%).
4. Watering of plants after planting with solution of 2.0 ml per 1 litre of water (concentration of 0.2%).
5. Watering of plants after planting with solution of 0.5 ml per 1 litre of water (concentration of 0.05%) + as top dressing treatment every 7-10 days with solution of 0.1 ml per 1 litre of water (concentration of 0.01%).
6. Watering of plants after planting with solution of 0,5 ml per 1 litre of water (concentration of 0.05%)+ as top dressing treatment every 7-10 days with solution of 0.2 ml per 1 litre of water (concentration of 0.02%).
7. Watering of plants after planting with solution of 0,5 ml per 1 litre of water (concentration of 0.05%)+ as top dressing treatment every 7-10 days with solution of 0.4 ml per 1 litre of water (concentration of 0.04%).

The end measurements of plants were made at full bloom, i.e. for *Tagetes patula* between 27 and 31 July, for *Salvia splendens* on 29th July and for Mexican paintbrush on 30-31 July 2011. The measurements included: plant weight, total height, diameter, number of flowers, number of buds, number of lateral shoots and quality classification. The results were processed statistically, using the analysis of variance, and the average values were compared using the Duncan test with probability of $P=95\%$.

Results:

Tagetes patula nana fl.pl. 'Aurora'

The application of TOTAL HUMUS growth stimulator had a favourable effect on the growth of *tagetes patula* (table 1). It was concluded that the beneficial variant was to water the plants after planting with solution at 0.05% with additional watering during growth phase every 7-10 days with solution at 0.02%. After such treatment, a material (when compared to the control batch) stimulating impact on vegetative growth was recorded, which resulted in higher fresh weight of above ground parts and total plant height. Such treated, the plants had also a larger number of flowers and larger diameter, but these differences were not confirmed statistically.



Table 1. Impact of TOTAL HUMUS growth stimulator on the growth and blossom of *Tagetes patula nana* fl.pl.Aurora¹.

Treatment	Fresh plant weight (g)	Plant height (cm)	plant diameter (cm)	Number of flowers (pcs)	Number of flower buds (pcs)	Number of lateral shoots (pcs)
Control batch	232.9 a	28.42 a	28.46 a	37.73 a	12.48 a	19.29 a
TOTAL HUMUS - watering after planting (0.05)%	267.2 ab	30.12 ab	29.88 a	39.00 a	12.73 a	20.50 a
TOTAL HUMUS - watering after planting (0.1)%	261.1 ab	30.75 ab	30.29 a	38.67 a	11.62 a	18.62 a
TOTAL HUMUS - watering after planting (0.2)%	247.3 ab	29.91 ab	29.57 a	40.79 a	13.60 a	17.60 a
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.01%)	257.6 ab	29.23 ab	29.49 a	40.27 a	12.68 a	19.12 a
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.02%)	272.3 b	31.12 b	30.90 a	41.65 a	13.48 a	20.18 a
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.04%)	255.7 ab	29.89 ab	29.87 a	40.40 a	12.27 a	19.08 a

Explanations:

¹ Average values designated with the same letter are not materially different at statistical significance of $\alpha=0.05$.

Salvia splendens 'Ramona'

Regardless of the method and dosage of TOTAL HUMUS growth stimulator, its favourable effect on the increase in plant weight as well as flower and lateral shoots formation was recorded (table 2). The best effects of TOTAL-HUMUS growth stimulator were obtained when the product was applied prior to planting, in concentration of 0.05% and during vegetation every 7-10 days in concentration between 0.01-0.04%. Compared to control plants, such a method had a material impact on all evaluated qualities of *Salvia splendens*.

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Table 2. Impact of TOTAL HUMUS growth stimulator on the growth and blossom of *Salvia splendens* 'Ramona'

Treatment	Fresh plant weight (g)	Plant height (cm)	Plant height up to inflorescence base (cm)	Plant diameter (cm)	Number of inflorescences (pcs)	Number of lateral shoots (pcs)
Control batch	80.99 a	36.96 ab	26.26 a	24.41 a	10.3 a	11.76 a
TOTAL HUMUS - watering after planting (0.05)%	97.43 ab	39.26 ab	28.13 ab	27.21 abc	13.56 b	15.80 b
TOTAL HUMUS - watering after planting (0.1)%	93.68 ab	37.80 ab	27.33 ab	26.50 ab	13.96 b	15.76 b
TOTAL HUMUS - watering after planting (0.2)%	94.93 ab	36.70 a	26.53 ab	26.51 ab	14.43 b	16.30 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.01%)	116.2 b	40.26 ab	29.06 ab	28.68 bc	14.33 b	17.20 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.02%)	119.4 b	40.16 ab	29.76 ab	27.45 abc	14.96 b	18.03 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.04%)	117.2 b	40.83 b	30.03 b	29.78 c	14.50 b	17.03 b

Explanations:

¹ Average values designated with the same letter are not materially different at statistical significance of $\alpha=0,05$.

Mexican paintbrush

The best effects of the application of TOTAL HUMUS growth stimulator were obtained in the cultivation of the Mexican paintbrush (table 3). Regardless of the method and dosage, the stimulator's clear impact was recorded on the stimulation of flower buds and therefore on the number of flowers, stimulation of lateral shoots which had a positive impact on the fresh weight of above-ground part of plants. Compared to control plants, the average values were obtained: approx. 50% more flowers, approx. 120% more flower buds, approx. 50% more lateral shoots and the plant weight was by approx 50% higher.



Table 3. Impact of TOTAL HUMUS growth stimulator on the growth and blossom of the Mexican paintbrush (*Ageratum houstonianum*).

Treatment	Fresh plant weight (g)	Plant height (cm)	Plant diameter (cm)	Number of flowers (pcs)	Number of flower buds (pcs)	Number of lateral shoots (pcs)
Control batch	139.4 a	18.69 a	26.75 a	74.24 a	9a	23.15 a
TOTAL HUMUS - watering after planting (0.05)%	212.7 b	22.05 b	29.91 b	110.6 b	21.48 b	33.82 b
TOTAL HUMUS - watering after planting (0.1)%	209.8 b	22.30 b	29.55 b	111.6 b	20.61 b	35.02 b
TOTAL HUMUS - watering after planting (0.2)%	208.5 b	20.95 ab	30.25 b	115.1 b	19.64 b	34.17 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.01%)	216.5 b	21.54 b	29.92 b	110.6 b	19.02 b	35.23 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.02%)	223.7 b	23.02 b	29.96 b	100.5 b	20.59 b	33.94 b
TOTAL HUMUS - watering after planting (0.05%) + as top dressing every 7-10 days (0.04%)	217.4 b	22.66 b	29.96 b	113.18 b	21.89 b	34.17 b

Explanations:

¹ Average values designated with the same letter are not materially different at statistical significance of $\alpha=0.05$.

Summing up the results, it may be concluded that TOTAL HUMUS growth stimulator has demonstrated high effectiveness and proved to be very useful in the cultivation of ornamental bedding plants grown in soil. To obtain top quality plants, it is recommended to use TOTAL-HUMUS growth stimulator prior to planting, in concentration of 0.05% and during vegetation every 7-10 days in concentration between 0.02-0.04%.

Tests performed by

Dr inż. Jacek Nowak

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I, Agata Kordylewska, certified translator of the English language entered in the register of certified translators kept by the Minister of Justice under entry number TP/48/13, do hereby certify the above to be a true and faithful translation of the document presented to me in the Polish language.

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Poznań, 19 December 2017

Agata Kordylewska

