THE EFFECT OF DIFFERENT MAGNESIUM SUPPLY ON GROWTH OF PELARGONIUM

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Abstract: *Pelargonium is one of the most "traditional" balcony plants. It has a relatively high nutrient requirement, so it needs continuous nutrient supply. In our study we used the red-flowered 'Victor Improved' variety of Pelargonium zonale, made by the German PAC Elsner breeding company. In our experiment a long-acting fertilizer was used as a base fertilizer, and the nutrient supply was performed with a complex fertilizer in 0.5 to 1.5 ‰ concentration. The nutrient supply was carried out with a 2.4 mS EC solution of Volldünger fertilizer and with the 1.5% solution of FitoHorm 24 Mg, as a leaf fertilizer. In our research we followed the effect of nutrient supply on the ornamental value and the beginning of flowering time, and we measured the number of flowers, plant height and plant extension as well.*

Key words*: Pelargonium zonale 'Victor Improved', FitoHorm 24 Mg, number of flowers, plant height, extent of plants.*

INTRODUCTION

Geranium is an ornamental plant that has a history since several centuries, and has retained its significance till this day. In the 18th century it was spread in noble collections and botanical gardens. From the middle of the 19th century, it began to spread more widely in the gardens and became today's characteristic flower of rural gardens. Nowadays it is one of the most important potted flowers used for decoration of outdoor spaces: a large number of geranium are planted in gardens, parks and balconies into a dome or a large pottery. It has a rich summer bloom and color palate [7], [12], [13].

In the gnat family there are 250 species, most species are native to South Africa [1], [10],. The pure species have not been long in culture, the breeding dates back to the end of 18th century. The geranium cultivated today is the result of a long breeding work. Almost 10 species is known in the formation of ornamental plants hybrids [6], [11].

One of the most important hybrid species is the Pelargonium – Zonale hybrids, which prefer a water-permeable, nutrient rich peat mixture. The high porosity of finely minced medium holds too much water, causing the root to choke [2]. In Hungary, white peat (peat in the Baltic, Novobalt) is mixed with 60:40 ratios in domestic black peat, after this medium-sized garden soil or sterile compost, bark beetle is added. To maintain the structure, perlite or zeolite is mixed with the medium [7]. Peat mixes use a complex fertilizer or controlled nutrient fertilizer [4]. The optimum nutrient requirement for the geranium: 400 mg / L nitrogen (N), 200 mg / L phosphorus (P_2O_5), 600 mg / L potassium (K_2O) [5], [9], salt content 1.5 g / L, N: P: K = 2: 1: 3 ratio, and 50 mg / L magnesium (MgO) [7], [14]. Nitrogen overdose should be avoided because it results in loose tissue, which is beneficial to attack fungal diseases [2], [8].

The cultivation of the geranium in Hungary is prospective, it does not tolerate longer transport [11].

MATERIALS AND METHODS

Our research work was carried out in Kecskemét, in the Primor-1 type greenhouse of the Faculty of Horticulture and Rural Development, John von Neumann University. In our experiment, we used the red-flowered 'Victor Improved' variety of Pelargonium Zonale hybrids, purchased by the German PAC Elsner breeding company, which is medium-growth, early blooming, zoned leafy variety [3]. The cuttings rooted in the paper roll (figure 1) were planted on 14 March 2017 into 9 cm diameter tiles, and the TS 4 medium plus clay type medium marketed by Klasmann was used.

Figure 1. Rooted geranium cuttings

The mixture is medium-sized decomposed white peat mixture (0-25 mm white peat + white peat fiber + 10 to 25 mm white peat bricks) with 20 kg / m^3 clay granules, wetting additives and added nutrients (140 mg / l N, 100 mg / l P_2O_5, 180 mg / l K_2O, 100 mg / L Mg + trace elements). The nutrient supply was performed with a 2.4 mS / cm (EC) solution of fertilizer Volldünger Linz (14-7-21 NPK + 1% Mg + 1% microelements: B, Cu, Mn, Fe, Zn) once a week until the sale (end of May). A part of the plants was treated with a 1.5% solution of FitoHorm 24 Mg magnesium medium (6.6% MgO + 18% SO_3) as a foliar fertilizer from April 4th weekly, a total of five times.

During there search, the effect of FitoHorm 24 Mg magnesium media onornamental value was investigated. We compared the treated and untreated plants, the flowering time, flower number, plant height and plant extension (two diameter products) were measured. The measurements were carried out fourtimes: on 3 May, 10 May, 17 May and 24 May. The measured data were recorded in an excel table and evaluated by mathematical calculation. At the end of the growing season, a leaf analysis was carried out at the Faculty of Soil and Plant Testing Laboratory as follows: The leaf was washed and then dried at 70 ^oC in a drying oven and grounded. Dry poured samples were analyzed for element

alanalytical assays. The preparation step was made in the presence of concentrated nitric acid and hydrogenperoxid ebay microwave digestor instrument (Milestone Ethos Plus) for P, K, Ca and Mg elements, Elementary analysis was made by Ultima 2 type ICP-AES spectrometer. Kjeldahl nitrogen content was measured after sulfuric acid digestion by FOSSK jeltec 2300. The content of the elements (N, P, K, Ca, Mg) was given in m / m% air dry matter.

RESEARCH RESULTS

Impact of leaf fertilizer on flowering time

According to our observations, the effect of foliar fertilization on the beginning of flowering time was not significant, but the treated stock flourished few days earlier than the untreated.

Effect of leaf fertilizer on flower and bud numbers

Figure 2 illustrates the combined value of the average number of flowers and buds in the plants, as it can be seen from the figure, the treated stock had more flowers and buds than the untreated.

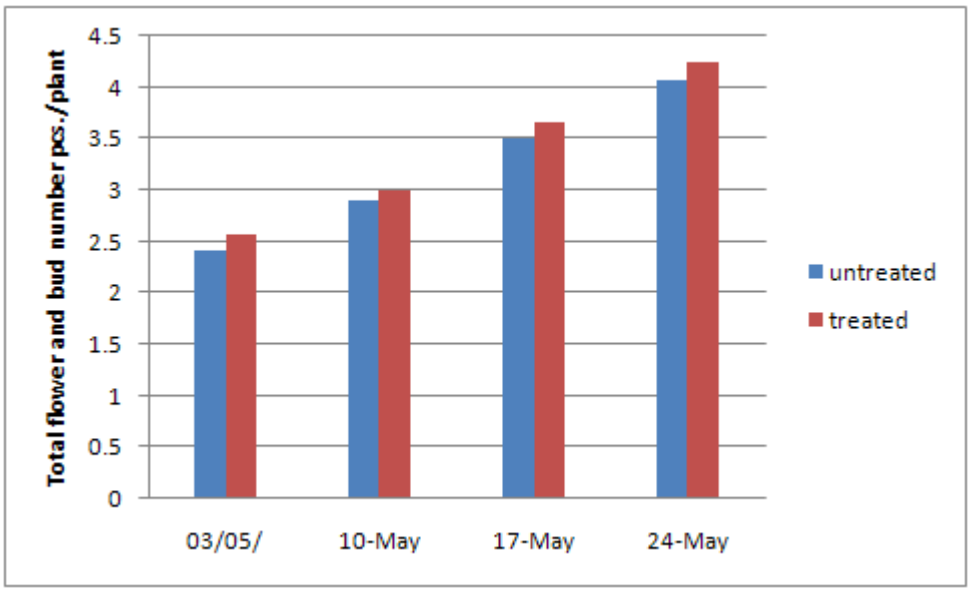

Figure 2. Effect of leaf fertilizer on flower and bud numbers

Impact of leaf fertilizer on plant height

Figure 3 illustrates the average height of the plants, according to which the plants in the treated stock were higher than in the untreated ones.

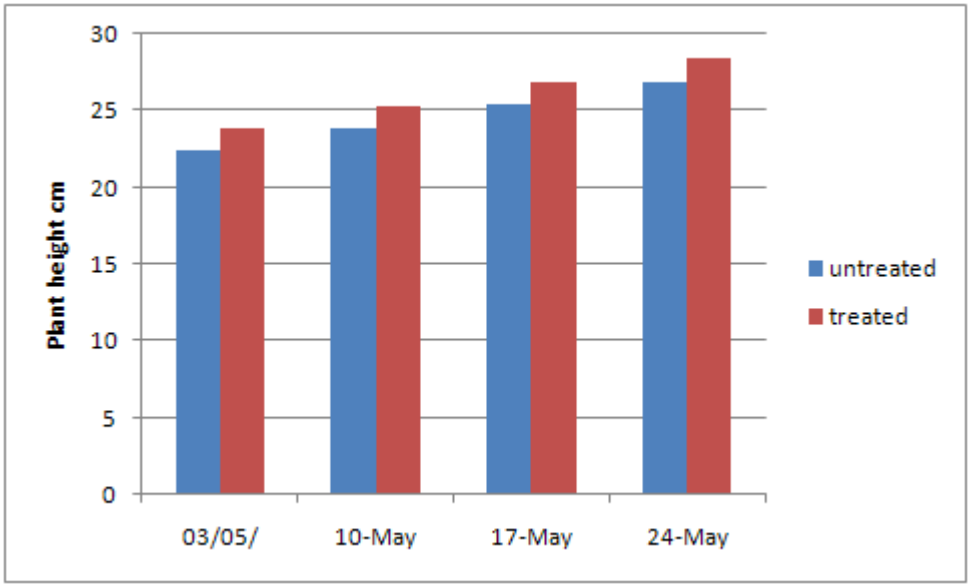

Figure 3. Impact of leaf fertilizer on plant height

Impact of foliar fertilizer on the extent of plants

Figure 4 illustrates the average size of the plants, from which we can conclude that the size of plants in the treated plants was greater than that of the untreated ones.

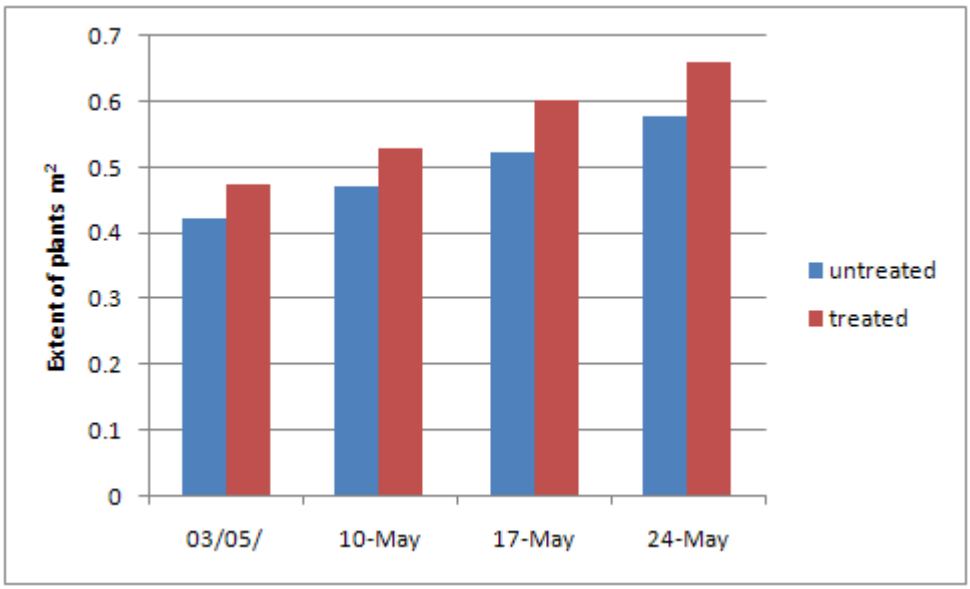

Figure 4. Impact of foliar fertilizer on the extent of plants

Impact of leaf fertilizer on the nutritional value of the leaf plate

The results of the leaf analysis are shown in Table 1. The inner values of leaves also demonstrate the positive effect of leaf fertilization, while the leaves of the treated stock have higher levels of nitrogen, phosphorus, potassium and magnesium compared to the control stock. Calcium content was the same in the treated and untreated plants.

Table 1.

Investigation of leaf analysis of the Pelargonium zonale 'Victor Improved'

Test name	Units	Untreated	Treated
Nitrogen	m / m% air dry	2.46	2.57
Phosphorus	m / m% air dry	0.379	0.469
Potassium	m / m% air dry	1.97	2.11
Calcium	m / m% air dry	1.66	1.66
Magnesium	m / m% air dry	0.319	0.325

CONCLUSIONS

Magnesium as an important building component of chlorophyll molecule plays a vital role in plant life.

Based on our research we can conclude that FitoHorm 24 Mg magnesium foliar fertilizer had a positive effect on the flowering period of the geranium, the flowers and the buds, the height of plants and the extent of the plants (figure 5), as evidenced by the higher macro and mezo element content in the leaves of the plants.

These results are preliminary research results, there is a need for further testing in our later studies.

Figure 5. Flowered Pelargonium zonale 'Victor Improved'

ACKNOWLEDGEMENT

This research is supported by EFOP-3.6.1-16-2016-00006 "The development and enhancement of the research potential" project. The Project is supported by the Hungarian Government and co-financed by the European Social Fund. We are also grateful to the plant propagating material at Plant Alliance Hungary [15], a horticultural and commercial enterprise in Csólyospálos.

REFERENCES

[1]. A. JAKÁBOVÁ, 1983, A muskátli. Priroda, Bratislava
[2]. ALGEIER W., 2010, Főszereplő a muskátli. Kertészet és Szőlészet (59. évf.) 45. sz. 24-25. p.
[3]. B. KOLLATZ, A. WREDE, W. HENLE, 2014, Versucheim deutschen Gartenbau. Gemeinschafts versuch Pelargonien. http://www.landwirtschaft.sachsen.de/landwirtschaft/
[4]. C. TOMOS, M. MARGHITAS, 2013, Differential Fertilization and Nutritive Substrates Effect on the Flowering Degree of Pelargonium Zonale. Bulletin UASMV serie Agriculture 70 (1), 141-149.
[5]. CZÁKA S.,1998, Cserepes dísznövények. Mezőgazda Kiadó, Budapest
[6]. GERBÁR J., 1976, A muskátli. Mezőgazdasági Kiadó, Budapest
[7]. HONFI P., SZÁNTÓ M., TILLYNÉ MÁNDY A., 2011, Muskátlik. CSER Kiadó, Budapest
[8]. H. T. ARAYA 2012, Rose-scented geranium (Pelargonium spp.) herbage yield, essential oil yield and composition as influenced by nitrogen nutrition and liming. University of Pretoria
[9]. M. ABTAHI, T. BAKHSHI, B. KAVIANI, 2013, Influence of Fe, K, N, and P on phytomass amount and Pelargonium graveolens essence percentage in Kashan. European Journal of Experimental Biology, 3(5):297-300
[10]. NAGY B., 1991, Egynyári virágok. Mezőgazdasági Kiadó, Budapest
[11]. SCHMIDT G., 2002, Növényházi dísznövények termesztése. Mezőgazda Kiadó, Budapest
[12]. SCHMIDT G., 2003, Növények a kertépítészetben. Mezőgazda Kiadó, Budapest
[13]. SZÁNTÓ M., MÁNDY A., FEKETE SZ., 2003, Virágágyi és balkonnövények. Nyugat – dunántúli Díszfaiskolások Egyesülete, Szombathely
[14]. TILLYNÉ MÁNDY A., HONFI P., 2016, Növényházi dísznövénytermesztés. Szent István Egyetem Kertészettudományi Kar Dísznövénytermesztési és Dendrológiai Tanszék, Budapest
[15]. http://www.plantalliance.hu/hu/Musk%C3%A1tli