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STUDY OF GROWTH AND FORMATION OF DECORATIVE PROPERTIES OF FLOWERS, PLANTED IN PROTECTED GROUND WHEN IRRIGATED WITH VARIOUS FERTILIZERS

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Abstract

This article is aimed at solution of topical issue of obtainment of new theoretical knowledge and practical skills in determination of quality of floral products, as well as the means of its advancement in the process of flower's growth, with the aim of competitive recovery at the market of potted flowers that are planted domestically, demand for which is constantly increasing. We have provided results of researches, directed in definition of influence of various types of fertilizers on decorative properties of flowers as exemplified by Begonia hybrida elatior. The term for conduction of study was six months. It was stated that the best indicators of growths and decorative features might be obtained while using organic and mineral fertilizers. In accordance with developed matrix of introduction of such fertilizers their ratio was optimized, which allowed obtaining maximal decorative effect. It was stated that the highest degree of decorative features is observed when flowers are irrigated with complex that consists of organic and non-organic fertilizers in 50:50 or 60:40 ratio

Key words: fertilizers, decorative features of potted floral products, floral products, hybrid begonia.

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ИССЛЕДОВАНИЕ РОСТА И ФОРМИРОВАНИЯ ДЕКОРАТИВНЫХ СВОЙСТВ ЦВЕТОВ ЗАКРЫТОГО ГРУНТА ПРИ ПОЛИВЕ РАЗНЫМИ УДОБРЕНИЯМИ

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Аннотация

Статья направлена на решение актуального вопроса приобретения новых теоретических знаний и практических навыков в определении качества цветочной продукции, а также способов его повышения в процессе роста растения, с целью повышения конкурентоспособности на рынке горшечных цветов местного выращивания, спрос на

которые повышается с каждым годом. Приведены результаты исследований по определению влияния различных видов удобрений на декоративность цветочной продукции на примере *Begonia hybrida elatior*; срок проведения исследований – 6 месяцев. Установлено, что лучшие показатели роста и декоративности можно получить при использовании органического и минерального удобрений. В соответствии с разработанной матрицей введения данных удобрений оптимизировано их процентное соотношение, что позволило достичь максимального декоративного эффекта. Установлено, что высшая степень декоративности наблюдается при поливе комплексом из органического и неорганического удобрений в процентном соотношении 50: 50 или 60:40.

Ключевые слова: удобрения; декоративность горшечной цветочной продукции; цветочная продукция; бегония гибридная.

It is known that esthetically designed potted flowers are widely used in many types of spaces. With their help, one may effectively emphasize elegance or chastity of the interior, to create cozy atmosphere in living apartment, shopping space or any other public floors. Flowers are used to create decorations at the entrance in offices, industrial areas, porches at private houses and many other places [1, 2]. Primary function of potted flowers lies in the possibility to create positive mood with the help of specially selected compositions of green and flowering plants and their fragrance. Psychologists believe that the abovementioned decoration techniques may help attracting visitors to shopping malls, public catering facilities, while obtaining regular customers who involuntarily wish to return to the area where they experienced positive emotions [2, 3].

The main principle that should be considered is correlation of floral design with general idea of the object, which is subject to beautification.

That is why within the recent years in Ukraine we may observe increase in demand on floral products, especially on potted flowers. Since this type of goods are very fastidious and is not easily transported at long distances, in Ukraine a proper market segment is being formed, which specializes in cultivation and production of flowers [7]. Since this business line is rather new, there is a necessity of obtaining new theoretical knowledge and practical skills for quality determination of this type of products, as well as the means of boosting such quality with the aim of seeking competitiveness at the market of flower goods.

It is known that for normal vital activity any plant requires a wide range of various elements, which are taken up by it from various mediums like oxygen, carbon, hydrogen, partially nitrogen – from air and water; potassium, nitrogen, phosphorus, magnesium, sulfur, calcium, boron, iron, manganese, copper, molybdenum, zinc – from soil. Plants consume nutrients through root hairs and carbon dioxide – through leaves. Maximal need in nutrients is

experienced by plant within blossoming, flower bud formation and fructification periods [4, 6].

Excess or lack of some elements influence plant's visual appearance, which negatively affects decorative attributes of it [5]. Insufficient amount of nitrogen (nitrogen deficit) leads to the fact that plants' leaves become lighter and smaller, they are discolored to brown, blossoming or seed-bud are delayed, and stems become thinner. Excessive amount of nitrogen leads to boosted growth of stems, sprouts and leaves. Phosphorus is present in proteins' complements, favors better taking of nitrogen, potassium, sulfur and enhances formation and quick ripening of fruits. In case of phosphorus' deficit, growing leaves have smaller sizes and obtain purple hue. Potassium participates in production of carbohydrates, increases plants' resistance to diseases and low temperatures. A consequence of this elements' deficit is expressed in bad plants' growth, weakness of their leaves and dying-off of chlorotic tissue. In case of magnesium deficit, chlorosis manifests at lower leaves, tissue between nerves turn yellow and white. At insufficient amount of calcium plants, growth stops, they become dwarfish, upper buds die off, roots become thick and slinky. In case plants lack iron, upper sprout dies off first, then upper leaves become pale-green, tissue become brown and drops off. In case of copper deficit stems become thin and stiff, they lose their flexibility. Lack of zinc makes leaves grey up to brown color. Manganese favor normal process of plants' breathing and formation of chlorophyll, it takes part in redox-processes. In case of its deficit leaves become paler [8-10].

The subject of the work was to study influences of various types of fertilizers on the process of growth and formation of decorative features of floral products.

Materials and methods of research

We selected samples of *Begonia hybrida Elatior* as objects, which were simultaneously planted into ceramic pots with similar soil mixture. Four types of fertilizers were selected as influence factors, which

had certain features and composition, like: mineral, microbiological, organic and universal fertilizer. Sample of potted plants of begonia hybrida elatior (*B. hybrida elatior*), was used for control. It was constantly irrigated with pure settled faucet water. The term of study conduct equaled 12 months. Indices of decorative attributes of plants were registered in organoleptic way (visually, kinesthetically). Measurements and calculations of physical indicators, in particular, the height of plants, length and width of leaves were performed with the help of standard measuring instruments: ruler, beam compass, meter and magnifying glass.

Results of the study and their discussion

Studies were performed at several stages. At the first stage, we investigated influence of various types of fertilizers on decorative features of plants during six months. At the same time, we considered the fact that plants' need in various nutritious elements is different at various stages of individual development. Nitrogen fertilizers favor growth of vegetative parts, and thus they deliver benefits at the beginning and during periods of plant's intensive growth. Lack of some elements in soil causes negative impact at plant's visual appearance; deficiency symptoms occur at leaves and stems, as well as other changes are manifested.

For the study we took four types of fertilizers: organic one (bio-compost (g/l is contained in composition in the amount that is not less than: N – 5,0; P – 10,0; K – 10,0; humic substances – 2,0; complete set of nutritional substances and pH growth stimulators 8,0...10,0)), non-organic (mineral (composition: N – 17%, P – 4,5%, K – 12%, Mg – 1%, Zn, Co, Ca, Mo, Mn, Fe, Cu, B)), universal (Florovit® (composition: 3.0% of nitrogen; 2.0% of potassium, dissolved in water; 0.007% of copper, 0.04% of iron; 0.015% of manganese; 0.002% of molybdenum; 0.015% of zinc)) and microbiological one ("Baikal EM 1") (composition: lactic, nitrogen-fixing, photosynthesizing bacteria, yeast fungi and

metabolic by-products of these microorganisms). Fertilizers were introduced according to recommendations, mentioned at labeling by the producer.

Obtained results indicate that the most outstanding external effect was obtained in the samples of *B. hybrida elatior*, in which both organic and non-organic fertilizers were introduced. *B. hybrida elatior*, which were irrigated with organic fertilizer, had bright coloring of leaves, quite attractive appearance, but weakened, stretched stem, which negatively affected their decorative characteristics. The sample, in which non-organic fertilizer was introduced, has bright dark leaves, which, however, were of small size.

External effect from application of universal and microbiological fertilizer was not typical enough, which is explained by averaged quantitative composition of elements. Microbiological fertilizer caused positive effect on plant's appearance, however, for bacterial activity, which are part of its composition, certain elements are needed, which should originate to plant from outer environment – in a standard way or by means of their special introduction. Thus, the result of this stage would be registration of brighter visual effect of growth, development and outer appearance of plants' samples from application of organic and non-organic fertilizers.

At the next stage, we studied effect of reaching maximal decorative features of plants after introduction of organic and non-organic fertilizers in various ratios. The term for conduction of studies was six months.

For the work in the abovementioned direction, we needed to develop the structure for introduction of fertilizers. For this, we made eight samples, concentration of fertilizers in which was taken in accordance with developed matrix of introduction of fertilizers (Table 1).

Table 1

Matrix of introduction of fertilizers

Introduced fertilizer	Concentration in samples, %							
	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
Organic one	20	30	40	50	60	70	80	-
Mineral one	80	70	60	50	40	30	20	-
Water	-	-	-	-	-	-	-	100

Measurements and calculations of physical indices, particularly, height of plants, length and width of leaves, was performed in three of six months after studies had been performed (Table 2). In six

months after the beginning of the experiments, we observed more defined regularity between introduction of certain concentration of fertilizers and plants' physical indices.

Table 2

Physical indices of studied samples of *B. hybrida elatior*

Sample	Indices					
	Plant's height, cm		Leaves' length, cm		Leaves' width, cm	
	3 months	6 months	3 months	6 months	3 months	6 months
No. 1	19	42	1.5	2.6	0.9	1.3
No. 2	16	40	1.5	2.6	0.9	1.3
No. 3	17	41	1.7	2.9	0.8	1.5
No. 4	16	35	2.0	3.0	1.0	2.0
No. 5	15	28	2.7	3.8	1.2	2.5
No. 6	14	22	2.7	3.9	1.3	2.6
No. 7	13	15	2.9	4.1	1.2	2.7
No. 8	10	13	1.8	3.0	1.1	2.2

In comparison with the sample that was irrigated with water (No. 8), those samples of *B. hybrida elatior*, at irrigation of which fertilizers were introduced, we observed more intense growth of vegetative parts of the plant. Some visual effect was evident yet in three months after the beginning of the experiment. Height of *B. hybrida elatior* by the third month of the experiment equaled 13 to 19 cm, mean length/width ranged within 1.5/0.9 cm – 2.9/1.3 cm. Height of plants by the sixth month was 15-42 cm, mean length/width – 2.6-4.1/1.3-2.7 cm. The highest degree of decorative was observed at samples of *B. hybrida elatior*, which were irrigated with fertilizer in ratio of organic to non-organic as 60:40. The least degree of decorative features were observed at samples of *B. hybrida elatior*, in which fertilizers were introduced in correlation of organic fertilizer to non-organic in 20:80 and 80:20 ratio, respectively. Sample of *B. hybrida elatior*, which was irrigated with majorly organic fertilizer, we observed fast growth of vegetative parts, decrease in elasticity and extraction of stem, thickening of limbs. Sample of *B. hybrida elatior*, which was irrigated majorly with non-organic fertilizer, we observed slow growth of vegetative parts and small size of leaves.

Study of organoleptic indicators of *B. hybrida elatior* in six months after the beginning of the experiment showed that plants grow and develop synchronically, although some differences in external appearance are present. All samples have green color of leaves, but of various intensity. Thus, samples of *B. hybrida elatior* No. 4 and No. 5 had leaves of intense green color with distinct strips of venation. Samples of *B. hybrida elatior* No. 1 and No. 2 we observed less intense color of leaves, their limb was thickened, but it was paler than that of the other samples. Samples of *B. hybrida elatior* No. 6 and No. 7 had small leaves of dark green color. Samples of *B. hybrida elatior* (No. 4, No. 5), which had been

characterized by the best decorative characteristics at previous studies, kept them, and also obtained more esthetical appearance in comparison with other samples.

Conclusion

Thus, studies, conducted through the example of *B. hybrida elatior*, showed more distinct result in terms of growth and decorative features of floral production of protected ground at application of organic and mineral types of fertilizers. In addition, it was stated that at irrigation of samples of plants with the abovementioned fertilizers in their ratio of 50:50 and 60:40, respectively, maximal decorative effect is observed, and, thus, boost of aesthetical attributes of potted plants. Abovementioned concentrations of fertilizers are recommended for irrigation of plants at protected ground for planting plants from begonia family.

References

- Hessayon D.G. The flower expert. London: Transword Publishers, 2004. 256 p.
- Pleasant B. The complete houseplant survival manual: Essential know-how for keeping (not killing) more than 160 indoor plants. North Adams: Storey Publishing, 2005. 384 p.
- Courtier J. Indoor plants: The essential guide to choosing and caring for houseplants. New York: A Readers Digest Book, 2012. 240 p.
- Roost V. Toalilled. Tallinn: Tammerraamat, 2014. 256 p.
- Bezuglova O.S. Fertilizers, bio additives and growth factors for your crop. Rostov-N / D.: Fenyks, 2007. 255 p.
- Zavada T.L. Rules of care of decorative and deciduous flowers and succulents // Flowers of Ukraine. V. 5 (2003): 35-38.
- Kyrov V.N. Factors surrounding among which influence houseplants // Flowers in a garden and houses. V. 7 (2002): 45-47.
- Sorokyna S.V., Golovko N.P., Akmen V.A. Research of influence of fertilizers, as abiotic factors, on

decorative effect of flower production // Materials of International science-practical Conf.: The progressive equipment and technologies of food productions, hotel, restaurant households and trade. Economic strategy and prospects of development of the sphere of trade and services. Kharkov: HDUHT, 2013. P. 249-250.

9. Sorokyna S.V., Lutsenko Y.N. The influence of different types of fertilizers on decorative effect of pottery flower production // Bulletin of national technical

university "HPI". Thematic release "Chemistry, chemical technology and ecology". V. 10 (2008): 89-92.

10. Sorokyna S.V., Letuta T.N., Lucenko Y.M. The formation of decorative effect of flower production under the influence of abiotic factors on the example of a chlorophytum plant // Are progressive equipment and technologies of food productions of restaurant economy and trade: Proc. Sb. of scientific works. Kharkov: HDUHT. V. 2 (6) (2008): 259-264.