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ВЛИЯНИЕ ИНДОЛИЛ УКСУСНОЙ И ГИБЕРЕЛЛИНОВОЙ КИСЛОТ НА РОСТ, ЦВЕТЕНИЕ И ХАРАКТЕРИСТИКУ ЛУКОВИЦЫ ГЛАДИОЛУСА (GLADIOLUS GRANDIFLORUM VAR. WHITE PROSPERITY)*

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EFFECTS OF GIBBERELLIC ACID AND INDOLE-3-ACEDIC ACID ON FLOWERING, STALK ELONGATION AND BULB CHARACTERISTICS OF GLADIOLUS [GLADIOLUS GRANDIFLORUM VAR. WHITE PROSPERITY]]

Аннотация. Гладиолус (Gladiolus grandiflorum var. with prosperity) является широко культивируемым в мире луковичным цветущим растением. Основная потеря урожая гладиолуса связана с хранением и транспортировкой. Краткость жизни срезанных цветов гладиолуса способствует понижению их качеств и уменьшает конкурентоспособность ее при продаже. В представленной работе изучено влияние индолил уксусной (ИУК) и гиббереллиновой (ГК) кислот на рост, первичное цветение, фазы цветения и образование луковицы. В ходе работы ГК использовали в концентрации 50 (G1), 100 (G2) и 150 (G3) ppm, а ИУК 100 (I1), 150 (I2), 200 (I3) ppm. В контрольном варианте не использовали ИУК и ГК. Луковицы гладиолуса были заражены указанными концентрациями ИУК и ГК в течении 6 часов и затем были посажены. По полученным результатам было установлено, что вариант G3 является более эффективным в течении 12 суток после посадки, а контрольный вариант все время (в течение 21 суток) характеризовался низкими показателями. Использование G1 стимулировало цветение. Результаты показали, что G2 имеет самый большой розетт цветок (120 мм), при этом в контроле диаметр цветка был 83,5 мм. При использовании G3, луковичные листья были самым крупными и инфицированными, ГК вызвало увеличение продолжительность жизни срезанных цветов.

Ключевые слова: Гладиолус, индолил уксусная и гиббереллиновая кислоты, цветение, луковичная масса.

Abstract. Gladiolus (gladiolus grandiflorum var. white prosperity) is one of the most popular species of bulbous flowering plants widely cultivated in the word. The failure of cut gladiolus flowers to open fully after transportation and storage is a major post harvest problem. The marketability of these cut flowers is limited by their short life. This study was carried out to determine the effect of gibberellic acid (GA) and indole-3-acedic acid (IAA) on germination, onset flowering, open flower, vase life and bulb formation of gladioluses (var. white prosperity). Gibberellic acid at a concentration of 50 (G1), 100 (G2) and 150 (G3) ppm and indole-3-acedic acid at a concentration of 100 (I1), 150 (I2), 200 (I3) ppm were applied. In the control group neither GA nor IAA were used. Primarily, bulbs were treated with the indicated concentrations of gibberellic acid and indole-3-acedic acid solely for 6 hours then planted. According to the results obtained, application of GA (G3) had the highest effect on germination (12 days after being planted), whereas the control group had lowest effect (within 21 days). The use of GA at a concentration of 150 ppm stimulated flowering. The results obtained indicated that the GA application (G3) resulted in the largest diameter of the flower rosettes (120mm) compared to the control group (83.5 mm). Treatment with GA (G3) caused an increase in the vase life of cut flowers and in the bulb weight which was the highest among all groups.

Key words: gladiolus, gibberellic acid, indole-3-acedic acid, flowering, bulb weight.

In the world, 90% of bulb flowers (ornamental geophytes) production area comprise with tulip, gladiolus, hyacinth, iris, lily and narcissus, gladiolus is the major produced bulb flower all over the word (Pakistan 1). Researches on bulb flower aimed increase stalk elongation, bulb quality and stimulate early flowering in recent years, thus, researcher applied different temperature treatments and different doses of plant grow regulators (PGR) before or after sowing as gibberellic acid (GA3), benzyl amino po-rin (BA) and alpha naphthalene acetic acid (NAA). Bulbs were injected in 5°C temperature at the sowing time, ethephon was sprayed on the plant at the onset of flowering. GA3 reduced forcing time, increased the number of bulblets, but decreased their size. The involvement of gibberellins in the regulation of stem elongation and flowering has been implicated by cold requiring plants, including tulip. The failure of gladiolus after transported a major harvest problem [6]. Several treatments with GA3 also have been used to prevent leaf senescence in range of cut flower. Species as chrysanthemum including to alstroemeria [4]. Other important factor in the deterioration of cut flowers diminishing of respiration of substrates, the speed of changes depend on amount of reserves that present in the flower when they have cut IAA, NAA and IBA application on buds of Guodosshnik stimulated stalk elongation [2]. In this regard, the effects of different doses of GA3 (Gibberellic acid) and IAA (indole-3-acedic) on flowering, stalk elongation and bulb yield of Gladiolus grandifolium have some prosperity.

Material and methods

Plant materials: Experiments were carried out in Department of Agricultural and Natural Resources Research Center of Arak, in Iran, in 2009-2010. Bulbs were placed in plastic vases containing IAA with concentrations of 100, 150 and 200 mg/l, and GA_3 with concentrations of 50, 100 and 150 mg/l. The vases containing various concentrations of IAA and GA_3 were arranged in a completely randomized design (CRD) with 3 replications. Bulbs were grown under commercial conditions in field. Bulb germination expressed as the percentage of bulb which produces normal seedling [5] GA_3 effect on germination. The flowers will reach on an emergent shoot enclosed within 7 leaves. The flowering stage was determined by onset of flower on stalk. Specified samples were picked up when the first bud show full color. Cut samples were transported to the laboratory. The cut flowers were immediately placed into 300 ^{cc} glasses containing water. During the experiment light intensity was same to natural light, temperature was 20 ± 2 and relative humidity was 60% until last vase life ends. Diameter floret determined. The vase life of gladiolus as cut flowers was determined by changes carbohydrate content in leaves and petals and also chlorophyll content in leaves. The bulbs were dismantled from november, individual bulb weight (gr) was estimated.

Data analysis: Data were analyzed using one-way ANOVA with the generalized liner model procedure of SAS (Version 9.1, SAS institute Inc., Cary, NC, USA), Significant ($P \leq 0.01$) treatment effects were determined by ANOVA and data means were separated by the LSD test at $P=0.01$.

Results and discussion: According to the results of the variance analyses emergency of bulb, time of flowering, diameter floret, vase life and weigh of bulbs affected by PGR treatments. There were significant effect ($p \leq 01$) obtained from bulb after treated with IAA and $GA_{3.}$ The effects of hormone on germination of bulb determined between 12 day (GA_1) and 16 day after sowing. Gibberellic acid by concentration 150 mg/l significantly stimulated onset of flower on stalk well than other studied treatments (Table 1). In addition, it was found that provision of 150 mg/l IAA stimulated early flowering in comparison with other IAA treatment. Effects of GA application were found more stimulate than IAA (Table 1). GA by stimulation ∞ amylase activity increased degradation of starch and induce in energy supply for germination and growing. The involvement of gibberellins in the regulation of stem elongation and flowering has been implicated in cold-requiring plant. In this investigation GA and IAA application

affected increase diameter of florets and stalk elongation, in bulb plants auxin is also necessary for stalk elongation. Removal of the flower bud and leaves, both major auxin sources, before the rapid elongation of the floral stalk, it considerably reduces floral stalk elongation, whereas application of IAA reverses this effect (14, 11,21 Pakistan). Treatment with 100 mg/l GA and 150 mg/l IAA was the most effective about increasing diameter of florets (Table 1). PGR reduced water loss and increased water uptake, therefore improving the water balance [3]. It was found that GA and IAA increase longevity in cut flower. GA have active influence effect on amylase enzyme, for total soluble carbohydrate content-increase that carbohydrate may have contributed to the energy pool and increased osmotic potential of flower [1], treatment with GA increases content of carbohydrate in petal against to the leaves. In general, all PGR application increases bulb weight. G2 gave highest values with 625 gr and the lowest values were obtained from G1 1085 gr. In this respects, GA and IAA applications was favorable. Ingestion of PGR by bulb flower immediately before sowing resulted in a higher fresh weight.

As a result of the study, all GA and appropriate dose of IAA has found very useful practice to enhance number of early flower, germination, stalk elongation and weight bulb.

Table1: The effect of application on germination, early flowering, stalk elongation, diameter of floret, bulb weight

Application	Germination (day after sowing)	Onset pedicel (day after sowing)	Stalk elongation	Diameter floret (mm)	Bulb yield (gr)	Vase life (day)
Control	22b	74c	62/3ab	85ed	725/5b	8c
50 ppm GA	14a	54a	68/6a	97/5b	1085ab	12a
100 ppm GA	13a	59b	69/3a	119/2a	1625a	10/1ab
150 ppm GA	12a	55a	66a	96/8b	1207ab	10/6ab
100 ppm IAA	16a	61b	62ab	117/71a	1267ab	11ab
150 ppm IAA	16a	60b	61ab	88/1cd	1535a	10bc
200 ppm IAA	15a	58/3ab	62/3ab	93/6cb	1395ab	11/6bc

Values with different superscripts inside columns are significantly different (p_0.01)

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