

EFFECT OF DIFFERENT HARVESTING TIMES ON THE CORM YIELD OF SOME GLADIOLUS (*GLADIOLUS L.*) CULTIVARS

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The effects of three different harvesting times (when the leaves were green, beginning to yellow and drying) on the yield of corm and cormlets of commercial Gladiolus varieties; Nova Lux, Mascani, White Prosperity and Piricilla were determined in pots under field conditions. The experiment was laid out in split-plot design taking 216 corms of Gladiolus, each with girth of 8-11 cm.

The studied parameters relating to new corms were: number of corms, number of cormlets, corm girth (cm), cormlet diameter (cm), corm weight (g) and cormlet weight (g). The second and third harvesting times gave maximum number of cormlets. The largest girth and the maximum weight of corm were found in the c.v. 'Mascani'. The largest cormlet diameter and cormlet weight were obtained from the first harvest.

Key words: Gladiolus, Corm yield, Harvesting time.

Introduction

In 16 provinces of Turkey, all the ornamental plants are produced on an area of approximately 630 hectares. Cut flowers are grown on 464.3 hectares of land out of which 95.0 hectares are used for growing bulbous, tuberous and rhizome ornamental plants (Aybak 1989). The Gladiolus occupies an area of approximately 61.0 hectares and thus ranks first among the cut flowers.

According to the Ornamental Plant Society, 6,061,000 Gladiolus plants were sold during 1987 (Aybak 1989) whereas during 1993, the number was 32,799,000 (Anon 1993).

In Turkey, Gladiolus are propagated under green house conditions or in the field, to get the corm or flower produce. Off-season Gladiolus are, however, exclusively grown in the green house for cut flower production. Out of the total 61 hectares of land, green house occupies 6 hectares while 55 hectares of open field is utilized for the production of Gladiolus (Celem 1986).

The most suitable provinces for Gladiolus corm production are Kocaeli and Istanbul and for the cut flowers Antalya, Izmir, Adana and Antakya. During the last few years, central and northern regions had gained importance for corms as well as for high quality summer cut flower production (Altan and Altan 1984).

The province Tekirdag, is important with respect to topography, climate and soil characteristics. During summer, here, the temperature is relatively lower as compared to southern region, hence the area is suitable for the quality Gladiolus flower production (Korkut 1990; 1991).

For the production of commercial corm of Gladiolus, cormlets are used as stock material. Different experiments demonstrated that the new corms of Gladiolus originated from the old corms and these new corms started to produce at a stage when the leaves attained the height of 20 cm and basal part of shoot axil became thick. When the leaves attained the height of 40-60 cm, the new corms reached the same size as the old ones and started to develop roots. During the course, the cormlets were produced in between the old and new corms. The leaves continued to store nutrients following the flowering, as a result the nutrients accumulated in the new corms. After harvesting of the corms, it was observed that during late summer, some of the new corms and a bulk of cormlets (5-500 in numbers) were produced from the basal part of growth (Bailey 1963; Disperati 1982; Anon 1985).

During the last few years in Turkey, a considerable quantity of corms of Gladiolus were imported to meet the requirements (Anon 1993). The local growers used these corms to obtain flowers in the following years, consequently, the quality and quantity of flowers became low.

For ensuring the production of the corms of Gladiolus in

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Turkey and lessening dependence on the imports, the production of corms as a stock material is quite imperative.

The yield of corms of *Gladiolus* varies according to the plant density and the depth in different kinds of soil and climatic conditions besides the type of *Gladiolus* variety and the harvesting time (Bahar 1993).

A lot of research work has been carried out to observe the effect of planting distances and depths on the yield of corms and cormlets and quality of flowers of commercial *Gladiolus* varieties (Korkut 1991; Ata 1992; Korkut 1992 b; Bahar 1993). Prior to these investigations, little information was available regarding optimum harvesting times of *Gladiolus* varieties.

The time of harvesting is one of the most important factors that affect quality of corms. The corms of *Freesia* and *Gladiolus* are similar in structure and are generally harvested at the time when the flowerings collapse and the leaves become yellow and dry. In recent years, however, experiments elucidated that the weight of corms increase if harvested at a time when the leaves are still green (Ertan and Ulug 1991).

The present research envisages to ascertain the effect of three different harvesting times after flowering on the corms of four important exotic commercial varieties of *Gladiolus*, under local climatic conditions.

Materials and Methods

The experiment was conducted in the experimental area at Agricultural Faculty, Thrace University, Turkey. Four different varieties of *Gladiolus* L. namely; Nova Lux, Mascani, White Prosperity and Piricilla were selected. A total of 216 corms, with 8-11 cm girth (circumference) were selected for experiment. The medium contained sterilized soil, peat moss and perlite in the ratio of 2:1:1 respectively (Anon 1980). Each pot contained 6 corms and the planted corms were treated with fungicide Captan 2.0 g per litre before planting. The plant nutrients in the form of concentrated solution contained ammonium nitrate, diammonium phosphate and potassium sulphate as recommended for flowering plants (Anon 1985). The nutrient solution was applied in the ratio of 1:200 after every 15 days. Experiment was laid out in a split plot design with 3 replications (Acikgoz 1988). The flowers were harvested manually after opening of the first florets. However, the spike bearing florets, were cut with a sharp knife. The cormlet diameter was measured with compass while the girth of corm, by means of circle pattern. Weight of corm and cormlets was determined with an electronic balance. The parameters taken into consideration for new corms included number of corms and cormlets, girth of corm and diameter of cormlets (cm) and weight of corms and cormlets (g).

For statistical analysis data obtained were analyzed by split plot design arrangement and the means were compared by least significant degree (LSD) test (Duzgunes 1987).

Results and Discussion

The average values of various parameters are given in Table 1.

Number of Corms. Results of harvesting times for different varieties and their interactions were found statistically insignificant with respect to plant distances, varieties and their interactions (Bahar 1993). The variety Nova Lux excelled the others followed by Mascani and White Prosperity. The second harvesting time, however, showed the best results as compared to the other two (Table 1).

Number of Cormlets. Harvesting times and varietal interactions were found significant at 1% probability.

The maximum number of cormlets was obtained at the time of harvesting when the leaves started to become yellow (H.T. II) and dry (H.T. III). Within the same group, a higher number of cormlets (av. 8.277) was obtained at the second harvesting time followed by that at the third harvesting (av. 5.954).

Cormlet is used as a stock material for the commercial production of *Gladiolus* corm. Since acquisition of maximum number of cormlets is a desired characteristic, the second harvesting time (H.T. II) is the most suitable for corm collection.

So far varieties x harvesting time interaction is concerned, the second harvesting time in Piricilla (19.167 corms) gave the maximum number of cormlets. The first and the second harvesting times of Nova Lux, all harvesting times of Mascani, the first and the third harvesting times of Prosperity and Piricilla gave the least number of cormlets. Thus, it is presumed that the effect of harvesting times on the number of cormlets varies with the variety.

Girth of Corms. In respect of the girth of the corms all the varieties are considerably important at 5% probability while the interaction between varieties and harvesting time at 1% probability is statistically significant (Table 1). The variety Mascani superceded the other varieties with the largest corm girth (10.600 cm) followed by Nova Lux (10.061 cm) whereas Piricilla (9.964 cm) ranked the last for the girth of corms. In one of the experiments carried out on *Gladiolus* crop, with respect to plant distances, varieties and their interactions, Nova Lux gave minimum girth of corm (Bahar 1993). At the first harvest, White Prosperity and at the second harvest Mascani produced the corms of the largest girth (11.053 cm). At the second harvest, however, corm size of White Prosperity was insignificant. These results indicated that harvesting time did not affect the number of new corms but their girth.

Table 1
The effect of different harvesting times on various parameters of four *Gladiolus* varieties

Parameters	Harvesting Time	Nova Lux	Mascani	W. Prosperity	Piricilla	Average harvesting time
Number of corms	H.T.-I	5.667	5.667	5.333	4.667	5.333
	H.T.-II	6.000	6.000	5.667	5.333	5.750
	H.T.-III	6.000	5.333	6.000	5.000	5.583
	Effect of varieties	5.889	5.667	5.667	5.000	5.556
Number of cormlets	H.T.-I	2.120 c	1.610 c	3.497 c	2.020 c	2.312 b
	H.T.-II	2.940 c	2.633 c	8.367 bc	19.167 a	8.277 a
	H.T.-III	14.153 ab	1.943 c	4.910 c	2.810 c	5.954 a
	Effect of varieties	6.404	2.062	5.591	7.999	5.514
Girth of corm(cm)	H.T.-I	9.543 cd	10.497 abc	11.053 a	10.030 abcd	10.281
	H.T.-II	10.830 ab	11.053 a	9.010 d	9.420 cd	10.078
	H.T.-III	9.810 bcd	10.250 abc	10.887 ab	10.443 abc	10.348
	Effect of varieties	10.061 b	10.600 a	10.317 ab	9.964 b	10.236
Diameter of cormlet (cm)	H.T.-I	0.717 ab	0.743 a	0.677 abc	0.700 ab	0.709 a
	H.T.-II	0.647 bcd	0.650 bcd	0.533 e	0.537 e	0.592 b
	H.T.-III	0.537 e	0.573 de	0.617 cd	0.600 cde	0.582 b
	Effect of varieties	0.633	0.656	0.609	0.612	0.628
Weight of corm (g)	H.T.-I	6.903 bcd	8.607 ab	9.703 a	7.293 bc	8.127
	H.T.-II	8.577 ab	9.457 a	5.120 d	5.917 cd	7.267
	H.T.-III	7.327 bc	8.143 ab	9.630 a	7.930 abc	8.257
	Effect of varieties	7.602 bc	8.736 a	8.151 ab	7.047 c	7.884
Weight of cormlet (g)	H.T.-I	0.260 ab	0.293 ab	0.303 a	0.263 ab	0.280 a
	H.T.-II	0.250 ab	0.240 b	0.143 c	0.147 c	0.195 b
	H.T.-III	0.147 c	0.163 c	0.183	0.177 c	0.167 c
	Effect of varieties	0.219	0.232	0.210	0.196	0.214

For a parameter, the figures with common letter(s) do not differ significantly.

Diameter of Cormlets. The interaction between varieties and harvesting time at 5% probability and harvesting time at 1% probability are statistically significant while the varieties are nonsignificant (Table 1). The cormlet of largest diameter (0.709 cm) was obtained at the first harvest followed by 0.592 cm and 0.582 cm at the second and the third harvest, respectively.

So far the varieties x harvesting time interaction is concerned, Mascani produced the cormlet with the largest diameter (0.743 cm) at the first harvest. Similarly Nova Lux, at the third harvest and White Prosperity and Piricilla at the second harvest yielded cormlets of the least diameter (0.537, 0.533 and 0.537 cm respectively) Thus it is presumed that the effect of harvesting time on the diameter of cormlet varies with the varieties.

Weight of Corm. Varieties and varieties x harvesting time interaction were found to be significant at 1% probability.

Mascani gave the maximum weight of corm (8.736 g) followed by White Prosperity (8.151 g). The minimum weight of corm was noticed in the variety Piricilla (7.047 g).

As for varieties x harvesting time interaction for the weight of corm, the first and the third harvesting times of W. Prosperity and the second of Mascani gave maximum result (9.630 g), (9.703, 9.630 and 9.457 g respectively). The minimum weight of corm was obtained from the second harvesting time of W. Prosperity (5.120 g).

Weight of Cormlet. Harvesting times and varieties x harvesting time interactions were found to be significant at 1% probability (Table 1). The weight of cormlet decreased from

the first harvesting time (0.280 g) to the third (0.167 g). The first harvesting time of White Prosperity (0.303 g) gave the maximum weight of cormlet followed by the first harvesting time of Mascani (0.293 g), Piricilla (0.263 g) and Nova Lux (0.260 g) and the second harvesting time of Nova Lux (0.250 g).

Conclusion

The experiments revealed that Mascani proved to be the best with the largest girth and maximum weight of the corm. It was observed that the diameter and the weight of cormlets showed a decreasing trend from the first to the third harvesting time.

References

- Acikgoz N 1988 *Research and trial methods in agriculture*. Aegean Uni, Agri Fac Pub No 473, Bornova, Izmir, Turkey.
- Altan T, Altan S 1984 *Growing of Gladiolus and Gerbera* T.A.V. Pub. No. 6, Yalova, Turkey.
- Anonymous 1980 *Forcing flower bulbs*. International Bulb Centre, The Netherlands.
- Anonymous 1985 *Fertilizer Recommendations*. Ref Book No 209. Ministry of Agri. Fish and Food, Turkey, p 22.
- Anonymous 1993 *The total annual selling quantity of Gladiolus*. S.S. Flower Growing and Sale Cooperative, Yalova, Turkey.
- Ata H 1992 *Investigations on the effect of different planting times on the flowering and flower quality in Gladiolus*. Masters Thesis. Thrace University, Agri Campus (Hort), Tekirdag, Turkey.
- Aybak H C 1989 *Ornamental plant production in Turkey, especially in Antalya First Symposium on Ornamental Plants*, 15-17 March 1989, Antalya, Turkey.
- Bahar N S 1993 *Investigations on the effects of planting density on the yield of corms and cormlets of some Gladiolus varieties*. Masters Thesis. Thrace University Agri Campus (Hort), Tekirdag, Turkey.
- Bailey L H 1963 *Gladiolus. The Standard Cyclopedia of Horticulture*. Macmillan Co, N Y, (Z: 1308-9).
- Celem H 1986 *Cut Flower Potential in Turkey*. Greenhouse Production, S: 105, Istanbul, Turkey.
- Disperati B 1982 *Growing of Gladiolus; growing of important cut flowers*. Pub No 52, Ataturk Horticulture Research Institute, Yalova Turkey.
- Duzgunes O, Kesici T, Kavuncu O, Gurbuz F 1987 *Research and trial methods*. Ankara Univ, Agri Fac Pub No 1021, Turkey.
- Ertan N, Ulug B V 1991 *A year old growing of Freezia*. Ataturk Hort Res Inst, Ornamental Plants Res Project Report, Yalova, Turkey.
- Korkut A B 1990 *Problems of cut flowers growing in Turkey and suggestions. The Third Technical Congress of Turkish Agricultural Engineering*. 1-9 Jan, 1990, Ankara, Turkey.
- Korkut A B 1991 *J. Garden and Greenhouse*. 191 (4).
- Korkut A B 1992a *Growing of Gladiolus; a Handbook on Greenhouse Production*, Hasat Publication, Istanbul, Turkey, pp 179-196.
- Korkut A B 1992b *Effects of different planting times on flowering, flower quality and yield in some Gladiolus cultivated varieties*. Thrace University, Agri Faculty Pub No 123.