INFLUENCE OF PLANTING DATE ON GROWTH AND CUT FLOWER IN GLADIOLUS

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Abstract

The effect of two planting dates (April 20 and May 10 – 20 days apart) of the corms of the first two Bulgarian gladiolus cultivars on the separate phases of development and flower production was studied in 2013-2014 in the area of Plovdiv. The period from the beginning of germination to the beginning of flowering was 68 and 84 days for the cultivars Iva and Ekaterina, respectively and for those planted on May 10 – 65 and 78 days, respectively. The planting date affected the indexes of the cut flower. The later planting date in both gladiolus cultivars had a positive effect on the stem length and flower diameter and the earlier planting date brought the formation of more buds per cut flower in the same cultivars.

Key words: gladiolus, cultivar, planting date, phenophase, cut flower

Introduction

A number of factors, such as the size of the corms and cormles, time and depth of corm planting as well as nutrition schedule influence flower production and quality of gladioli *(*Arora, Khanna, 1990; Bistrichanov, Kaninski**,** 2009).

Whereas gladiolus corms dipping with GA_3 100 ppm was proved to be the best for earliest corm sprouting, improving plant height, number of leaves plant^{-1}, leaf area plant^{-1}, early spike emergence, numbers of spikes, spike length, rachis length, numbers of florets spike^{-1}, flower duration and vase life**(** Kumari, Patel, Mahawer, 2011).

Late planting had a negative effect on the growth and yield of cut flower while earlier planting led to the increase of height, number of branches and leaves as well as cut flower yield of gladiolus (Misra, 1996, 1997; Maitra, Roy,1999; Laskar, Jana,1994; Ko, Kim, Uin, Han, Lee, 1994; Kalasareddi, Reddy, Patil, Kulkarni B, 1997; Dod, Saawarte, Kulwal, Vaidya, 1989).

It is recommended to plant the large fraction gladiolus corms at 10-15 day intervals in the summer for continuous flowering (Dinova, Nikolova, 1994) or consecutively in non-heated polyethylene and steel glasshouses as well as in the field (Kaninski, Atanasova, Zaprianova**,** 2008).

The objective of the present research was to study the effect of different planting dates on the growth and development of the first two Bulgarian gladiolus cultivars Iva and Ekaterina in the conditions of the Plovdiv area.

Material and Methods

The research took place in the area of Plovdiv, the village of Krumovo in 2013 – 2014. The trials targeted two planting dates in field conditions – April 20 and May 10 (20 days apart)

– of the first two Bulgarian gladiolus cultivars Iva and Ekaterina(Kaninski, Ivanova, Galeva, 2012).

The tests were performed with second grade corms, 60 pieces per square meter in four replications, planted on 1 m^2 plot at a depth of 8-10 cm.

The trial took place on sandy clay soil with predecessor mixed grass: cereal grass (85%) and white clover (15%) with soil pH in KCl - 7.5.

The gladioli were grown according to the technology for the production of gladiolus cut flower in the open, approved by the Expert Council of the Academy of Agricultural Science (Bistrichanov et al., 2012).

The following activities were carried out during the vegetation period: monitoring of the initial, mass and final manifestations of the phenophases of germination (beginning and end), 3-5 leaves (beginning and end); bud formation (beginning and end) and blooming (beginning and end) (Baideman, 1954).

The following indexes were examined: plant height (cm), stem length (cm), number of flower buds per cut flower (pieces), flower diameter (cm) (Lidanski, 1998).

The biometric indexes were recorded on 20 tagged plants in each replication.

The data were processed statistically (IBM SPSS Statistics 19).

Results and Discussion

The period between planting and beginning of germination in the cultivar Iva was ten days for both planting dates (April 20 and May 10) (Table 1.)

The duration of germination for the first date of corm planting of Iva and Ekaterina was 16 and 13 days, respectively and for the second date – only 4 and 2 days, i.e. the difference was 12 and 11 days, respectively. This was probably due to the lower and smaller temperature difference in the soil layer at a depth of 8-10 cm.

The reduced period of corm germination was most likely due to the higher temperature values on the soil surface and in the zone of the corms during the second ten day period of May.

Table 1. Phenological data for *Gladiolus* cv. Iva and Ekaterina (average for the period 2013-2014)

Phenophase	Cultivar	planting date – 20.IV			planting date – 10.V		
		Initial	End	Duration of phenophase (days)	Initial	End	Duration of phenophase (days)
Planting	Iva	01.V	16.V	16	20.V	24.V	4
	Ekaterina	02.V	15.V	13	21.V	23.V	2
Third-fifth leaf	Iva	18.V	12.VI	24	11.VI	04.VII	23
	Ekaterina	23.V	24.VI	31	15.VI	07.VII	22
Budding	Iva	30.VI	18.VII	18	14.VII	20.VII	6
	Ekaterina	14.VII	01.VIII	16	23.VII	06.VIII	14
Flowering	Iva	07.VII	04.VIII	28	25.VII	07.VIII	16
	Ekaterina	24.VII	09.VIII	13	07.VIII	22.VIII	15

The 3-5 leaf phase in cv. Iva was approximately the same (24 days) for both planting date, only it was 1 day shorter in the later planting term (May 10) (Table 1).

The 3-5 leaf phenophase continued for 31 days in cultivar Ekaterina for the first planting date (April 20) and 22 days for the second. This showed that the later planting date had a positive effect on the duration phase by reducing it with 9 days compared to the earlier planting date.

The phenophase of bud formation in cv. Iva occurred on June 30 for the first planting date (April 20) and its duration was 18 days. The duration for the second planting date (May 10) in

the same cultivar was 16 days, i.e. a difference of only 2 days. The data showed that the different planting dates did not affect the duration of this phase (Table 1).

Compared to Iva, the beginning of bud formation in cv. Ekaterina for the first planting date started 14 days later and continued for only 6 days (July 14) (Table 1.). For the second planting date, the phase was 7 days longer, compared to the first.

The duration of flowering in cv. Iva was 28 days for the first planting date (Table 1) and 16 days for the second planting date. The reduction of the flowering period with 12 days was obviously due to the higher temperature during flowering that had led to the faster expiration of this phase.

The flowering period of cv. Ekaterina for the first planting date continued for 13 days (Table 1), compared to 15 days for the second. The insignificant difference of 2 days showed that the duration of lowering in this cultivar was not affected by the planting date. The beginning of flowering in variety Ekaterina for the first term of planting occurred 11 days after the beginning of bud formation and the duration of that phase was 13 days. In the second planting date, the beginning of flowering occurred 9 days after the beginning of bud formation and the duration of flowering was within 15 days.

The difference of the duration of flowering in cv. Ekaterina for both planting date was very small – just 2 days and it showed that the duration of this phenophase did not depend on the time of planting.

The indexes of cut flower quality (Table 2) showed higher values for the length of the stem and flower diameter in both cultivars for the later planting date. The lengths of the stem and flower diameter in cultivars Iva and Ekaterina for this specific planting date were with 9.05 cm ($P \geq 0.001$) and 0.28 cm ($P \geq 0.05$) and 10.25 cm and 0.25 cm ($P \geq 0.001$) larger than for the earlier planting date, respectively.

Table 2. Effect of planting date on cut flower in gladiolus cultivars Iva and Ekaterina (average for the period 2013-2014)

Cultivar	Planting date	Stem length, cm	Number of flower buds of a cut flower no	Flower diameter, cm
Iva	20.04	76,25	19,25	8,69
	10.05	85,3	17,54	8,97
	P≥ 0.001	***	**	*
Ekaterina	20.04	84,25	16,4	13,55
	10.05	94,5	15,92	13,80
	P≥ 0.001	***	**	***

The number of the flower buds in both cultivars was significantly smaller for the later planting date with 1.71 pieces/bloom ($P \geq 0.01$) in cultivar Iva and 0.48 pieces/flower in cultivar Ekaterina, respectively, the decrease being smaller in the second cultivar.

Conclusions

It was found that when the corms were planted on April 20, the period from the beginning of germination to the beginning of flowering was 68 and 84 days for the cultivars Iva and Ekaterina, respectively and for those planted on May 10 – 65 and 78 days, respectively in the area of Plovdiv.

The planting date affected the indexes of the cut flower. The later planting date in both gladiolus cultivars had a positive effect on the stem length and flower diameter and the earlier planting date brought the formation of more buds per cut flower in the same cultivars.

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