

Original Research Article

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Studies on the Adaptability of Tulip (*Tulipa sp.*) in Sub-Tropics of West Bengal, India

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ABSTRACT

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A field experiment was carried out at Horticulture Research Station, Mandouri, Bidhan Chandra Krishi Viswavidyalaya during 2013-14 and 2014-15 to assess the varietal performance of commercial tulip. Ten varieties viz. Apeldorn, Maureen, Holland Cich, Day Dream, Pussima Design, Avignon, Roi-du-mudu, Clear Water, Pink Diamond and Jumbo Beauty were selected for the research purpose and each variety was considered as one treatment and laid out with Randomized Block Design. The results indicated that maximum plant height (58.96 cm) and leaf length (19.04 cm) occurred in Pink Diamond while maximum flower length (6.06 cm) and flower diameter (4.35 cm) recorded in Avignon. Pink Diamond showed delayed petal drop in about 3.74 days whereas Roi-du-mudu recorded earliest petal drop in about 3.01 days from full bloom. Apeldorn recorder maximum number of stems per plot (16.39) and maximum bulblets (1.61) amongst all selected variety.

Introduction

The tulip (*Tulipa spp.*) plays an important role in decorating homes, offices and even shops in this modern era and its importance cannot be denied. The tulip is a bulbous flower having more than 3000 varieties. It originated from Turkey and central Asia, but now Holland is regarded as home of the tulip (Debrowski, 1964). Tulip (*Tulipa gesneriana* Linn.), the premier ornamental flowering bulb, belongs to family Liliaceae. It is one of the commercially important bulbous ornamental plants owing to its unsurpassed beauty and economic value. It stands at 4th position among the top ten cut flowers in global floriculture trade (Jhon and Neelofer, 2006). Tulip is the major produced flower bulb all over the world. Holland share world

tulip production by 60%. 90% of the global area planted with flowering bulbs is designed for reproduction of six species – tulip, lily, narcissus, gladiolus, hyacinth and iris (Le Nard and De Hertogh, 2002). Among them, mainly by tulip, which is concentrated in a dozen countries around the world. The largest growing area is in the Netherlands, about 87% of the global area. Other countries with significant global surface cultivation of tulips are Japan (300 ha), France (293 ha), USA (280 ha) and Poland (200 ha) (Buschmann, 2005). The farms producing flower bulbs use them for two purposes – for further reproduction and for protected cultivation of cut flowers (Wróblewska, 2009). In India tulips are successfully grown mainly under

the temperate regions of Jammu and Kashmir, Himachal Pradesh and Uttarakhand. Keeping all these in view, this following experiment was undertaken to find out the suitable cultivars for the plains of West Bengal.

Materials and Methods

The experiment was carried out at the Horticultural Research Station, Bidhan Chandra Krishi Viswavidyalaya, Mondouri, Nadia, West Bengal. The location of the Experimental site at about 23.5⁰ N latitude and 89⁰ E longitude with an average altitude of 9.75 m above mean sea level. The soil of the field experimental site is new alluvial with good water holding capacity and aeration.

The locality of the experimental site had a humid subtropical climate. The temperature during summer months of April to May range from 36.9 to 38.0 degree C while the night temperature ranges from 27 to 30 degree C. Winter is mild and short with day temperature varying between 15 to 17 degree C and night temperature 7 to 10 degree C.

This experiment was laid out with RBD (Randomized Block Design), which was replicated thrice with 10 treatments. Ten varieties of tulip namely Apeldorn (T₁), Maureen (T₂), Holland cich (T₃), Day Dream (T₄), Pussima Design (T₅), Avignon (T₆), Roi-du-mudu (T₇), Clear Water (T₈), Pink Diamond (T₉) and Jumbo Beauty (T₁₀) were selected for the research purpose and each variety was considered as one treatment. Normal cultural practices were done in the 1m x 1m raised beds with a spacing of 20cm P-P and 25cm R-R.

Results and Discussion

The result as well as the relevant discussion of the present research is described in following sub-heads.

Vegetative parameters

Significant variation in plant height was reflected among the cultivars during the two years (2013-14 and 2014-15) of investigation (Table 1). Plant height ranged from 32.00 to 58.38 cm in the first year and from 31.09 to 59.53 cm in the second year.

A maximum of 58.96 cm plant height was recorded in Pink Diamond (T₉) followed by Avignon (T₆) with a plant height of about 50.48 cm whereas Jumbo Beauty (T₁₀) recorded the minimum plant height of 31.82 cm. Leaf length showed a variation of 10.44 to 19.04 cm. Pink Diamond (T₉) produced leaves with maximum length (19.04 cm) followed by Avignon (T₆) (16.26 cm) and Jumbo Beauty (T₁₀) produced leaves with minimum length (10.44 cm). Leaf width showed a variation of 1.25 to 1.82 cm. Pink Diamond (T₉) produced leaves with maximum width (1.82 cm) followed by Avignon (T₆) (1.79 cm) and Jumbo Beauty (T₁₀) produced leaves with minimum width (1.25 cm).

Flower quality parameter

The different cultivars in the study significantly influenced the flower length in both the years of investigation (Table 2). Flower length is an important trait which showed a variation of 3.19 to 6.06 cm. Avignon (T₆) produced flowers with maximum flower length (6.06 cm) followed by T₁ (5.35 cm) and Maureen (T₂) produced flowers with minimum length (3.19 cm). Flower length ranged from 0.40 to 0.50 cm in both years. A maximum of 0.48 cm stem girth was recorded in T₄ and Avignon (T₆) whereas Maureen (T₂) and T₁₀ recorded the minimum stem girth of 0.42 cm. Flower diameter ranged from 2.30 to 4.29 cm in 1st year and 2.34 to 4.41 in the 2nd year of investigation.

Table.1 Vegetative parameters

Treatment	Plant height	Leaves per plant	Leaf length	Leaf width
T ₁	36.67	3.11	12.38	1.53
T ₂	36.36	3.06	12.07	1.44
T ₃	35.14	3.11	11.67	1.5
T ₄	34.94	3.06	11.57	1.32
T ₅	34.41	3.06	11.07	1.26
T ₆	50.48	3.11	16.26	1.79
T ₇	33.12	3.06	10.91	1.38
T ₈	36.4	3.11	11.32	1.48
T ₉	58.96	3.06	19.04	1.82
T ₁₀	31.82	3.06	10.44	1.25
S.Em (±)	3.4367	0.07962	1.04719	0.15916
C.D. at 5%	7.77436	0.18011	2.36891	0.36005

Table.2 Flower quality parameters

Treatment	Flower length	Stem girth	Flower diameter
Apeldorn(T ₁)	5.35	0.45	3.58
Maureen(T ₂)	3.19	0.42	2.37
Holland cich(T ₃)	3.31	0.43	2.61
Day Dream(T ₄)	3.47	0.48	2.6
Pussima Design(T ₅)	3.75	0.45	2.66
Avignon(T ₆)	6.06	0.48	4.35
Roi-du-mudu(T ₇)	3.83	0.43	2.89
Clear Water(T ₈)	3.69	0.45	2.46
Pink Diamond(T ₉)	5.33	0.45	3.11
Jumbo Beauty(T ₁₀)	3.53	0.42	2.44
S.Em (±)	0.13741	0.02094	0.12093
C.D. at 5%	0.43961	0.04736	0.27356

Table.3 Flowering parameters

Treatment	Planting to FBE	FBE to BB	BB to FB	FB to PD
Apeldorn(T ₁)	45.64	4.35	2.44	3.74
Maureen(T ₂)	50.46	4.09	3.01	3.25
Holland cich(T ₃)	45.88	3.82	2.8	3.58
Day Dream(T ₄)	46.32	4.41	2.68	3.34
Pussima Design(T ₅)	45.84	4.41	2.54	3.4
Avignon(T ₆)	64.03	4.08	2.41	3.45
Roi-du-mudu(T ₇)	52.11	4.06	2.53	3.01
Clear Water(T ₈)	66.38	4.22	2.67	3.12
Pink Diamond(T ₉)	71.41	3.92	2.85	3.74
Jumbo Beauty(T ₁₀)	41.8	4.2	2.83	3.03
S.Em (±)	0.60175	0.29596	0.1878	0.17481
C.D. at 5%	1.36126	0.6695	0.42483	0.39545

Table.4 Yield parameters

Treatment	Stems per plot	Bulblets per plant
Apeldorn(T ₁)	16.39	1.61
Maureen(T ₂)	5.72	0
Holland cich(T ₃)	5.11	0
Day Dream(T ₄)	5.17	0
Pussima Design(T ₅)	4.33	0
Avignon(T ₆)	10.44	0
Roi-du-mudu(T ₇)	4.33	0
Clear Water(T ₈)	4.33	0
Pink Diamond(T ₉)	14.44	0.72
Jumbo Beauty(T ₁₀)	12.61	0
S.Em (±)	0.1964	0.0778
C.D. at 5%	0.44429	0.17599

Avignon (T₆) recorded the maximum flower diameter of 4.35 cm followed by Apeldorn (T₁) (3.58 cm) and Maureen (T₂) recorded the minimum flower diameter of 2.37 cm.

Flowering parameters

Days required from planting to first flower bud emergence, from first flower bud emergence to bud burst, from bud burst to full bloom and from full bloom to petal drop were recorded as flowering parameters. The different cultivars in the study significantly influenced these different parameters in both the years of investigation (Table 3).

Jumbo Beauty (T₁₀) showed earliest flower bud emergence in about 41.80 days followed by Apeldorn (T₁) (45.64 days) whereas Pink Diamond (T₉) recorded most delayed flower bud emergence in about 71.41 days from planting. Most early bud burst was recorded in Holland Cich (T₃) (3.82 days) followed by Pink Diamond (T₉) (3.92 days). Day Dream (T₄) and Pussima Design (T₅) both showed most delayed bud burst in about 4.41 days from first flower bud emergence. The days taken in this respect was in the range of 2.41 to 3.01 days, the cultivar Maureen (T₂) took maximum number of days to attain full bloom whereas Avignon (T₆) came to full bloom early. Apeldorn (T₁)

and Pink Diamond (T₉) showed delayed petal drop in about 3.74 days followed by Holland Cich (T₃) (3.58 days) whereas Roi-du-mudu (T₇) recorded earliest petal drop in about 3.01 days from full bloom.

Yield parameters

Stems per plot and Bulblets per plant were recorded as the yield parameters. The data on number of stems per plot (Table 4) revealed significant differences during the experiment. The number of stems per plot was in range of 4.33 to 16.39. It is evident from the results that maximum number of stems per plot (16.39) were produced by Apeldorn (T₁) followed by Pink Diamond (T₉) (14.44) whereas Pussima Design (T₅), Roi-du-mudu (T₇) and Clear Water (T₈) recorded as at par as well as they produced minimum number of stems per plot (4.33).

Number of bulblets per plant ranged from 0.00 to 1.77 in first year and from 0.00 to 1.44 in the second investigating year. A maximum of 1.61 numbers of bulblets per plant were recorded in Apeldorn (T₁) followed by Pink Diamond (T₉) with 0.72 number of bulblets per plant whereas other cultivars did not produce any bulblets.

Above study proves that Apeldorn variety gave good responses than other varieties mentioned

in this research. Apeldorn seems to have comparatively better vegetative, flower quality and flowering as well as yield parameters and hence it can be suggested to be cultivated in the sub-tropics of West Bengal.

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