Original Research Article

Morphological characterization of tulip cultivars at 1587 m above mean sea level under Kashmir Himalayas

Abstract

Morphological characterization of tulip cultivars was carried out during 2018-19 at Division Of Floriculture And Landscape Architecture SKUAST- K Shalimar with an objective to assess the genetic diversity on the basis of qualitative and quantitative traits of growth, flowering and propagation ratio. Results based on analysis of variance depict sufficient genetic diversity among the genotypes. The variability response for minimum to maximum values ranged 92.00 to 107.00 for days to bulb sprouting after planting , 117.00 to 164.00 for days to flowering, 4.70 to 8.20 cm for flower diameter,9.00 to 18.00 days for duration of flowering, 23.13 to 72.22 cm for Plant Height (cm) , 3.5 to 6.50 for number Of leaves per plant, 1.13 to 1.72 for number of bulbs plant^{-1-} and 12.30 to 21.20g for bulb weight plant^{-1} . However minimum days to sprouting after planting 92.00 resulted with cultivar First proud and maximum days 107.00 with Royal virgin. Maximum days taken to flowering 164.00 were noticed with La courtine and minimum 117.00 with Royal virgin. Highest values for flower diameter 8.20 cm were recorded with Antartica whereas lowest 4.70cm with Royal virgin. Duration of flowering resulted maximum18.00 days with cultivar La courtine and minimum 9.00 days with Royal virgin. Plant height (72.22cm) , number of leaves(6.50) were observed maximum with cultivar La courtine where as minimum 23.13 cm and 3.5 respectively with Royal virgin. Maximum number of bulbs plant^{-1} 1.72 & Bulb weight plant^{-1} 21.20g were recorded with cultivar Happy generation where as minimum values 1.13 & 12.30 g respectively with cultivar Royal virgin. It was concluded that highly significant varietal differences indicated the presence of high amount of variability. This morphological variability delaminated cultivars First proud, Happy generation Purple prince, Royal virgin, Triple A in early group, Antartica, Avenue, Darwiorange, Niigata (mid cultivars) and La courtine as late flowering cultivar.

Keywords: Flowering, Morphology, Tulip cultivars ,Variability.

1. Introduction

Globally, the floriculture business has increased up to US $ 60 billion over the past few decades. The annual growth rate in floriculture industry is about 15%. Potential of floriculture as a viable agricultural business has been acknowledged recently. It is an emerging business venture having transformed from a domestic activity to a global industry as there has been a tremendous increase in demand and consumption of floriculture industry including cut flower production, live plant propagation, followed by propagation material production (seed and bulb production).Numerous factors like increase in population, growing habits of flower use, upliftment of economic condition and an inherent love for flowers have contributed to the growth of floriculture industry. Consequently, the demand of ornamentals for landscaping of houses, educational institutes, roads, farm-complexes and industrial units has alarmingly increased the basic input for production of these ornamental bulb or propagule. India's share in this global floricultural trade is around $0.75 billion. The area under floriculture in India has almost crossed 2.5 lakh hectares. Domestic production has increased manifold and the export earnings have gone 2000 crore. Tulip (*Tulipa* sp.), belongs to family Liliaceae. In international market, Tulip ranks first amongst the bulbous crops and demanded temperate ornamental bulbous crop in international floriculture trade(Masoodi *et al* 2018). Around 3,000 tulip varieties belonging to 14 groups are available in trade including early, mid and late flowering. When assessing the situation of import, temperate bulbs particularly Tulip are imported annually worth crores of rupees. These are planted in plains as annuals and in Kashmir as perennials. In India, Kashmir is endowed with highly suitable agro-climate and offers immense scope for bulb production. So in absence of any interstate competition, Kashmir can supply bulbs of tulip, not only in the state but to national markets. But which variety can perform best from vegetative to reproductive point of view is always questionable. Thus current study of evaluation envages a scope for delaminating varities of tulip which can be explored from commercial point of view.

2. Materials And Methods

2.1 Geographical features

Srinagar is situated between 34º05′ to 34º07′ north latitude and 74º08′to 74º09′ east longitude at an altitude of about 1587 m above mean sea level.

2.2 Experimental site

The experiment was carried out at the Experimental Farm of Division of Floriculture and Landscape Architecture SKUAST-K Shalimar, Kashmir.

2.3 Experimental details

Number of varieties **:** 10

Design **:** RCBD (Randomized Complete Block Design)

Replications **:** 03

2.4 Preparation of beds for experimental trial

The field selected for the experiment was prepared by ploughing with tractor thoroughly and leveled properly. The stubbles of previous crop, weeds and grasses were removed and then field was finally leveled to make the soil pulverized.

2.5 Application of manures and fertilizers and Cultural practices

Recommended dose of well decomposed farmyard manure (FYM) and inorganic fertlisers were applied and mixed thoroughly with the soil before the planting of bulbs. Uniform cultural practices were followed through the growth period. Irrigation, weeding-cum-hoeing and plant protection measures were carried out as and when required.

2.6 Observations recorded

Observations were observed on days to bulb sprouting after planting , days to flowering, flower diameter, duration of flowering, Plant Height (cm) , number Of leaves per plant, number of bulbs plant^{-1-} and bulb weight plant^{-1}

3 Results and Discussion

As evident from Table 3.1 the variability response for minimum to maximum values ranged 92.00 to 107.00 for days to bulb sprouting after planting, 117.00 to 164.00 for days to flowering, 4.70 to 8.20 for flower diameter and 9.00 to 18.00 days for duration of flowering. This depicts the flowering behavior and concluded that First proud, Happy generation Purple prince, Royal virgin, Triple A (early cultivars), Antartica, Avenue, Darwiorange, Niigata (mid cultivars) and La courtine as late flowering cultivar. Data on phenotypic and propagation co-efficient of variation recorded 23.13 to 72.22 cm for Plant Height (cm) , 3.5 to 6.50 for number Of leaves per plant, 1.13 to 1.72 for number of bulbs plant^{-1-} and 12.30 to 21.20g bulb weight plant^{-1}(Table 3.2). Duration of flowering resulted maximum18.00 days with cultivar La courtine and minimum 9.00 days with Royal virgin. Plant height (72.22cm), number of leaves (6.50) were observed maximum with cultivar La courtine where as minimum 23.13 cm and 3.5 respectively with Royal virgin. Maximum number of bulbs plant^{-1} 1.72 & Bulb weight plant^{-1} 21.20g were recorded with cultivar Happy generation where as minimum values 1.13 & 12.30 g respectively with cultivar Royal virgin(Fig 3.1 & 3.2).Most of the differences in recorded parameters were statistically significant. Cultivars and Phenotypic co-efficient of variation was fond to be higher than the genotypic co-efficient of variation for all the traits indicating that the genotypic expression is superimposed by the environmental influence. These findings are in agreement with the work of Monika *et al*. (2008) and Masoodi *et al* 2018. Similar results were observed for number of flowers per stem in China Aster by Ravikumar and Patil (2003) and Nimbalkar *et al* 2016 in French marigold and number of florets per spike in gladiolus (Kispotta *et al.,* 2017). Grassotti *et al*. (1990) and Balode (2010) also reported higher phenotypic variability for plant height in Lilium. Higher genotypic co-efficient of variation for different plant characters can be effectively utilized in future breeding programme. Singh and Sen (2000) suggested that if the phenotypic coefficient of variation is greater than the genotypic co-efficient of variation, the apparent variation is not only due to genotypes, but also due to influence of environment

and hence selection may be misleading. The estimates of phenotypic and genotypic co-efficients of variance showed a low disparity for plant height (cm), number of leaves per plant and inflorescence diameter (cm) indicating the least effect of environment on different traits and phenotypic variability could be a reliable measure of genotypic variability. The progress in the selection is directly proportional to the amount of genetic gain, therefore the effect of selection is realized more quickly in the characters with high heritability and genetic advance estimating the relative amount of heritable portion of variation. Bhatia *et al*. (2013) also observed similar results for spike length and plant height in tulip, Mishra *et al.* (2006) in spray chrysanthemum for the time taken for bud initiation. High heritability with high genetic advance indicates that the trait is governed by the additive gene action. Selection on the basis of these characters would be more effective for improvement the Lilium. Number of leaves, inflorescence diameter and number of days to bud appearance exhibited high heritability with moderate genetic advance indicating presence of dominant and epistatic genes and these traits can be improved through hybridization (Kumar *et al*., 2012). The results are also in line with the findings of Singh and Kumar (2008) in marigold for number of flowers per plant and plant height, Dhiman *et al*. (2015) in Asiatic hybrid lily,

Masoodi *et. al.* (2018) in Asiatic, Oriental and La hybrids, Bichoo *et al.* (2002) in gladiolus, and in gladiolus for number of floret per spike (Ramzan *et al.*, 2016) and number of flowers per plant in chrysanthemum (Baskaran *et al.*, 2009).

Table 3.1: Estimation of sprouting and flowering behavior of 10 tulip cultivars

Variety	Days to sprouting (DAP	Days to flowering (DAP	Flower diameter (cm)	Duration of flowering (Days)	Remarks
Antartica	107.00	144.00	8.20	17.00	Mid
Avenue	104.00	130.00	7.75	16.00	Mid
Darwiorange	103.00	147.00	8.50	18.00	Mid
First proud	92.00	145.00	7.90	17.50	Early
Happy generation	98.00	142.00	9.10	18.00	Early Mid
La courtine	110.00	164.00	9.65	18.00	Late
Niigata	96.00	128.00	7.13	14.50	Mid
Purple prince	84.00	120.00	6.50	12.00	Early
Royal virgin	107.00	117.00	4.70	9.00	Early
Triple A	100.00	130.00	7.52	16.00	Early Mid
CD($p \leq 0.05$)	2.150	1.397	0.67	0.877	

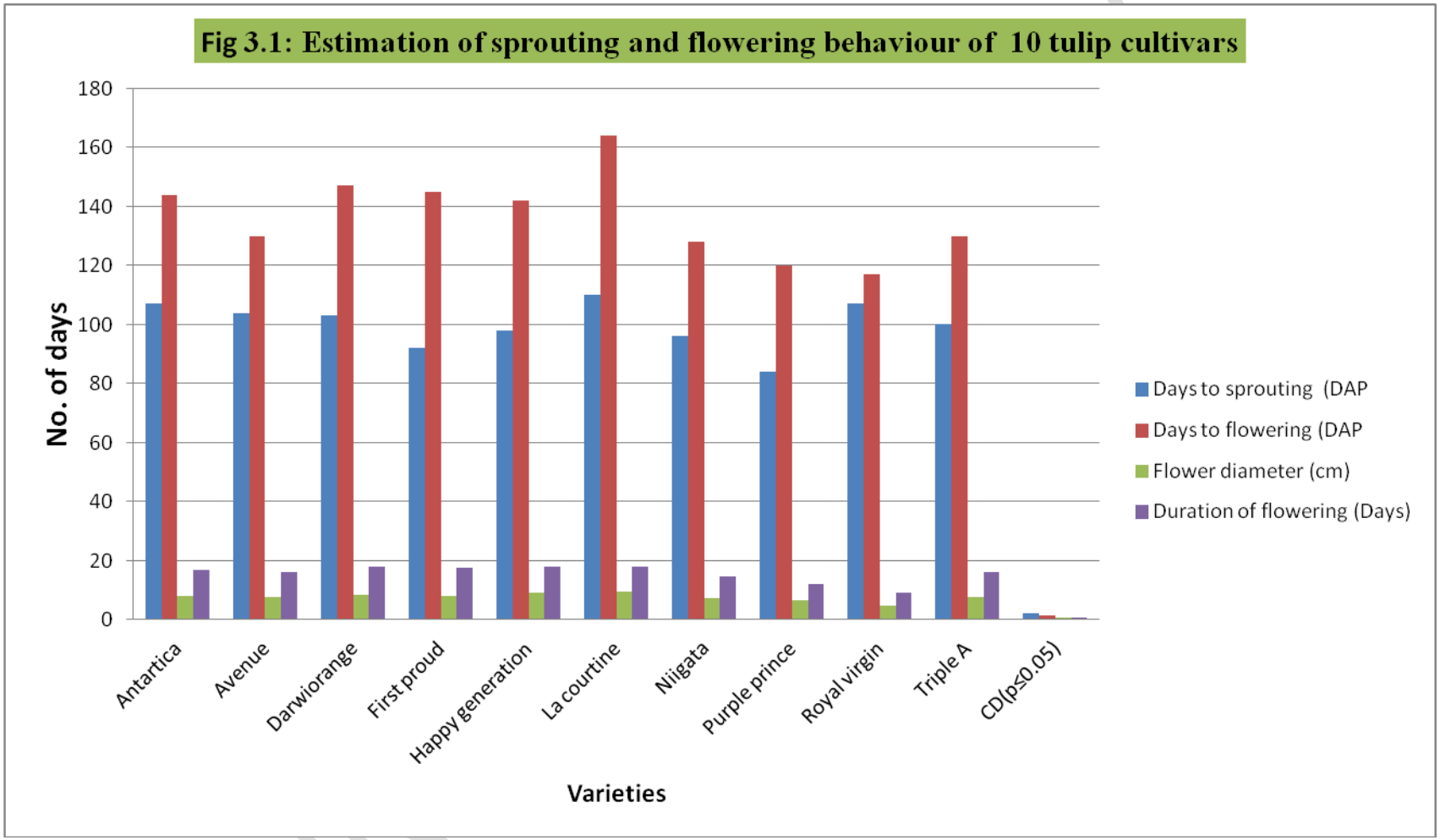
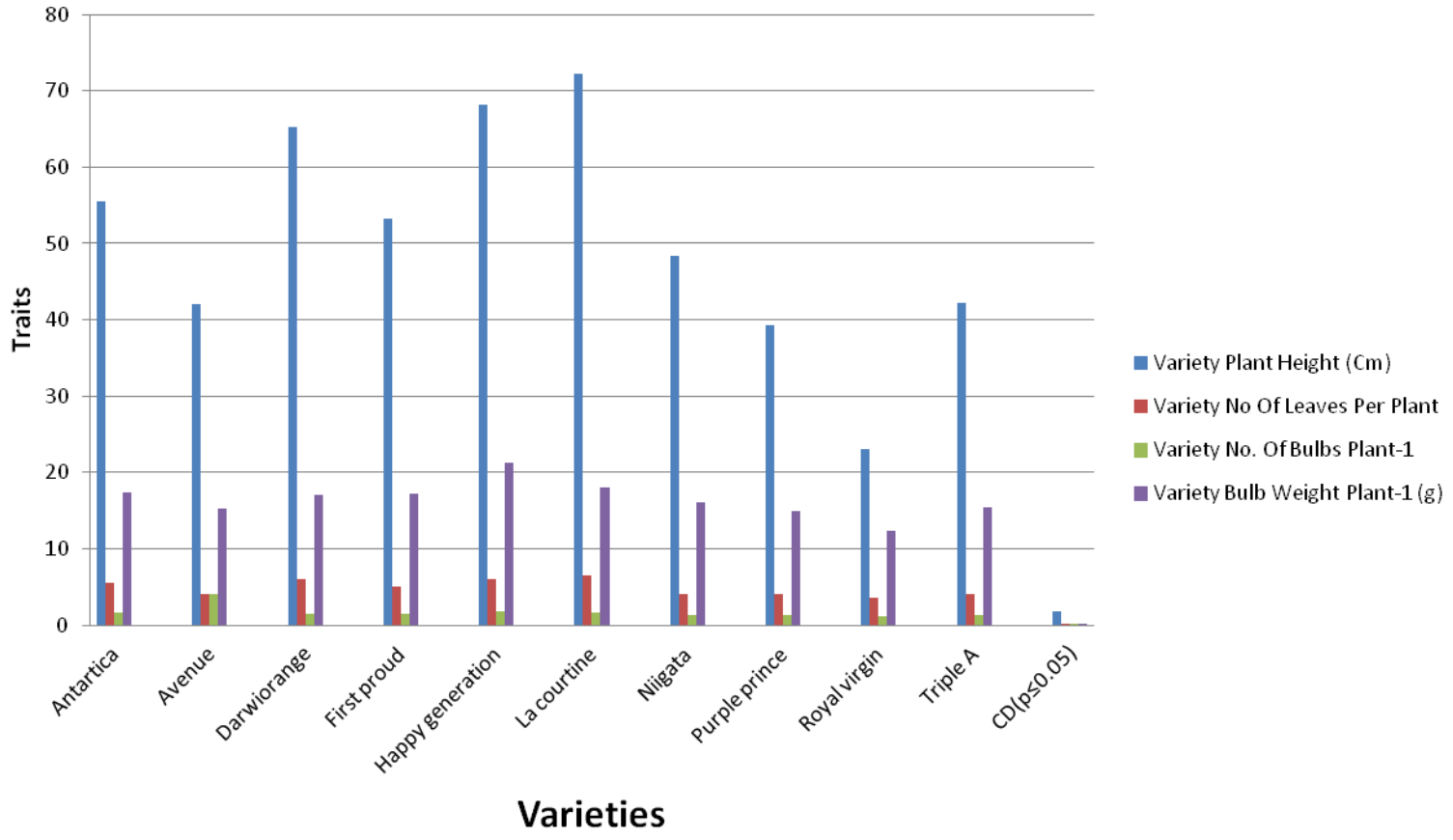


Table 3.2: Response of tulip cultivars to vegetative and propagation traits

Variety	Plant Height (Cm)	No Of Leaves Per Plant	No. Of Bulbs Plant^{-1}	Bulb Weight Plant^{-1} (g)
Antartica	55.52	5.50	1.61	17.33
Avenue	42.11	4.00	1.25	15.30
Darwiorange	65.23	6.00	1.49	17.10
First proud	53.22	5.00	1.55	17.20
Happy generation	68.16	6.00	1.72	21.20
La courtine	72.22	6.50	1.68	18.10
Niigata	48.44	4.00	1.33	16.00
Purple prince	39.22	4.00	1.27	15.00
Royal virgin	23.13	3.5	1.13	12.30
Triple A	42.22	4.00	1.28	15.50
CD($p \leq 0.05$)	1.806	0.147	0.003	0.012

Fig. 3.2: Response of tulip cultivars to vegetative and propagation traits



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