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## Performance of Tulip (*Tulipa gesneriana*) Cultivars under Rawalakot Conditions

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**Abstract:** Five cultivars of tulip namely, Burgundy, Gander, Don Quichotte, Upstar and King blood were evaluated for their adoptability and performance. Results on vegetative characteristics showed that cultivars Burgundy produced more plants (1.83) per bulb, Don Quichotte produced more leaves (3.6) and obtained maximum height (14.2 cm). Results on floral characteristics showed that cultivars Gander and Burgundy faced Blindness (without flower). Don Quichotte, Upstar and King blood produced flower. Results on bulb and bulblets characteristics showed that Don Quichotte produced more bulbs and proved itself promising cultivars. Upstar and Gander also formed flowers and bulbs. Hence these three cultivars (Don Quichotte, Upstar and King blood) recommended for general cultivation.

**Key words:** Tulip cultivars, evaluation, acclimatization, performance, vegetative characteristics, bulb characteristics, floral characteristics

### INTRODUCTION

In this modern era no one can deny the importance of floriculture. Every man rich or poor wants to decorate his home, office and even shops with beautiful flowers. In this regard tulip is playing its role. *Tulipa gesneriana* a bulbous flower belongs to family Liliaceae. There are 3000 known varieties of tulip. Tulip the Queen of bulbs originated in Turkey and central Asia. Holland now regarded as home of tulip<sup>[1]</sup>. Tulips are generally planted in late winter, early spring, mid spring and late spring throughout the world. There are many colors of flowers. Flower life ranges from 10 days to 3 weeks having fragrance also<sup>[2]</sup>. This delicate flower can be grown alone on beds, with other bulbs and indoor in pots. Their extracts are used for cosmetics and medical industries. There is great potential for export of cut flowers and bulbs. Bulbs are also edible having taste like onion<sup>[3]</sup>.

Tulips are grown as a source of foreign exchange. Although a lot of work has been done on various aspects of this important flower in other parts of the world but little or no work has been done in our country. Keeping in view its importance, cultivars of tulip were introduced to see their performance, for boosting up floriculture industry by utilizing potential of this area. Tulip has been subjected to various trails for evaluation of cultivars for vegetative and reproductive growth. This research work with respect to cultivar evaluation is briefly reviewed here.

Optimum temperature for flower formation of various tulip cultivars is 17-20°C and bulb size is critical for flowering process, larger the bulb bigger the flower. It was also noted that (Antholyse) blindness was related with size<sup>[4]</sup>. Hertogh *et al.*<sup>[5]</sup> evaluated many cultivars for

selection of early and late forcing. 'Topsiore' and 'Pink Supreme' were found suitable for the purpose. Doughlas<sup>[6]</sup> reported that tulip cultivars 'Richter', 'Prominence' and 'Christmas Marvel' performed well and enjoy flower in mid to late winter when provided well drained media and placed them in dark at 50°F till 2-5 leaves emerged. Dosser and Larson<sup>[7]</sup> found that either warm days or night temperature decreased number of days to flowering of cultivars Red Queen, Utopia, Roland, Madame, Spoor and Charles. McFarland *et al.*<sup>[8]</sup> stated that tulip cultivars Robinea and Couleur carinal gave better flowering when planted in sunny places in well-drained soil. Nard *et al.*<sup>[9]</sup> observed variation in growth characteristics, which were attributed to the clone. Algera<sup>[10]</sup> observed that temperature and carbohydrate contents of tulip affected morphological characters and bulbs development. It has been observed that genetic as well as environmental factors like temperature and light played role in growth and development of bulbs. Safiullah and Ahmed<sup>[11]</sup> evaluated various cultivars and observed that Blue Isle, Blad Jack, and City of Light was more successful than other cultivars. Ahmed and Khan<sup>[12]</sup> observed that various cultivars showed variable responses for production of bulbs. Ahmed and Gul<sup>[13]</sup> noted variable responses for plant per tuber, number of flower, number and size of tuber. For dahlia cultivars, which were related with their genetic make up. Ahmed *et al.*<sup>[14]</sup> observed similar results for gladiolus cultivars.

### MATERIALS AND METHODS

These studies were carried at University College of Agriculture, Rawalakot Azad Kashmir, during 2001-2002.

For present studies healthy and diseases free bulbs of 5 cultivars Burgundy, Gander, Don Quichotte, Upstar and King Blood were collected from Awan Nursery and Seed Store, Rawalpindi. Soil was prepared by adding FYM, 2 kg m<sup>-2</sup>. It was ploughed and pulverized thoroughly. Bulbs were treated with (DM-45) before planting.

The experiment was laid out according to randomized complete block design (RCBD). There were five treatments with three replications. Total numbers of plots were fifteen. The size of each plot was 1.5 to 3 M. Irrigation was done at interval of 5-6 days. Hoeing and weeding was carried out during whole growing season. Harvesting of bulbs was done after 3 months. Bulbs obtained were cleaned, dried and stored. Data were collected on days to sprouting, plants per bulb, leaves per plant, plant height (cm), days to bud formation, days to flowering, flower life (days), bulbs per plant, weight of bulb (g) and diameter of bulb (cm).

Results obtained were statistically analyzed and results exhibiting significant differences were subjected to LSD Test for comparison of their means<sup>[17]</sup>.

## RESULTS AND DISCUSSION

**Vegetative characteristics:** Observations showed that Upstar required more days (15.2) for sprouting while Gander took (13.4 days) for the purpose. Don Quichotte, Burgundy and King Blood sprouted earlier and took 7.8, 7.5 and 6.3 days, respectively (Table 1).

From these results it is clear that Upstar and Gander required maximum days (13.4) for sprouting whereas, minimum days (6.3) were taken by King Blood. Variations in sprouting of these cultivars were due to genetic makeup and its interaction with environment. These studies were also confirmed by other workers. Ahmed *et al.*<sup>[14]</sup> stated that various cultivars of gladiolus showed variable responses which were attributed to their genetic make.

Results for number of plants per bulb showed that Burgundy produced more plants (1.83) per bulb whereas, Don Quichotte, Upstar, King Blood and Gander responded equally and produced 1.5, 1.3, 1.16 and 1.0 plants per bulb, respectively. Results for leaves per plant showed that Don Quichotte and Upstar responded equally and produced leaves per plant 3.6 and 2.75, respectively. Gander produced 2.3 leaves per plant whereas King Blood and Burgundy produced 1.5 and (1.4) leaves, respectively. From these results it is clear that Don Quichotte interacts positively with environmental condition. Results on plant height showed that Don Quichotte gained maximum plant height (14.2 cm) whereas Upstar obtained plant height (10.16 cm). Burgundy, King

Blood and Gander responded equally and produced plant height of 6.72, 6.35 and 5.87 cm, respectively (Table 1).

It has been observed that different cultivars showed variable responses. Debrowski<sup>[1]</sup> observed variation in number of plants, height of plant and leaf area which were under the control of gene.

Environmental condition, like temperature, nutrients and humidity also played role in expression of a character such as height of various cultivars. McFarland<sup>[8]</sup> observed that tulip cultivars Madame, Spoor and Merry window performed well under sunny places and well-drained soil than other cultivars. Ahmed and Khan<sup>[12]</sup> found variations in morphological characteristics of hyacinth cultivars due to variable responses to environmental conditions.

Table 1: Vegetative characteristics of tulip cultivars

Cultivars	Days to sprouting	Plants bulb <sup>-1</sup>	Leaves plant <sup>-1</sup>	Plant height (cm)
Upstar	15.2a	1.3b	2.75a	10.16b
Gander	13.4ab	1.0b	2.3ab	5.84c
Don Quichotte	7.8b	1.5b	3.6a	14.20a
Burgundy	7.5b	1.83a	1.4b	6.72c
King Blood	6.3b	1.16b	1.5b	6.35c

cMeans sharing same letters are not significant

**Floral characteristics:** Results on bud formation showed that Don Quichotte took more days (17.6) for flower bud formation while Upstar and King Blood required (17.3) and (16.6) days, respectively. Gander and Burgundy were subjected to Blindness and remained without flower bud formation (Table 2).

Results for flower life showed that Upstar obtained flower life for 9.0 days while King Blood retained its flower more attractive for (7.5) days. Minimum flower life (5.8 days) was exhibited by Don Quichotte. Results on days to bud formation showed that King blood produced buds earlier than Don Quichotte and Upstar. This might be due to its genetic potential, which enable it to produce buds earlier. However, all the three cultivars showed non-significant differences for days to bud formation and flower formation (Table 3). Results showed that Don Quichotte, Upstar and King Blood produced flower buds and flower while Gander and Burgundy faced blindness. Fluctuations in temperature particularly at the time of flower bud formation is more critical for flower formation. Moore *et al.*<sup>[15]</sup> observed complex physiological disorder Blindness, which related with many factors such as temperature, insect attack and ethylene production. Don Quichotte, Upstar and King Blood withstand fluctuated temperature better than the Gander and Burgundy and produced buds and flowers.

Results for bulb and bulblets characteristics showed that Don Quichotte produced more bulbs (4.25) per plant whereas, Gander produced minimum bulbs (1.0) per plant.

Table 2: Floral characteristics for tulip cultivars

Cultivars	Days to bud formation	Days to flowering	Flower life (days)	Flowering age%
Quichotte	17.6a	4.0a	5.8b	100
Upstar	17.3a	3.25a	9.0a	100
King Blood	16.6a	3.7a	7.5ab	100
Gander	0.0b	0.0b	0.0c	0
Burgundy	0.0b	0.0b	0.0c	0

Means sharing same letters are not significant at 0.05 level of significance.

Table 3: Bulb and bulblets characteristics of tulip cultivars

Cultivars	Bulbs Plant <sup>-1</sup>	Weight of bulbs (g)	Diameter of bulb (cm)
Don Quichotte	4.25a	11.6a	2.72a
Burgundy	2.16b	5.96ab	1.58b
King Blood	1.3b	3.89b	1.42b
Upstar	1.08b	3.06b	0.98b
Gander	1.0b	1.79b	0.83b

Means sharing same letters are not significant at 0.05% level of significance.

Burgundy and King Blood produced (2.16) and (1.3) bulbs per plant and responded equally. Non-significant differences were observed between Upstar and Gander.

'Don Quichott' produced maximum bulbs per plant. The same cultivar also produced maximum leaves per plant and maximum plant height. Phytohormones (IAA) played key role in increasing number of storage organs such as bulb. Leaves contribute in synthesis and translocation of dry matter of large size bulbs<sup>[9]</sup>. These results are also confirmed by Ahmed *et al.*<sup>[14]</sup> during their studies on corms development by gladiolus cultivars.

Results for weight of bulbs showed that Don Quichotte produced maximum weight (11.6 g) per bulb whereas, Burgandy produced bulbs of intermediate weight (5.96). Both the cultivars responded equally for weight gain. King Blood, Upstar and Gander responded equally and obtained bulb weight i.e., 3.89, 3.08 and 1.79 g, respectively. Don Quichotte produced bulbs of maximum weight than other cultivars. Leaves played role in carbohydrates synthesis. Don Quichotte having more leaves (leaf area index) synthesized and translocated dry weight for gaining more weight of the bulbs than the other cultivars.

Results on diameter of bulbs showed maximum value (2.72 cm) for Don Quichotte. All other cultivars Burgundy, King Blood, Upstar and Gander responded equally. However, minimum diameter (0.83 cm) was observed for Gander. Maximum bulb diameter was observed for 'Don Quichotte. This was due to presence of more leaves and production and translocation of more photosynthates towards the bulbs as storage organ. Variations occur in bulbs and bulblet characteristics of various tulip cultivars, which were related with genetic and environmental factors. Moore *et al.*<sup>[15]</sup> observed variation in bulb size and susceptibility to diseases for tulip cultivars. Ahmed and

Gul<sup>[13]</sup> noted variation in under ground parts of various dahlia cultivars which were related with genetic composition and its interaction with environment.

Wassink<sup>[16]</sup> stated that light intensity and temperature affect the weight of bulbs and bulblets of tulip cultivars Snow star, Pax, Salamon, Trance, Top score and Crosby.

## REFERENCES

1. Debrowski, J., 1964. Influence of soil moisture on yield of tulip bulb. Acta Agrobot., 24: 171-204.
2. Hartsema, A.M., 1961. Influence of temperature on flower formation of bulbous plants. In encyclopedia of plant physiology, (Ed.) W. Ruhland and V. Springer, 16: 123-161.
3. Larson, R.A., 1980. Introduction to Floriculture. New York Academic Press, pp: 89-95.
4. Rasmussen, E., 1980a. Experiments on different storage temperatures for tulip bulbs. Acta Hort., 109: 43-47.
5. Hertogh, A.A., J.E. Barret and D.R. Dilly, 1978. Effect of low pressure storage on tulip, hyacinth and daffodil bulb. J. Amer. Soc. Hort. Sci., 103: 206-265.
6. Doughlas, J., 1979. Success with houseplants. The Reader's Digest Association. Inc. Pleasantville, New York, pp: 35-42.
7. Dosser, A.L. and R.A. Larson, 1981. Influence of various growth chamber environment of growth, following and senescence of tulip cultivar Paul Richter. J. Amer. Soc. Hort. Sci., 106: 247-250.
8. McFarland, J.H., R.M. Hatton and D.J. Foley, 1941. Garden bulbs in color. New York, McMillan, pp: 201-213.
9. Nard, M.E., M. Biot, M. Le-Nard, K.H. Lilien, H. Kipris and A.H. Haivey, 1997. Measurement of variation of tulip in different conditions. Proceedings of seventh International Symposium on flower bulbs. Herzliya, Israel, 10-16, March 1946. Acta Hort., 43: 837-841.
10. Algera, L., 1936. Concerning the influence of temperature on morphological development of the tulip. Proc. Kon. Ned. Akad. Wet (Ams.), 39: 846-855.
11. Safiullah and M. Jamil Ahmed, 2001. Evaluation of exotic cultivars of Gladiolus (*Gladiolus grandiflorus*) under Rawalakot Condition. Sarhad J. Agric., 17: 172-174.
12. Ahmed, M.J. and Z. A. Khan, 2002. Evaluation of exotic cultivars of Hyacinth under Rawalakot conditions. Sarhad J. Agric., 17: 257-260.
13. Ahmed, M.J. and S. Gul, 2002. Evaluation of exotic cultivars of Dahlia (*Dahlia coccineae*). Asian J. Plant Sci., 1: 565-567.

14. Ahmed, M.J., Zarqa Akbar, Nazia Kousar and Zahida A. Khan, 2002. Evaluation of exotic cultivars of (*Gladiolus grandiflorus*) under Rawalakot conditions. *Asian J. Plant Sci.*, 1: 560-562.
15. Moore, W.E. A.A. Brunt, D. Price and A.K. Rees, 1979. Diseases of bulbs. Ministry of Agriculture, Fisheries and Food, London, pp: 23-25.
16. Wassink, E.C., 1965. Light intensity effect in growth and development of tulip in comparison with those in gladiolus. *Hogesch Waagchingen*, 65: 1-21.
17. Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics. McGraw Hill Book Co. New York, U.S.A., pp: 21-30.