



## Varietal performance of *Gerbera Jamesonii* Cut flower under poly tunnel conditions

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### Abstract

Gerberais one of the most elegant cut flowers and hold 4<sup>th</sup> position in terms of popularity in floriculture industry. As gerbera is such an economically important cut flower, this study was conducted to evaluate the efficiency of gerbera cut flower varieties under poly tunnel condition in Pothowar (arid)region. This experiment was designed as Complete Randomized Design with three replications. Four Gerbera Cut Flower Varieties (Kilimanjaro, Rosalin, Scapino and Bieber) were subjected under poly tunnel conditions (control). The results of statistical analysis revealed that the Kilimanjaro variety showed significantly different response in all parameters. Maximum plant height (25.806 cm), number of leaves plant<sup>-1</sup> (28.111), leaf area (277.33 cm<sup>2</sup>), flower bud diameter (1.5361 cm), number of flowers plant<sup>-1</sup> (21.899), flower stalk length (26.417 cm), flower stalk diameter (0.4778 cm), fresh weight of flower (11.458 gm), dry weight of flower (6.0694 gm), spreading of plant (60.028 cm), vase life (9.6667) while minimum days taken to initiate flowering (15.111), days to 50% flower opening (3.2778) and days to 100% flower opening (6.3889) were observed in Kilimanjaro variety under poly tunnel conditions. Among different varieties of gerbera cut flower Rosalin showed maximum flower diameter (9.7361 cm) while Scapino showed maximum production of suckers (2.8056) and minimum percent weight loss of flower (45.966 %). The interaction (poly tunnel conditions and varieties) was non-significant in majority of parameters. Therefore, under poly tunnel conditions Kilimanjaro variety should be recommended for higher yield, quality and shelf life of cut flower.

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## Introduction

Gerbera is one of the leading and most beautiful cut flowers all over the world. Gerbera flowers have a wide range of colors as red, white, orange, yellow etc., however red one is the consumer choice. It is commonly identified as Transvaal daisy, which is an important floriculture crop grown around the world (Pattanashetti *et al.*, 2012), with long stalks and daisy-like flower, belongs to the family *Asteraceae*. Variation of color has made this flower to be used in landscaping i.e., herbaceous edges, planting beds and pots and as cut flowers for bouquets due to its excellent shelf life. It is also found in the making of traditional Chinese drugs i.e., tu-er-feng for healing cold and also for rheumatism (Ye *et al.*, 1990). Due to short life cycle (130-150 days) of gerbera cut flower, it occupy potential to earn foreign exchange, has wide varietal prosperity and better economic returns than other crops.

Floriculture market for cut flowers is very specific, only when the crop is grown under poly tunnel conditions. To meet the quality and quantity standard of cut flower; it is needed to grow under protected conditions (Pattanashetti, 2009). Poly tunnel is a framed structure covered with polyethylene film which can provide the favorable conditions for the growth of the plants in several ways, viz., unfavorable environmental condition, protection from heavy wind, insects or pest, diseases and other environmental conditions. Nowadays, Gerbera cultivation under poly tunnel is quite popular in Maharashtra (Bhosale *et al.*, 2012).

Production of gerbera cut flower under poly tunnel conditions showed good growth, quantity and quality characteristics. The leaves were broad and fresh containing more dry matter content, due to which, the number of flowers increased and large number of side shoots were formed (Singh and Ramachandran, 2002; Singh and Mandhar, 2002; Kandpal *et al.*, 2003 and Sankar *et al.*, 2003). Keeping in view the importance of poly tunnel conditions for higher yield and quality of cut flower of gerbera, the present experiment was conducted to screen the best suited

variety of gerbera cut flower under poly tunnel conditions.

## Materials and methods

### *Plant Material*

The study was conducted under poly tunnel condition at Estate Care Nursery, Department of Horticulture, Arid Agriculture University Rawalpindi during spring 2016. Complete Randomized Design (CRD) was used as experimental design. This experiment consisted of total four treatments (Table 1) and each treatment was repeated three times. Seedlings of the Gerbera cut flower (5-6 true leaves) were brought from reputed nursery, Changa Nursery, Pattoki, Pakistan and transplanted to experimental site on ridges in February, 2016. Semi ventilated poly tunnel was used for the gerbera cut flower production.

### *Study parameters*

Various parameters related to vegetative and flowering attributes such as plant height (cm), number of leaves plant<sup>-1</sup>, leaf area (cm<sup>2</sup>), days to flowering, flower bud diameter (cm), Flower Diameter (cm), number of flowers plant<sup>-1</sup>, flower stalk length (cm), flower stalk diameter (cm), fresh weight of flower (gm), dry weight of flower (gm), spreading of plant (cm), suckers, vase life, days taken to initiate flowering, days to 50% flower opening, days to 100% flower opening and percent weight loss of flower (%) were studied. Three gerbera plants randomly selected from four varieties were tagged and used for recording the parameters.

### *Statistical analysis*

The data was analyzed according to ANOVA (Analysis of Variance) by Software Statistix 8.0 and mean comparison was examined by applying LSD (least significant difference) at 5% level of significance (Steel *et al.*, 1997).

## Result and discussion

### *Plant Height (cm)*

Varieties have best genetic character showed more plant height as compared to other varieties as under poly tunnel conditions. As data presented in the Table

2 shows that the protected conditions have progressive impact on the plant height of different varieties of gerbera cut flower. Treatments (varieties) have shown significant results from each other. T<sub>1</sub> (Kilimanjaro) showed more plant height as 25.806 followed by T<sub>3</sub> (Rosalin) and T<sub>2</sub> (Scapino) as 24.83 cm and 24.67 cm and respectively. On the basis of data T<sub>4</sub> (23.64 cm) gave less plant height as compared to other imported varieties. Results of our study are in accord to Sarmah *et al.* (2014) who also observed that

plant height in Dune (54.70 cm) was maximum followed by Cacharelle cultivar (51.27 cm). However, the minimum plant height was observed in Forza (38.53cm) followed by Danaellen (36.00 cm) and Lancastar (32.47 cm). In order to get maximum production of quality cut flowers need to focus on the environmental conditions, nutrition of plants and cultural practices. But out of these environmental conditions comprises prime importance to nourish the gerbera plants.

**Table 1.** Varieties name as treatments.

Treatment	Variety name
T <sub>1</sub>	Kilimanjaro
T <sub>2</sub>	Scapino
T <sub>3</sub>	Rosalin
T <sub>4</sub>	Bieber

#### *Number of Leaves Plant<sup>-1</sup>*

Data regarding the number of leaves has been presented in Table 2. With the help of data it shows that the T<sub>1</sub> (Kilimanjaro) produced maximum number of leaves per plant as 28.19 while T<sub>3</sub> (Rosalin) showed minimum number of leaves 22.28. Then gradually decrease in the development of leaves from T<sub>4</sub> (Bieber) followed by T<sub>3</sub> (Rosalin) as 24.78 and 22.28 respectively. Similar results was found by Sarmah *et*

*al.*, (2014) that in Lancastar (42.20) the number of leaves per plant varied from 9.66 (cv. Goliath) to 26.53 (cv. Stanza). Plant spread was recorded highest in cv. Stanza (47.12 cm) followed by cv. Cacharelle (42.60 cm) while the lowest was recorded under cv. Goliath (23.43 cm). Due to acceptable environmental conditions the physical and quality characteristics; gerbera cut flower can also be cultivated under poly house.

**Table 2.** Effect of Poly Tunnel on Plant Height (cm), Number of Leaves Plants<sup>-1</sup>, Leaf Area (cm<sup>2</sup>), Days to Flowering of Gerbera cut flower.

Treatments	Plant Height (cm)	Number of Leaves Plants <sup>-1</sup>	Leaf Area (cm <sup>2</sup> )	Days to Flowering
T <sub>1</sub> (Kilimanjaro)	25.806±0.53 A	28.111±1.12A	277.33±4.31A	15.111±0.09B
T <sub>2</sub> (Scapino)	24.667±0.42 AB	21.972±1 B	275.53±5.26A	16.833±0.75B
T <sub>3</sub> (Rosalin)	24.833±0.28 AB	22.278±0.12 B	266.53±3.84AB	19.278±0.45A
T <sub>4</sub> (Bieber)	23.639±0.42 B	24.778±1.28AB	258.14±1.27B	19.944±0.23A

#### *Leaf Area (cm<sup>2</sup>)*

Leaves produce food for the plant by the photosynthesis process, larger the surface area of leaf higher will be photosynthesis process which ultimately increases the food reserves for plant and it has direct effect on yield. Data (Table 2) shows that the leaf area gradually decreased from T<sub>1</sub> (277.33 cm<sup>2</sup>) to T<sub>2</sub> (275.53 cm<sup>2</sup>) under poly tunnel conditions. It was observed that the leaf area decreased in T<sub>3</sub>

(266.53 cm<sup>2</sup>) while T<sub>4</sub> (Bieber) showed minimum leaf area about 258.14 cm<sup>2</sup>. According to data analysis, more than 2 means are not significantly different from each other with LSD 5%. The leaf area of different varieties of gerbera at different stages varied significantly. The maximum leaf area was recorded in varieties Dana Ellen (6425.60 cm<sup>2</sup>) followed by Amulet (5048.20 cm<sup>2</sup>), Winter Queen (4723.14 cm<sup>2</sup>), Savannah (3829.49 cm<sup>2</sup>), Salvatore (3241.94 cm<sup>2</sup>),

Doni (3185.50 cm), Sunway (2686.23 cm), Paco (2654.02 cm) whereas, the minimum leaf area was recorded in variety Goliath 2439.80 cm<sup>2</sup> followed by Rosalin (2561.58 cm). The variation in the leaf area in different varieties of gerbera also may be due to additive gene effect. Similar results were also recorded by Naik *et al.* (2006) who attributed it to the

genetic makeup of the cultivars and the growing conditions. The results of the present study are in conformity with Nair and Medhi (2002) who also recorded significant variation among different gerbera varieties and attributed it to inherent genetic factors.

**Table 3.** Effect of Poly Tunnel on Flower Bud Diameter (cm), Flower Diameter (cm), Number of Flower Plants<sup>-1</sup>, Flower Stalk Length (cm) of Gerbera cut flower.

Treatments	Flower Bud Diameter (cm)	Flower Diameter (cm)	No. of Flowers Plant <sup>-1</sup>	Flower Stalk Length (cm)
T <sub>1</sub> (Kilimanjaro)	1.5361±0.02A	9.6333±0.06A	21.889±0.81A	26.417±0.41A
T <sub>2</sub> (Scapino)	1.4528±0.03A	9.6028±0.04A	18.639±0.4B	25.222±0.12B
T <sub>3</sub> (Rosalin)	1.4944±0.06A	9.7361±0.03A	21.250±0.22A	25.194±0.15B
T <sub>4</sub> (Bieber)	1.3000±0.02B	9.1306±0.04B	14.806±0.39C	23.294±0.23C

#### Days to Flowering

Analysis of data (Table 2) showed that in poly tunnel, gerbera provides suitable environmental conditions due to which flowering in T<sub>1</sub> (15.11) early as compared to others while in T<sub>4</sub> (19.94) flowering was late. According to table, days of flowering increased from T<sub>1</sub> (15.11) to T<sub>3</sub> (19.28) while T<sub>4</sub> took maximum days (19.94) of flowering among other varieties. Hence, Kilimanjaro variety was more suitable for maximum yield of flowers as compared to other cultivars. After

analysis it showed that 3 means were not significantly different from each other with LSD 5%. From previous research of Bellubbi *et al.* (2015) minimum number of days for full flowering was observed in the treatments 75% RDF+ *Glomus fasciculatum* + *Trichoderma harzianum* + Panchagavya + Amrut pani + Dry mulch + Agnihotra ash under poly tunnel conditions favorably influenced flower parameter like minimum number of days taken for flowering (139.87 days) in comparison with other treatments.

**Table 4.** Effect of Poly Tunnel on Flower Stalk Diameter (cm), Fresh Weight of Flower (gm), Dry Weight of Flower (gm), Spreading of Plant (cm) of Gerbera cut flower.

Treatments	Flower Stalk Diameter (cm)	Fresh Weight of Flower (gm)	Dry Weight of Flower (gm)	Spreading of Plant (cm)
T <sub>1</sub> (Kilimanjaro)	0.4778±0.01A	11.458±0.2A	6.0694±0.09A	60.028±0.41A
T <sub>2</sub> (Scapino)	0.4639±0.02 AB	10.839±0.08B	5.8472±0.07AB	52.917±0.07B
T <sub>3</sub> (Rosalin)	0.4694±0.02 AB	10.600±0.12B	5.6000±0.08B	50.694±0.45B
T <sub>4</sub> (Bieber)	0.4219±0.01B	10.028±0.13C	5.1417±0.09C	49.722±1.59B

#### Flower Bud Diameter (cm)

It was observed in Table 3 that maximum flower bud diameter in Kilimanjaro treatment (1.5361 cm) in protected condition that causes increase in diameter of flower bud. After thoroughly analysis of data showing that the diameter of flower bud drastically decreased from T<sub>1</sub>. T<sub>4</sub> (1.3 cm) shows minimum bud diameter among other treatments. Data showed that flower bud diameter of Rosalin Treatment (T<sub>3</sub> 1.49 cm) while T<sub>2</sub> (1.45 cm). Statistical analysis almost showed significant differences among all the

treatments with 5% least significant difference. With reference to previous study of Kallol and Biradar (2016) the cultivar Dana Ellen took minimum duration for bud initiation (54.32 days), bud development (68.00 days) and flower harvesting (79.33 days) followed by cv. Winter Queen (64.29, 78.00 and 87.00 days respectively) while cultivar Brilliance was delay in flower bud initiation, bud development and flower harvesting (81.41, 94.39 and 104.00 days, respectively).

*Flower Diameter (cm)*

From data (Table 3), it was clear that maximum flower diameter attained by the Rosalin variety T<sub>3</sub> (9.74 cm) while T<sub>4</sub> showed minimum flower diameter of about 9.13 cm. It was gradually decreases from T<sub>1</sub> (9.63) to T<sub>2</sub> (9.60) in controlled conditions. Bieber variety (T<sub>4</sub>) showed minimum diameter of flower after Scapino variety (T<sub>2</sub>). Hence, it showed that Kilimanjaro has maximum flower size among others varieties. According to statistical analysis 3 means of

treatments showed non-significant difference with LSD 5%. Similar research was attained by Kallol and Biradar (2016) in which they concluded that the significant and maximum flower diameter was recorded in the cv. Rosalin (10.91 cm) followed by cv. Winter Queen (10.55 cm), both were at par; while the minimum (7.98 cm) was recorded in the cv. Goliath. The increase in flower diameter was due to bigger ray florets of the same cultivars as reported by Naik *et al.*(2006).

**Table 5.** Effect of Poly Tunnel on Suckers, Days taken to 50% Flower Opening, Days taken to 100% Flower Opening, Vase Life, Percent Weight Loss of the Flower (%) of Gerbera cut flower.

Treatments	Suckers	Days taken to 50% Flower Opening	Days taken to 100% Flower Opening	Flower Vase Life	Percent Weight Loss of the Flower (%)
T <sub>1</sub> (Kilimanjaro)	2.5833±0.1 A	3.2778±0.12A	6.3889±0.16A	9.6667±0.27A	46.995±0.66B
T <sub>2</sub> (Scapino)	2.8056±0.08A	3.4167±0.1A	6.4167±0.1A	9.0000±0.16AB	45.966±0.39B
T <sub>3</sub> (Rosalin)	2.5000±0.08AB	3.3611±0.18A	6.5000±0.08A	8.9167±0.17B	47.155±0.17AB
T <sub>4</sub> (Bieber)	2.1944±0.08B	3.7778±0.09A	6.5833±0.1A	8.6944±0.02B	48.743±0.38 A

*Number of Flowers Plant<sup>-1</sup>*

It was analyzed that in protected conditions number of flowers per plant increases. Hence, according to data analysis (Table 3) T<sub>1</sub> (Kilimanjaro) showed maximum number of flowers 21.89 while Bieber variety of gerbera T<sub>4</sub> (14.81) shows minimum number of flower produce per annum. It drastically decreased from T<sub>3</sub> (Rosalin) followed by T<sub>2</sub> (Scapino) and T<sub>4</sub> (Bieber) as 21.25, 18.64 and 14.81. After statistical analysis 3 varieties shows non-significant difference from each other with 5% LSD. The recent results are also in line with the study of Habibah *et al.*(2008) and Barooah and Talukdar (2009) investigated that Cacharelle produced maximum number of flowers per plant (37.10) and it was followed by cvs. Pre Intenzz (35.80) and Winter Queen (33.80) while the least was in cv. Goliath (23.90).

The increased in flower yield may be attributed to the greater leaf area and more number of suckers and leaves per plant as well as plant spread which might have resulted in production and accumulation of maximum photosynthates, ultimately resulting in more number of flowers with bigger size.

*Flower Stalk Length (cm)*

The presentation of information in Table 3 shows an association between varieties (treatments) and flower stalk length. It displayed the highest flower stalk length in T<sub>1</sub> (26.42 cm) under poly tunnel condition. Minimum flower stalk length observed in Bieber variety of gerbera T<sub>4</sub> (23.29 cm). From the table it displays that flower stalk length decreased from T<sub>2</sub> (25.22 cm) to T<sub>3</sub> (25.19 cm) and T<sub>4</sub> (23.29 cm). Statistical analysis showed 3 means are non-significant different from each other with 5% LSD. Sarkar and Ghimaray (2004) observed that the length of stalk is a genetic factor thus, assumed that it varies among the cultivars to cultivars of gerbera. Similar results were concluded by Sarmah *et al.*(2014) Dune variety recorded more stalk length as compared to other varieties in poly tunnel conditions followed by Goliath, Cacharelle, Malibu, Forza while Danaellen and Lancaster show minimum stalk length to genetic variability. The results were in conformity with the findings of Chobe *et al.* (2010) and Ahlawat *et al.* (2012). Stalk length decides the quality of cut flower. It is observed that if cut flower has more stalk length it contains more reserve food which will later be available to the cut flower for longer period of time.

#### *Flower Stalk Diameter (cm)*

Data was recorded and showed in the Table 4. Flower stalk diameter (cm) contributes a lot in holding of flower on the plants. There was a variation trend in diameter of flower stalk under controlled conditions. Maximum flower stalk diameter of flower was observed in T<sub>1</sub> (0.48 cm) whereas T<sub>4</sub> exhibited minimum diameter of flower stalk 0.44 cm. The flower stalk length gradually decreased from T<sub>3</sub> (Rosalin) and T<sub>2</sub> (Scapino) as 0.47 and 0.46cm respectively. The Statistical analysis shows 2 means are non-significant different from each other with 5% LSD. According to previous observation, Sarmah *et al.*(2014),the stalk diameter was significantly maximum in cvs. Brilliance, Stanza and Dana Ellen (0.96, 0.89 and 0.82 cm respectively). They were significantly superior over other genotypes and least was in cv. Goliath (0.47 cm). These differences in stalk diameter of cut flower quality may be due to the presence of additive genes in the individual cultivar which express their entire genetic potential under favorable growing conditions like poly house. This was also in accordance to the findings of Mantur and Patil (2010).

#### *Fresh Weight of Flower (gm)*

It was assumed that fresh weight depends on the accumulation of dry matter content. Results in Table 4 reveal that varieties of gerbera under controlled conditions interacted non-significantly at  $p < 0.05$  in terms of flower fresh weight. Table shows that flowers from T<sub>1</sub> (11.46 gm) gained more weight whereas bieber variety (T<sub>4</sub> 10.03 gm) lighter in weight. Analysis revealed that weight of fresh flower gradually decreased from T<sub>2</sub> (Scapino) followed by T<sub>3</sub> (Rosalin) and T<sub>4</sub> (Bieber) as 10.84 gm, 10.6 gm, 10.03 gm respectively. From earlier findings of Danaeet *al.* (2011), assumed that the fresh weight of cut flower increased in polytunnel condition and with different treatments of gibberellins and butyric acid under polytunnel condition on gerbera cut flower varieties; GA<sub>3</sub> 50 mgL<sup>-1</sup> and BA 50 mgL<sup>-1</sup> were the most effective treatments on vase life, fresh weight, solution uptake, membrane stability and total soluble solids of gerbera cut flowers.

#### *Dry Weight of Flower (gm)*

According to result shown in the Table 4, it showed that after moisture loss from the fresh flower the dry weight of T<sub>1</sub> (Kilimanjaro) flower as 6.07 gm gain more weight than other varieties. Whereas, dry weight of bieber variety of gerbera T<sub>4</sub> (5.14 gm) was lighter in weight. From the data analysis, dry weight of flower gradually changed from T<sub>2</sub> (5.85 gm) to T<sub>3</sub> (5.6 gm) and T<sub>4</sub> (5.14 gm). With the help of statistical analysis showed that more than 2 means are non-significant from others at 5% LSD.

These results are also in agreement with Danae *et al.* (2011) who concluded that the dry weight is dependent on the growth and development of cut flower and also depend on the vase life of flower. Dry weight of flower reflects the yield as well as the dry matter present in it. SA significantly increased vase life, dry weight and flower diameter of cut gerbera flowers (Jamshidi *et al.*, 2012).

#### *Spreading of Plant (cm)*

Protected conditions showed significant effect on morphological characteristics of plants. According to data analysis (Table 4), the spreading of cultivars gradually decreased as T<sub>1</sub> (Kilimanjaro), T<sub>2</sub> (Scapino), T<sub>3</sub> (Rosalin) and T<sub>4</sub> (Bieber) as 60.03 cm, 52.92 cm, 50.69 cm and 49.72 cm respectively. Whereas, minimum spreading shown in the bieber variety T<sub>4</sub> (49.72 cm). Statistical Analysis shows that 4 means are not significantly different from one another at  $p < 0.05$ . A similar study conducted by Kallol and Biradar (2016) concluded that the plant spreading was recorded highest in cv. Stanza (47.12 cm) followed by cv. Cacharelle (42.60 cm) while the lowest was recorded under cv. Goliath (23.43 cm). Variation in plant spread was due to the inherent genetic character of the individual cultivar and also it depends upon the leaf length and leaf breadth of the cultivars as reported by Kumari *et al.* (2010) and Bhosale *et al.* (2012) in gerbera.

#### *Suckers*

Protected conditions enhance the production of suckers which was recorded and analyzed thoroughly.

According to Table 5, maximum suckers produced by T<sub>2</sub> (2.81) per plants while T<sub>4</sub> (Bieber Variety) produced minimum number of suckers per plant as 2.19. Production of suckers per plants decreased as T<sub>1</sub> (Kilimanjaro) and T<sub>3</sub> (Rosalin) from 2.58 and 2.50 respectively. Analysis of statistics showed that 2 means are not significantly different from one another with LSD 5%. These results are also supported by Kallol and Biradar (2016) that the maximum number of suckers per plant was produced by cv. Cacharelle (26.80) followed by cv. Pre Intenzz (25.20) while the minimum were produced by cv. Goliath (11.20). The cultivars Cacharelle, Pre Intenzz and Stanza which produced higher number of leaves per plant exhibited greater plant spread and produced higher number of suckers per plant compared to other cultivars which are also in accordance with the results of Chobe *et al.*, (2010), in gerbera.

#### Days to 50% Flower Opening

In controlled structure, flower blooms can be enhanced by suitable environment and data was recorded on the basis of 50% opening of flowers. According to data (Table 5), it showed that T<sub>1</sub> (3.28) blooms 50% earlier than other varieties while Bieber variety T<sub>4</sub> (3.78) need more days for flower opening. Data displayed that T<sub>3</sub> (3.36) open flower earlier than T<sub>2</sub> (3.42) and T<sub>4</sub> (3.78) vice versa. Statistical analysis shows that 2 means are not significantly different from one another with LSD 5%. Results are in correspondence with S. B. Bellubbi, *et al.*, (2015) in which minimum number of days for 50% flowering (100.03 days) was recorded in the treatment T<sub>5</sub> (*Glomus fasciculatum* + *Trichoderma harzianum* + Panchagavya + Amrut pani + Dry mulch + Agnihotra ash) which was found to be on par with T<sub>2</sub> and T<sub>1</sub> (101.97 days 102.47 days, respectively).

#### Days to 100% Flower Opening

Effect of poly tunnel conditions studied and recorded the data after 100% flower blooms. According to Table 5, data showed that T<sub>4</sub> (Bieber) took 6.58 days to bloom 100%. Data displayed that flower of T<sub>1</sub> (Kilimanjaro) blooms 100% too earlier than T<sub>2</sub> (Scapino) and T<sub>3</sub> (Rosalin) as 6.42 and 6.50 days.

From statistical analysis, 2 means are not significantly different from one another at LSD 5%. From earlier study Bellubbi, *et al.* (2015) proved that minimum number of days (110.10 days) for full flowering was observed in the treatments T<sub>5</sub> (*G. f* + *T. ha* + PG + AP + Dry mulch + Agniotbra ash) and T<sub>2</sub> (75% RDF + *G. f* + *T. ha* + PG + AP + Dry mulch + Agniotbra ash) it was on par with the treatments T<sub>6</sub>, T<sub>1</sub>, T<sub>7</sub> and T<sub>3</sub> respectively.

#### Vase Life

Effect of different condition and water solution on vase life of flower analyzed and data was recorded. Vase life observed by the physiology of the flower i.e., wilting or dry. According to Table 5, it shows that T<sub>1</sub> (Kilimanjaro) variety had maximum vase life as 9.67 days whereas T<sub>4</sub> (8.69 days) showed minimum vase life in comparison with others. Data reveals that vase life gradually decreases from T<sub>2</sub> (9.00 days) to T<sub>3</sub> (8.92 days). Previous study by Kallol and Biradar, (2016) the shelf life of cut Flower was an important trait which decides its longevity in vase as well as in decorations. Maximum vase life was recorded in cv. Rosalin (14.83 days) followed by Pre Intenzz (11.80 days) and minimum vase life was recorded in cv. Stanza (7.50 days) and Goliath (7.56 days). The variation in vase life of different cultivars of gerbera might be attributed to genetic variability and also the stalk length and stalk diameter which will have stored food material. In general, vase life of flower greatly depends on the general condition of the mother plant. The varieties which exhibit longer vase life might possess better water uptake capacity and higher accumulation of metabolic sugars (reducing and non-reducing) in the plant as well as in the flower stalk. The cultivar Primrose due to its long vase life could be a very popular choice in the wholesale market. The results are in accordance to the findings of Amiri *et al.* (2009) Anil Kumar *et al.* (2010).

#### Percent Weight Loss of Flower (%)

Percentage weight loss of the flower analyzed with the help of a formula studied in material and methods. Table 5, data shows that minimum percent weight loss occurred in T<sub>2</sub> (45.97 %) while maximum in T<sub>4</sub>

(48.74 %) and vice versa. However, it is assumed that percent weight loss increased from T<sub>1</sub> (Kilimanjaro) followed by T<sub>3</sub> (Rosalin) as 46.99% and 47.16% respectively. From previous investigation by M. Mehdikhah, (2016) the results revealed that the maximum dry matter percentage with 20.95% and minimum dry matter percentage with 15.81% were related to treatment of 200 mg l<sup>-1</sup> citric acid and control, respectively. Moreover, 100 mg l<sup>-1</sup> salicylic acid with 19.37% and 200 mg l<sup>-1</sup> ascorbic acid with 18.09% had the high dry matter.

### Conclusion

It is concluded that the Kilimanjaro variety of gerbera cut flower provided the best results on the vegetative and reproductive growth of gerbera cut flower and it is also recommended for higher yield and good quality under poly tunnel conditions in Pothowar (Arid) region.

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