GERBERA GENOTYPES AS PERFORMED UNDER DIFFERENT SOIL AMENDMENTS

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ABSTRACT

Cultivation of gerbera is a promising practice among the flower growers. Proper soil preparation can substantially improve their productivity. Finding the appropriate gerbera genotype performing better in a suitable soil combination is a potential field of study. On this aspect, an experiment was conducted to evaluate the growth and performance of Gerbera genotypes with soil amendments during the period from November 2014 to July 2015 at the field research site of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur-1706, Bangladesh. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. There were five treatments viz. T0 (control), T1 (Cowdung), T2 (Mustard oil cake), T3 (Urea+ TSP+ MOP), T4 (Organic+ Inorganic) along with five genotypes (G1 = White double, G2 = Yellow double, G3 = Light orange single, G4 = Light pink spider G5= Deep red double). Significant variation among the genotypes and treatment were observed either in single or in combination. Genotype G3 produced the maximum leaf number, flower number (32.4), whereas genotype G5 had the maximum diameter of flower stalk and produced larger flower as well (9.2cm). However, genotype G1 showed the maximum vase life (9.47days). These all were happened when organic and inorganic fertilizers (T4) applied combined. Among all, G3 produced the maximum leaf and flowers numbers which was dwarf at the same time and in case of interaction effect, G3T4 was observed to produce maximum number of leaves and flowers.

Keywords: Soil amendments, Gerbera genotype, Plant nutrition, Organic, Inorganic

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INTRODUCTION

Gerbera (*Gerbera jamesonii*) belongs to the family Asteraceae is an herbaceous perennial flower crop, with long stalks and daisy-like flower, a native to South Africa. It was named in honor of the German botanist and naturalist Traugott Gerber. Gerbera grown throughout the world scattered from Africa to Madagascar into tropical Asia and South America (Pattanashetti *et al.*, 2012). Variety in color has made this flowering plant attractive for use in garden decorations and for cut flowers as it has a long vase life (Chung *et al.*, 2005; Chauhan, 2004). Gerbera is very popular and is the fourth (Sujatha *et al*., 2002) most widely used cut flower in the world after rose, carnation, chrysanthemum, and tulip**.** There is a wide range of variation available in shape, size and color of gerbera flower. The annual production of flower sticks per plant is directly related to the cultivars (Singh and Mandhar, 2004). Thangam *et al*. (2009) also reported that gerbera variety Savannah recorded the highest values for leaf length, leaf breadth, flower stalk length and number of petals per flower whereas Rosalin recorded highest fresh and dry weight of leaves and flower stalk circumference. The flower diameter was the maximum in Dalma followed by Dana Ellen, Rosalin and Savannah. Dalma was the prolific bearer with 70.24 flowers/plant/year followed by Savannah and Rosalin.

In Bangladesh, gerbera was introduced recently and was gaining popularity quickly. It has great potential for local as well as export market. Cultivation of flower is reported to give 3-5 times and 1.5-2.0 times more returns than obtained from rice and vegetable cultivation, respectively (Dadlani, 2003). At present, 10,000 hectares of land covers flower cultivation taking the lead by Jessore district (Chowdhury, 2010) for commercial flower cultivation. Recently, several areas of Gazipur, Savar, Mymenshing are also using for gerbera cultivation.

Economic production of gerbera depends upon factors like soil organic status, irrigation, water quality, fertigation, plant density, plant protection measures, etc. But, nutritional requirement plays greater role in successful crop production. Soil alone as a growing medium does not fulfill all requirements for its higher yield and quality. The introduction of the soilless medium has brought radical change in its protected cultivation and is gaining importance day by day. Barad *et al*. (2010) concluded that for maximum growth, flower yield and quality of gerbera flowers cv. Sangria under net house conditions, the crop should be fertilized with 20:10:20 g/m^2 N:P:K (2:1:2) for better growth and yield. Amin *et al*. (2015)

concluded that the combination of 12.5 g P m^{-2} and 15 g K_2O m^{-2} influenced most of growth and flowering parameters of Gerbera.

Increasing awareness of environmental issues, need to dispose of rising amounts of waste along with the need to reduce the consumption of non-renewable materials have greatly encouraged the use of composted organic biomass in agriculture (Riaz *et al*., 2008; Tariq *et al*., 2012). It is very much encouraging to learn that the global trade of gerbera had increased. Hence in the present organic era, use of Integrated Nutrient Management (INM) needs to be effectively used both in increasing the production and improving the quality and longevity of flowers thereby accounting for an effective growth and quality. Bellubbi *et al*. (2015) was conducted with six kinds of organic substrates along with inorganic fertilizers to study the effect of INM practices in improving the growth and yield of gerbera (*Gerbera jamasonii* L.) Var. Rosalin. The results proved that 75% RDF (150:137:190 NPK g/m^2 + 20 t/ha FYM) +*Glomus fasciculatum* + *Trichoderma harzianum*+ Panchagavya +Amrutpani + Dry mulch + Agnihothra ash improved the growth and flowering attributes in gerbera. Saijeen *et al*. (2009) also reported that all treatments (7 different media and organic fertilizers) with chemical fertilizer showed the best performance with maximum values in leaf and flower number. Among the five growing media evaluated, growth and flower quality were better in soil with vermicompost followed by soil with FYM reported by Thangam *et al*. (2009).

MATERIALS AND METHODS

The experiment was conducted in the nurseryof the Department of Horticulture, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur from November 2014 to July 2015. A two factor experiment with three replications was laid out in Randomized Complete Block Design (RCBD). There were five treatments viz. T_0 (control), T_1 (Cowdung), T_2 (Mustard oil cake), T_3 (Urea+ TSP + MOP), T_4 (Organic+ Inorganic) along with five genotypes (G1=White double, G_2= Yellow double, G_3=Light orange single, G_4=Light pink spider G_5=Deep red double). For planting gerbera, pot was filled by 10 kg garden soil with recommended fertilizer dozes i.e. N:P:K – (20:10:20) g/m^2 as per treatments. Pots were prepared one week before transplanting. Mother plants (large clumps) were divided into smaller units called suckers. Before transplanting in the pot, the roots and leaves of suckers were trimmed by keeping the central shoot intact.

Data were collected in respect of number of leaves per plant, days required to bud emergence, days required from bud to opening flower, flower stalk length, flower stalk diameter, flower diameter, numberof flowerper plants, vase life etc. Collected of data on various parameters under study were statistically analyzed using MSTAT-C program. The significance of the differences among the treatment means was evaluated by LSD test at 1% and 5% level of probability for the interpretation of results.

RESULTS AND DISCUSSION

Data on different growth parameters and flower characters were recorded and have been presented in table and graphs and possible interpretations are given under the following headings:

Number of leaves per plant: It was observed that the numbers of leaves per plant were significantly varied among genotypes (Figure 1a) and by the application of different doses of organic and chemical fertilizers. Leaf number increased gradually from 45 to 75 DAT. After that it increased in a consistent manner up to 105 DAT. The highest number of leaves produced by genotype G_3 (17.47). Number of leaves in G_4 and G_5 were very close to 75 days, but gradually G_4 produced higher number of leaves than G_5 when it goes to 105 DAT. Mean while, the lowest number of leaves was produced by genotype G_1 (11.07). Variations among the varieties were controlled by the genetic materials (Singh and Mandhar, 2004) along with environmental effects influenced for its expression.

Similar growth trend was also observed in Figure 1b. However, the maximum number of leaves (17.00) was recorded in treatment T_4, which is statically identical to mustard oilcake treatment, i.e.T_2 (15.53).The lowest number of leaves was produced fromT_0 (9.00), where no fertilizers were applied. The chemical fertilizers along with organic manure may increase the availability of available nitrogen, phosphorus and potassium in the soil which resulted in more number of leaves (Ahmed *et al*., 2004). Plants produce food materials through the process of photosynthesis. Generally, the increasing number of leaves, photosynthesis is supposed to be increased. Adequate numbers of leaves are essential for normal growth and production of more flowers. Anuje *et al.* (2004) also carried out an experiment on effect of growing media on growth, flowering and yield of gerbera under polyhouse conditions and found similar result.

It was observed that the interaction of genotype and treatment had significant influenced on leaf number in 105 day after transplanting (Table 1).The highest number of leaves was found in G_3T_4 (20cm)which was statistically similar to G_3T_3 (18.67cm) G_4T_4 (18.67cm) G_3T_2 (18.00cm) and the lowest number of leaves was found in G_5T_0 (8.67cm).

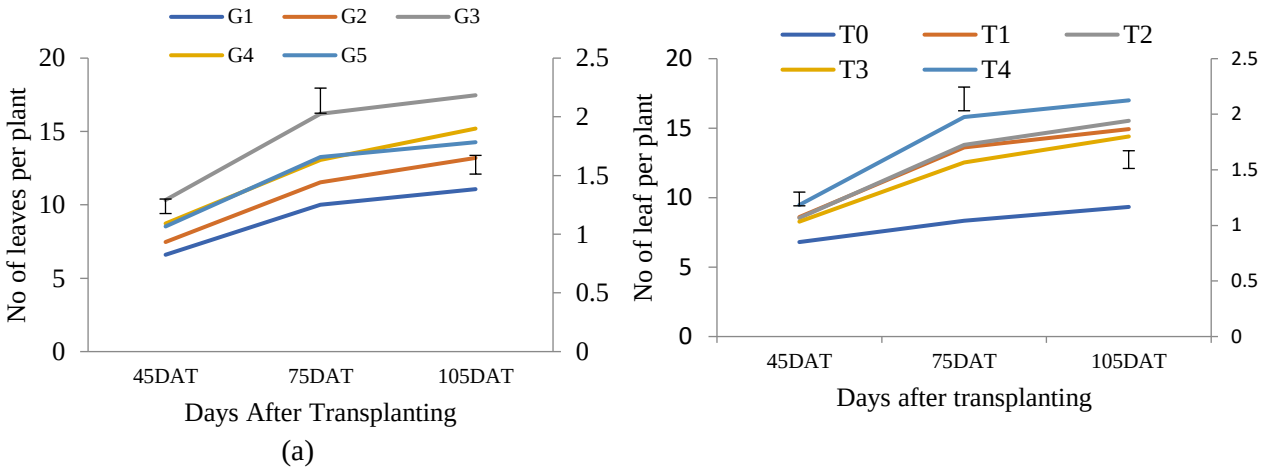


Figure 1. Number of leaves were influenced by different (a) genotypes and (b) different treatments (vertical bars indicate the level of significance at 1%)

Table 1. Interaction effect of genotypes and treatment combinations on leaf number

Treatment Combination		Number of Leaves		
		45DAT	75DAT	105DAT
G_1	T_0	5.00	8.00	9.00jk
	T_1	6.67	9.33	10.67gk
	T_2	7.00	10.00	11.33fk
	T_3	7.00	10.67	11.33fk
	T_4	7.33	12.00	13.00ej
G_2	T_0	6.00	8.00	10.00hk
	T_1	8.00	12.00	13.33di
	T_2	7.67	12.67	16.00be
	T_3	7.33	11.67	12.67ek
	T_4	8.33	13.33	14.00ch
G_3	T_0	8.33	9.00	9.67ijk
	T_1	10.67	17.67	19.00ab
	T_2	10.33	16.67	18.00bc
	T_3	10.33	17.33	18.67ab
	T_4	12.00	20.33	22.00a
G_4	T_0	7.67	8.67	9.33ijk
	T_1	9.00	15.00	16.67bc

	T_2	8.67	14.67	16.33bc
	T_3	8.33	9.67	15.00bf
	T_4	10.00	17.33	18.67ab
G_5	T_0	7.00	8.00	8.67k
	T_1	8.67	14.00	15.00bf
	T_2	9.00	15.00	16.00bc
	T_3	8.33	13.33	14.33cg
	T_4	9.67	16.00	17.33bcd
Level of Sinificance		NS	NS	**
LSD Value				1.592
%CV		15.17%	17.03%	11.42%

Genotype
G_1=White (double)
G_2= Yellow (double)
G_3=Light orange (single)
G4=Light pink (spider)
G5=Deep red(double)

Treatment
T_0= Control
T_1=Cowdung
T_2= Mustard oil cake
T_3= Inorganic(Urea+ TSP+MOP)
T_4= Organic+ Inorganic

=Significant at **1% level of Probability

Leaf length: The leaf length of different gerbera genotypes were statistically significant (Table 2). The longest leaf was recorded from G_5 (28.40cm) while the shortest leaf length (22.86cm) was recorded from G_2. These results had similarities with the findings by Das *et al.* (2012).

The result presented in (Table 2) showed that integrated use of organic and inorganic fertilizers had positive influence on the leaf length. The highest leaf length was obtained from T_4 (28.40cm) followed by T_1-Cowdung (26.65cm) and T_2 Mustard oil cake (26.68cm). The shortest leaf length was obtained from T_0 (22.55cm), where no fertilizer dose was applied. Sindhu *et al*. (2010) also reported such result earlier from his experiment. The interaction effect of treatment and genotype was not significant.

Leaf width: Leaf width showed significant variation for differentgenotypes and treatments (Table 2), but their interaction effects are not significant. The highest leaf width (6.78 cm) was showed by the genotypes G_5 (6.91cm) and G_4 (6.50 cm). The lowest (5.20 cm) was showed by genotype G_3. Partially similar results also reported by Das *et al.* (2012) from his experiments, where he investigate the growth and yield performance of different exotic Gerbera.

The plant treated with T_4 treatment produced widest leaf (6.96cm) which is statically similar toT_2 (6.45cm).In T_4 organic and inorganic fertilizer were applied combined, while in T_2 only mustard oil cake was applied. The lowest was obtained from T_0 (4.70cm) followed by T_3 (5.70cm). The main reason for that was lack of nutrition level i.e., phosphorous (31.68 ppm), potassium (210 ppm) and particularly nitrogen (0.01%) which is responsible for vegetative growth in plants (Ahmed, 2004). Saijeen *et al*. (2009) also found best result while using organic manure with chemical fertilizer. The interaction effect between genotype and treatments was non-significant.

Table 2. Leaf length and leaf width as influenced by genotype and treatment

Factor		Leaf Length	Leaf Width
Genotype	G_1	26.15ab	5.80b
	G_2	22.86c	5.65b
	G_3	26.45ab	5.20b
	G_4	25.01bc	6.50a
	G_5	28.40a	6.91a
Treatment	T_0	22.55c	4.70d
	T_1	26.65ab	6.25bc
	T_2	26.68ab	6.45ab
	T_3	24.59bc	5.70c
	T_4	28.40a	6.96a
Level of Significance		**	**
LSD Value		3.02	0.66
%CV		11.97	11.18%

Days required to bud emergence: The results for days required to first emergence were statistically significant among the genotypes and treatments, but their interactioneffects were not significant.The range of days required to bud emergence was 65.47 to 103.40 days (Table 3).Genotypes G_5 needed higher days for bud emergence that was 103.40 days and G_3 required lower days for bud emergence (65.47days). Environmental factors (light intensity, nutrient availability, etc.) along with the genetic factor may be responsible for this variation. Keditsu (2013) also reported similar result.

Integrated use of inorganic and organic fertilizer (T_4) requires higher days (93.20 days) for bud emergence which is statically similar to the result of Cowdung (T_1) and Mustard oil cake (T_2) application that is 89.20 and 89.80 days, respectively. Proper vegetative growth completed here before starting of reproductive stage. Control treatment, T_0 required lower days (83.60 days) for bud emergence where no fertilizer was applied. Here, proper vegetative growth was not completed due to nutrient deficiency.

Days required for bud to fully opening of flower: This days requirement was significant. The range of required days for bud to fully opening of flower was 6.76 to 9.06 days of

Gerbera genotypes (Table 3). Higher days required to tall genotype G_5 at 9.06 days and lower days required for dwarf genotype G_3 at 6.73 days. Riaz *et al*. (2014) also found earlier flower from dwarf and delayed flower from tall variety in zinnia. Keditsu (2013) also reported closely related results to this finding in different planting time**.**

In case of fertilizer treatments the range of days varied from 6.53 to 9.06 days. Higher days were required in T_4 (9.06 days) where organic and inorganic fertilizers are applied in integrated manner. Lower days were required in T_0 (6.53days) where no fertilizers were applied. In case of treatment combinations, G_5T_4 (11days) requires higher days for flower opening from bud, which was statistically similar to G_2T_4 (10 days) followed by G_5T_4 (9.67 days). Lower days were required in G_3T_0 (5.33 days) and G_2T_0 (6.33), which are statically identical which is statically identical.

Table 3. Effect of genotypes and treatments on days required to bud emergenceand bud to fully opening of flowers

Factor		Days Required for Bud Emergence	Days required for bud to fully opening flower
Genotype	G_1	96.80b	7.47c
	G_2	94.00b	8.13b
	G_3	65.47d	6.73d
	G_4	81.80c	6.86d
	G_5	103.40a	9.06a
Treatment	T_0	83.60c	6.53c
	T_1	89.20ab	7.73b
	T_2	89.80ab	7.93b
	T_3	85.67bc	7.00c
	T_4	93.20a	9.06a
Level of Significance		**	**
LSD Value		3.98	0.53
CV (%)		4.60%	7.08%

Table 4. Interaction effect of Genotype and Treatment in days required for bud to fully opening flower

Treatment Combination		Days required for bud to fully opening flower
G_1	T_0	6.33gh
	T_1	7.33defg
	T_2	8.00def
	T_3	7.00efg
	T_4	8.67 cd
G_2	T_0	7.00efg
	T_1	8.33 de
	T_2	8.00def
	T_3	7.33defg
	T_4	10.00ab
G_3	T_0	5.33 h
	T_1	7.00efg
	T_2	7.33defg
	T_3	6.00fg
	T_4	7.33defg
G_4	T_0	6.00gh
	T_1	7.33defg
	T_2	6.67fg
	T_3	6.00gh
	T_4	8.33 de
G_5	T_0	8.00def
	T_1	8.67 cd
	T_2	9.67bc
	T_3	8.00def
	T_4	11.00 a

Level of Significance	*
LSD Value	1.187
CV (%)	7.08%

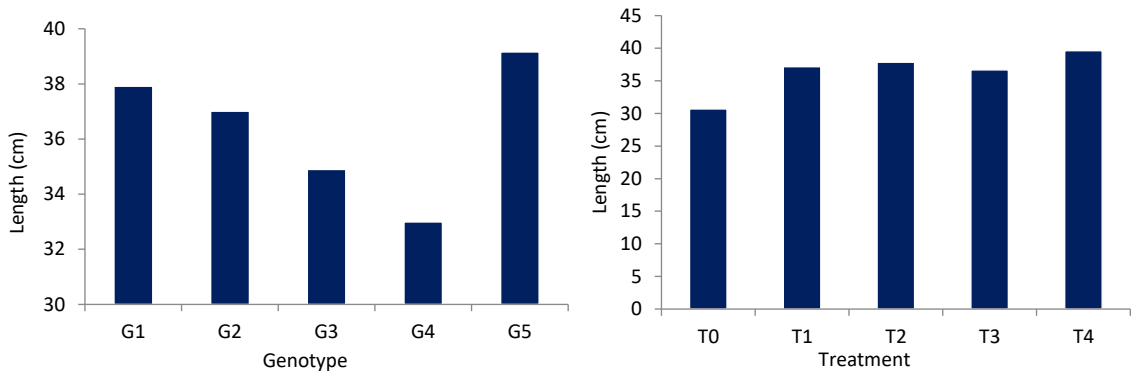
Genotype
G_1=White (double)
G_2= Yellow (double)
G_3=Light orange (single)
G4=Light pink (spider)
G5=Deep red(double)

Treatment
T_0= Control
T_1=Cowdung
T_2= Mustard oil cake
T_3= Inorganic(Urea+ TSP+MOP)
T_4= Organic+ Inorganic

*=Significant at 5% level of Probability
**=Significant at 1% level of Probability

Length of flower stalk: Significant variation was observed in respect of stalk length among the genotypes in (figure 2a).The longest peduncle of 39.16 cm was produced by genotype G_5 which is statically similar with genotype G_2 (37.01 cm), while the shortest peduncle of 32.99 cm was produced by genotype G_4.). The stalk length is a genetical factor therefore it is expected to vary among the cultivars as earlier observed by Sarkar and Ghimiray (2004).

Effect of fertilizer treatments found significant in case of flower stalk length in (figure2b). Application of organic and inorganic fertilizer produced higher stalk length together in T_4 (39.6 cm). It is statically identical to T_2 (37.84 cm) where only mustard oil cake is applied. T_0 produced the shortest peduncle (30.7 cm), because no fertilizers are applied here. Cowdung and chemical fertilizer produced the similar result here. Gaurav, *et al*. (2002) reported the results closely related to the findings.The interaction effects are not significant here.



(a) (b)

Figure 2: Length of flower stalk as influenced by (a) genotypes and (b) fertilizer treatments

Diameter of Flower stalk: Diameter of flower stalk varied significantly for different cultivars, Treatments and their interaction effect on potted gerbera (Table 5). The range of flower stalk diameter was 2.46 to1.81 cm. Among the genotypes the maximum diameter of peduncle was recorded in G_5 (2.46 cm) and the minimum flower stalk recorded in G_3 (1.81 cm). Similar result was reported by Uddin *et al.* (2012) for peduncle diameter range that varied from 1.0 to 2.7 cm. Variation might be occurred due to the variation of genetic expression association with the environmental factor (photoperiod).

Among various treatments, the range of flower stalk varies from 1.34 cm to 2.74 cm. The highest diameter of peduncle was 2.74 cm in T_4 (organic+ inorganic) and the lowest diameter was in T_0 (2.34 cm), where no fertilizer was applied. Simply, the organic fertilizer treatment, performed better than the chemical one. Gaurav *et al*. (2002) reported the closely related results for flower stalk.

In case of interaction effect, the highest diameter of peduncle was recorded 3cm from G_5T_4 which was statistically identical to G_1T_4 (3.00 cm) and G_5T_2 (2.90 cm). The lowest diameter (1.00cm) of peduncle was obtained from G_1T_0 (Table13).

Table 5. Effect of different genotypes and fertilizer treatments on flower stalk diameter

Factor		Leaf Length	Leaf Width
Genotype	G_1	26.15ab	5.80a
	G_2	22.86c	5.65a
	G_3	26.45ab	5.20b
	G_4	25.01bc	6.50b
	G_5	28.40a	6.91b
Treatment	T_0	22.55c	4.70d
	T_1	26.65ab	6.25bc
	T_2	26.68ab	6.45ab
	T_3	24.59bc	5.70c
	T_4	28.40a	6.96a
Level of Significance		**	**
LSD Value		3.02	0.66
%CV		11.97	11.18%

Table 6. Interaction effect of genotypes and treatments on flower stalk diameter

Treatment Combination		Flower stalk diameter
G_1	T_0	1.50mn
	T_1	2.40e-h
	T_2	2.70b-c
	T_3	2.10hij
	T_4	3.00ab
G_2	T_0	1.50mn
	T_1	2.30f-i
	T_2	2.55d-g
	T_3	2.00ijk
	T_4	2.80bcd
G_3	T_0	1.30no
	T_1	2.00ijk
	T_2	1.75klm
	T_3	1.60lmn
	T_4	2.40efgh
G_4	T_0	1.00o
	T_1	1.65lmn
	T_2	1.90jkl
	T_3	1.35n
	T_4	2.30f-i
G_5	T_0	1.40mn
	T_1	2.60c-f
	T_2	2.90abc
	T_3	2.20g-j
	T_4	3.20a

Level of Significance	*
LSD Value	0.3115
CV (%)	9.04%

Genotype
G_1=White (double)
G_2= Yellow (double)
G_3=Light orange (single)
G4=Light pink (spider)
G5=Deep red(double)

Treatment
T_0= Control
T_1=Cowdung
T_2= Mustard oil cake
T_3= Inorganic(Urea+ TSP+MOP)
T_4= Organic+ Inorganic

*=Significant at 5% level of Probability

Flower diameter: It has been revealed that flower size varied significantly in genotypes, treatments and between interactions. In case of genotypes, it ranged from 9.2 to 6.71 cm (Figure 3a). The highest diameter 9.2 cm was observed in genotype G_5. The lowest flower size of 6.71 cm was recorded in genotype G_3 which was dwarf in respect of leaf breadth. Sujatha *et al.*, (2002) conducted an experiment with 25 genotypes of gerbera and found flower diameter varied from 12.30-6.67 cm which was at par with the present investigation and also mentioned this difference due to the genetic factors. Riaz *et al.* (2014) also mentioned the availability of smaller flower from dwarf variety.

In case of treatments, the highest diameter of flower was recorded from T_4 (Organic+ inorganic), which is 9.34cm. The lowest diameter of flower was obtained from T_0 **(**7.08cm), where no fertilizer was applied (Figure 3b). Anuje *et al.* (2004) evaluated different media used for gerbera cultivationand and reported that the medium consisted of cocopeat and farm yard manure in a 1:1 ratio resulted the maximum values for flower diameter.

Among the interaction effect flower diameter varies from 5.40cm to 10.20cm. The maximum flower diameter was recorded in G_5T_4 (10.20cm), which was statistically similar to G_5T_2(9.80cm). The minimum flower diameter was recorded in G_3T_0 (5.40cm).

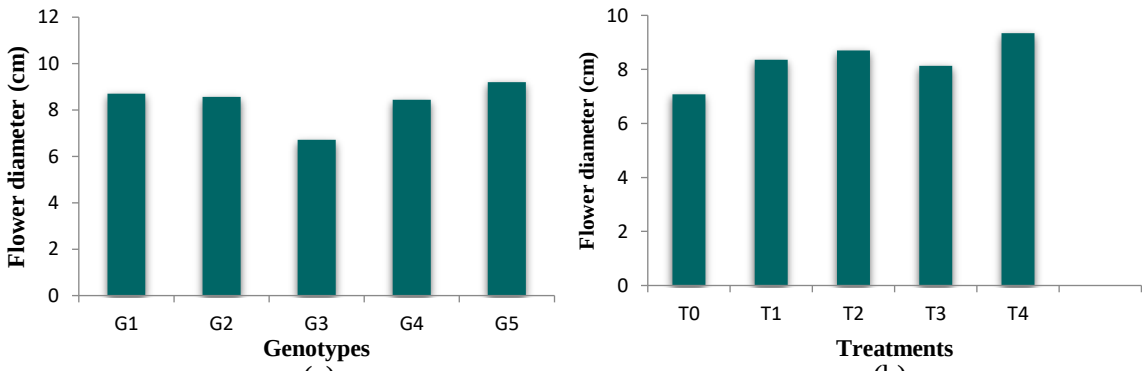


Figure 3.Flower diameter of different (a) genotypes and (b)treatments.

Table7. Interaction effect of genotypes and treatments on flower diameter

Factor		Flower Stalk Diameter
Genotypes	G_1	2.34ab
	G_2	2.23 b
	G_3	1.81 c
	G_4	1.64 c
	G_5	2.46 a
Treatments	T_0	1.34 d
	T_1	2.19 b
	T_2	2.36 b
	T_3	1.85 c
	T_4	2.74 a
Level of Significance		**
LSD Value		0.19
CV (%)		9.04%

Number of flowers per plant: Number of flowers per plant varied significantly with Genotypes, treatments and their interaction effect were also significant. In case of genotype, the highest number of flowers per plant (32.4) was recorded from G_3 (orange flower) (Figure 4a).The lowest (20.2) was recorded from G_5 (deep red). The G_5 can be consider as a tall genotype as it was produced the maximum leaf length and breadth, while the G_3 can be considered as dwarf variety as it gave the minimum leaf breadth with the maximum number of leaves. Riaz *et al*. (2014) also found the maximum flowers from dwarf and the minimum flowers from tall variety while studied with zinnia.

Among the treatment effect, the highest number of flower was observed in combined fertilizertreatment (T_4) which is 30.8 and the lowest (14.4) was recorded from T_0, where no fertilizer was applied (Figure 4b). Media containing more nitrogen, phosphorus and potasium produced more number of flowers in gerbera as reported by Thangam *et al*. (2009). China aster (Sonawane *et al*., 2009; Kumar *et al*., 2003), zinnia and marigold (Awang and Ismail, 1997) produced more number of flowers in media containing more amount of these nutrients.

Organic + inorganic may also have contributed in improvement in physico-chemical properties, soil health, and reduced the activities of complexing agents and in turn increased uptake of nitrogen, phosphorus, potash and some other nutrients in plants (Carter *et al*., 1973), which increased vegetative growth and balanced C:N ratio and might have increased the synthesis of carbohydrates as well, which ultimately promotes greater yield (Adilakshmi, 2008; Younis *et al*., 2008) and flowering. Gaurav *et al*. (2002) conducted an experiment to determine the optimum levels of N, P and K fertilizers required for the flower production of gerbera (*Gerbera jamesonii* cv. Ornella) and found the number of flowers per plant (30.62 and 29.00) from integrated use of organic + inorganic fertilizer combination.

In case of interaction effect the highest number of flowers per plant was obtained from G_3T_4 (40). It was statistically similar to G_3T_1(37) .The lowest number offlower was obtained from G_5T_0 (11).

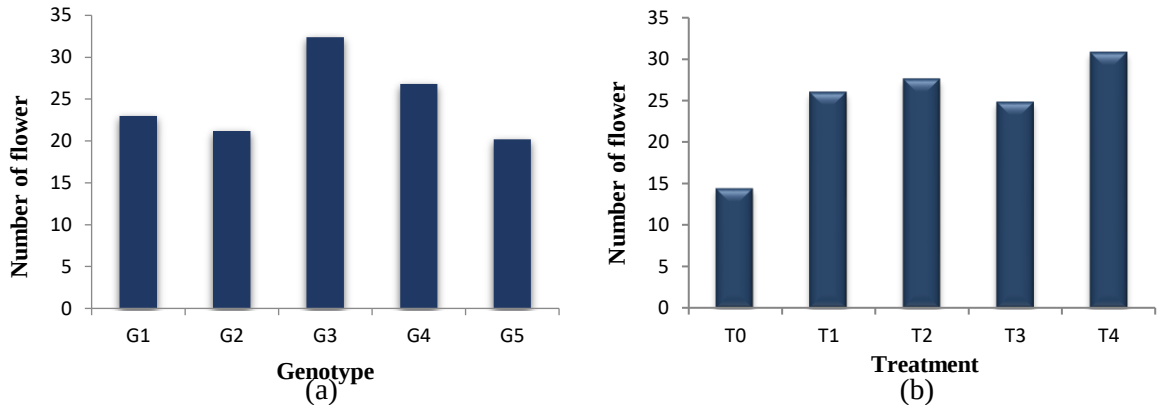


Figure 4. Number of flower as influenced by different (a) genotypes and (b) treatments

Table 8. Interaction effect of genotypes and treatments on flower number

Treatment Combination		Number of Flower
G_1	T_0	14kl
	T_1	24ghi
	T_2	26efg
	T_3	22hij
	T_4	29de

G_2	T_0	12kl
	T_1	21ij
	T_2	24ghi
	T_3	23g-j
	T_4	26efg
G_3	T_0	20j
	T_1	37ab
	T_2	34bc
	T_3	31cd
	T_4	40a
G_4	T_0	15k
	T_1	28def
	T_2	31cd
	T_3	26efg
	T_4	34bc
G_5	T_0	11l
	T_1	20j
	T_2	23g-j
	T_3	22hij
	T_4	25fgh
Level of Significance		**
LSD Value		3.362
CV (%)		6.21%

Genotype
$G_{1=}$White (double)
G_2= Yellow (double)
G_{3-}=Light orange (single)
G4=Light pink (spider)
G5=Deep red(double)

Treatment
T_0= Control
T_1=Cowdung
T_2= Mustard oil cake
T_3= Inorganic(Urea+ TSP+MOP)
T_4= Organic+ Inorganic

=Significant at **1% level of Probability

Vase life: The results of different genotypes considering vase life showedsignificant variation (Figure5a).Genotype G_1 showed the maximum vase life (9.47days)followed by genotypes G_2 (9 days).The lowest vase life was found in genotype G_4 (7.7 days).Variation in vase life among cultivars may be attributed to variations in their genetical make up.

Significant difference was observed in case of treatment effect (Figure 5b). Combined use of fertilizer (T_4) gives better vase life (9.33days) than single (i.e. only organic or inorganic) use of fertilizer.Thane *et al*. (2007) conducted an experiment on cut flower yield and quality of *G. jamesonii* and recorded vase life (8.95 days) from organic and inorganic fertilizers.

The interaction effect of Genotype and Treatment showed significant result. The highest vase life was recorded from G_1T_4(11 days). The lowest vase life was recorded from G_4T_0 (6.00) which were statically similar with G_3T_0 (6.33).

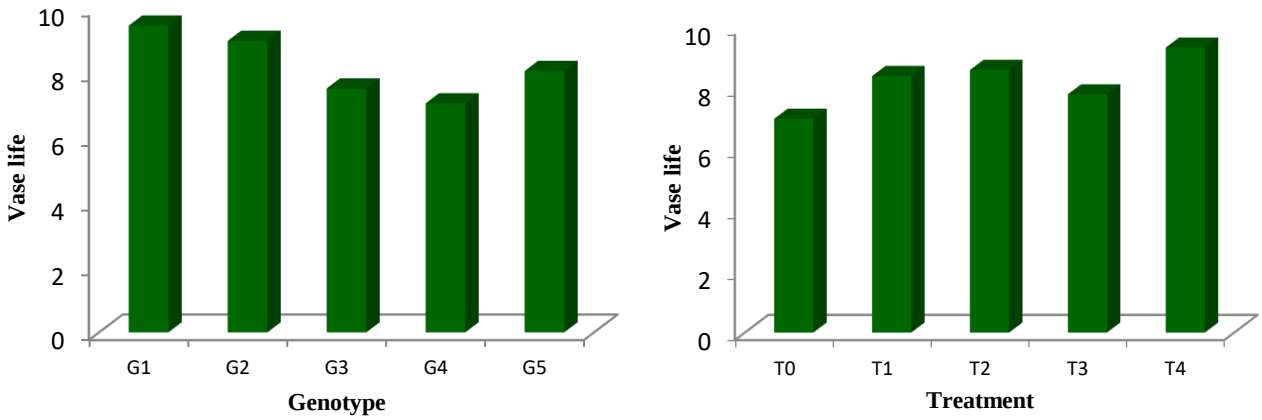


Figure 5. Vase life of Gerbera as influenced by different (a) genotypes and (b) treatments

Table 9. Interaction effect of genotypes and treatments on vase life of flower

Treatment Combination		Vase Life of Flower
G_1	T_0	8.00f
	T_1	9.33cd
	T_2	10.0b
	T_3	9.00de
	T_4	11.00a

G_2	T_0	7.67f
	T_1	9.00de
	T_2	9.67bc
	T_3	8.67e
	T_4	10.00b
G_3	T_0	6.33hi
	T_1	8.00f
	T_2	7.67f
	T_3	7.00g
	T_4	8.67e
G_4	T_0	6.00i
	T_1	7.67f
	T_2	7.00g
	T_3	6.67gh
	T_4	8.00f
G_5	T_0	7.00g
	T_1	8.00f
	T_2	8.87e
	T_3	7.67f
	T_4	9.00de
Level of Significance		*
LSD Value		0.542
CV (%)		4.01%

Genotype
G_1=White (double)
G_2= Yellow (double)
G_3=Light orange (single)
G4=Light pink (spider)
G5=Deep red(double)

Treatment
T_0= Control
T_1=Cowdung
T_2= Mustard oil cake
T_3= Inorganic(Urea+ TSP+MOP)
T_4= Organic+ Inorganic

*=Significant at 1% level of Probability

CONCLUSIONS

From the above mentioned findings and their discussion, it may be concluded that, among the five genotypes, G_3 was dwarf with maximum leaf and flower numbers. On the other hand, tall genotype G_5 showed the maximum leaf length and breadth, diameter of flower stalk and produced larger flower as well. Genotype G_1 showed the maximum vase life (9.47days) followed by genotype G_2 (9 days). Among the treatment, T_4 performed the best compare to other treatments, where organic and inorganic fertilizers were used together in recommended amount. In case of interaction effect, $G_3T_4$was observed to produce maximum number of leaves and flowers. The maximum diameter of peduncle and flower was recorded from G_5T_4. The highest vase life was recorded from G_1T_4 (11 days) followed by G_2T_4 (10 days) and G_2T_2 (9.67 days). For earlier and maximum flower genotype G_3, for larger flower genotype G_1, G_2 and G_5, and for long vase life genotype G_1 and G_2 can be suggested with organic + inorganic fertilizer combination.

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