

**EVALUATION OF GLADIOLUS
(*Gladiolus hybridus* Hort.) VARIETIES**

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EVALUATION OF GLADIOLUS
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By

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CERTIFICATE

This is to certify that the thesis entitled "**EVALUATION OF GLADIOLUS (*Gladiolus hybridus* Hort.) VARIETIES**" submitted by **Mr. BASAPPA S. KAMBLE** for the degree of **MASTER OF SCIENCE (HORTICULTURE)** in **FLORICULTURE AND LANDSCAPE GARDENING** of the University of Agricultural Sciences, Dharwad, is a record of research work done by him during the period of his study in this university under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar titles.

ARABHAVI
AUGUST 2001


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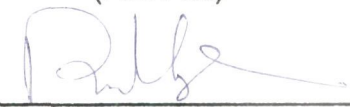
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INTRODUCTION

I. INTRODUCTION

Gladiolus (*Gladiolus hybridus* Hort.) is a glamorous bulbous flower of beauty and perfection. It is said to be the queen of bulbous flower crops grown in many parts of the world.

The word 'gladiolus' was coined from the Latin word 'Gladiolus' meaning a sword. It is also called as Sword Lily on account of the shape of its leaves. In Europe, it is commonly called as 'Corn flag' due to its infestation as a weed in corn fields. It was introduced into cultivation towards the end of sixteenth century (Innes, 1985), while it is of comparatively a recent introduction to India.

In the international cut-flower trade, gladiolus occupies fourth place and it is next to rose, chrysanthemum and carnation (Bose and Yadav, 1989). It is commercially cultivated in all parts of the world.

In India, it is grown in an area of 289 ha with a production of 459 lakh spikes (Kolavalli *et al.*, 1991). Major gladiolus growing states are Karnataka, Maharashtra, Tamil Nadu, Punjab, Haryana, Uttar Pradesh, West Bengal, Delhi and Nagaland.

Gladiolus is commonly propagated by corms and cormels. The corms are bulb like globose or ovoid having series of nodes and are wholly covered with tunic or husks.

Among the several flowering bulbous plant species in ornamental horticulture, gladiolus is very popular for its attractive

flower spikes. There are many excellent cultivars of gladiolus with magnificent inflorescence, in exhaustive range of colours, different shades, varying number of florets and size, wide range of keeping quality and adaptability to different seasons. These characters have made it very attractive for use as a cut flower, for vase, for bouquet preparation, for growing in herbaceous borders, beddings, rockeries, for pot cultivation and window boxes. India is having varied climatic conditions in different parts, which offers possibility of growing gladiolus throughout the year in one or the other parts of the country.

Gladiolus belongs to the family Iridaceae, consisting 250 species, of which 103 are native to South Africa (Annon., 1976). The common garden gladioli do not represent a single species, but are the products of continuous hybridisation of few species, that have proved horticulturally useful.

The performance of any crop or variety largely depends upon its genetical make up. Further, the performance of these crops depends upon climatic conditions of the region under which they are grown. As a result, cultivars, which perform well in one region, may not perform well in other regions of varying climatic conditions. Hence, it is very much necessary to collect and evaluate all the available genotypes in order to select suitable and high yielding genotypes.

Considering the commercial importance of gladiolus, research on this crop is very much necessary to find out the suitability of different varieties to a particular region. Growth, flowering, corm and cormel productivity are the important characters to be considered for the evaluation of varieties of gladiolus. Keeping these aspects in view, an experiment was laid out with the following objectives:

1. To assess the performance of different genotypes of gladiolus.
2. To identify the most suitable genotypes for maximising the flower production.
3. To identify the best genotypes having good flower quality and vase life.

REVIEW OF LITERATURE

II. REVIEW OF LITERATURE

The selection of cultivars is an important factor for successful cultivation of any flower crops. Many varieties of gladiolus have been developed in different parts of the world. As a result, there are wide range of cultivars in gladiolus, which vary in colour, shape of flowers and other quality parameters. The performance of these cultivars depends on climatic conditions under which they are grown. The available cultivars have to be evaluated for their performance in terms of vegetative growth, flowering and corm production. In this regard, it is very essential to look into the available literature in gladiolus and other related crops to understand the influence of genetical makeup on the performance of genotypes. Hence, the literature available on gladiolus and related flower crops have been reviewed and presented in this chapter.

2.1 Growth parameters

Leinfelder and Gruber (1985) compared 54 varieties of gladiolus and found early sprouting by 10 days in large flowered cultivars like Snow Princes, Rose Supreme, Hunting Song, Alde Baran, Jessica and Prabha than small flowered ones (Alice and Catalina). According to Arora and Sandhu (1987), sprouting in cv. Snow Princes was early but cv. Suchitra was late in sprouting. Saini *et al.* (1988) reported early sprouting of corms in cultivar Mazure (12.4 days). Early

sprouting was also observed by Hong and Gao (1991) in forms of cultivar Topaza among many gladiolus cultivars evaluated. Kalasaraddi (1996) reported early sprouting in cultivar American Beauty (15.91 days). Shiramagond (1997) observed early sprouting in cultivar Puppy Tear.

Mckay *et al.* (1981) reported variation in number of shoots produced per plant, which were maximum in cultivar Adventure and minimum in cv. Snow Velvet. Hegde (1994) reported that cultivars American Beauty and Ethel Cavecole produced maximum number of shoots per plant. Kalasaraddi (1996) reported cultivar American Beauty produced more number of shoots per plant. In a two year trial, cv. Salman Queen recorded maximum plant height, whereas Kotrain Local and Psittacinus hybrids were minimum in plant height. Saini *et al.* (1988) reported maximum plant height in cv. Mazure among many cultivars of gladiolus. Studies conducted at Pune by Dod *et al.* (1989) revealed that cv. Dibonar was best among different varieties of gladiolus with respect to plant height. Saini *et al.* (1991) studied the performance of six gladiolus cultivars under Hissar conditions and recorded maximum plant height in cv. George Mazure (99.70 cm) and minimum in cv. Miniature (59.70 cm). Hegde (1994) reported maximum plant height in Copper King among the many cultivars. Pasannavar (1994) reported higher plant height in Copper King. Sindhu and Verma (1995) studied the performance of 14

gladiolus cultivars under Katrain conditions and found that cultivars Age Wonder, Thumbolina and Sancera were best with respect to plant height. Kalasaraddi (1996) reported that cultivar American Beauty was the tallest by growing to a height of 41.94 cm. Shiramagond (1997) recorded maximum plant height in cv. Canadian Blood Red. Wilfret (1984) evaluated twenty commercial gladiolus cultivars under the agroclimatic conditions of Florida; correlation between the number of leaves and floret production. Varieties having maximum number of leaves had lower number of florets, while varieties having maximum leaves had maximum number of florets per spike. Studies conducted at Pune by Dod *et al.* (1989) revealed that cv. Dibonar was best with respect to number of leaves among the different varieties. Hegde (1994) reported maximum number of leaves in cultivars American Beauty and Ethel Cavecole. Pasannavar (1994) reported maximum number of leaves in American Beauty among the many varieties evaluated. Kalasaraddi (1996) reported maximum number of leaves in American Beauty and minimum in Melody. Similarly, Shiramagond (1997) recorded maximum number of leaves per plant in cultivar American Beauty. Kalasaraddi (1996) recorded long sized leaves and wider leaves in American Beauty. Mishra (1997) reported long sized leaves in PG-8 and PG-9 and wider sized leaves in genotypes PG-7 and PG-1. Shiramagond (1997) reported long sized leaves in Pacifica White and wider sized leaves in cultivar American Beauty.

2.2 Flowering, flower yield and flower characters

In an evaluation of twenty commercial cultivars of gladiolus under Florida conditions, Wilfret (1970) found flower quality indices ranging from 0.8 in Orange Gold to 6.1 in Wild Rose and rated as the best cultivar based on flower quality and quantity.

Swarup and Raghava (1972) evaluated many promising gladiolus cultivars for the North Indian plains. They assessed these genotypes on the basis of certain characteristics such as number of days taken for first floret opening, spike length, number of florets. These 122 cultivars were grouped in to early, mid season and late flowering. The varieties which produced flower spikes within 60 days after planting (DAP) were grouped as early and those which flowered in 60 to 80 DAP, as mid season and those which took more than 80 DAP, as late flowering types. Among these, Snow Princes was promising cultivar having long spikes and large florets.

Misra and Choudhary (1976) studied the performance of 100 gladiolus cultivars under Simla conditions. Out of which thirty seven cultivars were found outstanding for various quantitative characters. The cultivars which flowered within 70 DAP were grouped as early and those flowered between 70 to 100 days as medium which include Friendship, Green Wood Pecker, Happy End, Oscar, Snow Princess and Vink Glory. The group, which required more than 100 days were categorised as late, which includes Sylvia. The cultivar Vink's Glory

performed well with respect to spike length (1.0 to 1.3 m), while cultivars Friendship, Happy End, Vink's Glory were good cultivars with attractive florets.

Varela *et al.* (1977) evaluated 34 gladiolus cultivars in the Meresme region of Spain and recommended eight cultivars as promising ones. The promising cultivars included three red cultivars (Red Beauty, Cardula and Happy End), two yellow cultivars (Chalou and Yellow Emperor), two pink cultivars (Wild Rose and Hunting Song) and one orange cultivar (May Bride). All the varieties had good quality flowers and percentage flowering varied between 56.6 per cent in Red Beauty to 88.0 per cent in Happy End.

While studying the performance of seven gladiolus cultivars under Chakarta conditions, Lal and Singh (1978) found cultivars House of Orange and Oscar having longest spikes (66.5 and 66.0 cm, respectively) and early flowering in cv. House of Orange (92.2 days) and highest number of flowers per spike in cultivar Oscar (17).

Singh and Dohare (1980) studied the performance of new cultivars namely Agni Rekha (fire red), Suchitra (rose with vermillion strips) and Mayur (lilac purple) under Delhi conditions. Agni Rekha had fire red coloured florets with 18 florets per spike and six opened florets at a time.

Negi *et al.* (1982) evaluated 1091 hybridus for various characteristics under Bangalore conditions and came out with a few

promising ones which were named and released as Sapna, Meera, Poonam, Apsara and Arati.

Lal *et al.* (1984) assessed 47 gladiolus cultivars in Uttar Pradesh hills and grouped these cultivars into early, mid and late season bloomers. They reported spike length of 85.10 cm in Friendship and 81.40 cm in Oscar and number of florets as high as 22 per spike in Friendship, which was maximum.

In a varietal performance study of gladiolus cultivars in Brazil, Hanvan Megreen and Happy End were found as best ones (Mattos *et al.*, 1984).

Dr. Magie – a Salmon gladiolus cultivar was Fusarium resistant and performed well under Florida conditions as compared to other gladiolus cultivars evaluated (Wilfret, 1984).

Cultivars Suchitra, Melody, Ratan's Butterfly and Snow Princess were superior among many varieties evaluated with respect to spike length, which ranged from 80 to 90 cm under Ludhiana conditions (Arora and Khanna, 1985).

Arora and Sandhu (1987) reported longest and heaviest spikes and biggest florets in cv. Oscar. The cultivars Snow Princess and Sylvia were having the highest number of opened florets per spike.

Cultivar Salmon Queen had the maximum spike length, highest number of florets and floret diameter (Misra *et al.*, 1987).

Singh and Singh (1987) studied the performance of 41 gladiolus cultivars under the agroclimatic conditions of Delhi and reported that cultivars Friendship and Melody were most suitable for floral characters. The number of days to first floret opening varied from 83.36 to 119.26. On the basis of this character, cultivars were grouped into early, mid and late season. The early cultivars which flowered between 75 to 85 DAP were Snow Princess, Happy End and Vink's Glory. Cultivar Green Wood Pecker was included under mid season group, which flowered between 85 to 95 DAP. The late cultivar, which flowered 95 DAP was Sylvia.

According to Arora and Sandhu (1987), spike length was minimum in cv. Sylvia (58.79 cm), while it was maximum (79.09 cm) in cv. Oscar.

The average number of spikes per plant was higher (2.0) in Miniature cultivars as compared to other cultivars. The least number (1.0) of spikes was produced by cv. Sylvia. Significant differences were recorded among the cultivars with respect to marketable spikes per plant (Saini *et al.*, 1988).

Arora and Sharma (1991) in their varietal study under Ludhiana conditions with five cultivars found early flower opening in Princess and described Melody as a good performer.

Lal and Pant (1992) studied the performance of newly developed hybrids of gladiolus under Uttar Pradesh hilly conditions and found

Chaubattia Arunima with highest spike length of 89.20 cm and Chaubattia Ankur with an average spike length of 85.80 cm.

In an evaluation of seven Indian bred gladiolus cultivars, the results revealed that Sapna was significantly earliest in respect of days required for flowering. Suchitra and Tropic Seas were mid-late, whereas Selection-1 was significantly late in respect of flowering. There was no significant difference in length of spikes of different cultivars. Length of spike was more in cultivar Tropic Seas, while minimum in cv. Mayur. Cvs. Suchitra and Sapna had higher number of florets per spike (Patil *et al.*, 1993).

Cultivar Summer Pearl recorded the longest spike (112.67 cm), followed by cultivars Chipper and Hankan Wegreen produced longer spikes (more than 100 cm). Further, rachis length was maximum in Summer Pearl, Chipper and Friendship. The spike length varied from a minimum of 72.66 in cv. Wedding Bouquet to a maximum of 89.66 cm in cultivar American Beauty. American Beauty was significantly superior to other cultivars for spike length. The cultivar Wedding Bouquet produced the shortest spikes of 72.66 cm (Hegde, 1994).

Pasannavar (1994) reported that floret length was maximum (11.19 cm) in cv. American Beauty and was minimum (8.47 cm) in Sylvia. Spike girth was maximum (0.98 cm) in cultivar Copper King and was minimum (0.76 cm) in cv. Happy End. Cultivar American

Beauty produced maximum spike yield (2,32,100/ha), while cultivar Wedding Bouquet produced minimum spike yield (83.950/ha).

Sindhu and Verma (1995) studied the performance of 14 gladiolus cultivars under Katrain conditions and found that cultivars Age Wonder, Thumbolina and Sancera were best with respect to spike length and diameter of florets.

According to Kalasaraddi (1996), American Beauty followed by Melody were best with respect to spike length, number of florets per spike (13.12) and diameter of the flowers.

Mishra (1997) studied the performance of ten gladiolus cultivars and reported significantly longer spike and higher rachis length in PG-8 and PG-9 cultivars and bigger size florets and more number of spikes per plant in PG-14 and PG-4.

Shiramagond (1997) studied the performance of 8 gladiolus cultivars under Arabhavi conditions and found cultivars Pacifica White, Summer Sunshine, Canadian Blood Red as best with respect to spike length and American Beauty as best with respect to number of spikes per plant.

2.3 Yield of corms and cormels

Varieties Ratan's Butterfly, Snow Princess and Apple Blossom were good for multiplication of corms and cormels and less affected by the diseases in northern plains (Swarup and Raghava, 1972).

Misra and Choudhary (1976) reported that variety Vink's Glory was found to be the best multiplier of the corms and cormels. It multiplies more than four times in a season. Other varieties like Gold Dust, Sylvia and Winter Gladioli were also satisfactory multipliers of corms and cormels.

Lal and Singh (1978) found that cultivar House of Orange as the largest producer of cormels per plant (146). Negi *et al.* (1982) studied the performance of four new gladiolus cultivars, *viz.*, Sapna, Meera, Nazarana and Poonam for different characters. They found that all the four new cultivars were good for corms and cormels production. Mattos *et al.* (1984) studied the performance of seven gladiolus cultivars in Brazil and reported that Hanvan Megreen and Happy End were the best yielders of corms and cormels, while evaluating thirty gladiolus cultivars in a period of 3 years under Ludhiana conditions for different characters are qualitative and quantitative (Arora and Khanna, 1985). Arora and Sandhu (1987) studied the performance of 15 gladiolus cultivars under Ludhiana conditions and found the highest corm production in cv. Melody, while the higher cormel production in Suchitra. According to Misra *et al.* (1987) in their two years experiment under Katrain conditions with 12 cultivars of gladiolus, the Miniature cultivar produced more number of corms than the late bloomers, which produced less number of corms. But late bloomers produced bigger cormels due to

ample time for development. Singh and Singh (1987) studied performance of 41 gladiolus cultivars in Delhi and reported that cultivars Friendship and Melody as best ones for corm and cormel multiplication, while the cultivar Sylvia as the better one for the cormel size. Saini *et al.* (1991) studied the performance of six gladiolus cultivars under Hissar conditions and found Melody as a good multiplier of corms and cormels. In a study on the evaluation of seven Indian bred gladiolus cultivars, Patil *et al.* (1993) found cultivars Selection-1, Mayur, Suchitra and Tropic Seas as good ones for multiplication of corms and cormels. Size and weight of daughter corms and number of cormels were maximum in cultivar Summer Pearl under Dharwad conditions (Hegde, 1994). Corm size and weight was maximum in American Beauty (Pasannavar, 1994). Varieties Thumbolina, High Fashion, G-55 and Wing Song were the best multipliers of the corms and cormels (Sindhu and Verma, 1995). Variety American Beauty was also found to be the best multiplier of corms and cormels (Kalasaraddi, 1996). Genotypes PG-9 and PG-8 produced more number of corms and cormels (Mishra, 1997). Varieties American Beauty, Chipper White and Summer Sunshine were found to be the best multiplier of corms, while cultivars Summer Pearl, American Beauty and Apple Blossom were best with respect to cormel production.

Vase life

Cultivar Pusa Suhagin had higher vase life (11.58 days) over other cultivars (Saini *et al.*, 1991). Vase life was maximum in cultivar Tropic Seas (8.22 days), while it was minimum in cultivar Selection-1 (5.77 days) (Patil *et al.*, 1993). According to Pasannavar (1994), vase life of spike was maximum in cultivar American Beauty (11.60 days), whiel it was minimum in cultivar Happy End (7.60 days). Kalasaraddi (1996) observed higher vase life in cv. American Beauty (9.20 days), while minimum in cultivar Melody (8.90 days). Shiramagond (1997) observed higher vase life in cultivar Summer Sunshine (8.00 days) among many gladiolus cultivars evaluated.

MATERIAL AND METHODS

III. MATERIAL AND METHODS

The present investigations were carried out at Kittur Rani Channamma College of Horticulture, Arabhavi, Belgaum district of Karnataka during the period from August 2000 to January 2001 to study the performance of nine gladiolus varieties. The details of the materials used and techniques adopted during the course of investigations are described in this chapter.

3.1 Geographical location of the experimental site

Arabhavi is located in the Northern dry zone (Zone-3) of Karnataka state, geographically lies at 16°15' North latitude, 74°15' East longitude with an altitude of 612.03 m above mean sea level and receives an average rainfall of 423.70 mm.

3.2 Climatic conditions

Arabhavi is having the benefit of both South-West and North-East monsoons. The mean annual rainfall of this area is about 423.20 mm, which is distributed over a period of six to seven months (April to October) with prominent peaks during June to October. During the period of experimentation, the mean maximum temperature ranged from 28.07°C (August, 2000) to 30.00°C (November, 2000), the mean minimum temperature ranged from 12.27°C (December, 2000) to 22.81°C (August, 2000) and the mean relative humidity ranged from 53.54 per cent (March, 2000) to 79.15

(July, 2000). Meteorological data for the year 2000 to 2001 is presented in Appendix-I.

3.3 Planting material

Corms of the varieties used in this experiment were stored for four months after lifting from the field of previous crop and planted when they started sprouting.

3.4 Design and layout of the experiment

The experiment was laid out at Kittur Rani Channamma College of Horticulture, Arabhavi on 2nd August 2000. A spacing of 0.6 m between replications was provided for laying out irrigation channels and a spacing of 0.30 m was provided between plots. In each plot, 30 plants were accommodated.

Design of the experiment	: Randomised Block Design
Replications	: Three
Treatments	: Nine
Plot size	: 1.5 m x 1.2 m
Spacing	: 30 cm x 20 cm

Treatment details (varieties)

V ₁ : Summer Sunshine	V ₆ : American Beauty
V ₂ : Sylvia	V ₇ : Melody
V ₃ : Trust	V ₈ : Snow White
V ₄ : Majic	V ₉ : Yellow Cup
V ₅ : Vedanapoli	



Plate 1. Experimental field view at Kittur Rani Channamma
College of Horticulture, Arabhavi



Plate 2. Plate showing harvested flower spikes in cv. American Beauty

3.5 Land preparation, planting and cultural practices

The land was brought to fine tilth by repeated ploughing and harrowing and divided into flat beds of required size. Well-decomposed farmyard manure was applied before the land preparation at the rate of 25 tonnes/ha and mixed well into the soil. Fertilizers were applied at the rate of 20 : 60 : 20 g NPK per plot. Fifty per cent of nitrogen and full dose of phosphorus and potash were applied as basal dose and the remaining fifty per cent of nitrogen was applied 45 days after planting.

Before planting, the corms were dipped in Carbendazin (0.2%) solution for 10 minutes and dried under shade. Planting was taken up at 30 x 20 cm spacing at 5 to 6 cm depth. Light irrigation was given immediately after planting.

Weeding was taken up whenever it was necessary to keep the field free from weeds. Irrigation was given at regular intervals so as to maintain adequate soil moisture in the soil.

As a prophylactic measure, the whole plot was drenched with 0.2 per cent Carbendazin, once in a month after planting to control the fusarium wilt. Cut worms were noticed in the month of August and September and were controlled with soil application of Corbofuran granules near the plants in the rows at 30 and 45 days after planting. Monocrotophos was sprayed at the rate of 2 ml per litre to control hairy caterpillars at 30 and 45 days after planting

which were noticed in the months of August, September and November.

3.6 Harvesting

The spikes were harvested when one or two basal florets opened in a spike. The corms and cormels were removed from the ground when the foliage turned to yellow colour. The harvested corms and cormels were further used for recording different parameters.

3.7 Observations recorded

Five plants were selected at random within the net plot area of each treatment and replication for the purpose of recording the observations. The mean value of the data observed from five plants in each treatment of the three replications was taken to represent a particular genotype with respect to a character.

3.7.1 Growth parameters

3.7.1.1 Number of days taken for 50 per cent sprouting

Number of days taken for 50 per cent of corms to sprout from date of planting to emergence was recorded.

3.7.1.2 Plant height

Plant height was recorded in centimetres from the tagged plants from base of the plant to the tip of the longer leaf at 30 and 60 days after planting and the average was worked out.

3.7.1.3 Number of shoots per plant

Number of shoots per plant was recorded at 30 DAP from the tagged plants and then average was worked out.

3.7.1.4 Number of leaves per plant

Number of leaves produced from the tagged plants was recorded by counting the number of leaves at 30 and 60 DAP and average number of leaves produced per plant was worked out.

3.7.1.5 Plant girth

It was measured at 30 and 60 days after planting from the tagged plants with the help of vernier calipers leaving 5 cm from the ground level. The average was worked out and expressed in centimetres.

3.7.1.6 Leaf length

Leaf length was recorded from the base to tip of the leaf in the tagged plants at 30 and 60 DAP and average was worked out and expressed in centimetres.

3.7.1.7 Leaf width

Width of three leaves from the middle was recorded from the tagged plants by using scale. The average was worked out and expressed in centimetres.

3.8 Flowering and flower yield characters

3.8.1 Time taken for initiation of spike

This was recorded from the tagged plants by counting the number of days taken from planting of corm to spike emergence and the average was worked out.

3.8.2 Time taken for first floret opening

Number of days taken from planting of corms to first floret opening was recorded in tagged plants and average was worked out.

3.8.3 Spike length

Length of spike was measured from the tagged plants in centimetres from the fourth internode to tip of the inflorescence.

3.8.4 Rachis length

Length of rachis was measured in tagged plants in centimetres from the point of origin of first floret to the last floret.

3.8.5 Number of florets per spike

Number of florets per spike was counted from all the spikes of tagged plants and average was worked out.

3.8.6 Weight of the spike

It was recorded by weighing the spikes when the first one or two basal florets are opened. The average weight was worked out from the five spikes and expressed in grams.

3.8.7 Girth of spike

Girth of spike was measured at the point just below the basal floret with the help of vernier calipers from the tagged plants and average was worked out and expressed in centimetres.

3.8.8 Diameter of the floret

Diameter of the floret was measured with the help of scale from 20 florets, by randomly selecting, in tagged plants and average was worked out and expressed in centimetres.

3.8.9 Spike yield

Number of spikes produced per plant was recorded from the tagged plants and average number of spikes produced per plant was worked out.

3.8.10 Number of spikes per plot

Number of harvested spikes from each plant was computed on plot basis and expressed in numbers per plot.

3.8.11 Number of spikes per hectare

Number of spikes produced per hectare was worked out with the help of the following formula:

$$\text{Spikes/ha} = \frac{\text{Number of spikes per plot} \times 10000}{\text{Plot size (1.8 sq.m.)}}$$

3.9 Observations on corm and cormel characters

3.9.1 Number of daughter corms per plant

Number of corms produced per plant was recorded from the tagged plants as daughter corms per plant and average corms produced per plant were worked out.

3.9.2 Size of daughter corms

Equatorial diameter of the harvested corms from the tagged plants was recorded with vernier calipers and average was worked out and expressed in centimetres.

3.9.3 Weight of daughter corms

Corms produced per plant and harvested were lifted and weighed and average weight of corms produced per plant was worked out from the tagged plants and expressed in grams.

3.9.4 Weight of daughter corms per plot

Corms harvested from the plot were weighed and expressed in kilograms.

3.9.5 Weight of daughter corms per hectare

Corms yield on hectare basis in terms of weight was worked out by following formula:

$$\text{Corm yield (weight)/ha} = \frac{\text{Corm weight per plot} \times 10000}{\text{Plot size (1.8 sqm)}}$$

3.9.6 Number of cormels per plant

The number of cormels produced per plant was recorded from the tagged plants and the average was worked out and expressed as cormel yield in numbers per plant.

3.9.7 Size of cormels

Equatorial diameter of the harvested cormels from the tagged plants was recorded after harvest and average was worked out and expressed in grams.

3.9.8 Weight of cormels per plant

Weight of the harvested cormels from the tagged plants was recorded and expressed in grams.

3.9.9 Weight of cormels per plot

Cormels harvested from each plot were weighed and expressed in kilograms.

3.9.10 Weight of cormels per hectare

Cormels yield in terms of weight on hectare basis was worked out by using following formula:

$$\text{Cormels weight/ha} = \frac{\text{Cormels weight per plot} \times 10000}{\text{Plot size (1.8 sqm)}}$$

3.10 Vase life

The spikes were cut when one or two basal florets are opened, brought to the laboratory and kept in tap water immediately after giving recut to the cut end. These flower spikes were kept in vase having tap water to study the life of spike in tap water without chemicals. The end of the life of spikes was considered when 50 per cent of the florets were wilted.

3.11 Statistical analysis

Data were subjected to statistical analysis as per the procedure designed by Panse and Sukhatme (1967) and treatments were compared at five and one per cent probability level.

EXPERIMENTAL RESULTS

IV. EXPERIMENTAL RESULTS

The results of the experiment entitled "Evaluation of gladiolus varieties (*Gladiolus hybridus* Hort.)" conducted during August 2000 to January 2001 in the experimental unit of Department of Floriculture and Landscape Gardening, Kittur Rani Channamma College of Horticulture, Arabhavi are presented in this chapter. Performance of nine cultivars was assessed on the basis of vegetative and flowering characters included in the present investigation.

4.1 Vegetative parameters

4.1.1 Number of days taken for 50 per cent sprouting

Data pertaining to number of days taken for 50 per cent sprouting as influenced by different cultivars of gladiolus are presented in Table 1.

The differences varied significantly with respect to number of days taken for 50 per cent of corms to sprout, which ranged from 4.33 to 20.33 days. Cultivar Sylvia took minimum number of days (4.33) for 50 per cent sprouting, while cultivar Majic and Trust took more number of days (20.33 and 18.00, respectively). Cultivars Summer Sunshine (16.00 days), Yellow Cup (13.33 days), Snow White (11.00 days) and Melody (10.33 days) were medium in time taken for their corms to reach 50 per cent sprouting and were at par.

4.1.2 Number of shoots

The data pertaining to number of shoots produced per plant in different gladiolus cultivars at 30 and 60 DAP are presented in Table 1.

4.1.2.1 Number of shoots produced at 30 DAP

There was a significant difference among the cultivars with respect to number of shoots produced per plant at 30 DAP. It ranged between 1.0 in Majic to 3.60 in Vedanapoli. Cultivars Vedanapoli (3.60) and Sylvia (3.40) were at par. The cultivars Summer Sunshine (1.30), Trust (1.30), American Beauty (1.30), Snow White (1.20) and Yellow Cup (1.20) were at par with respect to number of shoots produced per plant at 30 DAP.

4.1.2.2 Number of shoots produced at 60 DAP

The difference among the cultivars were significant with respect to number of shoots at 60 DAP. Number of shoots produced per plant ranged between 1.0 to 3.80. The cultivars Vedanapoli and Sylvia produced significantly higher number of shoots (3.80 and 3.40, respectively) and these did not differ significantly between themselves. On the other hand, other cultivars did not differ significantly among themselves. However, Majic (1.06), Melody (1.13) produced lower number of shoots as compared to other cultivars.

Table 1. Sprouting of corms and number of shoots per plant as influenced by different cultivars of gladiolus

Sl. No.	Variety	Days taken for sprouting of corms	Number of shoots per plant	
			30 DAP	60 DAP
1.	Summer Sunshine	16.00	1.30	1.33
2.	Sylvia	4.33	3.40	3.47
3.	Trust	18.00	1.30	1.30
4.	Majic	20.33	1.00	1.06
5.	Vedanapoli	19.33	3.60	3.80
6.	American Beauty	7.67	1.30	1.53
7.	Melody	10.33	1.13	1.13
8.	Snow White	11.00	1.21	1.21
9.	Yellow Cup	13.33	1.20	1.20
	S.Em±	1.46	0.23	0.24
	C.D. at 5%	4.36	0.69	0.72

4.1.3 Plant height

The data pertaining to height of the plant at 30 and 60 DAP in different gladiolus cultivars are presented in Table 2.

4.1.3.1 Plant height at 30 DAP

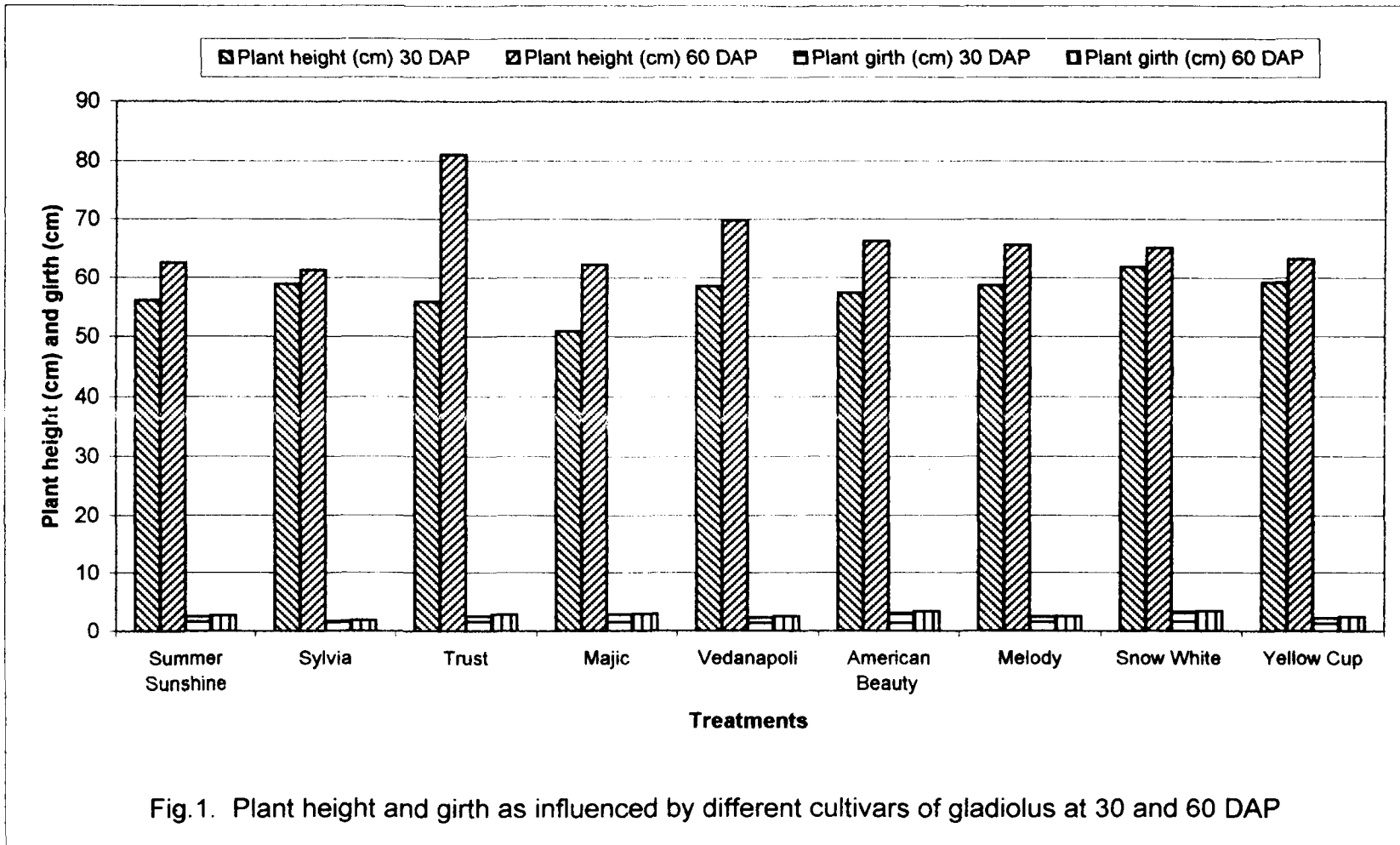
Plant height varied significantly among the cultivars at 30 DAP. The cultivar Snow White recorded maximum plant height (61.93 cm), while the Majic recorded the minimum (50.90 cm). Cultivars like Yellow Cup (59.23 cm), Sylvia (58.90 cm), Melody (58.70 cm), Vedanapoli (58.60 cm) and American Beauty (57.40 cm) were medium in plant height. Cultivars Summer Sunshine (56.13 cm) and Trust (55.92 cm) were comparatively dwarf.

4.1.3.2 Plant height at 60 DAP

The cultivars differed significantly among themselves with respect to height of the plant at 60 DAP. The cultivar Trust recorded maximum plant height (81.06 cm) and was significantly superior over other cultivars, while the cultivar Sylvia recorded minimum plant height (61.30 cm). Cultivars like Vedanapoli, American Beauty, Melody, Snow White, Yellow Cup, Summer Sunshine and Majic (69.90, 65.65, 65.20, 63.28, 62.60 and 62.30 cm, respectively) did not differ significantly among themselves.

Table 2. Plant height and girth as influenced by different cultivars of gladiolus

Sl. No.	Variety	Plant height (cm)		Plant girth (cm)	
		30 DAP	60 DAP	30 DAP	60 DAP
1.	Summer Sunshine	56.13	62.60	2.50	2.67
2.	Sylvia	58.90	61.30	1.70	1.84
3.	Trust	55.92	81.06	2.50	2.80
4.	Majic	50.90	62.30	2.80	2.91
5.	Vedanapoli	58.60	69.90	2.30	2.50
6.	American Beauty	57.40	66.30	3.04	3.33
7.	Melody	58.70	65.65	2.40	2.51
8.	Snow White	61.93	65.20	3.30	3.40
9.	Yellow Cup	59.23	63.28	2.23	2.43
	S.Em±	1.20	3.76	0.09	0.16
	C.D. at 5%	3.61	11.26	0.25	0.49



DAP = Days after planting

4.1.4 Plant girth

4.1.4.1 Plant girth at 30 DAP

The differences among the cultivars for plant girth varied significantly at 30 DAP. The plant girth was higher in Snow White (3.30 cm), while it was the lowest in Sylvia (1.70 cm). With respect to statistical significance for plant girth at 30 DAP, American Beauty (3.04 cm), Majic (2.80 cm) and cultivars Summer Sunshine (2.50 cm), Trust (2.50 cm) and Melody (2.40 cm) were at par with each other, while Vedanapoli (2.30 cm) was on par with Yellow Cup (2.23 cm).

4.1.4.2 Plant girth at 60 DAP

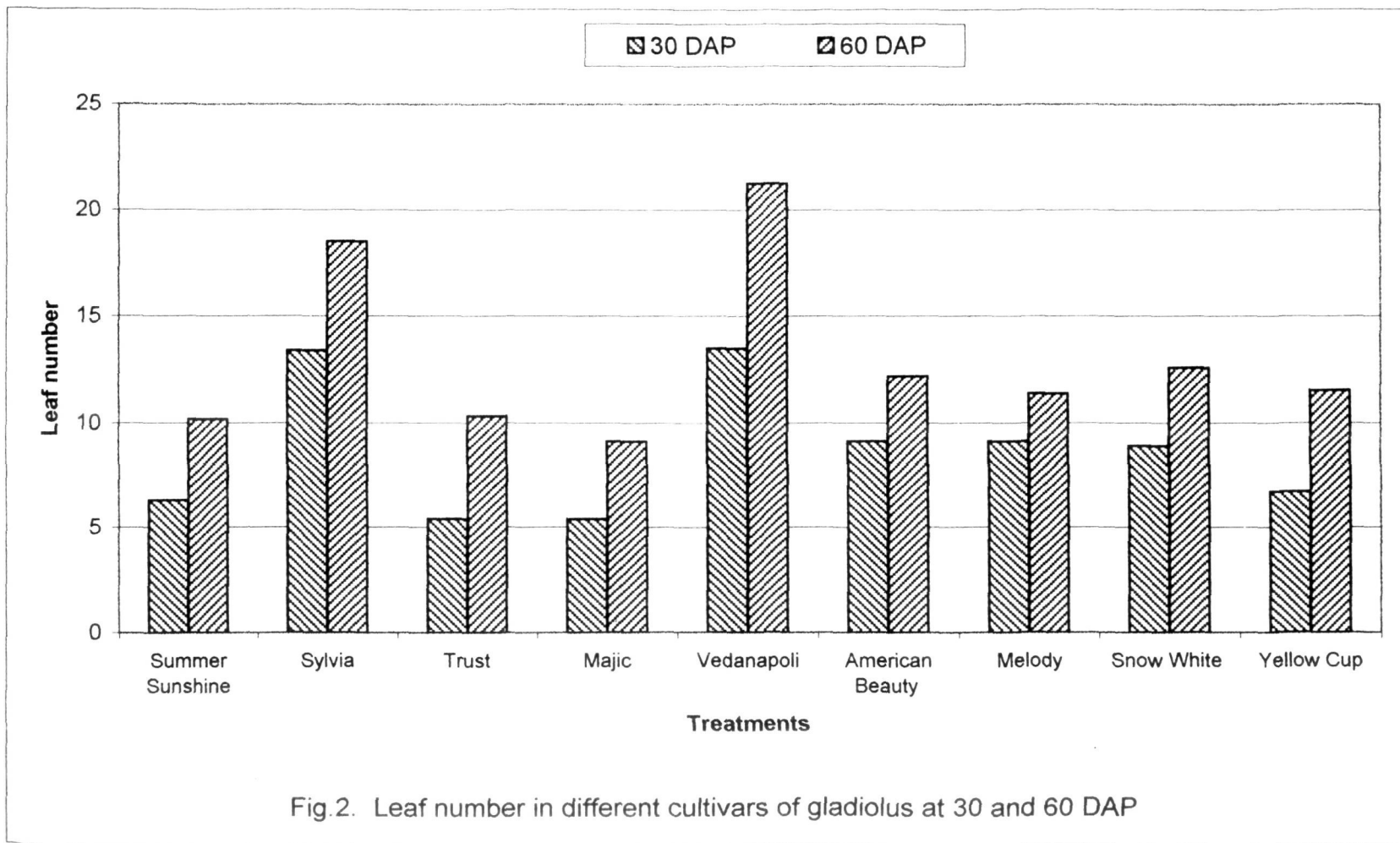
The variations for plant girth were significantly different due to the cultivars at 60 DAP. The highest plant girth was recorded in Snow White (3.40 cm), while the minimum plant girth was recorded in Sylvia (1.84 cm) with respect to statistical significance for plant girth among the rest of cultivars. American Beauty (3.33 cm) was on par with Majic (2.91 cm) and cultivars Summer Sunshine (2.67 cm), Melody (2.51 cm) and Yellow Cup (2.43 cm) were at par with respect to plant girth at 60 DAP.

4.1.5 Leaf production

The data pertaining to leaf production at different stages of plant growth are presented in Table 3.

Table 3. Leaf production as affected by different cultivars of gladiolus at different stages of plant growth

Sl. No.	Variety	Number of leaves	
		30 DAP	60 DAP
1.	Summer Sunshine	6.30	10.20
2.	Sylvia	13.40	18.53
3.	Trust	5.40	10.33
4.	Majic	5.40	9.13
5.	Vedanapoli	13.50	21.27
6.	American Beauty	9.13	12.20
7.	Melody	9.13	11.40
8.	Snow White	8.90	12.60
9.	Yellow Cup	6.73	11.53
	S.Em±	1.58	1.13
	C.D. at 5%	4.78	3.38



DAP = Days after planting

4.1.5.1 Number of leaves at 30 DAP

The number of leaves produced per plant differed significantly among the cultivars of gladiolus at 30 DAP. The number of leaves produced per plant ranged from 5.40 to 13.50. Among the cultivars, the leaf production was maximum in Vedanapoli (13.50) and was closely followed by Sylvia (13.40), but it was minimum in Majic and Trust (5.40). Cultivar Vedanapoli was closely followed by Sylvia (13.40) and American Beauty (9.13). Cultivars Yellow Cup (6.73) and Summer Sunshine (6.30), which recorded less number of leaves were on par with Majic and Trust, which produced least number of leaves per plant (5.40).

4.1.5.2 Number of leaves at 60 DAP

The leaf production varied significantly due to cultivars at 60 DAP and ranged from 9.13 in Majic to 21.27 in Vedanapoli. Cultivar Sylvia with 18.53 leaves per plant was next only to Vedanapoli. Cultivars Snow White, American Beauty, Yellow Cup and Melody with 12.60, 12.20, 11.53 and 11.40 leaves per plant, respectively, were on par with each other. Similarly, cultivars Trust and Summer Sunshine were at par with respect to leaf production, recording 10.33 and 10.20 leaves per plant, respectively.

4.1.6 Leaf size

The data pertaining to leaf size in terms of leaf width and length are presented in Table 4.

4.1.6.1 Leaf width at 30 DAP

There was a significant difference among the cultivars with respect to leaf width at 30 DAP. The leaf width was maximum in Trust (5.30 cm) and was minimum in Sylvia (3.50 cm). Cultivars Yellow Cup (4.90 cm), Summer Sunshine (4.90 cm), Snow White (4.31 cm) and American Beauty (4.07 cm) were at par with each other, but their leaf width was higher than Sylvia (3.50 cm), Vedanapoli and Melody (3.90 cm) and Majic (3.74 cm), which were at par with respect to this character.

4.1.6.2 Leaf width at 60 DAP

The leaf width as measured at 60 DAP differed significantly due to different cultivars of gladiolus. Leaf width was maximum in Trust (5.76 cm), while it was minimum in Sylvia (3.93 cm). Cultivar Yellow Cup (5.33 cm) was on par with Summer Sunshine (5.28 cm), whereas Majic (4.60 cm), Snow White (4.57 cm), American Beauty (4.50 cm), Melody (4.41 cm) and Vedanapoli (4.33 cm) were at par with each other with respect to this.

4.1.6.3 Leaf length

4.1.6.3.1 Leaf length

The data indicates the existence of varietal differences with regard to leaf length at 30 DAP. Leaf length which ranged between 36.40 cm to 43.71 cm was maximum in Sylvia (43.71 cm), while it

Table 4. Leaf size as affected by different cultivars of gladiolus at different stages of plant growth

Sl. No.	Variety	Leaf width (cm)		Leaf length (cm)	
		30 DAP	60 DAP	30 DAP	60 DAP
1.	Summer Sunshine	4.90	5.28	41.70	48.93
2.	Sylvia	3.50	3.93	43.71	44.34
3.	Trust	5.30	5.76	37.20	53.31
4.	Majic	3.74	4.60	36.40	44.87
5.	Vedanapoli	3.90	4.33	39.90	49.55
6.	American Beauty	4.07	4.50	42.30	45.16
7.	Melody	3.90	4.41	38.70	42.67
8.	Snow White	4.31	4.57	42.02	44.12
9.	Yellow Cup	4.90	5.33	40.50	43.94
	S.Em±	0.32	0.27	1.32	1.37
	C.D. at 5%	0.95	0.82	3.95	4.09

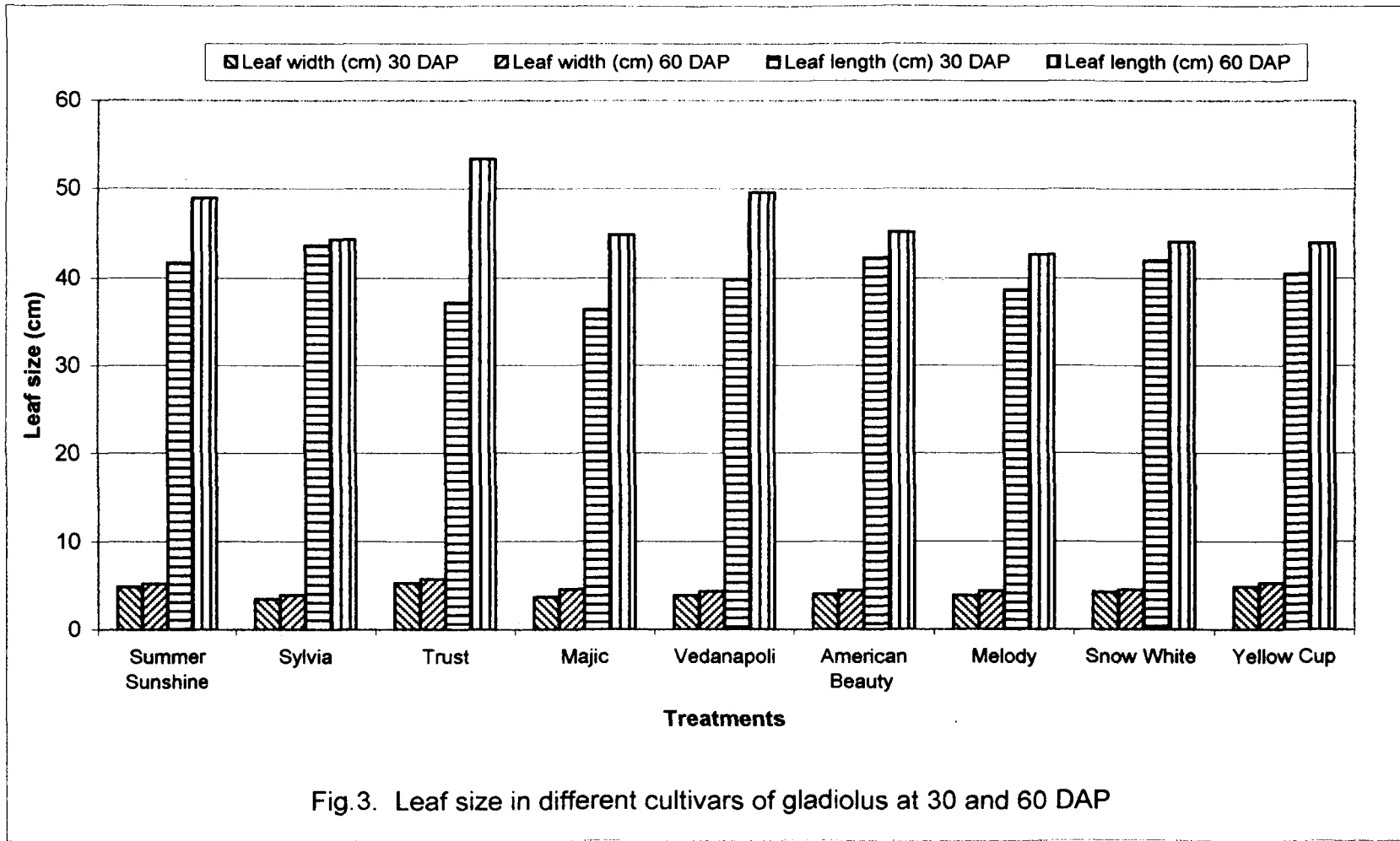


Fig.3. Leaf size in different cultivars of gladiolus at 30 and 60 DAP

DAP = Days after planting

was minimum in Majic (36.40 cm). Cultivar Sylvia was on par with American Beauty (42.30 cm), Snow White (42.02 cm), Summer Sunshine (41.70 cm) and Yellow Cup (40.50 cm), while Vedanapoli (39.90 cm) and Melody (38.70 cm) were on par with cv. Trust (37.20 cm).

4.1.6.3.2 Leaf length at 60 DAP

The data indicates the existence of significant varietal differences with regard to leaf length at 60 DAP. Leaf length, which ranged between 42.67 cm to 53.31 cm was maximum in Trust (53.31 cm), while it was minimum in Melody (42.67 cm). Cultivars Vedanapoli (49.55 cm), Summer Sunshine (48.93) and American Beauty (45.16 cm) were statistically at par.

4.2 Flowering parameters

4.2.1 Number of days taken for spike emergence

Data with respect to number of days taken for spike emergence as affected by different gladiolus cultivars are given in Table 5.

There were significant differences among the varieties regarding number of days taken for spike emergence, which ranged from 58.20 days (Snow White) to 8.80 days (Majic) indicating the earliness in Snow White and delayed spike emergence in Majic. Varieties Trust (76.47 days) and Vedanapoli (75.73 days) took more number of days compared to Snow White for spike emergence. Cultivars Summer

Sunshine (64.40 days), Yellow Cup (63.13 days) and Sylvia (62.00 days) were on par with each other, while Melody (60.83 days) was on par with American Beauty (60.67 days).

4.2.2 Number of days taken for first floret opening

The data with respect to number of days taken for first floret opening as affected by different gladiolus cultivars are presented in Table 5.

Significant differences were obtained in days taken for first floret opening among the varieties. The number of days taken for first floret opening ranged between 66.70 days to 98.13 days. Cultivar Majic took maximum days for first floret opening (98.13 days), while Snow White (66.70 days) took least number of days for first floret opening. Cultivar Melody (69.87 days) was on par with American Beauty (68.13 days), while cultivars Summer Sunshine (74.73 days) and Yellow Cup (70.74 days) were on par with Sylvia (70.73 days) with respect to this character.

4.2.3 Duration of flowering

Observation with respect to duration of flowering as influenced by different gladiolus cultivars are presented in Table 5.

The duration of flowering as influenced by different cultivars of gladiolus varied significantly, which ranged between 85.00 days to 110.00 days. Cultivars Majic (110.00 days), Trust (108.00 days) and



Plate 3. Plate showing cv. American Beauty in flowering



Plate 4. Plate showing harvested flower spikes in cv. Sylvia

Table 5. Number of days taken for spike emergence, first floret opening and duration of flowering in different cultivars of gladiolus

Sl. No.	Variety	Days taken for spike emergence	Days taken for first floret opening	Duration of flowering (Days)
1.	Summer Sunshine	64.40	74.73	93.78
2.	Sylvia	62.00	70.73	88.00
3.	Trust	76.47	85.87	108.00
4.	Majic	80.80	98.13	110.00
5.	Vedanapoli	75.73	83.60	100.00
6.	American Beauty	60.67	68.13	91.00
7.	Melody	60.83	69.87	85.00
8.	Snow White	58.20	66.70	91.11
9.	Yellow Cup	63.13	70.74	93.67
	S.Em±	1.76	2.17	2.13
	C.D. at 5%	5.27	6.50	6.39

Vedanapoli (100.00 days) had flowered over a wider period as compared to other cultivars and were at par with each other. While Melody (85.11 days) and Sylvia (88.00 days) flowered for only a few days. Cultivars Summer Sunshine (93.78 days), Yellow Cup (93.67 days), American Beauty (91.00 days) and Snow White (91.11 days) were at par with each other for duration of flowering.

4.3 Spike character

4.3.1 Spike girth, spike length, rachis length and spike weight

The data on spike girth, spike length, rachis length and spike weight are presented in Table 6.

Significant differences were observed with respect to spike length, which ranged between 67.67 cm to 93.40 cm. Summer Sunshine, which produced significantly longer spike length (93.90 cm) was on par with Melody (93.17 cm), Trust (89.61 cm) and Majic (85.49 cm), while cultivar Sylvia had the shortest spikes (67.67 cm). Cultivars Yellow Cup (82.50 cm), Vedanapoli (81.06 cm), which were at par, had comparatively longer spikes than American Beauty (78.73 cm) and Snow White (72.83 cm), which were on par with each other with respect to spike length.

4.3.2 Rachis length

Difference with respect to rachis length, which ranged between 37.70 cm to 54.43 cm among the different cultivars was significantly

different. American Beauty recorded the longest rachis length of 54.43 cm, which was closely followed by Melody (53.20 cm) and Summer Sunshine (50.00 cm). The rachis length was minimum in Sylvia (37.70 cm). Cultivars Snow White (46.37 cm), Vedanapoli (45.87 cm), Trust (42.23 cm) and Yellow Cup (43.08 cm) were on par with Majic (40.45 cm) with respect to this character.

4.3.3 Spike weight

Cultivars differed significantly with respect to fresh weight of the spike, which ranged from 69.60 g (Sylvia) to 127.26 g (Summer Sunshine). Summer Sunshine, which recorded the highest weight, differed significantly over all the other cultivars. Cultivars Vedanapoli and American Beauty, which were next to only Summer Sunshine exhibited spike weight of 98.94 g and 94.40 g were on par with each other. Cultivars Majic, Trust, Melody, Snow White and Yellow Cup produced spikes with weight of 88.47, 87.33, 75.07, 73.47 and 73.23 g, respectively, did not differ significantly among themselves.

4.3.4 Spike girth

Significant differences were observed among the cultivars with respect to spike girth, which ranged from 1.07 cm to 2.93 cm. Among the different cultivars, Vedanapoli recorded maximum spike girth (2.93 cm), which was closely followed by Sylvia (2.67 cm), while minimum spike girth was recorded in Trust (1.07 cm). Cultivars

Table 6. Spike characters of different cultivars of gladiolus

Sl. No.	Variety	Spike length (cm)	Rachis length (cm)	Spike weight (g)	Spike girth (cm)
1.	Summer Sunshine	93.90	50.00	127.26	1.08
2.	Sylvia	67.67	37.70	69.60	2.67
3.	Trust	89.61	45.23	87.33	1.07
4.	Majic	85.49	40.41	88.47	1.27
5.	Vedanapoli	81.06	45.87	98.94	2.93
6.	American Beauty	78.37	54.43	94.40	1.40
7.	Melody	93.17	53.20	75.07	1.60
8.	Snow White	72.83	46.37	73.47	1.27
9.	Yellow Cup	82.75	43.08	73.23	1.13
	S.Em±	2.75	2.16	8.42	0.10
	C.D. at 5%	8.24	6.47	25.23	0.31

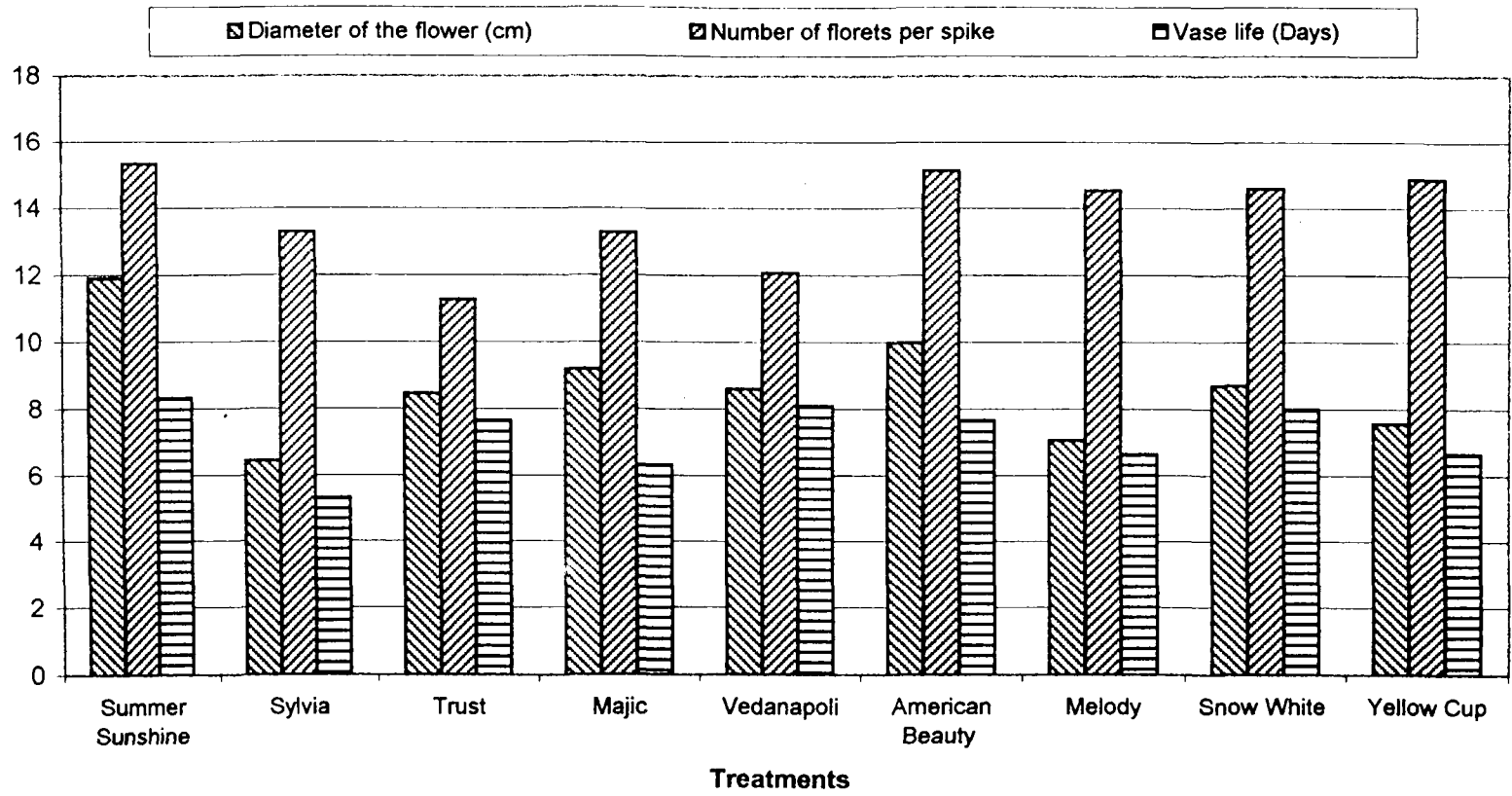


Fig.4. Spike characters in different cultivars of gladiolus

Melody (1.60 cm), Snow White and Majic (1.27 cm) and Yellow Cup (1.13 cm) were at par with each other.

4.3.5 Diameter of the flower

The data with respect to diameter of the flower as influenced by different gladiolus cultivars are presented in Table 7.

Diameter of the flower, which was recorded at the time of peak flowering varied significantly among the different cultivars and ranged from 6.45 cm in Sylvia to 11.91 cm in Summer Sunshine. Cultivars Snow White, Vedanapoli and Trust, which recorded flower diameter of 8.72 cm, 8.61 cm and 8.47 cm, were at par with each other. Similarly, Yellow Cup (7.58 cm) was on par with cultivar Melody (7.08 cm) with respect to flower diameter.

4.3.6 Number of florets per spike

The data with respect to number of florets per spike as influenced by different gladiolus cultivars exhibited significantly differences.

The number of florets per spike ranged from 11.27 to 15.33, which were maximum in cv. Summer Sunshine (15.33), which was followed by American Beauty (15.13) and it was minimum in cv. Trust (11.27). Cultivars Yellow Cup (14.87) and Snow White (14.60) were on par with Melody (14.33), while cultivars Sylvia, Majic and Vedanapoli,



Plate 5. Plate showing cv. Summer Sunshine in flowering



Plate 6. Plate showing cv . Majic in flowering

Table 7. Flower quality of different cultivars of gladiolus

Sl. No.	Variety	Diameter of the flower (cm)	Number of florets per spike	Vase life (Days)
1.	Summer Sunshine	11.91	15.33	8.33
2.	Sylvia	6.45	13.29	5.33
3.	Trust	8.47	11.27	7.67
4.	Majic	9.19	13.27	6.33
5.	Vedanapoli	8.61	12.07	8.10
6.	American Beauty	9.98	15.13	7.68
7.	Melody	7.08	14.53	6.67
8.	Snow White	8.72	14.60	8.00
9.	Yellow Cup	7.58	14.87	6.68
	S.Em±	0.76	1.31	0.37
	C.D. at 5%	2.28	3.93	1.09

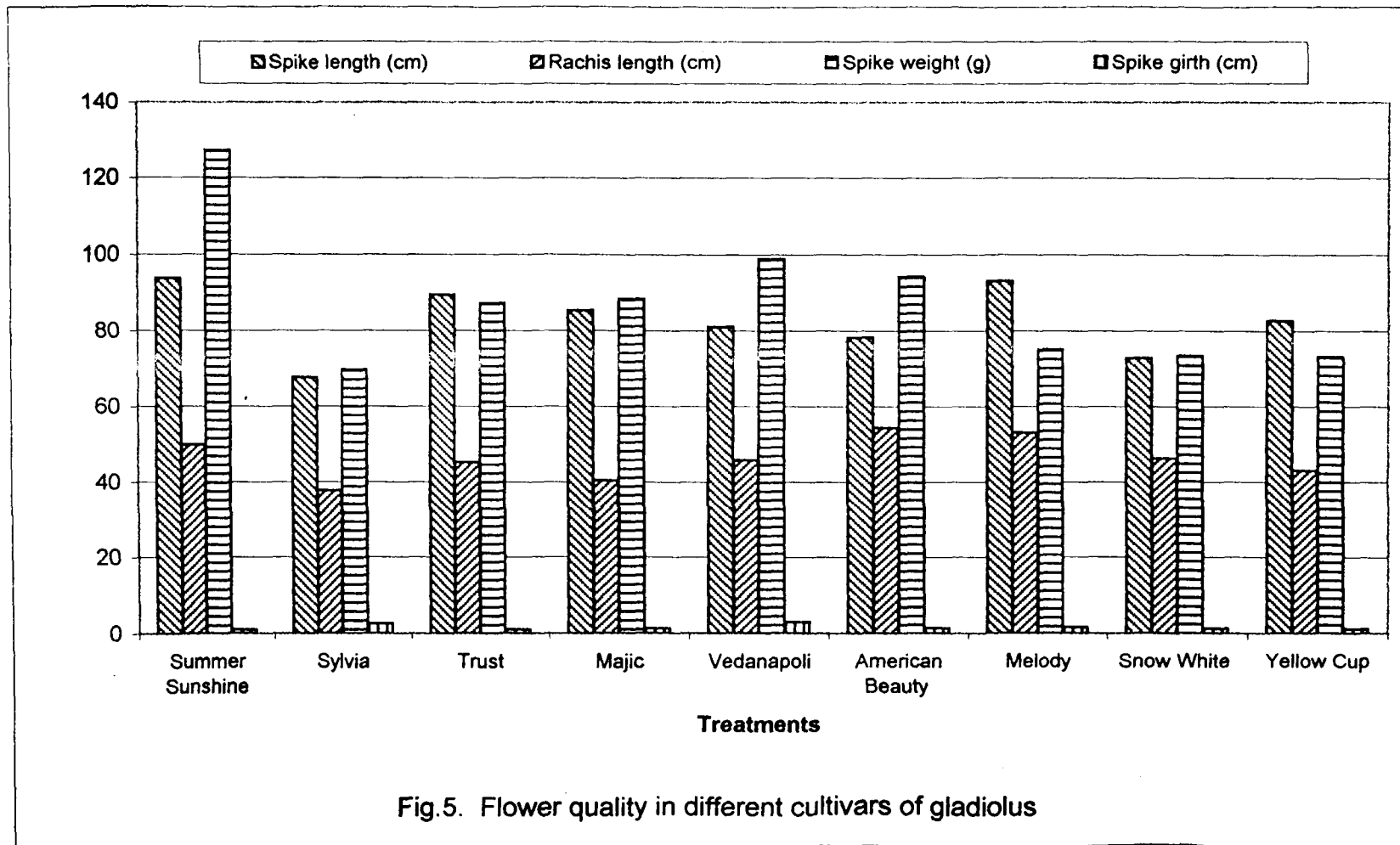


Fig.5. Flower quality in different cultivars of gladiolus

which produced comparatively less number of florets per spike (13.29, 13.27 and 12.07, respectively) were at par with each other.

4.4 Spike yield

The observations with regard to spike production as influenced by different gladiolus cultivars are furnished in Table 8.

There were significant differences among the varieties with respect to number of spikes produced per plant, which ranged from 1.07 to 2.93. Cultivar Vedanapoli produced the highest number of spikes per plant (2.93) and was significantly superior over other cultivars. Cultivar Trust produced the lowest number of spikes per plant (1.07). Cultivars Melody (1.60), American Beauty (1.40), Majic (1.27), Snow White (1.22), Yellow Cup (1.13) and Summer Sunshine (1.08) were at par with each other for spike yield per plant.

4.4.2 Spike yield per plot

Significant differences were observed among the cultivars with respect to number of spikes produced per plot.

The spike number per plot was maximum in Vedanapoli (87.90 cm), while it was minimum in Trust (32.10). Next best cultivars with respect to spike yield in terms of number per plot were Sylvia (80.10), Melody (48.00) and American Beauty (42.00). Cultivars Majic (38.10), Snow White (38.10), Yellow Cup (33.90) and Summer Sunshine (32.10) were at par with each other with respect to this character.



Plate 7. Plate showing cv. Snow White in flowering



Plate 8. Plate showing cv. Vedanapoli in flowering

Table 8. Spike yield in different cultivars of gladiolus

Sl. No.	Variety	Number of spikes per plant	Number of spikes per plot	Total number of spikes per hectare
1.	Summer Sunshine	1.08	32.40	180000.00
2.	Sylvia	2.67	80.10	445000.00
3.	Trust	1.07	32.10	178333.33
4.	Majic	1.27	38.10	211666.67
5.	Vedanapoli	2.93	87.90	488333.33
6.	American Beauty	1.40	42.00	233333.33
7.	Melody	1.60	48.00	266666.67
8.	Snow White	1.27	38.10	211666.67
9.	Yellow Cup	1.13	33.90	188333.33
	S.Em±	0.11	3.23	1796.62
	C.D. at 5%	0.31	9.68	53827.94

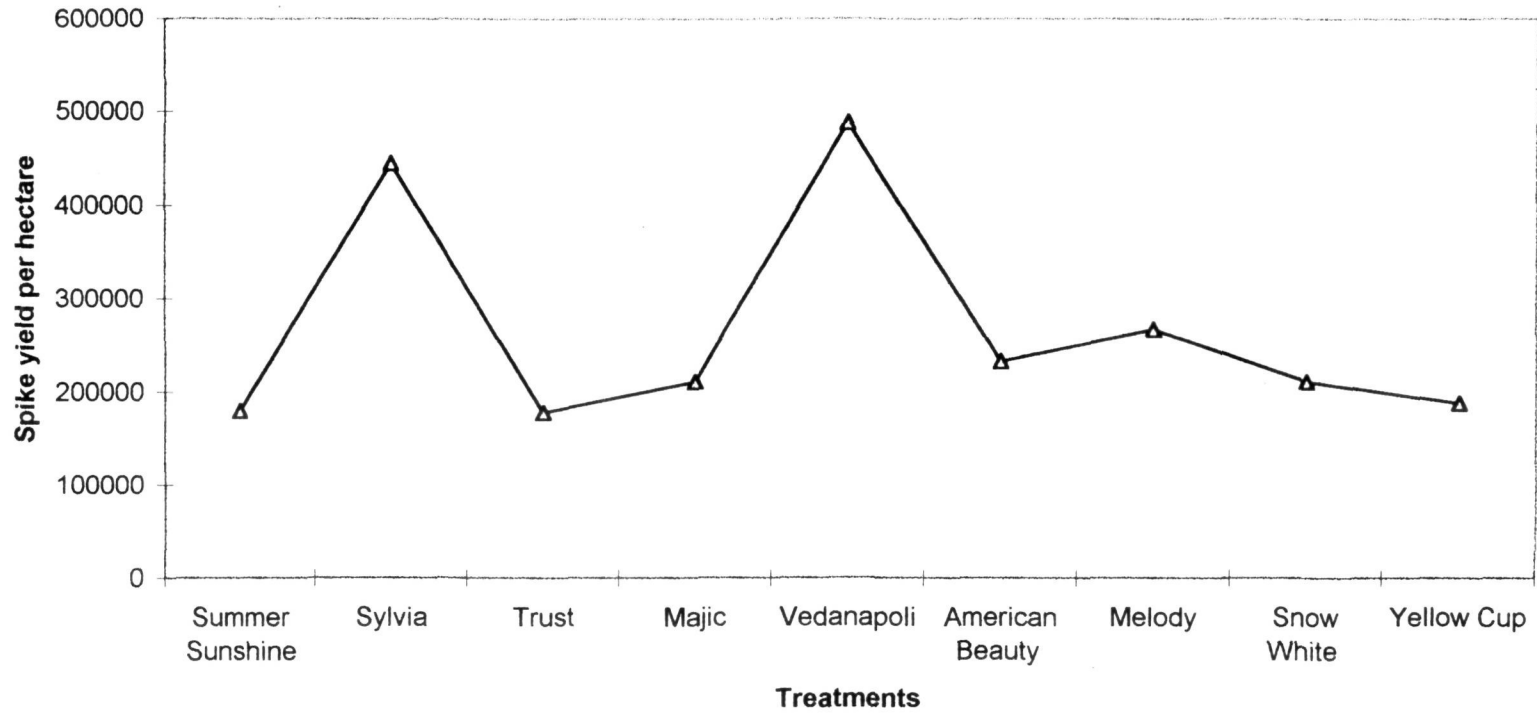


Fig.6. Spike yield per hectare of different cultivars of gladiolus



Plate 9. Plate showing harvested flower spikes in cv. Melody



Plate 10. Plate showing cv . Trust in flowering

4.4.3 Number of spikes per hectare

Significant differences were observed among the cultivars with respect to spike yield per hectare was maximum in Vedanapoli (488333.33), while it was minimum in Trust (178333.33). The next best cultivar was Sylvia (445000.00), which was followed by cultivars Melody (266666.67), American Beauty (233333.33), Majic (211666.67), Snow White (211666.67), Yellow Cup (188333.33) and Summer Sunshine (180000.00), however, they were at par with each other for this.

4.5 Corm and cormel yield and yield attributes

4.5.1 Number of corms per plant

The data with regard to production of daughter corms as influenced by different gladiolus cultivars are given in Table 9.

The variation in corm yield among the cultivars was significantly different. Cultivar Sylvia recorded the maximum corm yield in terms of number of corms (3.13), while Trust recorded the minimum number of corms per plant (1.13). Cultivar Vedanapoli (2.67) was on par with American Beauty (2.13), while cultivars Yellow Cup (1.87), Summer Sunshine (1.80), Melody (1.67), Majic (1.33) and Snow White (1.20) were at par with each other with respect to corm yield per plant.

4.5.2 Number of cormels per plant

Observation pertaining to influence of different gladiolus cultivars on cormel yield per plant are furnished in Table 9.

Number of cormels produced per plant varied significantly among the cultivars. Cultivars Sylvia, Melody and Vedanapoli (119.53, 117.00 and 93.67, respectively) recorded more number of cormels per plant. Cultivars Yellow Cup (56.80) and Summer Sunshine (55.33) were on par with American Beauty (48.87), whereas Majic (76.20) was on par with Snow White (72.00). The cormel production in terms of number of cormels produced per plant was the lowest in cv. Trust (48.22).

4.5.3 Size of the daughter corms

The data with respect to influence of cultivars on size of the daughter corms are given in Table 10.

Significant differences were noticed for size of the daughter corms among the gladiolus cultivars. It was maximum in cv. Summer Sunshine (6.83 cm), Melody (6.69 cm), Snow White (6.40 cm) and American Beauty (6.10 cm), however, these were at par with each other, while corm size was minimum in Sylvia (4.27 cm). Cultivars Majic (5.97 cm), Trust (5.92 cm), Yellow Cup (5.33 cm) and Vedanapoli (5.25 cm) were at par with each other for corm size.

Table 9. Number of corms and cormels in different cultivars of gladiolus

Sl. No.	Variety	Number of corms per plant	Number of cormels per plant
1.	Summer Sunshine	1.80	55.33
2.	Sylvia	3.13	119.53
3.	Trust	1.13	48.27
4.	Majic	1.33	76.20
5.	Vedanapoli	2.67	93.67
6.	American Beauty	2.13	48.87
7.	Melody	1.67	117.00
8.	Snow White	1.20	72.00
9.	Yellow Cup	1.87	56.80
	S.Em±	0.31	3.63
	C.D. at 5%	0.94	10.87

4.5.4 Weight of corms per plant

The data with respect to weight of corms per plant in different gladiolus cultivars are given in Table 10.

Significant differences were found among the cultivars with respect to weight of the corms. Weight of corms per plant was maximum in Summer Sunshine (143.87 g), while it was minimum in Snow White (61.67 g). Cultivars Melody (123.60 g), Vedanapoli (107.53 g), Trust (107.23 g), Sylvia (99.10 g) and Majic (97.43 g) were at par with each other, while cultivar Yellow Cup (74.11 g) was on par with American Beauty (71.63 g) for corm yield on individual plant basis.

4.5.5 Weight of corms per plot (1.80 sq.m.)

The data pertaining to weight of corms per plot in different gladiolus cultivars are given in Table 10.

Weight of corms on plot basis also varied significantly among the different cultivars of gladiolus. Corm yield on weight basis per plot was maximum in Summer Sunshine (4.32 kg), while it was minimum in Snow White (1.84 kg). Cultivars Melody (3.70 kg), Vedanapoli (3.23 kg), Trust (3.22 kg), Sylvia (2.97 kg) and Majic (2.92 kg) were at par with each other, while Yellow Cup (2.26 kg) was on par with American Beauty (2.15 kg) with respect to corm yield on plot basis.

Table 10. Corm yield parameters of different cultivars of gladiolus

Sl. No.	Variety	Weight of corms per plant (g)	Weight of corms per plot (kg)	Weight of corms per ha (kg)	Corm size (cm)
1.	Summer Sunshine	143.87	4.32	23977.78	6.83
2.	Sylvia	99.10	2.97	16516.43	4.27
3.	Trust	107.23	3.22	17870.37	5.92
4.	Majic	97.43	2.92	16238.89	5.97
5.	Vedanapoli	107.53	3.23	17930.37	5.25
6.	American Beauty	71.63	2.15	11937.79	6.10
7.	Melody	123.60	3.70	20600.02	6.69
8.	Snow White	61.67	1.84	10277.77	6.40
9.	Yellow Cup	74.11	2.26	12573.33	5.53
	S.E _m ±	4.16	12.06	670.91	0.03
	C.D. at 5%	0.94	36.14	2010.50	0.09

Plot size: 1.8 sq.m.

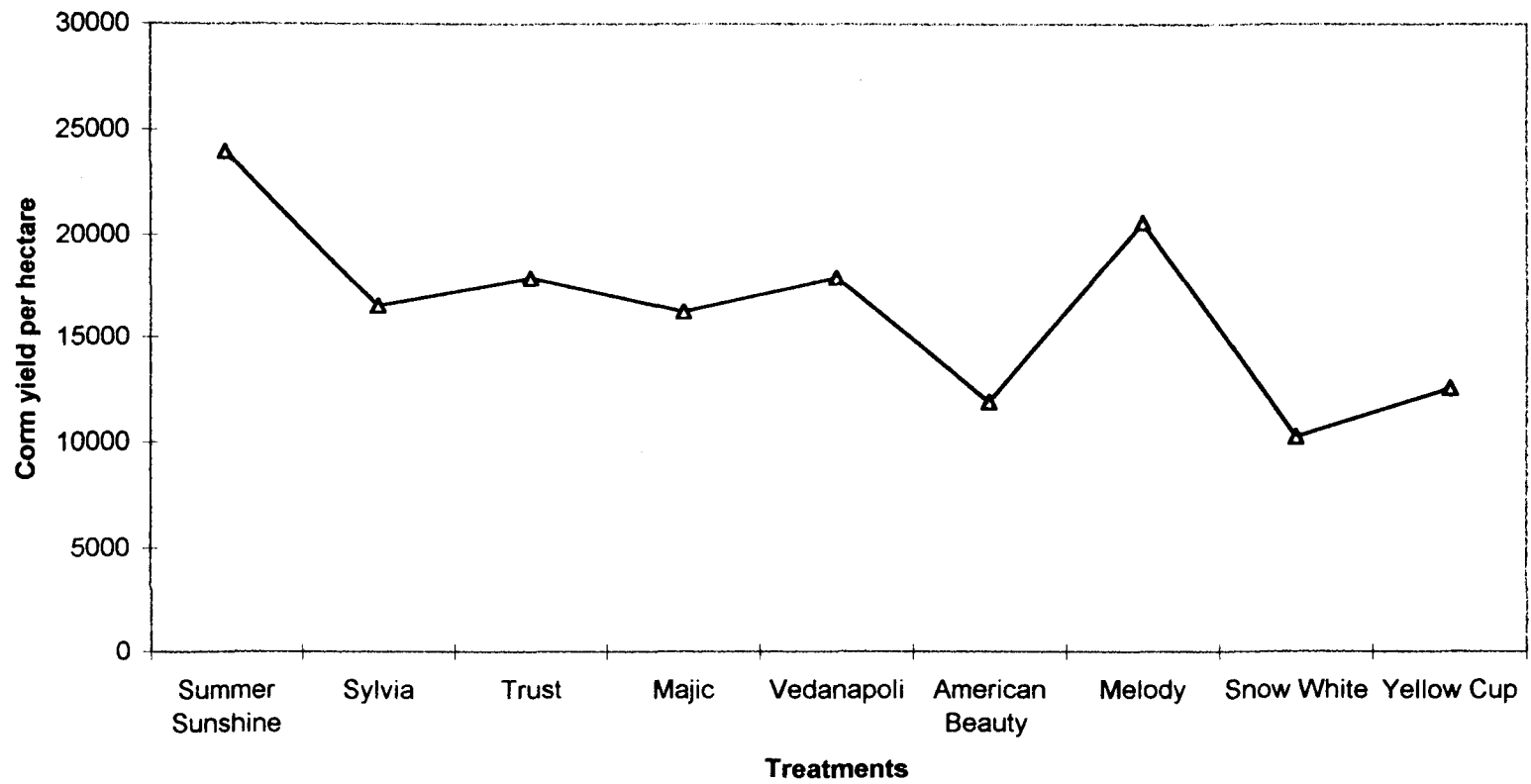


Fig.7. Corm yield in different cultivars of gladiolus

4.5.6 Corm yield per hectare

The data pertaining to weight of corms per hectare in different gladiolus cultivars are given in Table 10.

Cultivars differed significantly with respect to corm yield per hectare. Maximum corm yield was recorded in Summer Sunshine (23977.00 kg) and minimum was recorded in Snow White (10277.77 kg).

4.5.7 Weight of cormels per plant

The data pertaining to weight of cormels in different cultivars of gladiolus are presented in Table 11.

Weight of cormels produced differed significantly among the cultivars. It varied between 17.00 g to 52.00 g. The cultivars Yellow Cup, Melody, Sylvia and Summer Sunshine (52.50, 43.81, 42.90 and 39.30 g, respectively) recorded higher cormel weight per plant. Cultivar Snow White (34.77 g) was on par with Majic (34.48 g), while Vedanapoli (28.60 g) was on par with American Beauty (20.67 g).

4.5.8 Weight of cormels per plot (1.80 sq.m.)

The observations on weight of cormels per plot in different gladiolus cultivars are given in Table 11.

Cultivars differed significantly with respect to cormel yield per plot. Cormel yield per plot was maximum in Yellow Cup (1.60 kg) and minimum in Trust (0.51 kg). Comparatively higher cormel yield was

Table 11. Cormel yield parameters of different cultivars of gladiolus

Sl. No.	Variety	Weight of cormels per plant (g)	Weight of cormels per plot (kg)	Weight of cormels per ha (kg)	Corm size (cm)
1.	Summer Sunshine	39.30	1.20	6550.00	0.81
2.	Sylvia	42.90	1.30	7150.00	0.71
3.	Trust	17.00	0.51	2833.33	0.78
4.	Majic	34.48	1.03	5746.67	0.76
5.	Vedanapoli	28.60	0.85	4766.67	0.73
6.	American Beauty	20.67	0.62	3444.45	0.80
7.	Melody	43.81	1.50	7300.00	0.77
8.	Snow White	34.77	1.04	5794.50	0.82
9.	Yellow Cup	52.50	1.60	8787.03	0.75
	S.Em±	3.96	14.60	656.86	0.02
	C.D. at 5%	11.85	43.60	1968.40	0.06

Plot size: 1.8 sq.m.

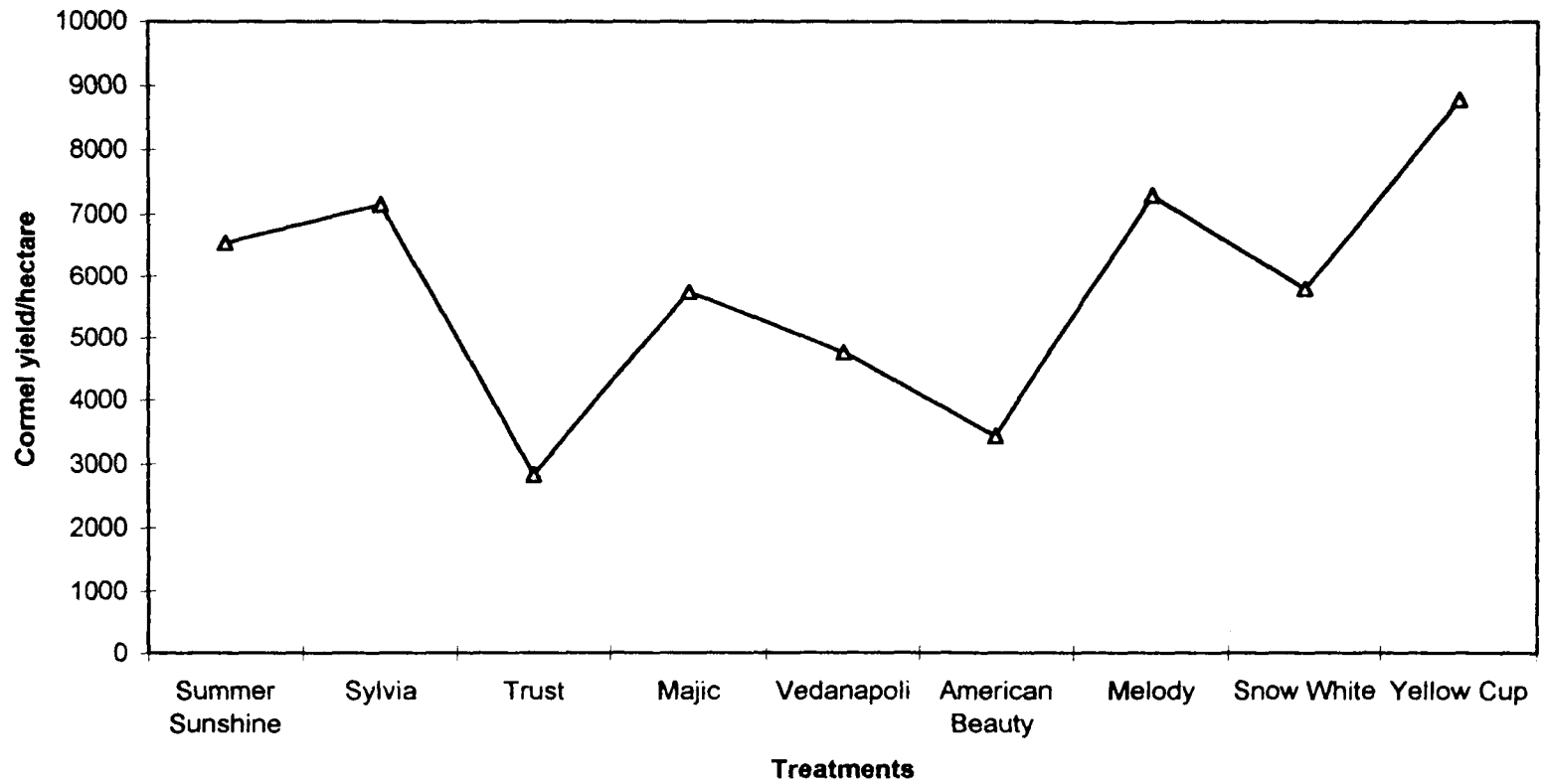


Fig.8. Cormel yield per hectare of different cultivars of gladiolus

recorded in cultivars Melody, Sylvia and Summer Sunshine (1.50, 1.30 and 1.20 kg, respectively). Cultivar Vedanapoli (0.85 kg) was on par with American Beauty (0.62 kg).

4.5.9 Weight of cormels per hectare

The observation on weight of cormels per hectare in different gladiolus cultivars are given in Table 11.

Cormels yield per hectare in genotypes differed significantly. Cormel yield per hectare was maximum in Yellow Cup (8787.03 kg), while it was minimum in Trust (2833.33 kg). Cultivars Melody, Sylvia, Summer Sunshine and Majic recorded cormels yield of 7300.00 kg, 7150.00 kg, 6550.00 kg and 5746.67 kg, respectively. However, Vedanapoli (4766.67 kg) was on par with American Beauty (3444.45 kg).

4.5.10 Vase life of spikes

The data pertaining to vase life of spikes as influenced by different gladiolus cultivars are presented in Table 7.

There was significant difference among the cultivars with respect to days for vase life of flowers of gladiolus. Vase life of different cultivars ranged from 5.33 to 8.33 days. It was maximum in Summer Sunshine (8.33 days), Vedanapoli (8.10 days) and Snow White (8.00 days), whereas it was minimum in Sylvia (5.33 days). Cultivars American Beauty (7.68 days), Trust (7.67 days), Yellow Cup

Table 12. Phenotypic correlations among nineteen characters in nine genotypes of gladiolus

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1.000	0.3820	-0.2050	0.4995	0.5827	0.8337**	0.8112**	0.8335**	0.5703	-0.1161	0.4674	-0.1920	0.0183	-0.4586	-0.1920	-0.4487	0.3169	-0.3508	-0.2610*
2		1.000	-0.0278	0.5217	0.7824*	0.4329	0.2835	0.4835	0.2842	0.1504	0.0495	-0.0983	0.3123	-0.7063*	-0.0983	-0.3376	0.0725	-0.3337	-0.7229*
3			1.000	-0.6090	0.0573	-0.0099	-0.1370	-0.2259	-0.5706	-0.2666	-0.1311	0.9575**	0.1022	-0.3568	0.9575**	0.8253**	-0.0421	0.5517	0.0015
4				1.000	0.5825	0.2455	0.1997	0.4517	0.5987	0.1054	0.3234	-0.7208*	-0.2247	-0.0935	-0.7208*	-0.6205	0.1584	-0.7674*	-0.1666
5					1.000	0.5831	0.4532	0.6164	0.3488	-0.0048	0.5445	-0.0168	-0.1330	-0.6521	-0.0168	-0.1374	0.3924	-0.4388	-0.6517
6						1.000	0.9740**	0.9315**	0.3116	-0.3871	0.2551	0.0859	0.2384	-0.7521*	0.0859	-0.1800	0.2616	-0.1294	-0.4124
7							1.000	0.9197**	0.3253	-0.4127	0.2473	-0.0051	0.1954	-0.6413	-0.0051	-0.2534	0.2708	-0.1022	-0.3295
8								1.000	0.2695	-0.3790	0.2518	-0.1924	0.2845	-0.6571	-0.1924	-0.4066	0.0635	-0.4209	-0.4913
9									1.000	0.4628	0.5212	-0.4912	-0.3798	0.0251	-0.4912	-0.5061	0.6849*	-0.2630	-0.0363
10										1.000	0.3786	-0.2982	-0.0568	0.4569	-0.2982	-0.2260	0.1594	-0.2468	-0.2746
11											1.000	-0.1460	-0.5368	0.1141	-0.1460	-0.0297	0.5928	-0.4355	-0.3002
12												1.000	0.0937	-0.3934	-0.1860	0.8429**	0.0934	0.7111*	0.0334
13													1.000	-0.3400	0.0937	-0.1381	-0.7241*	-0.0533	-0.4432
14														1.000	-0.3934	-0.0407	-0.1364	-0.1391	0.5023
15															1.000	0.8429**	0.0934	0.7111*	0.0334
16																1.000	0.0819	0.5215	0.2091
17																	1.000	0.2357	0.0725
18																		1.000	0.4168
19																			1.000

1. Days taken for 50% sprouting
 2. Plant height (cm)
 3. Number of leaves
 4. Leaf width (cm)
 5. Leaf length (cm)

6. Days taken for spike emergence
 7. Days taken for first floret opening
 8. Duration of flowering
 9. Spike length (cm)
 10. Rachis length (cm)

11. Spike weight (g)
 12. Spike girth (cm)
 13. Diameter of the flower (cm)
 14. Number of florets per spike
 15. Number of spikes per plant

16. Number of corms per plant
 17. Weight of corms per plant (g)
 18. Number of cormels per plant
 19. Weight of cormels per plant (g)

(6.68 days) and Melody (6.67 days), which were on par with Majic (6.33 days) with respect to vase life.

4.5.11 Correlation studies

Days taken for spike emergence was positively and significantly (at $P=0.01$) correlated with days taken for 50 per cent sprouting. Leaf length showed positive and significant (at $P=0.05$) association with plant height. Days taken for first floret opening was positively and significantly (at $P=0.01$) associated with days taken for spike emergence and days taken for 50 per cent sprouting.

Duration of flowering was associated positively and significantly with days taken for 50 per cent sprouting, days taken for spike emergence, days taken for first floret opening at one per cent probability.

Number of spikes per plant was positively and significantly (at $P=0.01$) associated with number of leaves, whereas it was negative with leaf width. Number of florets per spike showed negative and significant (at $P=0.05$) association with plant height, days taken for spike emergence. Spike girth was positively and significantly (at $P=0.01$) associated with number of leaves, while it was negative with spike girth.

Weight of corms per plant was positively and significantly (at $P=0.05$) correlated with spike length, whereas the association of weight of corms per plant was negatively and significantly associated

with diameter of flower. The association of number of corms per plant was positively and significantly associated with number of leaves, spike girth, number of spikes at one per cent probability.

Weight of cormels per plant was negatively and significantly (at $P=0.05$) associated with plant height. Number of cormels per plant was positively and significantly (at $P=0.05$) correlated with spike girth, number of spikes per plant, while number of cormels per plant was negatively and significantly (at $P=0.05$) correlated with spike girth, number of cormels per plant was negatively and significantly (at $P=0.05$) correlated with leaf width.

DISCUSSION

V. DISCUSSION

The crop performance in terms of growth and flower quality of any flower crop is influenced by various factors like variety of the crop, season, environment, pest and diseases, etc. Among these factors, cultivars themselves contribute much to their performance. Further, the performance of cultivars of many crop differs from one region to another region. Hence, selection of variety is an important criteria for successful cultivation of flower crops. The objectives of crop improvement is to select a high yielding flower crop with high flower quality.

Gladiolus is an important flower crop, which is grown widely in India and also in other countries. Recently, many research institutions have released improved cultivars. The experiment was carried out during the period from August, 2000 to January, 2001 by including nine cultivars. Findings of the present investigations are discussed under the following headings with the supporting data and available literature.

1. Vegetative parameters
2. Flowering characters
3. Spike yield, spike parameters
4. Flower quality parameters
5. Corms and cormels yield and their parameters

5.1.1 Vegetative parameters

Number of days taken for sprouting varied significantly among the cultivars. Corms of Sylvia were early to sprout, whereas cv. Majic was late to sprout. Variations in time taken for sprouting among the gladiolus cultivars have been reported previously by Pasannavar (1994), Kalasaraddi (1996) and Shiramagond (1997). Variations in time taken for sprouting was expected to occur as it was controlled by genetic composition of the cultivar.

Number of shoots per plant was maximum in cv. Vedanapoli followed by Sylvia, while cultivar Majic recorded minimum number of shoots per plant. Similar variation in number of shoots per plant was also observed previously in gladiolus by Hegde (1994) and Kalasaraddi (1996).

At early stages, plant height was maximum in cvs. Snow White followed by Yellow Cup and Sylvia, whereas it was minimum in cv. Majic. But in the later stages of crop growth, cvs. Trust and Vedanapoli recorded maximum plant height, whereas cv. Sylvia recorded minimum plant height. This is due to varied growth rate among the cultivars. Similar variations for plant height in cultivars were also observed previously by Pasannavar (1994), Kalasaraddi (1996) and Shiramagond (1997).

With respect to plant girth, cvs. Snow White and American Beauty recorded maximum values, whereas cv. Sylvia recorded

minimum value. Variations for stem girth due to cultivars were also observed previously by Kalasaraddi (1996) and Shiramagond (1997).

The leaf production was maximum in cv. Vedanapoli followed by Sylvia, while it was least in cv. Majic. Variations for number of leaves in cultivars were also observed previously by Pasannavar (1994), Kalasaraddi (1996) and Shiramagond (1997).

Leaf width was maximum in cvs. Trust, Yellow Cup and Summer Sunshine. Cv. Sylvia, which had narrow leaves recorded minimum leaf width. Variations in leaf width in cultivars was also recorded previously in gladiolus (Kalasaraddi, 1996; Mishra, 1997 and Shiramagond, 1997).

Length of leaf was maximum in cvs. Trust, Vedanapoli and Summer Sunshine. Leaves were short in cultivar Melody. Similar variations in cultivars were also observed previously in gladiolus in different set of genotypes by Kalasaraddi (1996), Mishra (1997) and Shiramagond (1997).

The variations for vegetative parameters due to cultivars could be attributed to their differences in genetical make up. As a result, variations in phenotypic expression are expected ones. Hence, wide variations for vegetative characters were observed.

5.2 Flower parameters

Spike emergence and first floret opening were early in cvs. Snow White, American Beauty and Melody. Cultivar Majic was initiative with respect to opening of first floret in spike. Similar variations due to cultivars also observed previously by Kalasaraddi (1996) and Shiramagond (1997).

Duration of flowering was longer in cvs. Majic, Trust and Vedanapoli, while it was minimum in Melody.

5.3 Spike yield parameters

Spike yield was higher in cvs. Vedanapoli, Sylvia, Melody and American Beauty, whereas it was minimum in cv. Trust. Variation of spike yield among the cultivars was due to the variation in number of shoots produced per plant, which is a genetically controlled character.

5.4 Flower quality parameters

The cultivars Vedanapoli, Sylvia and Melody had stronger spikes, while cv. Trust had weak spike. Previously, Pasannavar (1994) recorded variations in stem girth among the gladiolus cultivars. Summer Sunshine, Melody and Trust had longer spikes as compared to the other cultivars. On the other hand, rachis length was longer in cvs. American Beauty, Melody and Summer Sunshine. However, cv. Sylvia was inferior to all the other varieties by producing weaker and

short stem with short rachis. Variation for spike length and rachis length among cultivars was also observed previously by Hegde (1994), Kalasaraddi (1996) and Shiramagond (1997).

The spikes were heavier in cultivars Summer Sunshine, Vedanapoli and American Beauty, while the spikes of cv. Sylvia were light as compared to all the other varieties. Variation in spike weight was also reported by Kalasaraddi (1996) and Shiramagond (1997). Flower size was more in cvs. Summer Sunshine, American Beauty and Majic, while it was minimum in cv. Sylvia. Results of Sindhu (1995), Kalasaraddi (1996) and Shiramagond (1997) also reported varied flower size due to genotypes.

Spike quality is more precisely measured in terms of number of florets present in a spike. In this, cvs. Summer Sunshine, American Beauty, Yellow Cup and Snow White were superior over all the other varieties. Similarly, superiority of some of the genotypes over other genotypes was reported by Kalasaraddi (1996) and Shiramagond (1997).

Cultivars Summer Sunshine, American Beauty, Vedanapoli and Majic were vigorous with respect to vegetative growth. Therefore, these cultivars could produce better and quality spikes in terms of rachis length, size of the flowers, number of flowers and girth.

Along with quality, vase life of flower spike also decides the consumer's preference, wherein quality recorded was associated with

longer shelf life. Kalasaraddi (1996) and Shiramagond (1997) also recorded variations in keeping quality of gladiolus spikes due to genotypes. Variation in vase life might be attributed to increased accumulation of carbohydrates due to increased leaf production and photosynthesis and variation in sensitivity of cultivars to ethylene. In turn, variation in these aspects might be due to variation in the genetical make up of cultivars.

5.5 Corm and cormel production and their characters

Corm yield was maximum in cvs. Sylvia, Vedanapoli, American Beauty and Melody. Corm yield was minimum in cv. Trust. The production of corm and cormels generally depends upon the per plant shoot production. In the present investigations, the cultivars which produced the highest corm yields were also happened to be higher shoot production ones. This could be ultimately attributed to genetical make up of the cultivars.

The cultivars, which were strong in their vegetative growth also produced corms of bigger size. Corm and cormel size was maximum in cvs. Summer Sunshine, Melody, Snow White and American Beauty. Cultivars, which produced less number of corms had bigger sized corms and vice-versa. Sylvia, which produced more number of corms, had smaller corms. Similar variations in corm yield due to cultivars

were also observed previously by Hegde (1994) and Shiramagond (1997).

Weight of corms was maximum in cvs. Summer Sunshine, Melody, Vedanapoli and Trust. Variations in weight of corms could be attributed to the variations in corm size and number of corms per plant, which might be attributed to the genetic constitution of cultivars. Variations with respect to weight of corms was also recorded previously by Hegde (1994), Shiramagond (1997).

Weight of cormels per plant, per plot and per hectare was maximum in cvs. Yellow Cup, Melody and Sylvia, whereas minimum was recorded in cvs. Trust. Variation in weight of cormels might be attributed to the number of cormels produced per plant and size of cormels, which in turn are genetically controlled factors.

Future line of work

1. Sprouting difference between European and American types has to be confirmed by using corms of same season, size, and stored under similar conditions.
2. Studies on vase life have to be carried out.

SUMMARY

VI. SUMMARY

The present investigation on “Evaluation of gladiolus (*Gladiolus hybridus* Hort.) varieties” was carried out in the experimental field of the Department of Floriculture and Landscape Gardening, Kittur Rani Channamma College of Horticulture, Arabhavi during the *rabi* season of 2000-2001. The experiment was conducted in a randomised block design having three replications with nine cultivars as treatments. The main objective of the study was to find out superior cultivars for yield and quality attributes. The salient features of the experimental findings are summarised below.

Cultivars Sylvia and American Beauty sprouted early.

Cultivars Summer Sunshine, Snow White, Yellow Cup, Vedanapoli and American Beauty were fairly good with respect to growth attributes such as plant height, number of shoots per plant, plant girth, number of leaves per plant and leaf area.

Spikes of superior quality considering spike length, rachis length, diameter of the flowers, spike weight and number of florets per spike were exhibited by Summer Sunshine, Melody, Vedanapoli, American Beauty and Snow White. Flower quality was poor in Sylvia and Trust.

Longer vase life of spike was exhibited by Summer Sunshine (8.33 days), Vedanapoli (8.10 days) and Snow White (8.00 days), while cv. Sylvia was poor in vase life (5.33 days).

Cultivars Summer Sunshine, Melody and Vedanapoli were better multipliers for corms. Cultivars Yellow Cup and Melody were found superior with respect to cormel yield.

From the results obtained, it can be concluded that cultivars Summer Sunshine, Vedanapoli, American Beauty and Melody are promising ones for cut flower production in Ghataprabha command area.

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APPENDIX

APPENDIX-I

**Meteorological data recorded during the period of investigation at
Agricultural Research Station, Arabhavi**

Month and year	Temperature (°C)		Rainfall (mm)	Relative humidity (%)
	Minimum	Maximum		
January, 2000	13.04	27.73	-	69.95
February, 2000	14.56	32.10	-	64.06
March, 2000	19.41	34.22	-	53.69
April, 2000	23.39	34.30	21.60	53.54
May, 2000	23.06	33.74	68.20	63.30
June, 2000	24.48	29.46	56.90	75.14
July, 2000	22.46	27.29	29.70	79.15
August, 2000	22.81	28.07	53.90	78.59
September, 2000	22.50	29.28	26.10	74.81
October, 2000	22.24	29.94	166.80	73.49
November, 2000	18.57	30.00	-	65.66
December, 2000	12.27	27.67	-	61.96

EVALUATION OF GLADIOLUS (*Gladiolus hybridus* Hort.) VARIETIES



BASAPPA S. KAMBLE

2001

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ABSTRACT

Gladiolus is the most suitable bulbous plant in India for cut flower production. It is used for bouquet preparation, for growing in herbaceous borders, beddings, rockeries and for pot cultivation.

A field experiment was conducted at the Floriculture and Landscape Gardening, Kittur Rani Channamma College of Horticulture, Arabhavi during the *rabi* season of 2000-2001 with nine gladiolus cultivars for evaluating their performance and to find out the promising cultivars for maximising the production of quality cut flowers.

All the cultivars differed significantly for growth and flowering characters. The cultivars Sylvia, American Beauty and Melody were early to sprout, while Majjic was late. Cultivars Snow White, Yellow Cup, Sylvia and Melody were medium in growth, while the cultivars Majjic and Trust were dwarf in their growth.

Among the nine cultivars, cultivars Snow White, American Beauty and Sylvia were early in spike emergence and flowering. Cultivars Vedanapoli, Sylvia, Melody and American Beauty produced maximum number of spikes per plant. The cultivars Summer Sunshine, Melody and Vedanapoli were found superior for spike characters like spike length, rachis length and number of florets per spike.

Cultivars Sylvia, Vedanapoli, American Beauty, Yellow Cup and Summer Sunshine produced maximum number of daughter corms and cormels.