PERFORMANCE OF GLADIOLUS VARIETIES UNDER NAGPUR CONDITIONS

THESIS

Submitted to

Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola

in partial fulfilment of the requirements

for the Degree of

MASTER OF SCIENCE

IN

HORTICULTURE

(FLORICULTURE AND LANDSCAPE ARCHITECTURE)

By

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Enrolment Number – HH/155 **2015**

DECLARATION OF STUDENT

I hereby declare that, the experimental work and its interpretation of the thesis entitled, **"PERFORMANCE OF GLADIOLUS VARIETIES UNDER NAGPUR CONDITIONS"** or part there of has neither been submitted for any other degree or diploma of any University, nor the data have been derived from any thesis / publication of any University or scientific organization. The source of materials used and all assistance received during the course of investigation have been duly acknowledged.

Place : Nagpur

Date : 25-05-2015

(Asatkar Kiran Bhaskar)

Enrolment No. HH/155

CERTIFICATE

This is to certify that, thesis entitled **"PERFORMANCE OF GLADIOLUS VARIETIES UNDER NAGPUR CONDITIONS"** submitted in partial fulfillment of the requirement for the degree of **"Master of Science in Horticulture (Floriculture and Landscaping Architecture)"** of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola is a record of bonafide research work carried out by **Asatkar Kiran Bhaskar** under my guidance and supervision.

The subject of the thesis has been approved by the Student's Advisory Committee.

Place: Nagpur
Date : 25/5/15

(Dr. D. M. Panchbhai)
Chairman
Advisory Committee

Countersigned

Associate Dean,
College of Agriculture, Nagpur

THESIS APPROVED BY THE STUDENT'S ADVISORY COMMITTEE INCLUDING EXTERNAL EXAMINER (AFTER VIVA-VOCE)

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4) Member Shri P. D. Deshmukh .....

5) External Member (Dr. V V. Raut) .....

Acknowledgement

"Success comes before work only in the dictionary" but success in work is not possible lonely without the involvement of many minds and hand to beautify it. This endeavor was teamwork in which many persons were involved directly or indirectly right from the start up to its fructification.

Firstly, I feel immense pleasure for having this opportunity to express my esteemed and profound sense of gratitude to Honorable Chairman of my advisory committee Dr. D. M. Panchbhai, Professor of Horticulture, College of Agriculture, Nagpur, for suggesting the research work, intellectual inspiration, insightful guidance with care and painstaking efforts in scrutinizing the manuscript and everlasting encouragement during the course of present investigation.

I wish to extend my heartiest thanks to members of advisory committee Dr. S.A. Badge, Assistant Professor, Horticulture section, College of Agriculture, Nagpur, Dr.(Mrs.) S.R. Patil, Assistant Professor, Plant Breeding Section, College of Agriculture Nagpur, Shri. P. D. Deshmukh, Assistant Professor, Statistics Section, College of Agriculture, Nagpur, for their valuable guidance and help rendered during the course of studies.

I express my sincere thanks to Dr. V. K. Kharche, Associate Dean, College of Agriculture, Nagpur, for providing all the necessary facilities for the research work.

I am especially thankful to Dr. V. U. Raut and Dr. R. P. Gajbhiye, Associate Professors of Horticulture, Dr. (Mrs.) N.K. Chopde, Dr. S. S. Moon, Mrs. H. M. Khobragade and all the staff member of the Horticulture Section, College of Agriculture, Nagpur for their co-operation during research work.

I greatly thankful to Shri K. D. Urade, Senior Research Assistant Maharajbaug, Mrs. S. A. Thakre, Senior Research Assistant, Horticulture Section and Shri A. B. Abhalankar, Agriculture Assistant,

Maharajbaug, Nagpur. I am also greatful thanks to the students of Mali Training course for their help in carrying out necessary operations in the experimental plot and also greatfully acknowledge my indebtness to Shri. Kamal Dahat, Laboratory Attendant, Shri. Sheikh Bhau and Ghanmare kaka, Horticulture Section, for his timely help during the course of experiment.

It seems one uses the choicest words to measure the boundless love and fireless sacrifice of someone, I find no such measure adequate to quantify all that my parents done for me. I like to pour out my heart for my beloved father Shri. Bhaskar Asatkar, mother Sau. Padmabai Asatkar, my elder brothers Pankaj Asatkar and Chandrakant Asatkar and all my family members and relatives who has been source of encouragement throughout my educational career without which I would not have reached the present destination.

I wish to express my heartful thanks to my colleagues, Mayur, Vinod, Harshal, Murlidhar, Sushma, Ashwini, Minakshi and Parineeta my friends Pravin and Vishal and all my seniors as well as juniors for their co-operation and encouragement from time to time.

My sincere thanks to all those well wishers and who have rendered the co-operation directly or indirectly in completing this research work.

I am thankful to all authors in past and present whose literature has been cited.

Place: Nagpur
Date: 25-05-2015

(Asatkar Kiran Bhaskar)

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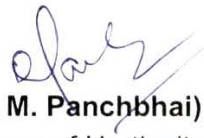
%	Per cent
/	Per
@	At the rate of
^0C	Degree Celsius
$^{-1}$	Per
CD	Critical difference
Cm	Centimeter
cv.	Cultivar
DAP	Days after planting
et al.	et alia (and associates)
Fig.	Figure
FYM	Farm yard manure
g	Gram (s)
ha	Hectare
hr	Hours
i.e.	id est (that is)
K_2O	Potassium
kg	Kilogram
km	Kilometer
m^2	Meter square
Max.	Maximum
Min.	Minimum
mm	Millimeter
N	Nitrogen
NS	Non-significant
P_2O_5	Phosphorus
R.H.	Relative Humidity
SE (m) ±	Standard error of mean
Sig.	Significant
t	Tones
Var.	Variety
Viz.	Namely

(E) THESIS ABSTRACT

a)	Title of the thesis	:	**"PERFORMANCE OF GLADIOLUS VARIETIES UNDER NAGPUR CONDITIONS"**
b)	Full name of student	:	**Asatkar Kiran Bhaskar**
c)	Name and address of Major Advisor	:	**Dr. D.M. Panchbhai** Professor of Horticulture, Horticulture Section, College of Agriculture, Nagpur
d)	Degree to be awarded	:	M.Sc. (Horticulture)
e)	Year of award of degree	:	2015
f)	Major subject	:	Floriculture and Landscape Architecture
g)	Total number of pages in the thesis	:	70
h)	Number of words in the abstract	:	337
i)	Signature of student	:	
j)	Signature, Name and address of forwarding authority	:	



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ABSTRACT

The present investigation entitled, "Performance of gladiolus varieties under Nagpur conditions" was carried out at Experimental Field, Horticulture Section, College of Agriculture, Nagpur during November to April, 2014-15. With objectives to study the performance of different gladiolus varieties under Nagpur conditions and to find out the suitable varieties of gladiolus for commercial cultivation.

The experiment was laid out in Randomized Block Design with nine treatments (Varieties) replicated three times (Varieties *viz* Snow Princess, Yellow Stone, Chandani, Nova Lux, Flaro Sovenier, Princess Morgerate Rose, Pricilla, Forta Rosa and Jester Gold).

The result of the present investigation indicated that, significantly maximum shoots plant^{-1} were noticed with the variety Yellow Stone.

Maximum vegetative growth of the plant *viz*. plant height and leaves plant^{-1} was noticed with the variety Yellow Stone. However, maximum Leaf area at 50 % flowering was recorded in the variety Snow Princess.

Minimum period for the first spike emergence, opening of first floret and 50% flowering were exhibited with the variety Chandani.

In respect of spike quality parameters such as length of spike, length of rachis and florets spike^{-1} were found maximum with the variety Forta Rosa. However, maximum diameter of floret and maximum diameter of spike was recorded with variety Nova Lux.

Maximum spikes yield of gladiolus plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone.

The highest longevity of flowers on plant and vase life of cut flowers was noted with the variety Yellow Stone.

Maximum corms yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone, however, maximum diameter of corm and weight of corm were noted with the variety Forta Rosa, Whereas, maximum cormels yield of gladiolus plant^{-1}, plot^{-1} and hectare^{-1} and weight of cormels plant^{-1} were obtained from the variety Yellow Stone.

Thus, it can be inferred from the results that, the gladiolus variety Yellow Stone was found to be suitable in respect of number of spikes and corms yield plant^{-1}. However, the variety Forta Rosa was suitable in respect of quality parameters of gladiolus spikes under Nagpur conditions.

Chapter I

INTRODUCTION

1.1 Background information

India has a long tradition of floriculture. References to flowers and gardens are found in ancient Sanskrit classics like Rig-Veda, Ramayana and Mahabharata. The social and economic aspects of flower growing were however, recognized much later. With changing life style and increased urban iffluence, floriculture has assumed a definite commercial status in recent times and it has emerged as an important agri-business venture.

The total area under floriculture crops in India was estimated to be 2,33,000 hectare with the production of 17,29,000 metric tones of loose flowers and 76,732 lakhs number of cut flowers. (Anon, 2014). The major growing states are Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, West Bengal, Uttar Pradesh, Haryana, Gujarat and Delhi. In the quest for diversification in agriculture production system, floriculture has emerged as a prominent and an attractive sector in view of high returns per unit area.

Maharashtra is one of the leading states of the country in flower production. Total area under floriculture in Maharashtra was estimated to be 22,000 hectare with the production of 1,19,000 tones of loose flowers and 7914 lakhs number of cut flowers and it contributes about 6.88% of loose flowers and 10.30% of cut flowers of total production of flowers in India (Anon., 2014).

The gladiolus has a long and noble history. The Latin word 'Gladius' means sword and hence it is often called as 'Sword lilly' because of the shape of its leaves. Gladiolus was also called 'xiphium' based on the Greek word 'Xiphos' also meaning sword. So, we have here what might appear to be pretty war like flower. But in another sense, the gladiolus is a romantic flower as it signifies remembrance and it also expresses infatuation. The roots of the gladiolus plants were

thought to be an aphrodisiac. But whether romantic or war like or quak medicine, the gladiolus remains as a popular garden flower, an old fashioned one that is equally at home in a cottage garden or in something more modernistic.

Gladiolus is grown throughout the world and belongs to family 'Iridaceae'. Large scale production of gladiolus cut flowers is seen in USA, Holland, Italy, France, Poland, Bulgaria, Brazil, Australia and also Israel. It stands fourth in the international cut flower trade after carnation, rose and chrysanthemum.

Though India has suitable agro-climatic conditions for gladiolus cultivation, it is being grown over an area of 1200 ha with a production of 1905.88 lakh spikes. In India, it is commercially cultivated in West Bengal, Himachal Pradesh, Sikkim, Karnataka, Uttar Pradesh, Tamil Nadu, Punjab and Delhi. In the eastern states like Tripura, Assam, Manipur, Meghalaya and Nagaland, this flower has established itself as a commercial proposition. There is a sizeable area under glad in Jammu-Kashmir, Andhra Pradesh and Gujarat also.

1.2 Importance of study

Gladiolus is very rich in its varietal wealth and every year there is an addition of new varieties; hence varietal evaluation becomes necessary to find out suitable variety for a particular region. Improvement of any crop is a continuous process and in gladiolus also there is scope to improve the existing cultivars or genotypes. In gladiolus the most common method of improvement is through hybridization. Since the gladiolus is highly heterozygous, it becomes more essential to evaluate.

Under given agro-climatic conditions, it is important to study the performance of existing varieties and hybrids and also to test the new lines or hybrids for their superiority in respect of desirable flower quality characteristics like spike length, rachis length, number and size of florets, longevity and vase life of cut flower etc.

Considering the importance and popularity of gladiolus as cut flower both in Indian market and World increasing availability of gladiolus flowers in large quantities over wider period of the year is considerably important. In Nagpur region, the growers are raising this crop throughout the year and presently, though the area under this crop is less, it is likely to be increased in the near future because of heavy demand for these flowers.

In cut flower industry, the most important aspects are suitability of the varieties to a particular type of climate in order to maximize the production of better quality cut flower in order to fetch more market prices.

Keeping in view the above points, on this aspect negligible research work is carried out at Nagpur of Maharashtra and present investigation to elucidate information on "Performance of gladiolus varieties under Nagpur conditions" was undertaken at Horticulture Section, College of Agriculture, Nagpur with the following objectives.

1.3 Objectives:

1) To study the performance of different gladiolus varieties under Nagpur conditions.

2) To find out the suitable varieties of gladiolus for commercial cultivation.

1.4 Hypothesis:

Gladiolus is one of the important popular commercial bulbous flower crop grown for cut flower as well as garden display. Selection of suitable cultivar is an important factor that determines successful cultivation of gladiolus under different agro-climatic conditions, as the performance of varieties with respect to various parameters like flower yield and quality and corm yield and quality differs greatly in different regions.

The factor accounting for variation in growth and yield of crop plants are very complex in nature. The performance of a cultivar in respect of growth and yield is known to be greatly influenced by the environmental conditions in which it is grown and the genetic makeup of the cultivar. Thus it is assumed that, the suitable variety for the region can provide the better quality production of gladiolus spikes as well as corms which would be beneficial for the flower growers of the region.

1.5 Scope and limitations

Gladiolus has special importance as a cut flower as well as garden display. The demand of cut flowers of gladiolus is increasing day by day, therefore it is necessary to increase the production of gladiolus flowers on a large scale to meet out the demands of consumer. There is a constant demand for flowers throughout the year for various functions, festivals, marriages and floral decorations. This indicates better scope for commercial cultivation of gladiolus in the region.

Indian floriculture industry has been shifting from traditional flowers to cut flowers for export purpose. The climate of Maharashtra is most suitable to take this crop in all three seasons, with ease and less expenditure. The flower production is estimated to be 2,00,000 tonnes of loose flowers and 500 million number of cut flowers.

The gladiolus flowers are in great demand at Mumbai and Pune market. The flower spikes are in great demand in foreign market also. Planting material of different varieties is a limiting factor for commercial cultivation throughout the year. Average market price of gladiolus flowers Rs. 5 to 30 per kg of flowers. Also no serious pest, disease and disorder found on this crop. Hence, gladiolus has occupied an important place among the flower growers.

Chapter II

REVIEW OF LITERATURE

The present investigation entitled "Performance of gladiolus varieties under Nagpur conditions" was carried out at Experimental field, Horticulture section, College of Agriculture, Nagpur during Nov. to April, 2014-15. The relevant Literature on the performance of gladiolus varieties under different conditions was reviewed and the available literature is presented in this chapter under an appropriate headings.

2.1 Growth characters

2.2 Flowering and quality characters

2.3 Corm and cormel study

2.1 Growth characters :

Rai *et al.* (2000) evaluated 16 varieties of gladiolus under sodic Wasteland. Based on different characters such as plant height and number of tillers per plant, the varieties like White Prosperity, White Goddess, Red Beauty, Friendship, Venetei, Aldebran and First Lady were found superior in comparison to others.

Roy and Sharma (2000) reported a lot of variation in plant height and the cultivar Video was the dwarf one (1.14 m) and White Prosperity was the much tallest (1.52 m) under Lucknow (UP) condition.

Sanjai and Brahma (2000) evaluated 20 gladiolus varieties for cut flower and corm production in Ladakh by considering different characters and found that variety Princess Margaret Rose showed maximum plant height (136.6 cm).

Sidhu and Arora (2000) evaluated gladiolus varieties for summer flower production under Ludhiana conditions and reported that variety White Prosperity produced significantly tall plants (130.85 cm) followed by Pole Position (111.60cm).

Kamble (2001) studied the performance of gladiolus cultivar in Arabhavi (Karnataka) and reported that cultivar Trust recorded maximum plant height (81.06 cm) and was significantly superior over other cultivars. He also found that cultivar Vedanapoli (21.27) showed maximum number of leaves at 60 DAP.

Safiullah and Ahmed (2001) studied the performance of ten gladiolus cultivars under Rawalakot conditions and reported that cultivars, Deciso, Trader Horn and T_{512} were superior for days to spike emergence and flowering, number of spikes plant^{-1}, plant height highest in Blad Jack, Trader Horn and T_{512}. Nova Lux and Rose Delight were the most promising for the number of leaves per plant.

Gupta *et al.* (2002) studied the performance of eight gladiolus cultivars in Malwa Region of Madhya Pradesh and reported that cultivar Thumbiliana showed the highest corm sprouting percentage at 30 days after planting (DAP), followed by White Prosperity and American Beauty. The maximum plant height was recorded by White Prosperity followed by Spring Green and Tiger Flame, while the lowest was by Summer Sunshine.

Baweja and Brahma (2003) evaluated 15 gladiolus cultivars under mid-hills conditions of Himachal Pradesh and reported that cultivar Oscar recorded the highest overall plant height (102.06 cm).

Salvi *et al.* (2004) studied effect of planting dates (30 September and 15 October 2002) on the performance of gladiolus varieties under Akola conditions and reported that American Beauty planted on 15 October in open condition was found superior in terms of number of leaves per plant.

Kishan *et al.* (2005) studied the performance of gladiolus under Delhi conditions and found that variety Dhanvantari produced tallest plants (130.83 cm), followed by Anjali (124.00 cm) whereas Sylvia was the smallest (74.33 cm) in height. Anjali produced maximum number of leaves per plant (11.33) followed by Dhanavantari (10.66).

Rao and Janakiram (2006) studied the performance of exotic Orchidiolas and I.I.H.R. gladiolus cultivars and reported that cultivar Darshan was earliest to flower, Plant height maximum in Dhiraj.

Kumar *et al.* (2007) studied 36 gladiolus cultivars under Western Uttar Pradesh conditions and reported that cultivar Jyotsana is significantly superior with respect to the plant height (73.50 cm), length of longest leaf (55.59 cm), while maximum number of leaves (24.65) recorded with cultivar Shabnam.

Rani *et al.* (2007) studied the performance of 15 cultivars of gladiolus under local agro climatic condition and reported that the performance of cv. 'American Beauty' was the best in respect of plant height, performance of variety 'White Prosperity' and 'Pink Friendship' were also next to American Beauty.

Ranpise *et al.* (2007) studied seven Indian varieties of gladiolus under Dhule conditions of Maharashtra and reported that cultivar Hunting Song recorded maximum height of plant (144 cm) followed by Sancerre (123.30 cm).

Ramachandrudu and Thangam (2008) evaluated eight gladiolus cultivars under Goa conditions and reported that the variety Rose Supreme recorded the maximum plant height (78.05 cm), whereas the minimum (62.38 cm) was observed in variety Dhiraj. Number of leaves per plant (11.88) noted in Dhiraj was significantly superior to other varieties.

Balaram *et al.* (2009) studied 35 (11 Indian and 24 exotic) genotypes on 26 characters revealed that, Indian genotypes exhibit early sprouting, more shoots and spikes per corm and leaves per shoot, early spike emergence.

Kumar (2009) evaluated 16 exotic cultivars under sub-tropical mid-hills of Meghalaya and reported that Cultivar 'Gold Beauty' gave maximum plant height (105.03 cm), leaf length (57.30 cm).

Pandey *et al.* (2009) evaluated 12 gladiolus cultivars under Jammu conditions and reported that Cultivar 'Advance Red' was superior over rest of the cultivars in plant height, days to slipping.

Pragya *et al.* (2010) evaluate the performance of 37 gladiolus cultivars at the experimental farm of CITH-RS, Mukteshwar (Uttarakhand) cultivar Chantiler gave maximum plant height (147.33 cm), leaf length (60.00 cm) and leaf breadth (3.06 cm).

Choudhary *et al.* (2011) studied the performance of 12 gladiolus cultivars under sub-humid conditions of Rajasthan and reported that minimum number of days required for corm sprouting (7.47 days) and days to slipping (59. 20) were recorded in 'Chandani' The highest plant height (154.33 cm) recorded in 'Sabnam'. The cultivar 'Dhanvantari' produced longest length of leaf (54.89 cm).

Islam and Haque (2011) studied the performance of two gladiolus cultivars under protected cultivation in the rainy season and reported that genotype GL-027 produced taller plants (73.8 cm) compared to the genotype GL-023.

Gawali *et al.* (2012) studied the performance of eight gladiolus varieties under Vidarbha conditions and found that, earlier sprouting and 50 per cent sprouting of gladiolus corms were seen with the variety Phule Neelrekha, while, the maximum sprouting of corms and sprouts $corm^{-1}$ were noticed with varieties Phule Ganesh and Pisttacinus Hybrid, respectively. The maximum vegetative growth of the plant *viz.*, height of plant and leaves $plant^{-1}$ was noticed with the varieties Nova Lux and Phule Neelrekha, respectively.

Shaukat *et al.* (2012) evaluated eight gladiolus cultivars under Union Council Bangoin Poonch, J&K conditions and reported that cultivars White Prosperity, Amsterdam took less number of days for sprouting, Fidelio and Priscilla produced more plants per corm and White Prosperity obtained maximum plant height.

Mushtaq *et al.* (2013) studied four exotic cultivars of gladiolus under Rainfed conditions and reported that cultivars Pietmohlen was promising for leaf length (cm), leaf area(cm), cultivar Florared showed superiority for number of leaves per plants.

Saleem *et al.* (2013) studied five potential, exotic cultivars of gladiolus, among the tested cultivars, 'Essential' performed best for greater number of leaves plant^{-1} (8.8), 'Corveira' ranked second for most of the above mentioned indices.

Shaukat *et al.* (2013) studied five cultivars of gladiolus under the climatic conditions of Bagh Azad Jammu and Kashmir, Pakistan reported that cultivar Applause and Amsterdam took less number of days for sprouting, Fidelio and Priscilla produced more plants per corm and Applause obtained maximum plant height.

Das *et al.* (2014) studied seven cultivars of gladiolus under rain-fed condition of Assam (India) reported that cultivar Aarti was found superior with respect to plant height in all stages of observation followed by cultivar Suchitra. Cultivar Aarti showed superiority for number of leaves per plants.

Negi *et al.* (2014) evaluated 13 gladiolus varieties suitable for low hills of Himachal Pradesh and found that maximum height were observed in cultivar Hb-1-8, Hb-1-28, Hb-15-A and Hb-15-4 with maximum number of leaves.

2.2 Flowering and quality characters :

Cantór *et al.* (2000) evaluated 26 gladiolus cultivars under Romania and France conditions for colour, flowering date, plant height, length of flower stem, number of flowers, size of flowers, reproductive capacity and asthetic value and concluded that, the most promising cultivars were White Prosperity, Rose Supreme, Priscilla, Oscar, Applause Turkana, Wind Song and Her Majesty.

Neeraj *et al.* (2000) evaluated 26 genotypes of gladiolus under North Bihar conditions. Among these PG-17, Moralo and Her Majesty were promising genotypes for more number of florets spike^{-1}.

Rai *et al.* (2000) evaluated 16 varieties of gladiolus under sodic waste land. Based on different characters such as plant height, number of tillers plant^{-1}, spike length, number of florets spike^{-1} and the varieties like White Prosperity, White Goddess, Red Beauty, Friendship, Venetie, Aldebran and First Lady were found superior in comparison to others.

Roy and Sharma (2000) studied the performance of some exotic gladiolus cultivars in Lucknow (UP) and reported that the number of florets Spike^{-1} in Jester was 18.3, White Red Gold recorded only 10.2 florets Spike^{-1}.

Sidhu and Arora (2000) evaluated the gladiolus varieties for summer flower production in Ludhiana and reported that variety White Prosperity produced the longest spikes (102.27 cm) and size of florets was maximum in variety Rose Supreme (8.92 cm).

Kamble (2001) studied the performance of gladiolus cultivars in Arabhavi (Karnataka) and reported that maximum spike length (93.90 cm) spike weight (127.26 g), diameter of florets (11.91 cm) and number of florets spike^{-1} were noticed in cultivar Summer Sunshine and Vadanapali showed maximum spike girth and spike yield hectare^{-1}.

Safiullah and Ahmed (2001) studied the performance of ten gladiolus cultivars under Rawalakot conditions and reported that spike length and number of florets per spike were highest Blad Jack, Trader Horn and T_{512}.

Gupta *et al.* (2002) studied the performance of gladiolus cultivars in Malwa region of Madhya Pradesh. They found that American Beauty and Spring Green recorded the maximum spike per

corn (1.3) followed by Propeticious (1.25) and White Prosperity recorded maximum spike length (83.20 cm) followed by Thumbilliana (72.00 cm).

Patil (2002) studied the performance of gladiolus cultivars under Mahabaleshwar conditions and reported that Sancerre produced larger spikes, more number of florets spike^{-1}, cultivars Yellow Stone and Tropic Seas were also found superior in respect of spike length, number of florets spike^{-1} as compared to rest of the varieties.

Rathod (2002) studied the comparative performance of five gladiolus cultivars under Nagpur conditions and found that the cultivar Novelty recorded best as regards the characters like days required for emergence of spike, spike length (99.91 cm), florets spike^{-1} (16.08), while amongst the production of spike plant^{-1}, spike hecare^{-1} cultivars Orange Queen and Sancerre are best.

Baweja and Brahma (2003) evaluated 15 gladiolus cultivars under mid-hills conditions of Himachal Pradesh and reported that cultivar Oscar recorded the highest overall spike length (95.68 cm), whereas Ben Venuto recorded the highest number of florets spike^{-1} (17.82) and floret size (11.24 cm).

Jagdish *et al.* (2003) studied the performance of various cultivars of gladiolus under Valley conditions of Uttaranchal and reported that, the cultivar Oscar showed best performance as far as spike length and number of florets spike^{-1} is concerned.

Kem *et al.* (2003) studied the performance of 14 gladiolus cultivars under Valley conditions of Uttaranchal and quoted that, the cultivar Oscar recorded the longest spike (91.11 cm) and the highest florets Spikes^{-1} (19.6).

Nair and Shiva (2003) evaluated nine gladiolus cultivars under Bay Island conditions and reported that Darshan produced the maximum number of spikes plant^{-1} (3.00) and Dhiraj recorded

maximum number of florets spike^{-1} (12.94) with 5.82 florets opening at a time. Pusa Suhagin had the longest vase life (9.20 days) hence its keeping quality was the best.

Patil (2003) studied the performance of nine gladiolus cultivars and reported that spike length was highest in Sancerre (115.5 cm) and lowest in Happy End (74.2 cm). Sancerre produced the highest number of florets spike^{-1}. The size of the floret was largest in Sancerre, Yellow Stone and Poonam, while Happy End recorded the smallest floret size.

Basavaraddy (2004) evaluated elite hybrids of gladiolus for cut flower production under Transition tract of Karnataka and reported that the hybrids AB x MC, M-HVG and MC x AB were found to be good for cut flower production with respect to their number of days taken for spike initiation, number of days taken for first floret to open, length of spike, rachis length, size of the floret and number of marketable spikes.

Kamble *et al.* (2004) studied the performance of gladiolus cultivars in Karnataka and reported that Summer Sunshine, Melody, Trust and Yellow Cup recorded the highest spike length, number of florets spike^{-1}, whereas Vedanapoli and Sylvia recorded the highest number of spikes plant^{-1}.

Salvi *et al.* (2004) studied effect of planting dates (30th September and 15th October, 2002) on the performance of gladiolus varieties under Akola conditions and reported that American Beauty planted on 15th October in open condition was found to be superior in terms quality of flower spike.

Rao and Janakiram (2006) studied the performance of exotic Orchidiolas and I.I.H.R. gladiolus cultivars and reported that spike length and rachis length were maximum in Dhiraj. Lowest rachis length and floret size were observed in Taltal. Maximum floret size was recorded in Kumkum, whereas the maximum number of florets spike^{-1} was in Dhiraj. The least number of florets spike^{-1} was found in Adi.

Kumar *et al.* (2007) studied 36 gladiolus cultivars under Western Uttar Pradesh conditions and reported that cultivar Picottee was found to be suitable for producing maximum number of florets (19.25 cm), length of spike (120.25 cm). maximum length of rachis (50.75 cm) was found with cultivar Red Beauty.

Rani *et al.* (2007) studied the performance of 15 cultivars of gladiolus under local agro climatic condition and reported that the performance of cv. 'American Beauty' was the best in respect of spike length, spike weight, floret number, floret size, duration of flowering in field condition, Performance of variety 'White Prosperity' and 'Pink Friendship' were also next to American Beauty.

Ranpise *et al.* (2007) studied seven Indian varieties of gladiolus under Dhule conditions of Maharashtra and reported that cultivar Hunting Song recorded significantly longer spikes (120 cm) followed by Sancerre (90.7).

Ramachandrudu and Thangam (2008) evaluated eight gladiolus cultivars under Goa conditions and reported that longest spikes (123.76 cm) were produced in Wigs Sensation. Maximum rachis length (52.01 cm) and highest number of florets spike^{-1} (17.2) were observed in variety Mascagni.

Balaram *et al.* (2009) studied 35 (11 Indian and 24 exotic) genotypes for 26 characters and revealed that exotic genotypes had larger florets, more florets open at one time and longer spikes.

Horo *et al.* (2009) Three years varietal trial was conducted at AICRP on Floriculture, Department of Horticulture, Birsa Agricultural University, Kanke, Ranchi. Ten potential genotypes were evaluated among the different cultivars tested, the longest spike length was recorded in the cultivar Candyman (82.40 cm) which was at par with cultivars IIHR-87-22-1(81.67 cm), Eigth Wonder (80.97 cm) and Arka Kesar (80.40 cm), where as the cultivar Pacifica exhibited shortest spike length (46.38 cm). Number of florets spike^{-1} was found to be

maximum in Eigth Wonder (15.00) followed and at par with Candyman (14.74), IIHR 87-22-1 (14.30), Arka Kesar and Jyotsna (14.00). The minimum number of florets spike^{-1} was found in cultivar Pacifica (10.43).

Kumar (2009) evaluated 16 exotic cultivars under sub-tropical mid-hills of Meghalaya and reported that cultivar 'Friendship Pink' gave longest spike (70.00 cm) and rachis (50.05 cm), maximum florets spike^{-1} (15.00) and long field durability (13.00 days).

Pandey *et al.* (2009) evaluated 12 gladiolus cultivars under Jammu conditions and reported that Cultivar 'Advance Red' was superior over rest of the cultivars in spike length, rachis length, number of florets spike^{-1}, diameter of first floret.

Pragya *et al.* (2010) evaluate the performance of 37 gladiolus cultivars at the experimental farm of CITH-RS, Mukteshwar (Uttarakhand) The longest spike was recorded in Pusa Jyotsana (88.67 cm), Novalux (88.33 cm), High Style (88.33 cm), Chantiler (86.33 cm), Pusa Dhanvantari (81.67 cm), Pusa Shabnam (80.33 cm), Summer Rose (83.33 cm) and Pusa Archana (83.33 cm) while the longest rachis was recorded in Chantiler (63.00 cm). Cultivar Pusa Jyotsana and Pusa Swarnima recorded maximum number of florets spike^{-1} (20.33).

Choudhary *et al.* (2011) studied the performance of 12 gladiolus cultivars under sub-humid conditions of Rajasthan and reported that highest spike length (96.47 cm) and flowering duration (14.93 days) were recorded in 'Sabnam'., while spike diameter (1.039 cm), floret-neck diameter (2.436 cm) and floret diameter (8.24 cm) were noted in 'TS-14'. The rachis length (66.87 cm), florets spike^{-1} (18.47) and number of florets remaining open at time (8.67) were recorded in 'Sancerre'. The maximum number of spikes (2.73) were produced in 'Punjab Dawn'.

Islam and Haque (2011) studied the performance of two gladiolus cultivars under protected cultivation in the rainy season and reported that genotype GL-027 produced longer spike (97.2 cm) and longer rachis (51.7 cm) compared to the genotype GL-023.

Gawali *et al.* (2012) studied the performance of eight gladiolus varieties under Vidarbha conditions and found that, spike quality parameters such as length of spike, length of rachis and florets spike^{-1} were found to be the maximum with the variety Phule Ganesh. However, the maximum diameter of spike was noticed with the variety Nova Lux.

Sankari *et al.* (2012) 42 genotypes were evaluated in Eastern Ghats of Tamil Nadu, under Yercaud conditions. Among 42 genotypes evaluated, 'Pusa Shagun' and 'Pusa Swarnima' recorded quality spikes with higher vase life indicating their suitability for use in floral arrangement.

Shaukat *et al.* (2012) evaluated eight gladiolus cultivars under Union Council Bangoin Poonch, J&K conditions and reported that cultivar White Prosperity and High Style were earlier for spike emergence, Priscilla and High Style took minimum days to flowering, maximum florets were produced by High Style and White Prosperity, White Prosperity obtained maximum spike length.

Bhajantri and Patil (2013) studied the performance of 32 gladiolus cultivars at Dharwad and reported that maximum spike length, rachis length, number of florets spike^{-1}, floret diameter, floret length and vase life was recorded in the hybrid AB x MC.

Mushtaq *et al.* (2013) studied four exotic cultivars of gladiolus under Rainfed conditions and reported that cultivars Pietmohlen was promising for number of florets plant^{-1} and florets length. Cultivar Florared showed superiority for vase life.

Shaukat *et al.* (2013) studied Five cultivars of gladiolus under the climatic conditions of Bagh Azad, Jammu and Kashmir. Results on floral characteristics showed that, cultivar Applause and Peter Pears were earlier for spike emergence, Priscilla and Peter Pears took minimum days to flowering, maximum florets were produced by Peter Pears and Applause. However, Applause obtained maximum spike length and Peter Pears remained attractive for longer time.

Saleem *et al.* (2013) studied Five potential, exotic cultivars of gladiolus, among the tested cultivars, 'Essential' performed best for early spike emergence (74.2 days), number of florets spike^{-1} (13.9), spike length (46.8 cm), spike diameter (1.0 cm), vase life (14.3 days), 'Corveira' ranked second for most of the above mentioned indices.

Singh *et al.* (2013) studied the performance of 19 gladiolus cultivars for various post harvest characters and reported that maximum length of spike at first and fifth day and vase life was recorded with variety Summer Rose.

Das *et al.* (2014) studied Seven cultivars of gladiolus under Rainfed condition of Assam (India) reported that cultivars Aarti was promising for days taken to start blooming, number of florets plant^{-1} and florets length, maximum number of marketable spikes plot^{-1} and in hectare area was recorded in the cultivar Aarti which was statistically at par with the cultivar Suchitra. Vase life period was observed to be highest in the cultivar Aarti, followed by Suchitra.

Kumar (2014) studied the performance of six exotic gladiolus cultivars for off season under Meghalaya conditions and reported that cultivar Casa Blanca produced longest flowering spike (98.07 cm), longest rachis (51.10 cm), florets spike^{-1} (15.22), diameter of 1st floret (10.02 cm) and duration of flowering (13.63 days).

Negi *et al.* (2014) evaluated 13 gladiolus varieties suitable for low hills of Himachal Pradesh and found that cultivar Hb-1-8 and Hb-1-28 took minimum days to spike emergence. Cultivars Hb-2-52, Hb-9-16

and Hb-1-8 took minimum day to flowering, maximum florets were produced by cultivar Hb-1-8, Hb-1-28, Hb-1-33 and Hb-15-4. Maximum spike length was observed in cultivars Hb-1-8, Hb-1-28, Hb-15-4 and remain attractive for longer time.

Sarkar and Chakraborty (2014) evaluated 15 gladiolus varieties in North Eastern Himalayan Region and found that variety Jester was found to have highest number of days to flowering, spike length, rachis length, number of florets remaining open at a time, size (diameter) of floret, weight of harvested spike, IIHR-Hybrid was found to have highest duration of flowering, Kumkum was recorded highest number of florets spike^{-1}. However, Swarnima was showed highest longevity (field life) of spike and Darshan was found to have highest vase-life of spike in tap water.

2.3 Corm and Cormels study

Rai *et al.* (2000) evaluated 16 gladiolus varieties under sodic waste land and found that number of corms per plant was maximum in variety First Lady (1.9 corms), followed by White Prosperity (1.6 corms). The corm size was maximum in Friendship (10.9 cm) followed by White Prosperity (10.2 cm). Sanjai and Brahma (2000) evaluated 20 gladiolus varieties for corm production in Ladakh and concluded that variety Victor Borge (55.7) showed higher number of cormels plant^{-1} followed by White Prosperity (50.2), Eurovision (48.8) and Novelty (48.8).

Roy and Sharma (2000) studied 10 gladiolus cultivars under Lucknow conditions and found that mother: daughter corm ratio was highest (1:1.8) in case of *cv.* Priscilla. Corm diameter was maximum in case of *cv.* Ice Gold (6.6 cm) and Rose Supreme (6.6 cm).

Sidhu and Arora (2000) conducted a trial to evaluate six gladiolus varieties for summer flower production and found that corm and cormel weight was significantly higher in variety Nova Lux. However, number of corms plant^{-1} was found highest in variety White

Prosperity (1.28) and number of cormels plant^{-1} was highest in variety Summer Sunshine (12) under Ludhiana conditions.

Kamble (2001) who evaluated gladiolus varieties in Arabhavi (Karnataka) reported that size of daughter corm (6.83 cm) and weight of daughter corm (143.87 g) were maximum in variety Summer Sunshine.

Safiullah and Ahmed (2001) studied the performance of ten gladiolus cultivars under Rawalakot conditions and reported that cultivars, Deciso, Trader Horn and T_{512} were superior for corm weight, cormel weight, corm and cormel diameters, maximum cormels was recorded by Mary Housley (79.95)

Patil (2002) studied the performance of gladiolus cultivars under Mahabaleshwar conditions and reported that Sancerre produced higher number of corms plant^{-1} cultivars Yellow Stone and Tropic Seas were also found superior in respect of corms plant^{-1} as compared to rest of the varieties.

Rathod (2002) studied the comparative performance of five gladiolus cultivars under Nagpur conditions and found that, the cultivar Orange Queen and Sancerre are best for yield of corms and cormels hectare^{-1}.

Baweja and Brahma (2003) evaluated 15 gladiolus cultivars under Mid-hill conditions of Himachal Pradesh and reported that cultivars Sunset and Summer Pearl recorded the highest number of corms plant^{-1} (4.56).

Jagdish *et al.* (2003) reported that number of corms plant^{-1} was highest in Melody and lowest in Sylvia under Uttaranchal conditions.

Kem *et al.* (2003) evaluated 15 gladiolus cultivars under Uttaranchal conditions and reported that Melody recorded the highest number of corms plant^{-1} (4.00).

Nair and Shiva (2003) evaluated nine gladiolus cultivars under Bay Island conditions and reported that the maximum number of corms plant^{-1} were produced by Green Willow (1.60). However, Pusa Suhagin gave the maximum number of cormels per plant (45.97).

Patil (2003) studied the performance of nine gladiolus cultivars and reported that corm production was highest in Yellow Stone and Sancerre. corm size was highest in Yellow Stone followed by Sancerre and Tropic Seas.

Kamble *et al.* (2004) studied the performance of gladiolus cultivars in Karnataka and reported that Summer Sunshine, Melody, Trust and Yellow Cup recorded the highest corm yield, whereas Vedanapoli and Sylvia recorded the highest number of corms plant^{-1}. Sylvia, Vendanapoli, Melody, Yellow Cup and Majic produced the highest number of corms and cormels plant^{-1}.

Salvi *et al.* (2004) studied effect of planting dates (30th September and 15th October, 2002) on the performance of gladiolus varieties under Akola conditions and reported that American Beauty planted on 30th September produced more number of cormels per plant.

Kishan *et al.* (2005) studied the performance of gladiolus under Delhi conditions and found that weight of single corm recorded maximum by Goid Dust (124.66 g) and Dhanavantari (120.00 g); while minimum by Vinks Glory (66.66 g).

Ram *et al.* (2005) evaluated eight gladiolus cultivars under sodic conditions and reported that White Prosperity recorded the highest values for number of corms (1.79) and cormels plant^{-1} (32.25).

Rani *et al.* (2007) studied the performance of 15 cultivars of gladiolus under local agro climatic condition and reported that the performance of cv. 'American Beauty' was the best in respect of corm

diameter. Excellent results were observed with respect to corm production in 'American Beauty', Pink Friendship' and White Prosperity.

Ranpise *et al.* (2007) studied seven Indian varieties of gladiolus under Dhule conditions of Maharashtra and reported that cultivar Sancerre recorded significantly highest number of corms (2.50 plant^{-1}) followed by Selection- 1 (2.12 plant^{-1}).

Ramachandrudu and Thangam (2008) evaluated eight gladiolus cultivars under Goa conditions and reported that both corm size (6.60 cm) and weight (95.87 g) were found maximum in Wigs Sensation.

Balaram *et al.* (2009) studied 35 (11 Indian and 24 exotic) genotypes for 26 characters and revealed that, exotic genotypes had high cormel multiplication rate and high corm multiplication rate with larger and heavier corms.

Kumar (2009) evaluated 16 exotic cultivars under sub-tropical Mid-hills of Meghalaya and reported that, maximum corm diameter (5.76 cm), corm weight (55.11 g) and weight of 5 corms (300.00 g) were given by 'Green Bay', cultivar 'Creamy White' gave maximum cormels (50.22) and cormel weight plant^{-1} (4.05 g).

Pandey *et al.* (2009) evaluated twelve gladiolus cultivars under Jammu conditions and reported that, cultivar 'Advance Red' was superior over rest of the cultivars in number of cormels plant^{-1}. However, maximum number of daughter corms was recorded in cv. 'Pusa Gunjan'.

Poon *et al.* (2010) Twenty-one genotypes were evaluated at Indian Institute of Horticultural Research, Bangalore. Genotype 'Hybrid selection 84-4-9' produced the highest number of corms (3.16) and cormels plant^{-1} (134.25). Genotype 'Hybrid selection 87-1-1' recorded the maximum corm weight (124.50 g) and corm diameter (8.00 cm). Genotype '*Psittacinus* hybrid' produced the maximum weight of cormel (3.41 g) and cormel diameter (1.92 cm).

Pragya *et al.* (2010) evaluate the performance of 37 gladiolus cultivars at the experimental farm of CITH-RS, Mukteshwar (Uttarakhand) Significantly maximum corm equatorial diameter (6.14 cm), corm polar diameter (2.65 cm), corm weight (55.51g) and propagation co-efficient (330.90%) were observed in Legend and Chantiler.

Choudhary *et al.* (2011) studied the performance of 12 gladiolus cultivars under sub-humid conditions of Rajasthan and reported that maximum number of corms (3.20) plant^{-1} were produced in 'Punjab Dawn'.

Kumar *et al.* (2011) An experiment entitled "Variability studies for yield and yield in attributing traits in gladiolus (Gladiolus L.)" carried out at the Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow (U.P.) The maximum weight of corms plot^{-1} was recorded in Rigency (0.964 kg) followed by Picardy (0.780 kg) and Tiger Flame (0.741 kg) and minimum weight of corms was recorded in Eurovision (0.519 kg) respectively.

Gawali *et al.* (2012) studied the performance of eight gladiolus varieties under Vidarbha conditions and found that, corm yield of gladiolus in respect of numbers was noticed maximum in variety Psittacinus Hybrid. Whereas, the maximum diameter of corm and weight of corm plant^{-1} were found superior with the variety Nova Lux and cormels produced plant^{-1} and their weight were noted maximum with the variety Phule Ganesh.

Sankari *et al.* (2012) 42 genotypes were evaluated in Eastern Ghats of Tamil Nadu, under Yercaud conditions. Among 42 genotypes genotypes like 'Thumbolina', 'Priscilla' and 'Candyman' were found superior in characters like corm number, corm weight and corm diameter

Shaukat *et al.* (2012) evaluated eight gladiolus cultivars under Union Council Bangoin Poonch, J&K conditions and reported that cultivars High Style and Fidelio produced more corms, White Prosperity produced maximum cormels and gained maximum corm size, maximum corm weight was recorded in Fidelio.

Saleem *et al.* (2013) studied Five potential, exotic cultivars of gladiolus, among these cultivars, 'Essential' performed best for cormel diameter (0.7 cm) and average weight of cormel (0.3 g). 'Corveira' ranked second for most of the above mentioned indices.

Shaukat *et al.* (2013) studied Five cultivars of Gladiolus under the climatic conditions of Bagh Azad Jammu and Kashmir. results on corm and cormels showed that Peter Pears produced more corms, Applause produced maximum cormels and gained maximum corm size. However, maximum corm weight was recorded in Fidelio.

Kumar (2014) studied the performance of six exotic gladiolus cultivars for off season under Meghalaya conditions and reported that cultivar Spic-N-Span produced bigger size corm (4.83 cm) and corm weight (42.50 g), maximum polar (2.03 cm) and equatorial (1.73) diameter, weight of 20 cormels (14.74 g).

Chapter III

MATERIAL AND METHODS

The investigation entitled "Performance of gladiolus varieties under Nagpur conditions" was carried out at Experimental Field, Horticulture Section, College of Agriculture, Nagpur during November to April, 2014-15. The details of material used and methods adopted during course of studies were mentioned in the chapter.

3.1 General :

3.1.1 Location:

The experiment was carried out at the Experimental Field, Horticulture Section, College of Agriculture, Nagpur.

Nagpur city is comes under Vidarbha region of Maharashtra State and is situated in the subtropical zone on 21^0, 10' N latitude and 79^0, 19' longitude and 321.26 meter above mean sea level.

3.1.2 Climate:

Nagpur was characterized with hot and dry summer and fairly cold winter. The area was under wide fluctuation of temperature. The weekly meteorological data on various parameters was recorded at Meteorological Observatory, Agronomy Section, College of Agriculture, Nagpur. The minimum and maximum temperature ranged from 7.4^0C to 36^0C during crop period.

Minimum and maximum relative humidity ranged from 21 to 85%. The meteorological data is given in Appendix-I for the weather conditions prevailed during the course of investigation.

3.2 Materials:

3.2.1 Experimental site

The topography of the land under the experiment was fairly uniform. The soil was medium black with uniform texture, colour and

good drainage. The soil of the experimental plot was analyzed for knowing its nutritional status prior to conduct of experiment and the detail obtained from the soil testing laboratory are given as below.

Chemical analysis of soil :

Sr. No.	Particular	Contents
1	pH	7.2
2	Electrical conductivity	0.24 d Sm^{-1}
3	Organic carbon	0.53%

Analysis of available N, P, K :

Ingredients	Quantity kg ha^{-1}	Method use
Available Nitrogen	152.88	Modified Kjeldahl's method as suggested by Piper, 1966.
Available Phosphorus	25.23	Olsen's method as suggested by Jackson, 1967
Available Potassium	310.8	Flame emission spectrophotometer method as suggested by Jackson, 1967

3.2.2 Experimental details :

The details of experiment was given below

1. Name of crop : Gladiolus
2. Botanical name : *Gladiolus grandiflorus* L.
3. Family : Iridaceae
4. Varieties : 9
5. Year of experiment : 2014-2015

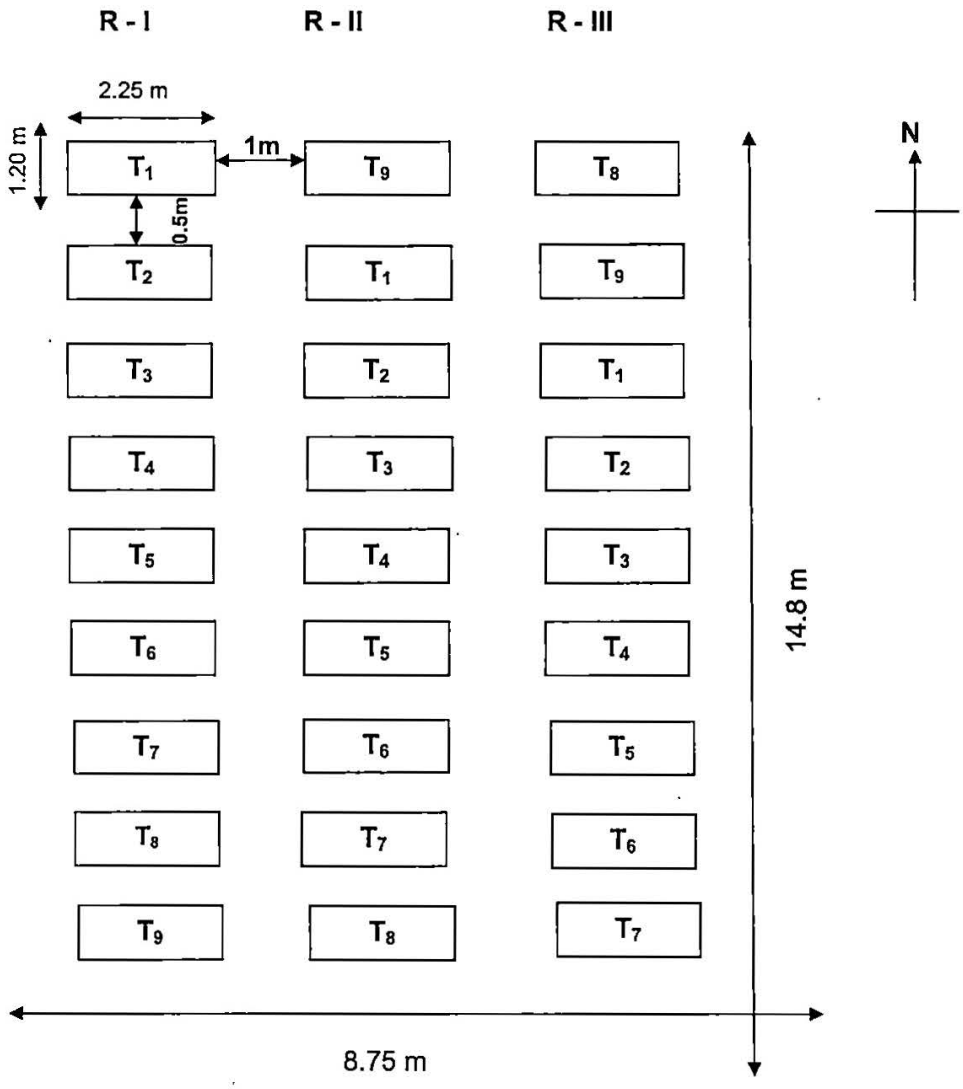


Fig 1: Plan of layout

Plate 1 : View of Experimental Plot At full bloom stage

6.	Experimental design	:	Randomized Block Design
7.	Treatments	:	9
8.	Replications	:	3
9.	Total plots	:	27
10.	Spacing		
	a) Row to Row	:	45 cm
	b) Plant to Plant	:	15 cm
11.	Plot size		
	a) Gross	:	2.25 m x 1.20 m ($2.7m^2$)
	b) Net	:	1.35 m x 0.90 m ($1.22m^2$)
12.	Plant population $plot^{-1}$		
	a) Gross	:	28 plants
	b) Net	:	10 plants
13.	Layout	:	Raised bed
14.	Planting time	:	24th November, 2014

3.3 Treatment details :

T_1 - Snow Princess

T_2 - Yellow Stone

T_3 - Chandani

T_4 - Nova Lux

T_5 - Flaro Sovenier

T_6 - Princess Morgerate Rose

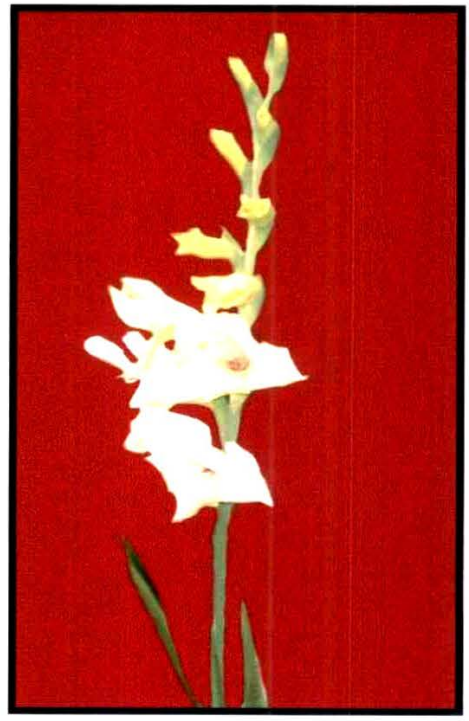
T_7 - Pricilla

T_8 - Forta Rosa

T_9 - Jester Gold

T1-Snow Princess

T_2-Yellow Stone



T_3-Chandani

Plate 2 : Gladiolus varieties

T_4-Nova Lux

T_5-Flaro Sovenier

T_6-Princess Morgerate Rose

Plate 3 : Gladiolus varieties

T_7-Pricilla

T_8-Forta Rosa

T_9-Jester Gold

Plate 4 : Gladiolus varieties

3.4 Methodology

Preparatory tillage and manuring of experimental plot :

The experimental plot was ploughed and subsequent harrowing were done clod crushing and soil was brought to fine tilth. At the time of land preparation, well rotted FYM @ 20t ha^{-1} was mixed uniformly in the soil before last harrowing. Layout of ridges and furrow in a given size was made in Randomized Block Design as per treatments.

3.4.1 Techniques adopted :

3.3.2 Planting :

The corms of nine varieties of gladiolus were procured from AICRP on Floriculture, Pune and cleaned by removing the dried husk present on them. Then they were dipped in copper fungicide (0.1%) solution for 20 minutes as preventive measure for *Fusarium wilt* disease. These corms were planted at a spacing of 45 x 15 cm in each row along the sides of the ridges at a depth of 5-6 cm. Light irrigation was given immediately after planting.

3.3.3 Fertilizer application :

Recommended dose of NPK (400:200:200 kg/ha) was applied in the form of urea, single super phosphate and muriate of potash respectively. At the time of planting half the dose of N, full dose of P_2O_5 and K_2O were applied. The crop was top dressed with remaining half dose of N at 30 days after planting (DAP).

3.4 Intercultural operations :

Gap filling :

The gap filling was done on 7^{th} day after planting and the plant population of each plot was maintained.

Irrigation :

The experimental field was irrigated at 8-10 days interval throughout the growing period of the crop. The first irrigation was given immediately after planting of corms through drip irrigation.

Weeding :

In order to keep the plots free from weeds, first weeding was done 20 days after planting of corms and remaining weeding were done as and when required.

Loosening of soil :

Loosening of soil in between two rows was carried out simultaneously during the weeding operation. It helpful to provide better aeration of corms.

Earthing up of soil :

Earthing up of soil in between ridges and furrows was carried out when required for proper covering of corms.

Stacking :

Stacking with bamboo sticks was carried out after 30-40 days after planting of corms when plant height increase upto 30 cm for protection and support of plants.

3.4.2 Plant protection :

Timely and suitable plant protection measures was taken up to protect the plants from pest and diseases incidence. An monocrotophos spray was taken up @ 0.2 per cent to control the leaf eating caterpillars and for the soil drenching purpose copper fungicide was used after every 15 days interval.

3.4.3 Harvesting :

The spikes were harvested at first floret loosening stage (opening stage) and used for recording different parameters. The corms and cormels were lifted from the ground when the foliage turned to yellow colour. These harvested corms and cormels were further used for recording different parameters.

3.5 Observations recorded

Five plants from each treatments plot were selected randomly for recording observations. Following observations are recorded during experimentation.

A. Growth Parameters:

1. Shoots plant^{-1}
2. Height of plant at 15 days interval (cm)
3. Leaves plant^{-1} at 15 days interval
4. Leaf area (cm^2) at 50% flowering

B. Flowering Parameters:

1. Days to first spike emergence
2. Days to 50 % flowering
3. Days to opening of first florets
4. Flowering span (days)
5. Longevity of intact flower (days)

C. Quality Parameters:

1. Length of spike (cm)
2. Diameter of spike (cm)
3. Length of rachis (cm)
4. Florets spike^{-1}
5. Floret length (cm)

6. Florets diameter (cm)

7. Vase life (days)

D. Yield parameters:

1. Spikes plant^{-1}

2. Spikes plot^{-1}

3. Spikes ha^{-1}

E. Corms and cormels parameters:

1. Corm weight (g)

2. Diameter of corms (cm)

3. Corms plant^{-1}

4. Corms plot^{-1}

5. Corms ha^{-1}

6. Cormel weight (g)

7. Diameter of cormel (cm)

8. Cormels plant^{-1}

9. Cormels plot^{-1}

10. Cormels ha

3.6 Details of various observations:

3.6.1 Growth Characters :

Shoots plant^{-1} :

Number of shoots plant^{-1} in each observational plant of treatment was counted and the average was worked out.

Height of plant at 15 days interval from planting (cm) :

Height of the plant was recorded from the ground to the tip of the youngest leaf at 15, 30, 45 and 60 DAP and expressed in centimeters.

Leaves plant^{-1} at 15 days interval from planting :

The number of leaves from each plant was counted at 15, 30, 45 and 60 DAP and the average was worked out.

Leaf area (cm^2) :

Randomly five leaves from the middle portion of the plant were selected from each observational plant at the time of 50 % flowering and leaf area was determined by using leaf area meter.

3.6.2 Flowering Parameters :

Days to first spike emergence :

Number of days required from planting of corms to the first spike emergence in each treatment was recorded and the average was worked out.

Days to 50 per cent flowering :

Number of days required from planting of corms to the at least 50 per cent flowering in each treatment was recorded and the average was worked out.

Days to opening of first floret :

Number of days required for opening of first floret from planting of corms in each observation plant of treatments was recorded and the average was worked out.

Flowering span (days) :

The days from first flower harvest to last harvest of flowers were recorded in each treatment.

Longevity of intact flowers (days) :

Number of days required from first pair of florets on spike to the drying of 80 per cent of spike in each observational plant.

3.6.3 Quality Parameters:

Length of spike (cm) :

Length of the spike was measured from the internode next to fourth leaf upto the tip of the spike and recorded in centimeters.

Diameter of spike (cm) :

Diameter of spike was measured with the help of vernier callipers below the first floret and expressed in centimeters.

Length of rachis (cm) :

Length of the rachis was measured from the point of emergence of first floret to the last floret is expressed in centimeters.

Florets spike^{-1} :

Number of florets produced by each spike were recorded from observational plant and the average was worked out.

floret length (cm) :

The length of third, fourth and fifth florets of the spike of each observational plant was measured before opening of the florets at spike harvesting stage with the help of meter scale and the mean value was recorded in centimeter

Floret diameter (cm)

An average width of fully opened (diameter) third, fourth and fifth florets of the spike of each observational plant was measured with the help of verneer caliper and the mean value was recorded in centimeter.

Vase life of flowers (days) :

Vase life of cut marketable gladiolus spikes of different varieties was observed in water and expressed in days. The spikes were harvested in the first floret started to open and showed colour and the cut ends were immediately kept in tap water in the laboratory these

flower spikes were kept in vases having tap water to study the life of spike in tap water without any chemicals.

3.6.4 Yield parameters:

Spikes plant^{-1} :

Number of marketable spike developed from each observational plant was recorded and the average was worked out.

Spike plot^{-1} :

Number of spike plot^{-1} was calculated on the basis of spike plant^{-1}.

Spikes hectare^{-1} :

Yield of spike hectare^{-1} was calculated on the basis of spikes plot^{-1}.

3.6.5 Corms and cormels parameters :

Corm weight (g) :

Weight of the corm after harvesting of corms was recorded in gram with the help of weighing balance.

Diameter of Corm (cm) :

Diameter of corm was measured with the help of vernier callipers after harvesting of corms and expressed in centimeters.

Corms plant^{-1} :

Total number of corms produced by each plant were recorded from observational plant and the average was worked out.

Cormels weight (g) :

Weight of cormels after harvesting of corms was recorded in gram with the help of weighing balance.

Cormels plant^{-1} :

Total number of cormels produced by each plant were recorded from observational plant and the average was worked out.

3.7 Statistical analysis :

The data on growth, flowering, yield and quality of flowers was recorded during the course of investigation and subjected to statistical analysis as per Panse and Sukhatme (1967). The appropriate standard error of mean S. E.(m) and the critical differences (C.D.) were calculated at 5% level of probability. The data have been depicted by suitable graphs and figures in appropriates tables.

3.8 Place / Duration / Season of experiment :

The experiment was carried out at the Experimental Field, Horticulture Section, College of Agriculture, Nagpur. during November to April, 2014-15.

Chapter IV

RESULTS AND DISCUSSION

This chapter deals with the results of an experiment entitled "Performance of gladiolus varieties under Nagpur Conditions" which was carried out at the Experimental Field, Horticulture Section, College of Agriculture, Nagpur during November to April 2014 -15.

The observations were recorded on the various parameters governing growth, flowering, yield of flowers and corms and cormels and quality of flowers. The data was statistically analyzed and the results obtained are presented under an appropriate heading and subheadings and it is interpreted with the help of histograms and photographs. The parameters are as under

4.1. Growth parameters

The data in respect of the growth parameters of gladiolus as influenced by the varieties is presented under appropriate headings.

4.1.1 Shoots plant^{-1}

The data presented in Table 1 and depicted through Fig 2 exhibited that, the gladiolus varieties showed significant differenced with respect to shoots plant^{-1}. The variety Yellow Stone had produced significantly maximum shoots plant^{-1} (2.73) which was statistically found to be at par with the variety Chandani (2.53). However, minimum shoots plant^{-1} (1.87) were produced with the variety Nova Lux.

The variation in production of shoots plant^{-1} of gladiolus might be attributed due to the genetic differences of varieties. Similar results are obtained by the workers viz. Balaram *et al.* (2009), Shaukat *et al.* (2012), Gawali *et al.* (2012) in gladiolus.

Table 1. Shoots plant^{-1} as influenced by varieties of gladiolus

Treatments	Shoots plant^{-1}
T_1 - Snow Princess	2.27
T_2 - Yellow Stone	2.73
T_3 – Chandani	2.53
T_4 - Nova Lux	1.87
T_5 - Flaro Sovenier	2.00
T_6 - Princess Morgerate Rose	2.00
T_7 – Pricilla	2.27
T_8 - Forta Rosa	2.33
T_9 - Jester Gold	2.00
'F' test	Sig.
SE (m) ±	0.10
CD at 5 %	0.31

4.1.2 Height of Plant

The data regarding height of the gladiolus plant as influenced by the varieties at 15, 30, 45 and 60 days after planting is presented in Table 2 and depicted through Fig. 3.

The data presented in Table 2 revealed that, significant differences were recorded among the gladiolus varieties under study for the height of plant at different growth period during 15, 30, 45 and 60 days after planting.

At the stage of 15 days after planting, significantly maximum height of plant was recorded in the variety Chandani (26.27 cm) which was statistically found to be at par with the varieties Forta Rosa (24.80 cm) and Yellow Stone (24.07 cm). However, significantly minimum height of plant was recorded in the variety Princess Morgerate Rose (20.20 cm).

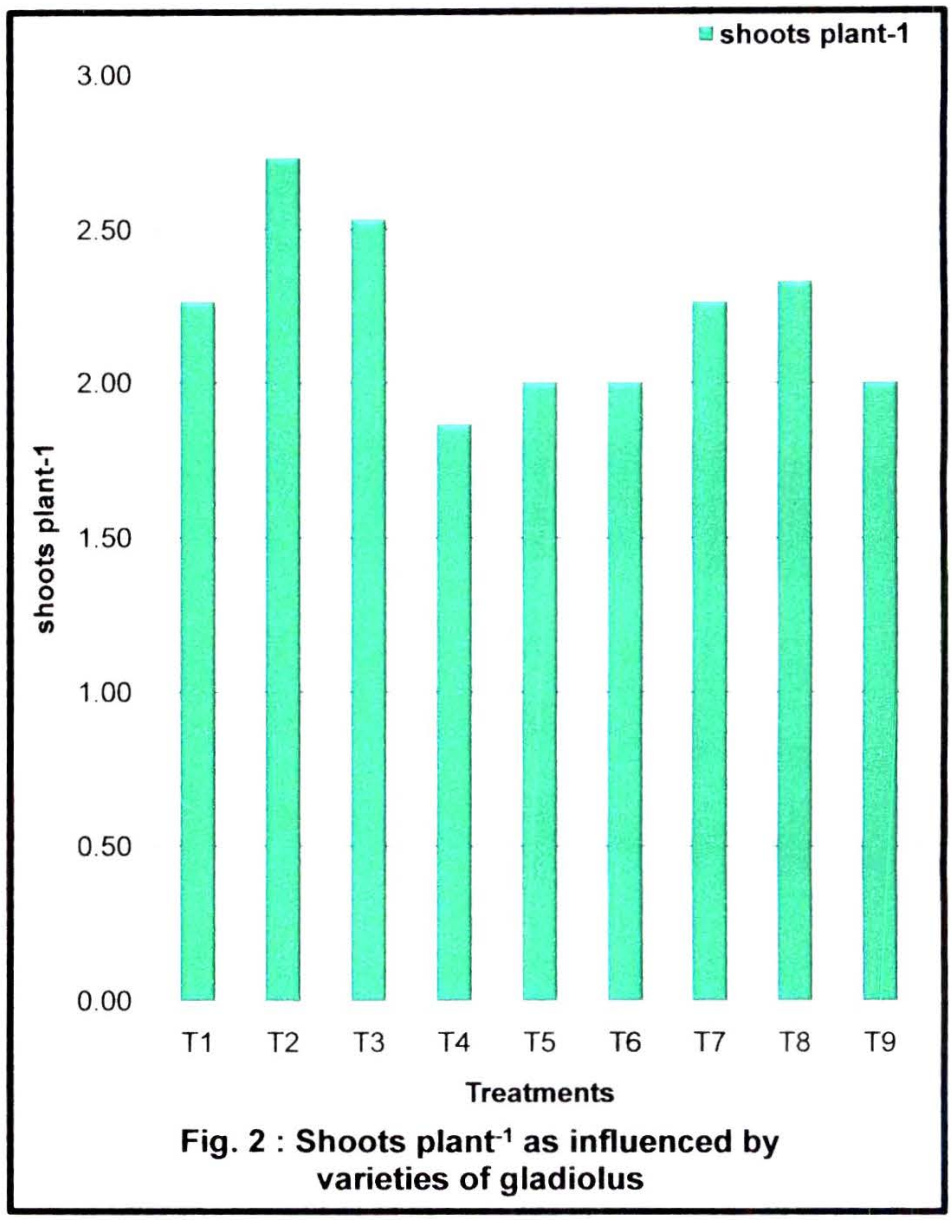


Fig. 2 : Shoots plant^{-1} as influenced by varieties of gladiolus

Table 2. Height of plant as influenced by varieties of gladiolus

Treatments	Height of gladiolus plant (cm)			
	15 DAP	30 DAP	45 DAP	60 DAP
T_1 - Snow Princess	21.13	37.87	61.07	73.93
T_2 - Yellow Stone	24.07	40.93	67.60	84.80
T_3 – Chandani	26.27	42.67	63.13	70.20
T_4 - Nova Lux	22.73	38.77	58.13	62.00
T_5 - Flaro Sovenier	20.47	35.20	56.33	67.87
T_6 - Princess Morgerate Rose	20.20	36.27	58.40	61.13
T_7 – Pricilla	21.87	37.00	55.13	59.53
T_8 - Forta Rosa	24.80	50.00	73.13	76.00
T_9 - Jester Gold	21.87	36.20	58.03	69.13
'F' test	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.89	1.16	1.78	2.05
CD at 5 %	2.65	3.47	5.29	6.10

At the stage of 30 days after planting, significantly maximum plant height was noted with the variety Forta Rosa (50.00 cm) and it was followed by the varieties Chandani (42.67 cm) and Yellow Stone (40.93 cm). However, significantly minimum height of plant was recorded in the variety Flaro Sovenier (35.20 cm).

At the stage of 45 days after planting, significantly maximum height of plant was recorded in the variety Forta Rosa (73.13 cm) and it was followed by the varieties Yellow Stone (67.60 cm) and Chandani (63.13 cm). However, significantly minimum height of plant was recorded in the variety Pricilla (55.13 cm).

At the stage of 60 days after planting, significantly maximum height of plant was recorded in the variety Yellow Stone (84.80 cm) and it was followed by the varieties Forta Rosa (76.00 cm) and Snow Princess (73.93 cm). However, significantly minimum height of plant was recorded in the variety Pricilla (59.53 cm).

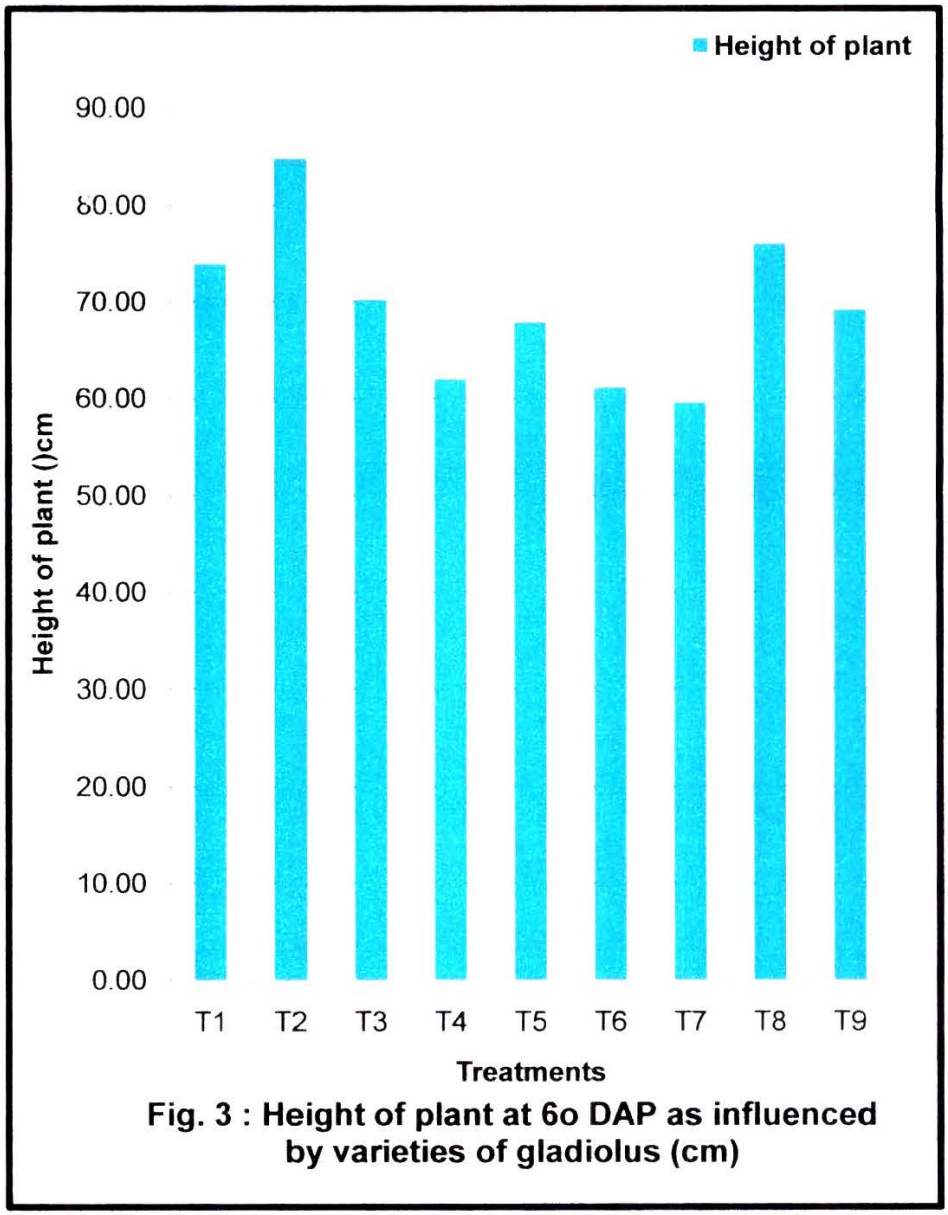


Fig. 3 : Height of plant at 6o DAP as influenced by varieties of gladiolus (cm)

The gladiolus varieties showed significant differences in respect of height of plant at different stages of growth viz. 15, 30, 45 and 60 days after planting. The variation in height of plant might be due to the differential genetic makeup and varied growth rate among the varieties of gladiolus.

Similar results in respect of height of plant in cultivars of gladiolus was quoted previously by Roy and Sharma (2000), Kamble (2001), Kumar *et al.* (2007), Rani *et al.* (2007), Ranpise *et al.* (2007), Pragya *et al.* (2010), Choudhary *et al.* (2011), Gawali *et al.* (2012), Das *et al.* (2014) and Negi *et al.* (2014).

4.1.3 Leaves Plant^{-1}

The data in respect of leaves plant^{-1} of gladiolus as influenced due to the varieties at 15, 30, 45 and 60 days after planting is presented in Table 3 and depicted through Fig. 4.

Table 3. Leaves plant^{-1} as influenced by varieties of gladiolus

Treatments	Gladiolus Leaves plant^{-1}			
	15 DAP	30 DAP	45 DAP	60 DAP
T_1 - Snow Princess	2.27	6.33	10.73	16.20
T_2 - Yellow Stone	3.03	7.67	12.67	19.80
T_3 – Chandani	2.87	7.40	12.87	18.20
T_4 - Nova Lux	1.87	6.13	9.67	13.40
T_5 - Flaro Sovenier	2.07	3.60	7.07	11.40
T_6 - Princess Morgerate Rose	2.00	6.07	10.87	14.80
T_7 – Pricilla	2.27	6.33	10.40	15.00
T_8 - Forta Rosa	2.80	6.93	11.40	16.07
T_9 - Jester Gold	2.00	5.80	9.47	14.87
'F' test	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.16	0.33	0.62	1.04
CD at 5 %	0.49	1.00	1.84	3.10

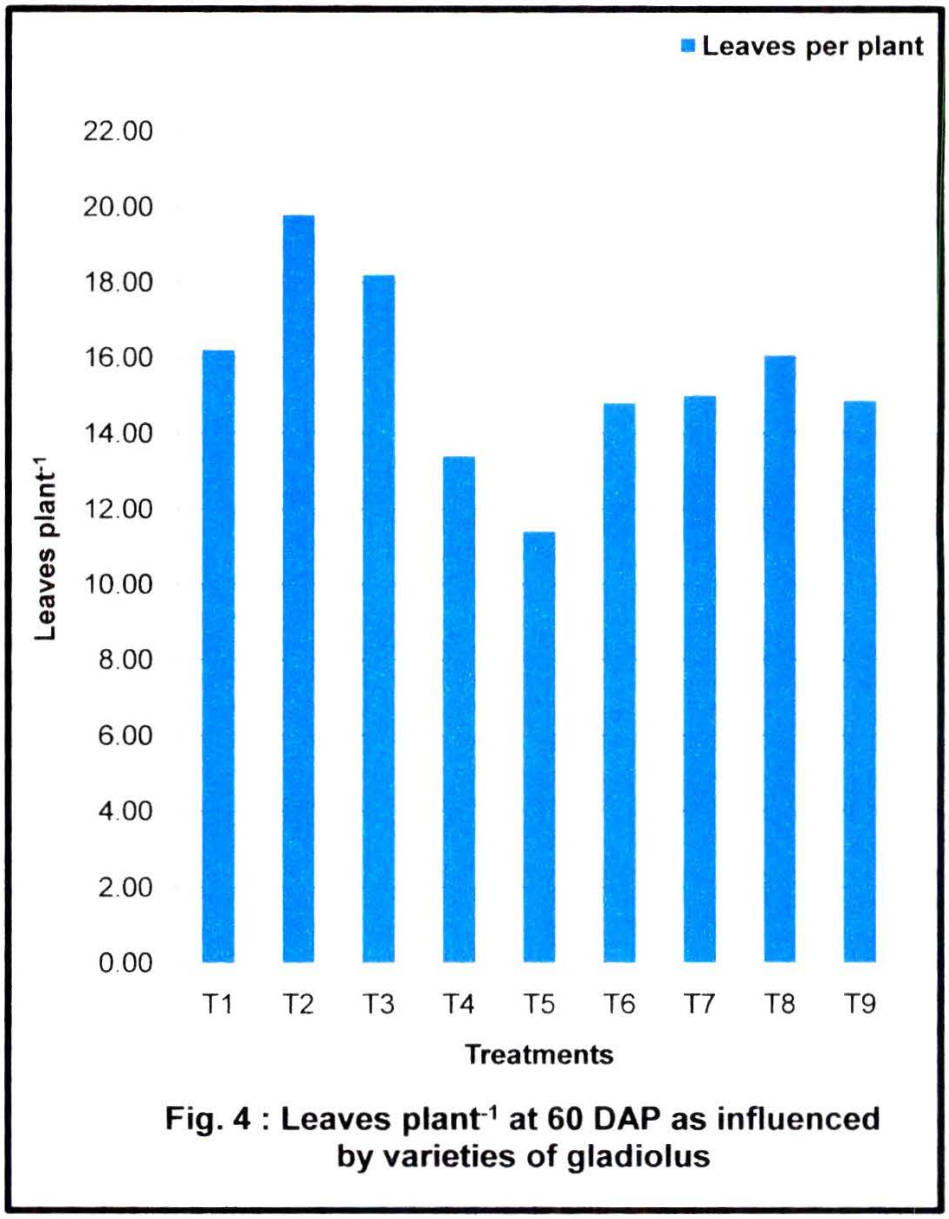


Fig. 4 : Leaves plant^{-1} at 60 DAP as influenced by varieties of gladiolus

It is evident from the data presented in Table.3 that, at all the stages of observation, the leaves plant^{-1} of gladiolus were significantly influenced by different varieties.

At the stage of 15 days after planting, the variety Yellow Stone recorded significantly maximum leaves plant^{-1} (3.03) which was statistically found to be at par with the varieties Chandani (2.87) and Forta Rosa (2.80). However, significantly minimum leaves plant^{-1} was recorded in the variety Nova Lux (1.87).

Similarly, at the stage of 30 days after planting, the variety Yellow Stone recorded significantly maximum leaves plant^{-1} (7.67) and it was statistically found to be at par with the varieties Chandani (7.40) and Forta Rosa (6.93). However, significantly minimum leaves plant^{-1} was recorded in the variety Flaro Sovnier (3.60).

At the stage of 45 days after planting, the variety Chandani recorded significantly maximum leaves plant^{-1} (12.87) and it was statistically found to be at par with the varieties Yellow Stone (12.67), Forta Rosa (11.40) and Princess Morgerate Rose (10.87). However, significantly minimum leaves plant^{-1} was recorded in the variety Flaro Sovnier (7.07).

At the stage of 60 days after planting, the variety Yellow Stone recorded significantly maximum leaves plant^{-1} (19.80) and it was found at par with variety Chandani (18.20). However, significantly minimum leaves plant^{-1} was recorded in the variety Flaro Sovnier (11.40).

The variation in production of leaves plant^{-1} of the different varieties of gladiolus might be due to the varied growth rate and their different genetic makeup. As a result, the variation in phenotypic expression is expected to occur. The present study confirms the results of Kamble (2001), Salvi *et al.* (2004), Rao and Janakiram (2006), Kumar *et al.* (2007), Rani *et al.* (2007), Gawali *et al.* (2012), Mushtaq *et al.* (2013), Das *et al.* (2014) and Negi *et al.* (2014) in gladiolus.

4.1.4 Leaf area (cm^2) at 50% flowering

The data regarding leaf area at 50% flowering stage as influenced due to the varieties of gladiolus is presented in Table 4 and depicted through Fig. 5.

Table 4. Leaf area as influenced by varieties of gladiolus

Treatments	Leaf area (cm^2) at 50% flowering
T_1 - Snow Princess	198.17
T_2 - Yellow Stone	196.33
T_3 – Chandani	105.87
T_4 - Nova Lux	111.87
T_5 - Flaro Sovenier	187.40
T_6 - Princess Morgerate Rose	191.13
T_7 – Pricilla	118.27
T_8 - Forta Rosa	136.53
T_9 - Jester Gold	134.73
'F' test	Sig.
SE (m) ±	3.59
CD at 5 %	10.67

The data presented in Table 4 revealed that, the treatment differences regarding leaf area at 50% flowering stage as affected the gladiolus varieties was found to be the significant.

The variety Snow Princess recorded significantly maximum (198.17 cm^2) leaf area at 50% flowering as compared to other varietiess which was statistically found to be at par with the variety Yellow Stone (196.33 cm^2) However, minimum leaf area at 50% flowering stage was observed in the variety Chandani (105.87 cm^2).

Similar variation in leaf area at 50% flowering in gladiolus is reported by the earlier workers viz. Kamble (2001), Neeraj et al. (2000), Basavaraddy (2004), Ranpise et al. (2007), Balaram *et al.* (2009),

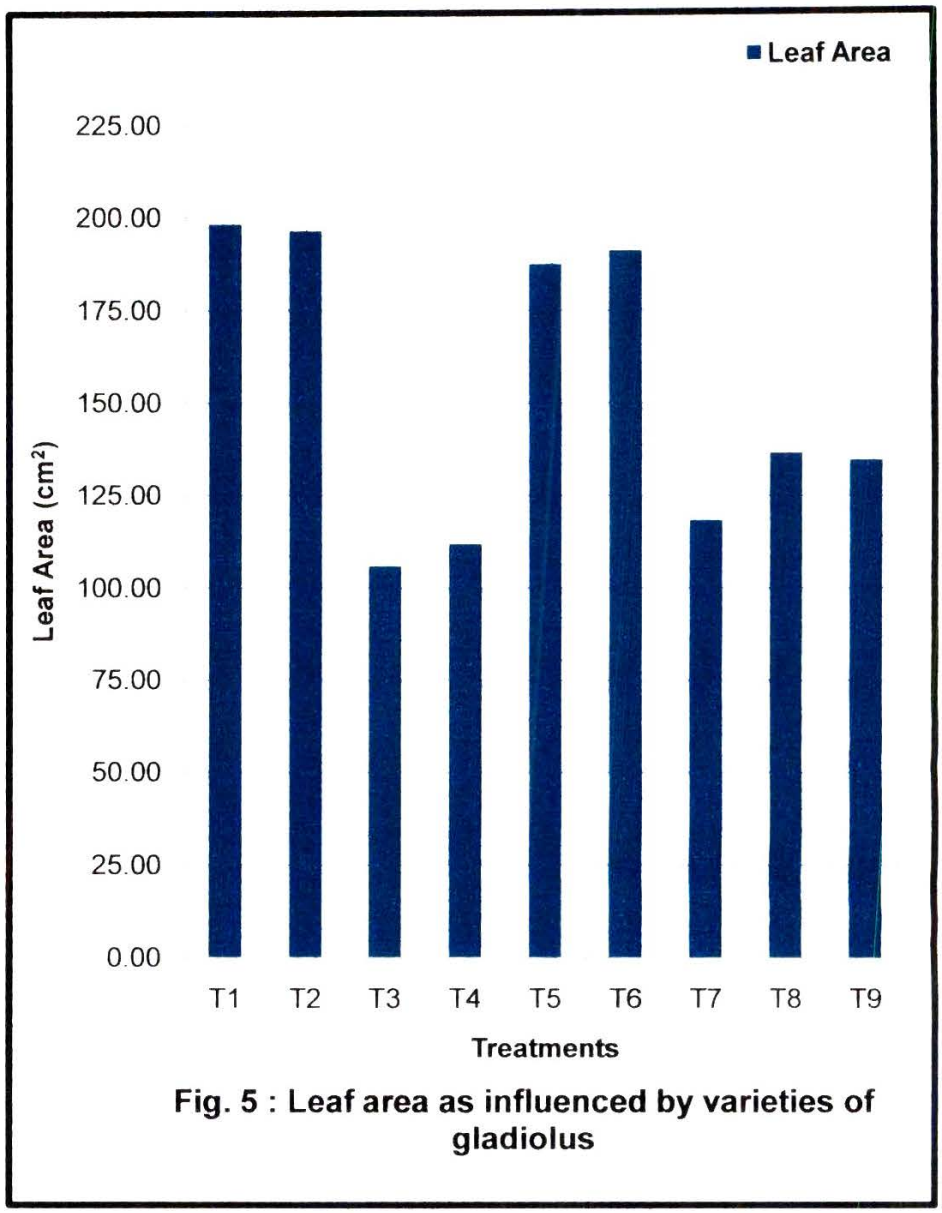


Fig. 5 : Leaf area as influenced by varieties of gladiolus

Pandey *et al.* (2009), Gawali *et al.* (2012), Bhajantri and Patil (2013), Saleem *et al.* (2013) in gladiolus.

4.2 Flowering Parameters

The data obtained in respect of flowering parameters of gladiolus as influenced by gladiolus varieties are presented under appropriate headings.

4.2.1 Days to first spike emergence

The data regarding days required for first spike emergence as influenced due to the gladiolus varieties is presented in Table 5 and depicted through Fig. 6.

Table 5. Days to first spike emergence as influenced by varieties of gladiolus

Treatments	Days to first spike emergence
T_1 - Snow Princess	66.80
T_2 - Yellow Stone	71.93
T_3 – Chandani	63.47
T_4 - Nova Lux	67.80
T_5 - Flaro Sovenier	70.27
T_6 - Princess Morgerate Rose	65.87
T_7 – Pricilla	66.93
T_8 - Forta Rosa	65.27
T_9 - Jester Gold	73.47
'F' test	Sig.
SE (m) ±	1.08
CD at 5 %	3.20

The data presented in Table 5 revealed that, the treatment differences regarding the days required for first spike emergence was significantly influenced by different gladiolus varieties.

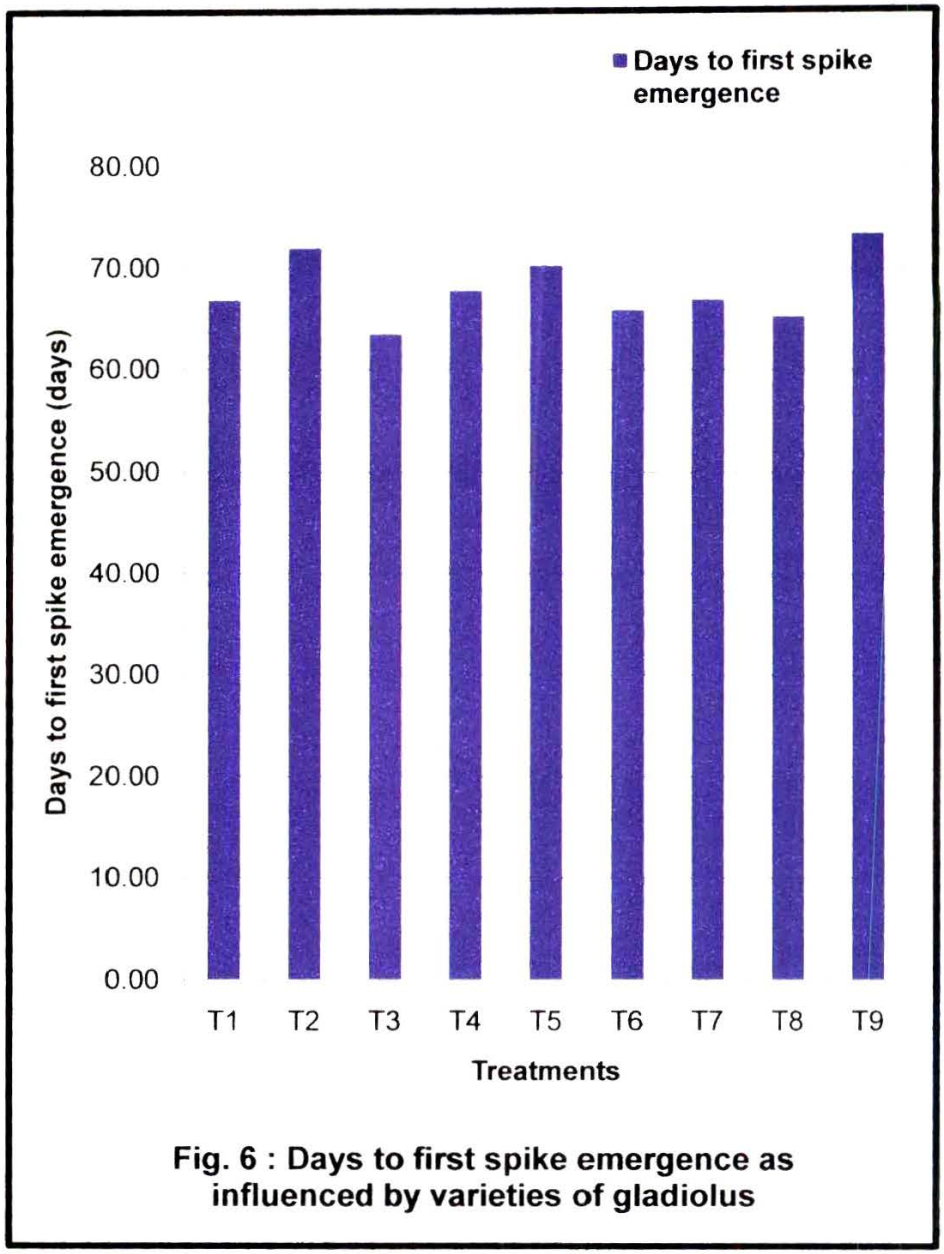


Fig. 6 : Days to first spike emergence as influenced by varieties of gladiolus

The variety Chandani required significantly minimum period for spike emergence (63.47 days) as compared to other varieties, which was statistically found to be at par with the varieties Forta Rosa (65.27 days) and Princess Morgerate Rose (65.87 days). However, significantly maximum days were required (73.47 days) for first spike emergence in the variety Jester Gold which was statistically found to be at par with the variety Yellow Stone (71.93 days).

Similar variation in period required for first spike emergence in gldiolus was reported by the earlier workers viz. by Neeraj *et al.* (2000), Gupta *et al.* (2002), Kumar *et al.* (2007), Horo *et al.* (2009), Pragya *et al.* (2010), Islam and Haque (2011), Gawali *et al.* (2012), Mushtaq *et al.* (2013), Das *et al.* (2014) and Negi *et al.* (2014).

4.2.2 Days to opening of first florets

The data in respect of days required for opening of first floret as influenced by the different gladiolus varieties is furnished in the Table 6 and depicted through Fig. 7.

Table 6. Days to opening of first florets as influenced by varieties of gladiolus

Treatments	Days to opening of first florets
T_1 - Snow Princess	77.07
T_2 - Yellow Stone	81.47
T_3 – Chandani	73.73
T_4 - Nova Lux	76.07
T_5 - Flaro Sovenier	79.93
T_6 - Princess Morgerate Rose	75.13
T_7 – Pricilla	76.33
T_8 - Forta Rosa	76.00
T_9 - Jester Gold	83.07
'F' test	Sig.
SE (m) ±	0.73
CD at 5 %	2.19

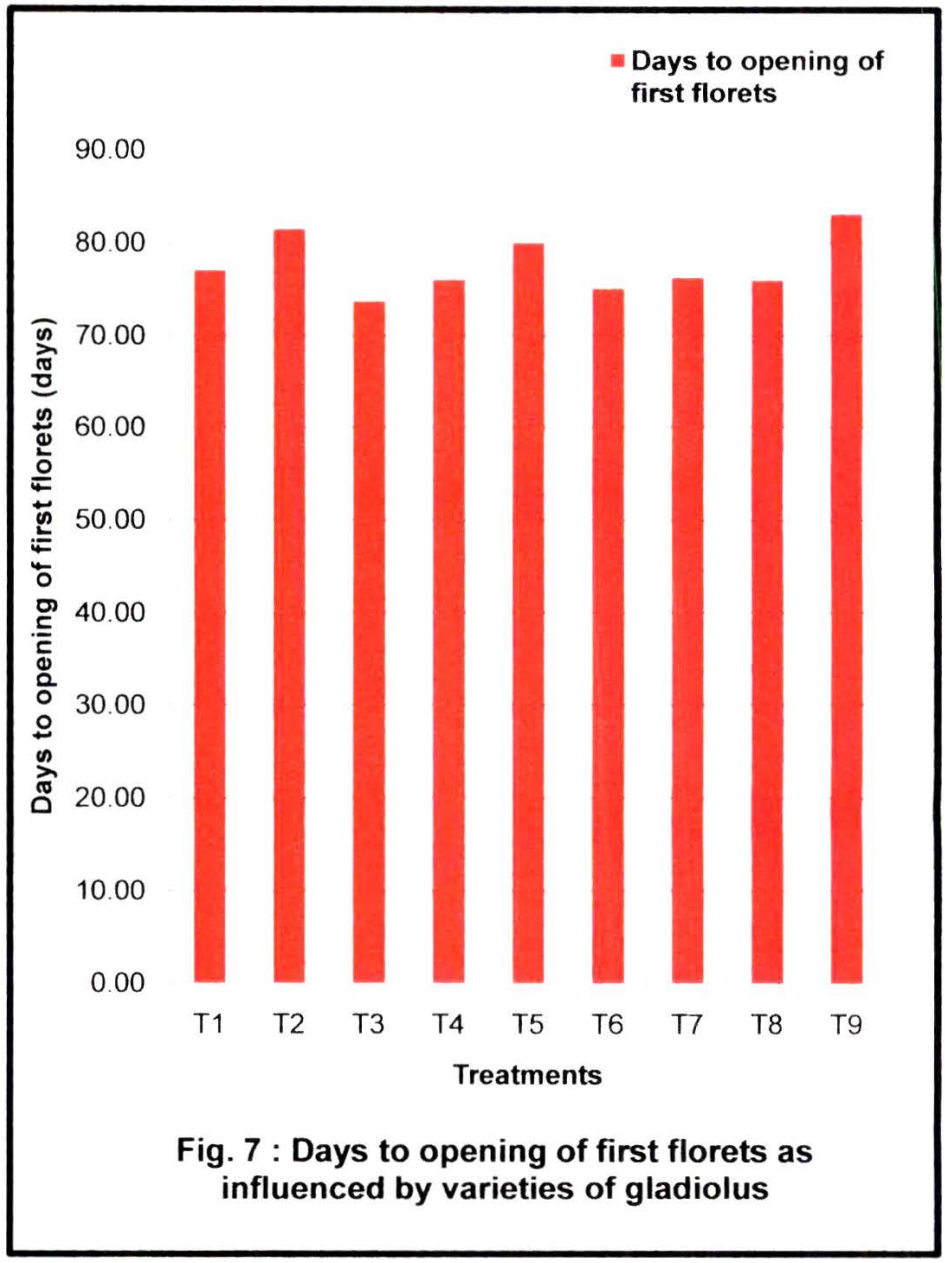


Fig. 7 : Days to opening of first florets as influenced by varieties of gladiolus

The data presented in Table 6 exhibited that, the gladiolus varieties had shown the significant effect on days required for opening of first floret.

From the data presented in table 6 it is revealed that variety Chandani required significantly minimum days for opening of first floret (73.73 days) and it was found to at par with variety Princess Morgerate Rose (75.13 days). However, maximum days were required for opening of first floret in variety Jester Gold (83.07 days).

Similar variation due to differential cultivars was documented by Neeraj *et al.* (2000), Rani *et al.* (2007), Kumar (2009), Sarkar and Chakraborty (2014), Choudhary *et al.* (2011), Shaukat *et al.* (2012), Shaukat *et al.* (2013), Das *et al.* (2014) and Ramachandrudu and Thangam (2008) in gladiolus.

4.2.3 Days to 50 % flowering

The data in respect of days required for 50 % flowering as influenced by the gladiolus varieties is given in Table 7 and depicted through Fig. 8.

The data presented in Table 7 exhibited that, significantly minimum days were required for 50 % flowering was recorded in variety Chandani (84.20 days) and it was found to be at par with varieties Princess morgerate Rose (84.33 days), Pricilla (85.67 days) and Forta Rosa (85.67 days) and Snow Princess (86.40 days). However, significantly maximum numbers of days (92.73 days) for 50 % flowering were taken by the variety Jester Gold.

Variation among the different varieties was found due to different genetic makeup of different gladiolus varieties.

Table 7. Days to 50 % flowering as influenced by varieties of gladiolus

Treatments	Days to 50 % flowering
T_1 - Snow Princess	86.40
T_2 - Yellow Stone	90.80
T_3 – Chandani	84.20
T_4 - Nova Lux	85.73
T_5 - Flaro Sovenier	89.60
T_6 - Princess Morgerate Rose	84.33
T_7 – Pricilla	85.67
T_8 - Forta Rosa	85.67
T_9 - Jester Gold	92.73
'F' test	Sig.
SE (m) ±	0.88
CD at 5 %	2.64

Similar variation due to differential cultivars was recorded in gladiolus by Kamble (2001), Neeraj *et al.* (2000), Basavaraddy (2004), Ranpise *et al.* (2007), Balaram *et al.* (2009), Pandey *et al.* (2009), Gawali *et al.* (2012), Bhajantri and Patil (2013), Saleem *et al.* (2013), Kumar (2014) and Sarkar and Chakraborty (2014) in gladiolus.

4.2.4 Flowering span (days)

The data in respect of flowering span of gladiolus as influenced by the gladiolus varieties is presented in Table 8 and depicted through Fig. 9.

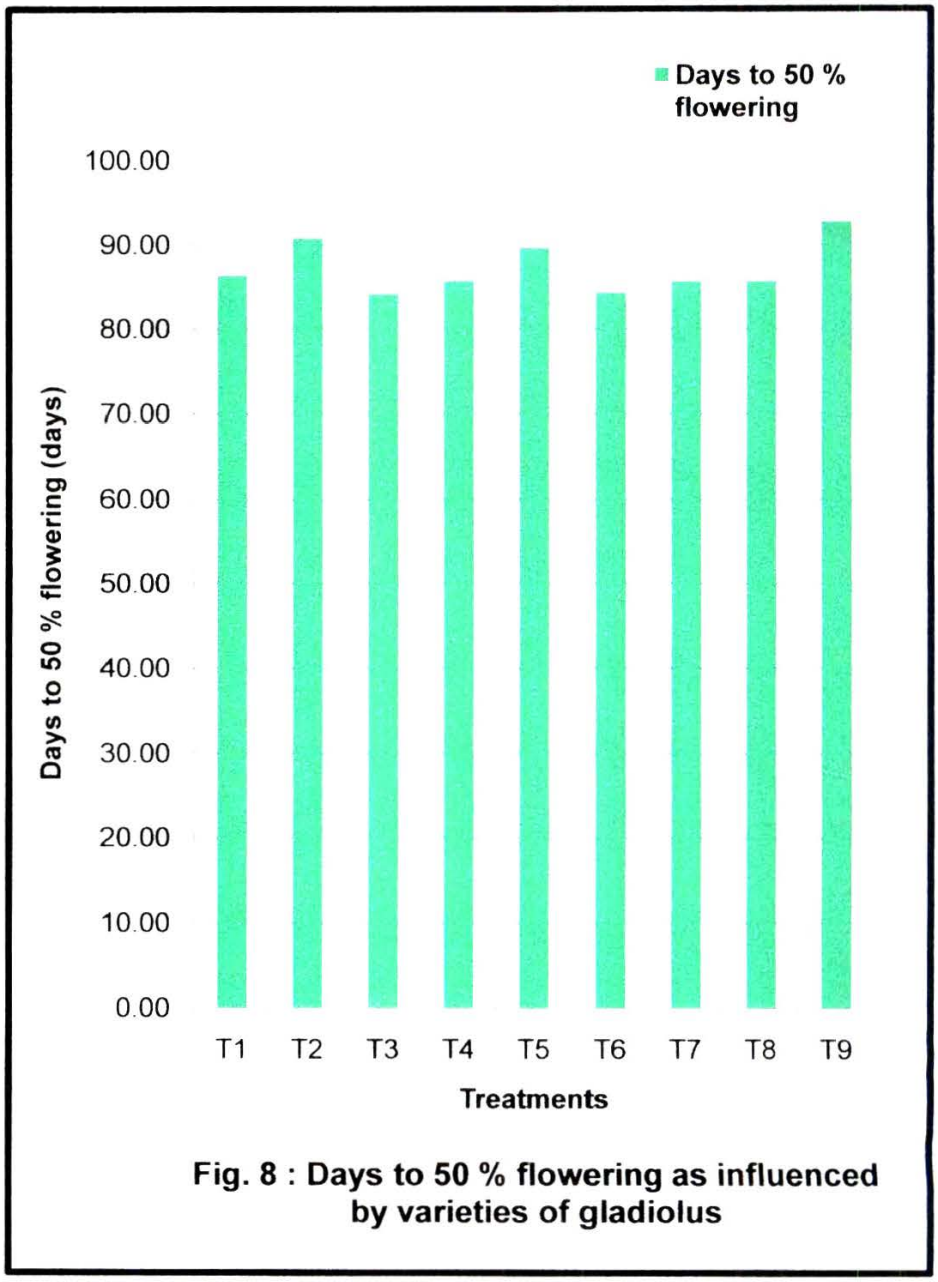


Fig. 8 : Days to 50 % flowering as influenced by varieties of gladiolus

Table 8. Flowering span as influenced by varieties of gladiolus

Treatments	Flowering span (days)
T_1 - Snow Princess	20.67
T_2 - Yellow Stone	21.33
T_3 – Chandani	16.67
T_4 - Nova Lux	18.00
T_5 - Flaro Sovenier	17.67
T_6 - Princess Morgerate Rose	17.33
T_7 – Pricilla	18.33
T_8 - Forta Rosa	19.67
T_9 - Jester Gold	19.33
'F' test	Sig.
SE (m) ±	0.42
CD at 5 %	1.26

The data presented in Table 8 exhibited that, the gladiolus varieties had shown the significant effect on flowering span.

From the data presented in Table 8 it is revealed that significantly maximum flowering span was recorded with the variety Yellow stone (21.33 days) which was found to be statistically at par with the variety Snow princess (20.67 days). However, the minimum flowering span was recorded in the variety Chandani (16.67 days).

Similar variation due to differential cultivars were documented by Neeraj *et al.* (2000), Rani *et al.* (2007), Kumar (2009), Sarkar and Chakraborty (2014), Choudhary *et al.* (2011), Shaukat *et al.* (2012), Shaukat *et al.* (2013), Das *et al.* (2014) and Ramachandrudu and Thangam (2008) in gladiolus.

4.2.5 Longevity of intact flower (days)

The data in respect of longevity of intact flower of gladiolus as influenced by the gladiolus varieties is presented in Table 9 and depicted through Fig. 9.

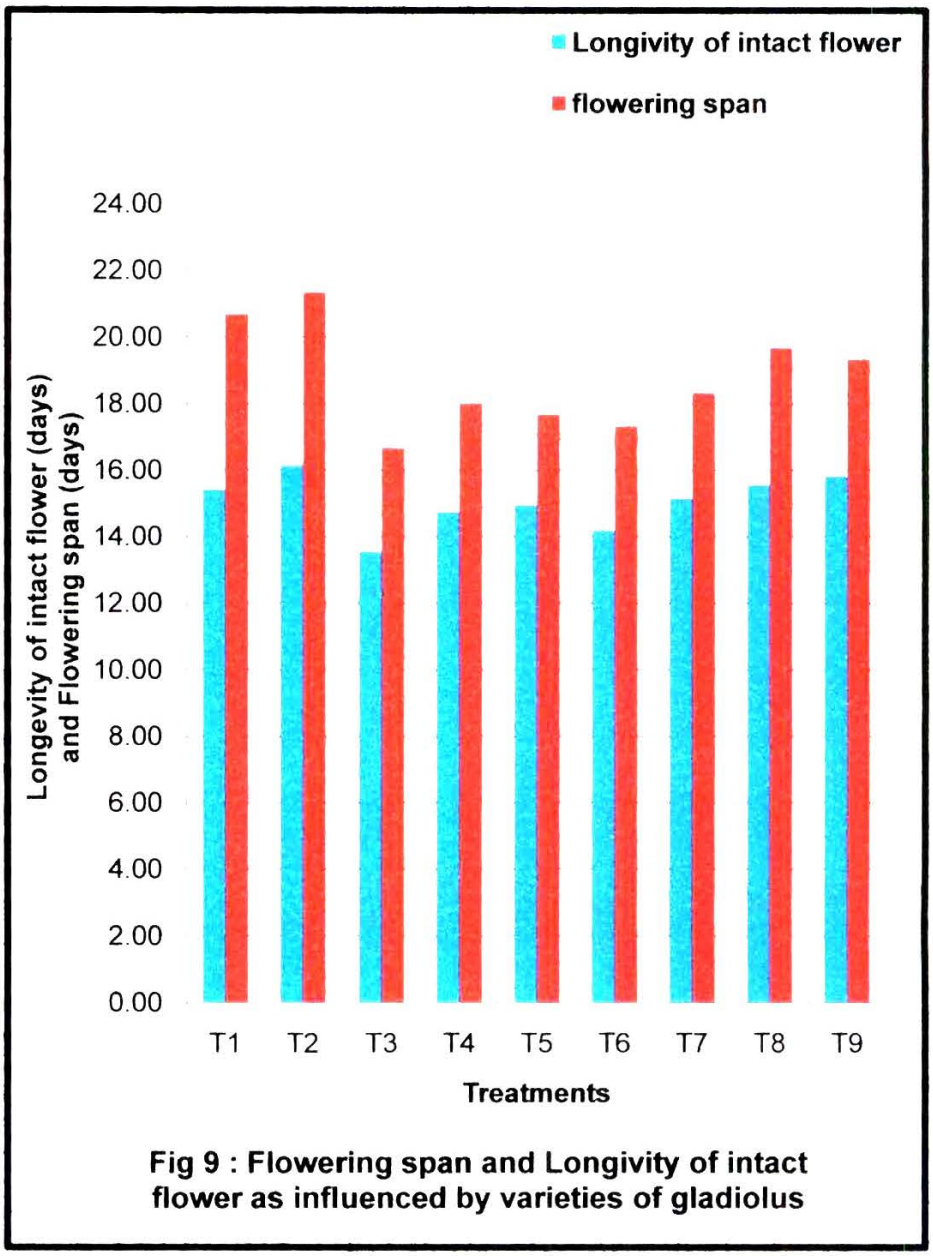


Fig 9 : Flowering span and Longivity of intact flower as influenced by varieties of gladiolus

Table 9. Longevity of intact flower as influenced by varieties of gladiolus

Treatments	Longevity of intact flower (days)
T_1 - Snow Princess	15.40
T_2 - Yellow Stone	16.13
T_3 – Chandani	13.53
T_4 - Nova Lux	14.73
T_5 - Flaro Sovenier	14.93
T_6 - Princess Morgerate Rose	14.17
T_7 – Pricilla	15.13
T_8 - Forta Rosa	15.53
T_9 - Jester Gold	15.80
'F' test	Sig.
SE (m) ±	0.44
CD at 5 %	1.32

The data pertaining to longevity of gladiolus flowers on plant indicated significant differences with respect to longevity of flowers on plant among the varieties. Significantly maximum longevity of gladiolus flowers on plant was recorded with the variety Yellow stone (16.13 days) which was found to be statistically at par with the varieties Jester Gold, Forta Rosa, Snow princess and Pricilla (15.80, 15.53, 15.40, 15.13 days, respectively). However, the minimum longevity of flower was recorded in the variety Chandani (13.53 days).

An increased longevity of flowers due to the gladiolus varieties Yellow stone, Jester Gold, Forta Rosa, Snow princess and Pricilla might be attributed due to production of better rachis with longer length and more floret spike^{-1}. Similar, results were recorded by Roy and Sharma (2000), Kamble (2001), Rathod (2002), Baweja and Brahma (2003), Patil (2003), Salvi *et al.* (2004), Rani *et al.* (2007), Ranpise *et al.* (2007), Kumar (2009), Gawali *et al.* (2012), Shaukat *et al.* (2012), Saleem *et al.* (2013) and Kumar (2014) in gladiolus.

4.3 Quality Parameters

4.3.1 Length of spike (cm)

The data recorded on length of gladiolus spike as influenced by the different varieties is presented in Table 10 and depicted through Fig. 10.

Table 10. Length of spike as influenced by varieties of gladiolus

Treatments	Length of spike (cm)
T_1 - Snow Princess	106.20
T_2 - Yellow Stone	113.13
T_3 – Chandani	100.87
T_4 - Nova Lux	87.87
T_5 - Flaro Sovenier	99.47
T_6 - Princess Morgerate Rose	97.33
T_7 – Pricilla	99.30
T_8 - Forta Rosa	117.47
T_9 - Jester Gold	97.80
'F' test	Sig.
SE (m) ±	1.47
CD at 5 %	4.39

The data presented in Table 10 revealed that, the gladiolus varieties varied significantly with respect to length of spike. Significantly maximum spike length (117.47 cm) was recorded in variety Forta Rosa which was statistically found to be at par with the variety Yellow Stone (113.13 cm). However, the variety Nova Lux (87.87) recorded significantly the minimum length of spike.

The variation in spike length due to different varieties of gladiolus might be attributed due to the genetic differences of the varieties. Superiority of some of the genotypes of gladiolus over the others in respect of spike length was also earlier reported by Sidhu and Arora (2000), Kamble (2001), Safiullah and Ahmed (2001), Gupta *et al.*

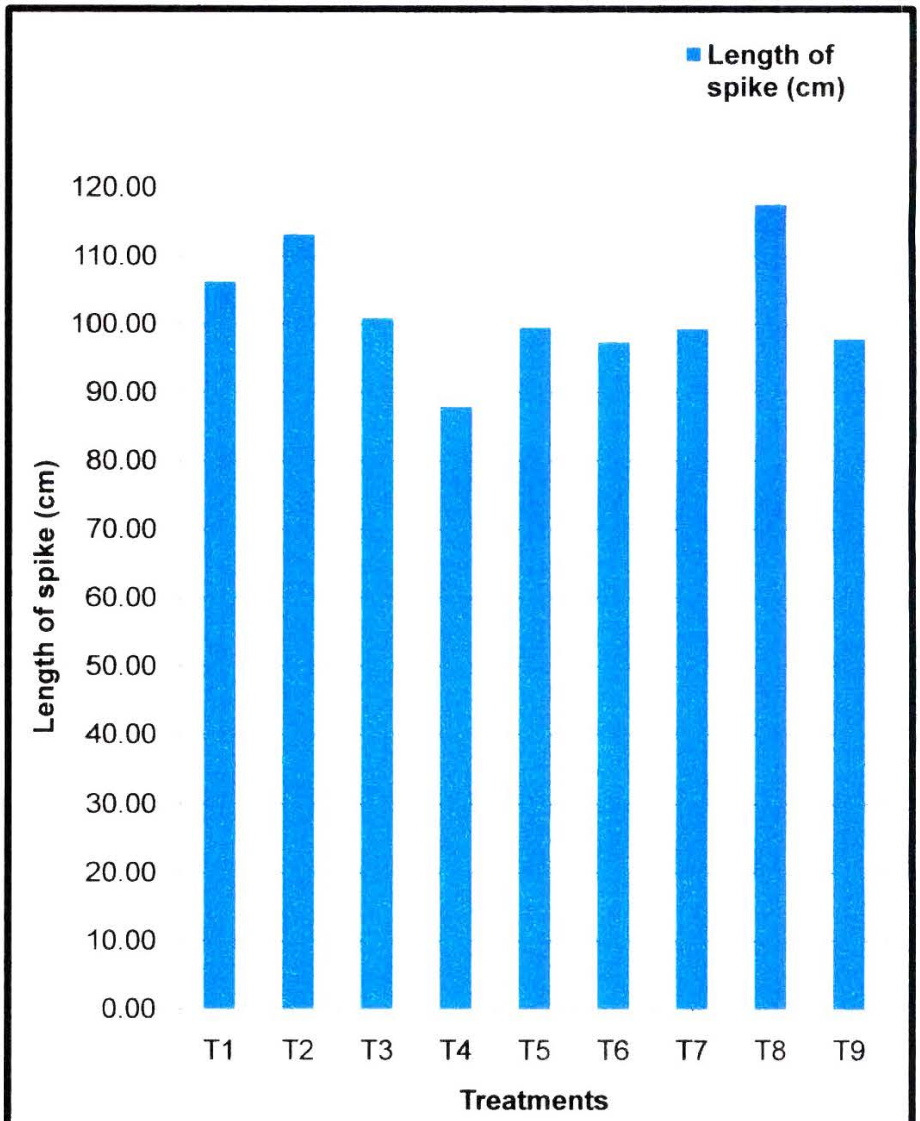


Fig. 10 : Length of spike as influenced by varieties of gladiolus

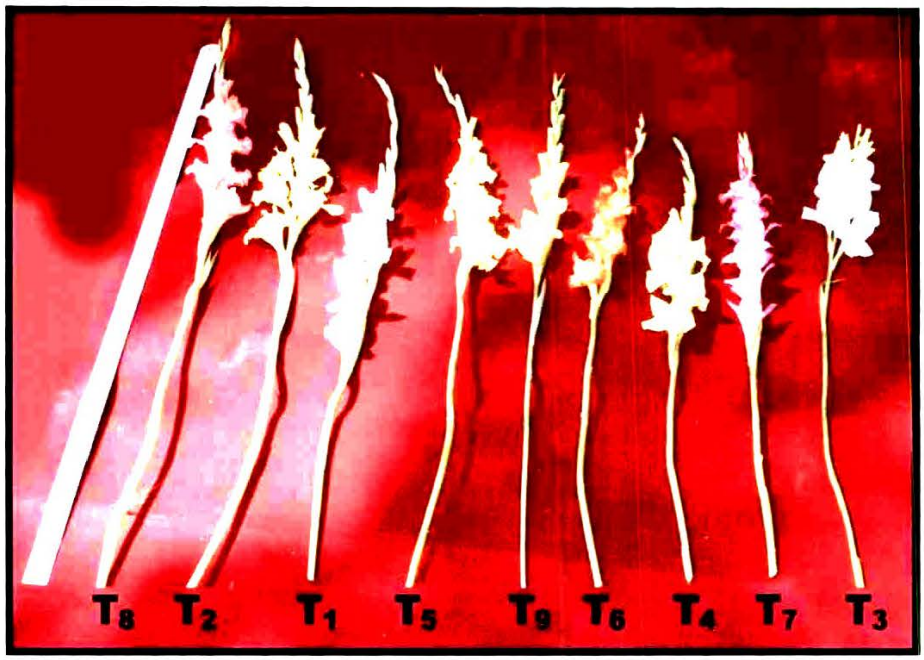


Plate 5 : Spike Of gladiolus varieties

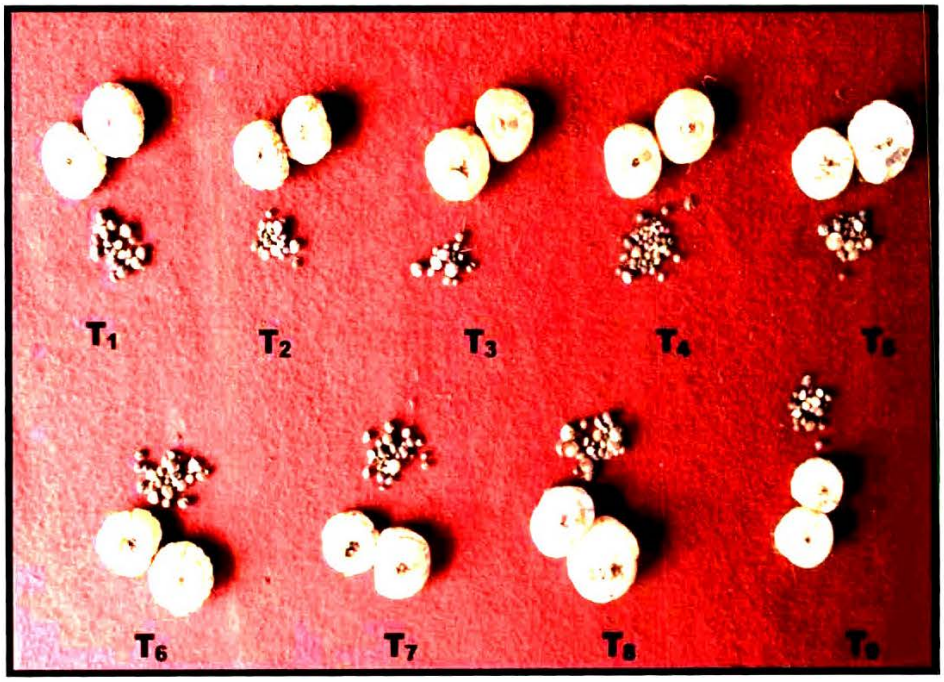


Plate 6 : Corm and Cormels of gladiolus varieties

(2002), Rathod (2002), Patil (2002), Baweja and Brahma (2003), Patil (2003), Kamble *et al.* (2004), Rao and Janakiram (2006), Kumar *et al.* (2007), Ranpise et al. (2007), Ramachandrudu and Thangam (2008), Horo *et al.* (2009), Kumar (2009), Pandey *et al.* (2009), Pragya *et al.* (2010), Gawali *et al.* (2012), Shaukat *et al.* (2012), Shaukat *et al.* (2013), Das *et al.* (2014), Kumar (2014), Negi *et al.* (2014) and Sarkar and Chakraborty (2014).

4.3.2 Diameter of spike (cm)

The data recorded on diameter of gladiolus spike as influenced due to the different varieties is presented in Table 11 and depicted through Fig. 11.

Table 11. Diameter of spike as influenced by varieties of gladiolus

Treatments	Diameter of spike (cm)
T_1 - Snow Princess	1.20
T_2 - Yellow Stone	1.03
T_3 – Chandani	0.80
T_4 - Nova Lux	1.23
T_5 - Flaro Sovenier	0.90
T_6 - Princess Morgerate Rose	0.90
T_7 – Pricilla	1.00
T_8 - Forta Rosa	1.20
T_9 - Jester Gold	1.10
'F' test	Sig.
SE (m) ±	0.06
CD at 5 %	0.19

The data presented in table 11 exhibited that, the varieties of gladiolus had the significant influence on the diameter of spike. Amongst the varieties, significantly maximum diameter of spike was

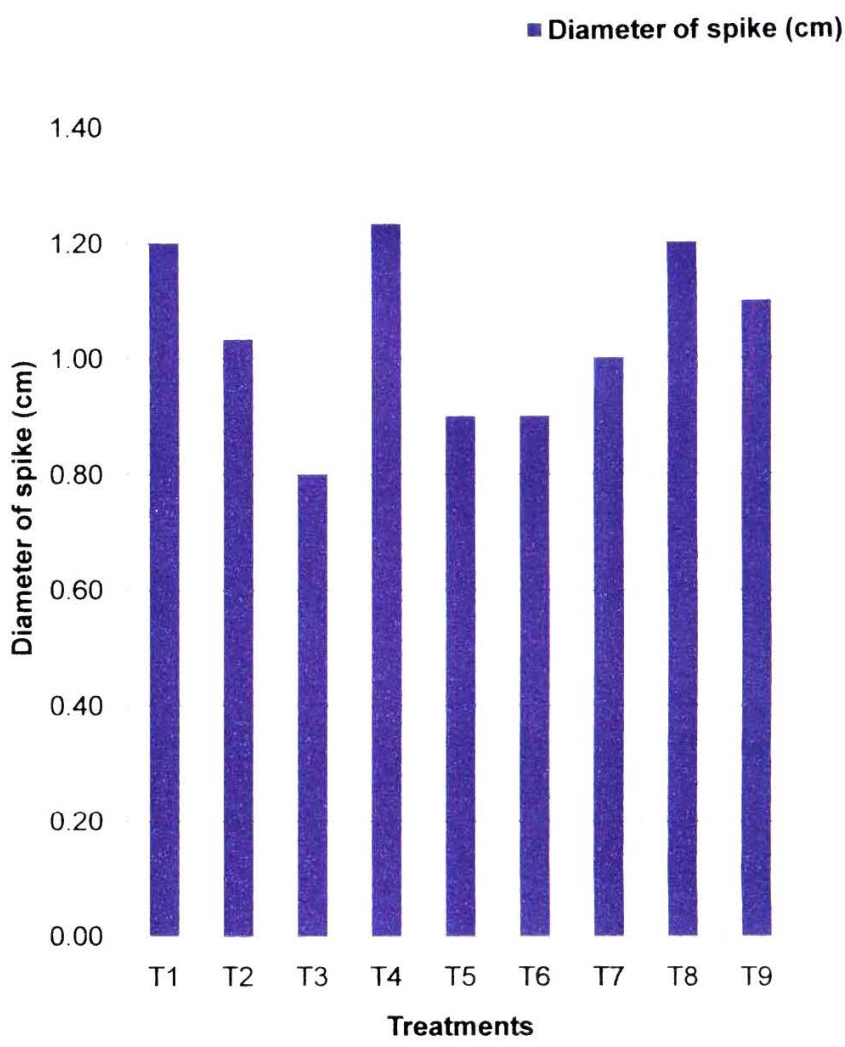


Fig. 11 : Diameter of spike as influenced by varieties of gladiolus

recorded in variety Nova Lux (1.23 cm) which was statistically found to be at par with the varieties Snow Princess (1.20 cm), Forta Rosa (1.20) and Jester Gold (1.10 cm). However, significantly minimum diameter of spike was recorded with the variety Chandani (0.80 cm). Variation among the different varieties was found due to different genetic makeup of different gladiolus varieties.

Similar variation in spike diameter was also reported by the workers viz. Sidhu and Arora (2000), Kamble (2001), Rao and Janakiram (2006), Gupta *et al.* (2007), Pandey *et al.* (2009), Islam and Haque (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012), Bhajantri and Patil (2013), Saleem *et al.* (2013), Das *et al.* (2014) and Negi *et al.* (2014) in gladiolus.

4.3.3 Length of rachis (cm)

The data in respect of length of rachis of gladiolus as influenced due to the varieties is furnished in Table 12 and depicted through Fig. 12.

Table 12. Length of rachis as influenced by varieties of gladiolus

Treatments	Length of rachis (cm)
T_1 - Snow Princess	57.27
T_2 - Yellow Stone	59.60
T_3 – Chandani	52.13
T_4 - Nova Lux	54.33
T_5 - Flaro Sovenier	50.60
T_6 - Princess Morgerate Rose	46.87
T_7 – Pricilla	56.47
T_8 - Forta Rosa	63.53
T_9 - Jester Gold	56.20
'F' test	Sig.
SE (m) ±	0.65
CD at 5 %	1.95

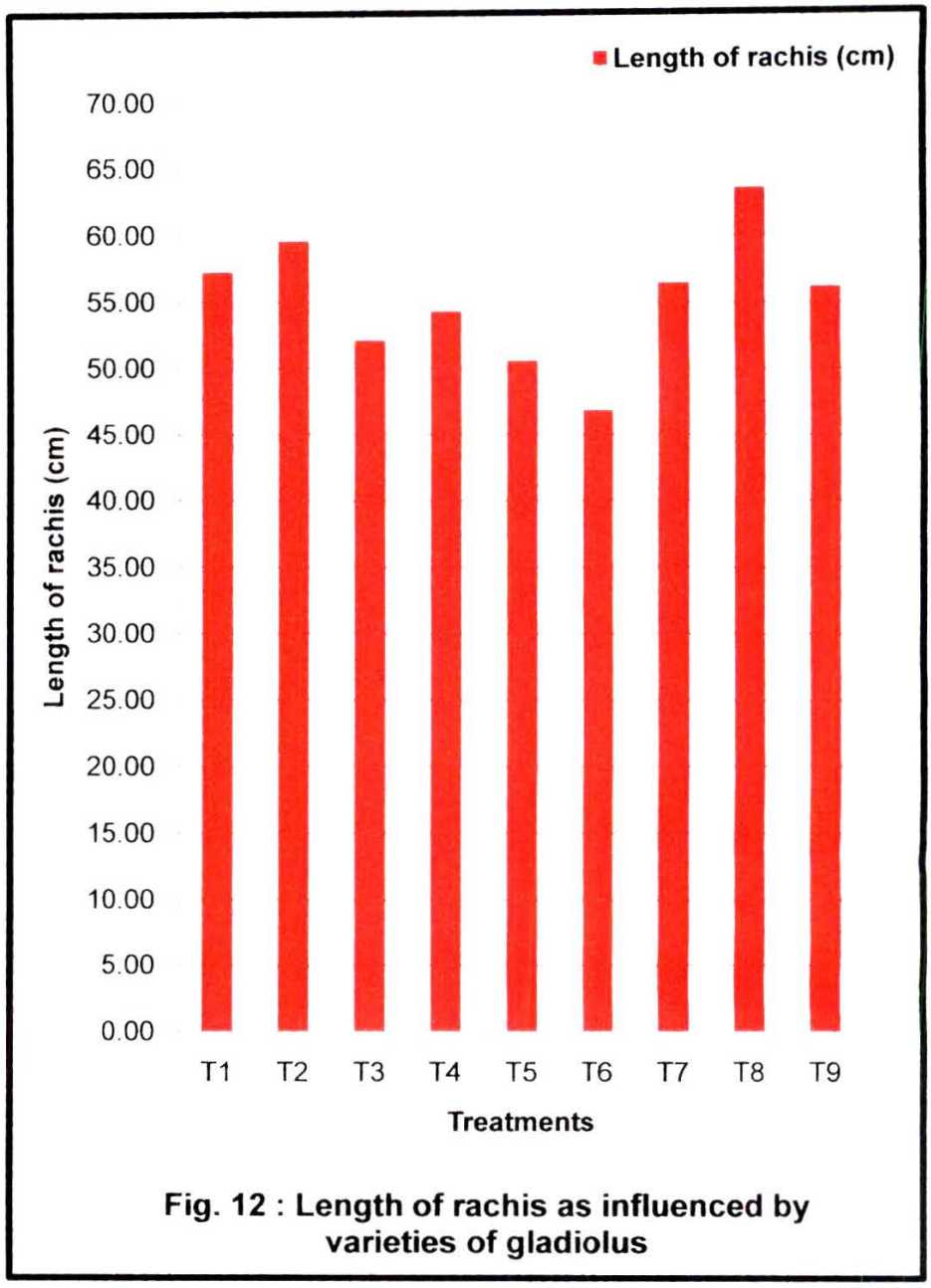


Fig. 12 : Length of rachis as influenced by varieties of gladiolus

The data presented in the Table 12 revealed that, in respect of length of rachis, the different varieties of gladiolus showed significant variations. Significantly maximum rachis length was observed in the variety Forta Rosa (63.53 cm) and it was followed by the varieties Yellow Stone (59.60 cm) and Snow Princess (57.27 cm). Whereas, minimum length of rachis was observed in variety Princess Morgerate Rose (46.87 cm).

The variation in length of rachis due to different gladiolus varieties might be due to the variation in distance between two florets of gladiolus, which is genetically controlled character. Similar differences in length of rachis in gladiolus were also observed by the workers *viz.* Basavaraddy (2004), Rao and Janakiram (2006), Kumar *et al.* (2007), Ramachandrudu and Thangam (2008), Kumar (2009), Pandey *et al.* (2009), Pragya *et al.* (2010), Choudhary *et al.* (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012), Shaukat *et al.* (2013), Singh *et al.* (2013), Kumar (2014) and Negi *et al.* (2014) in gladiolus.

4.3.4 Florets spike^{-1}

The data in respect of florets spike^{-1} of gladiolus as influenced due to the varieties is furnished in Table 13 and depicted through Fig. 13.

Table 13. Florets spike^{-1} as influenced by varieties of gladiolus

Treatments	Florets spike-1
T_1 - Snow Princess	17.20
T_2 - Yellow Stone	17.33
T_3 – Chandani	13.93
T_4 - Nova Lux	16.40
T_5 - Flaro Sovenier	15.53
T_6 - Princess Morgerate Rose	12.40
T_7 – Pricilla	14.33
T_8 - Forta Rosa	17.40
T_9 - Jester Gold	15.40
'F' test	Sig.
SE (m) ±	0.18
CD at 5 %	0.54

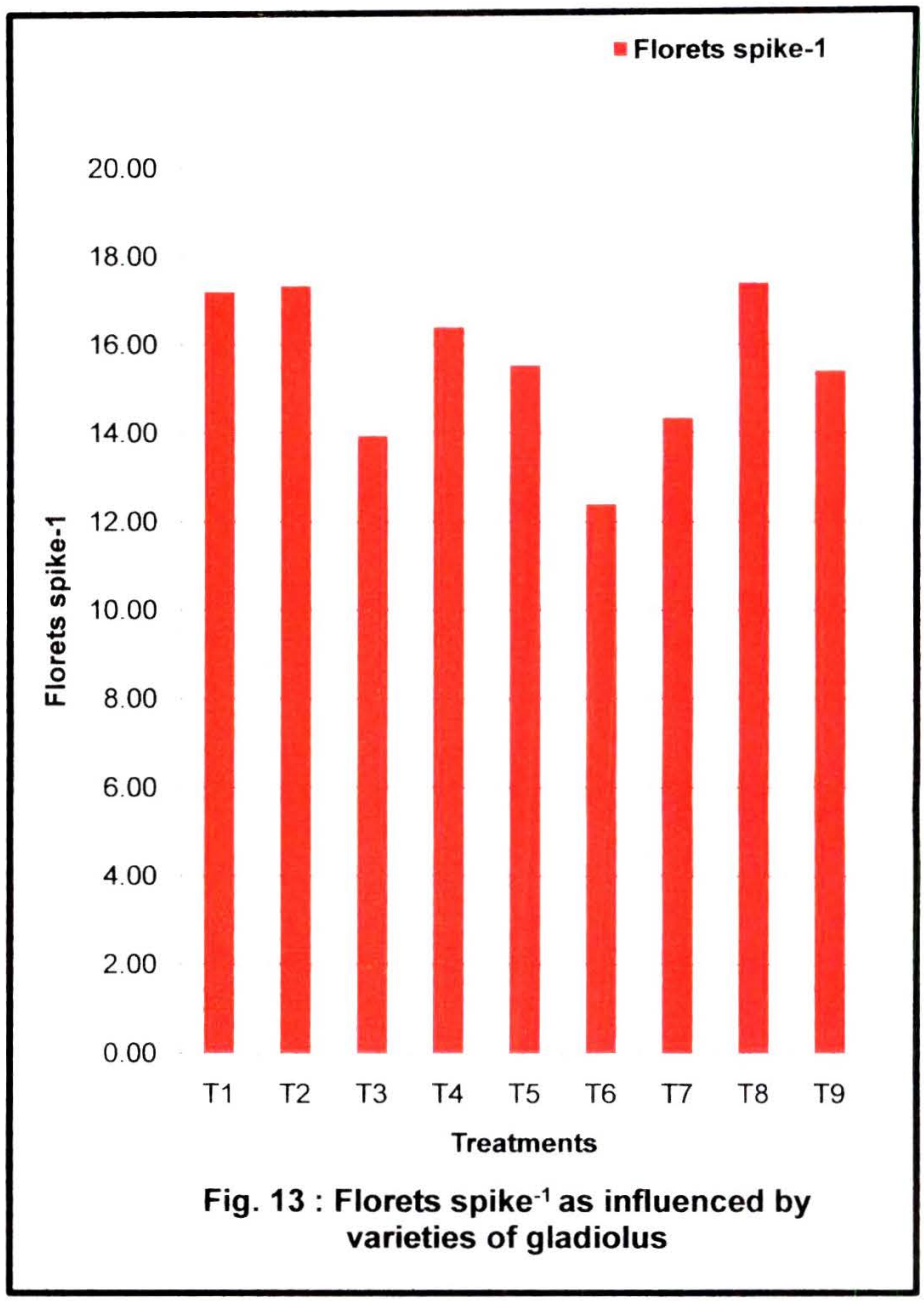


Fig. 13 : Florets spike^{-1} as influenced by varieties of gladiolus

The data presented in Table 13 revealed that, in respect of florets spike^{-1}, the different varieties of gladiolus showed significant variation. Significantly, maximum florets spike^{-1} was recorded in the cultivar Forta Rosa (17.40) and which was statistically found to be at par with the cultivars Yellow Stone (17.33) and Snow Princess (17.20). However, minimum florets spike^{-1} was observed in the variety Princess Morgerate Rose (12.40).

The differences might be due to variation in genetical make up of different cultivars. The findings are in line with the results obtained by Roy and Sharma (2000), Neeraj *et al.* (2000), Kamble (2001), Safiullah and Ahmed (2001), Patil (2002), Baweja and Brahma (2003), Patil (2003), Kamble *et al.* (2004), Rao and Janakiram (2006), Kumar *et al.* (2007), Ramachandrudu and Thangam (2008), Horo *et al.* (2009), Kumar (2009), Pandey *et al.* (2009), Pragya *et al.* (2010), Choudhary *et al.* (2011), Gawali *et al.* (2012), Negi *et al.* (2014), Shaukat *et al.* (2013), Singh *et al.* (2013), Kumar (2014) and Shaukat *et al.* (2012) in gladiolus.

4.3.5 Floret length (cm)

The data in respect of length of floret as influenced due to the varieties is furnished in Table 14 and depicted through Fig. 14.

Table 14. Floret length as influenced by varieties of gladiolus

Treatments	Floret length (cm)
T_1 - Snow Princess	9.80
T_2 - Yellow Stone	10.27
T_3 – Chandani	8.53
T_4 - Nova Lux	10.00
T_5 - Flaro Sovenier	9.93
T_6 - Princess Morgerate Rose	9.77
T_7 – Pricilla	9.10
T_8 - Forta Rosa	10.13
T_9 - Jester Gold	9.60
'F' test	Sig.
SE (m) ±	0.09
CD at 5 %	0.28

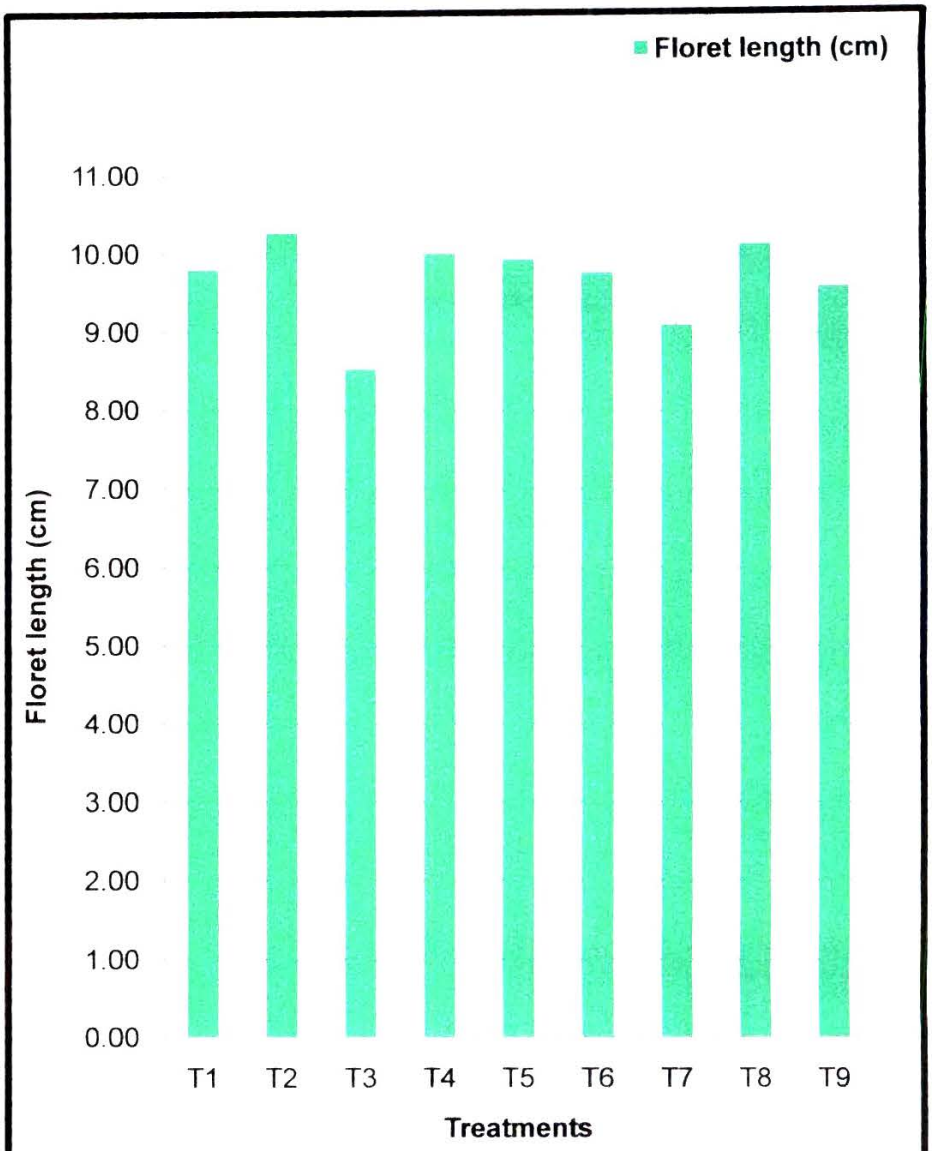


Fig. 14 : Floret length as influenced by varieties of gladiolus

The data represented in the Table 14 revealed that in respect of length of florets, the varieties of gladiolus showed significant variations. Significantly maximum floret length (10.27 cm) was observed in the variety Yellow Stone which was statistically found to be at par with the varieties Forta Rosa (10.13 cm) and Nova Lux (10.00) whereas, minimum floret length (8.53 cm) was observed in the variety Chandani.

The variation in length of floret in different gladiolus varieties is might be due to genetical make up of different cultivars. Similar differences in length of floret in gladiolus were also observed by the workers *viz.* Sidhu and Arora (2000), Cantor *et al.* (2000), Rathod (2002), Nair and Shiva (2003), Basavaraddy (2004), Ranpise et al. (2007), Kumar (2009), Shaukat *et al.* (2012), Shaukat *et al.* (2013) and Kumar (2014) in gladiolus.

4.3.6 Floret diameter (cm)

The data in respect of floret diameter (cm) of gladiolus as influenced due to the varieties is furnished in Table 15 and depicted through Fig. 15.

Table 15. Floret diameter as influenced by varieties of gladiolus

Treatments	Floret diameter (cm)
T_1 - Snow Princess	10.23
T_2 - Yellow Stone	10.70
T_3 – Chandani	7.30
T_4 - Nova Lux	11.17
T_5 - Flaro Sovenier	10.57
T_6 - Princess Morgerate Rose	8.23
T_7 – Pricilla	9.73
T_8 - Forta Rosa	10.60
T_9 - Jester Gold	9.97
'F' test	Sig.
SE (m) ±	0.09
CD at 5 %	0.27

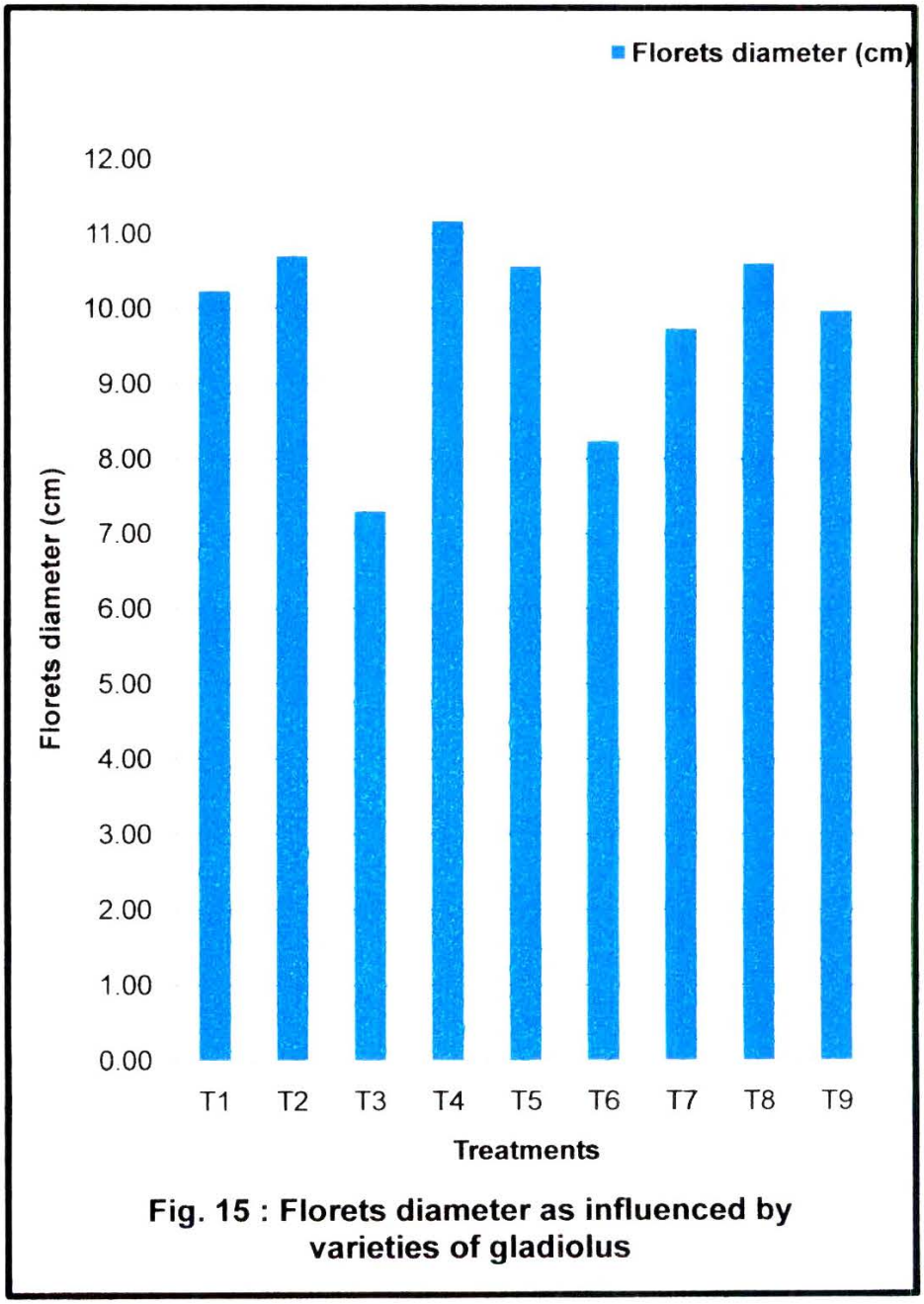


Fig. 15 : Florets diameter as influenced by varieties of gladiolus

The data represented in the Table 15 revealed that in respect of diameter of floret, the varieties of gladiolus showed significant variations. Significantly maximum diameter (11.17 cm) was observed in the variety Nova lux and it was closely followed by the varieties Yellow Stone (10.70) and Forta Rosa (10.60 cm). Whereas, the minimum diameter (7.30 cm) was observe in the variety Chandani.

The variation in diameter of Floret due to different gladiolus varieties might be due to genetical make up of different cultivars. Similar differences in diameter of floret in gladiolus were also observed by the workers *viz.* Sidhu and Arora (2000), Cantor *et al.* (2000), Rathod (2002), Nair and Shiva (2003), Basavaraddy (2004), Ranpise *et al.* (2007), Kumar (2009), Shaukat *et al.* (2012), Shaukat *et al.* (2013) and Kumar (2014).

4.3.7 Vase life of gladiolus flowers (days)

The data regarding vase life of cut gladiolus spike as affected due to the varieties is furnished in Table 16 and depicted through Fig. 16.

Table 16. vase life as influenced by varieties of gladiolus

Treatments	Vase life (days)
T_1 - Snow Princess	10.73
T_2 - Yellow Stone	11.47
T_3 – Chandani	9.47
T_4 - Nova Lux	10.07
T_5 - Flaro Sovenier	10.27
T_6 - Princess Morgerate Rose	9.87
T_7 – Pricilla	10.47
T_8 - Forta Rosa	10.87
T_9 - Jester Gold	11.13
'F' test	Sig.
SE (m) ±	0.18
CD at 5 %	0.55

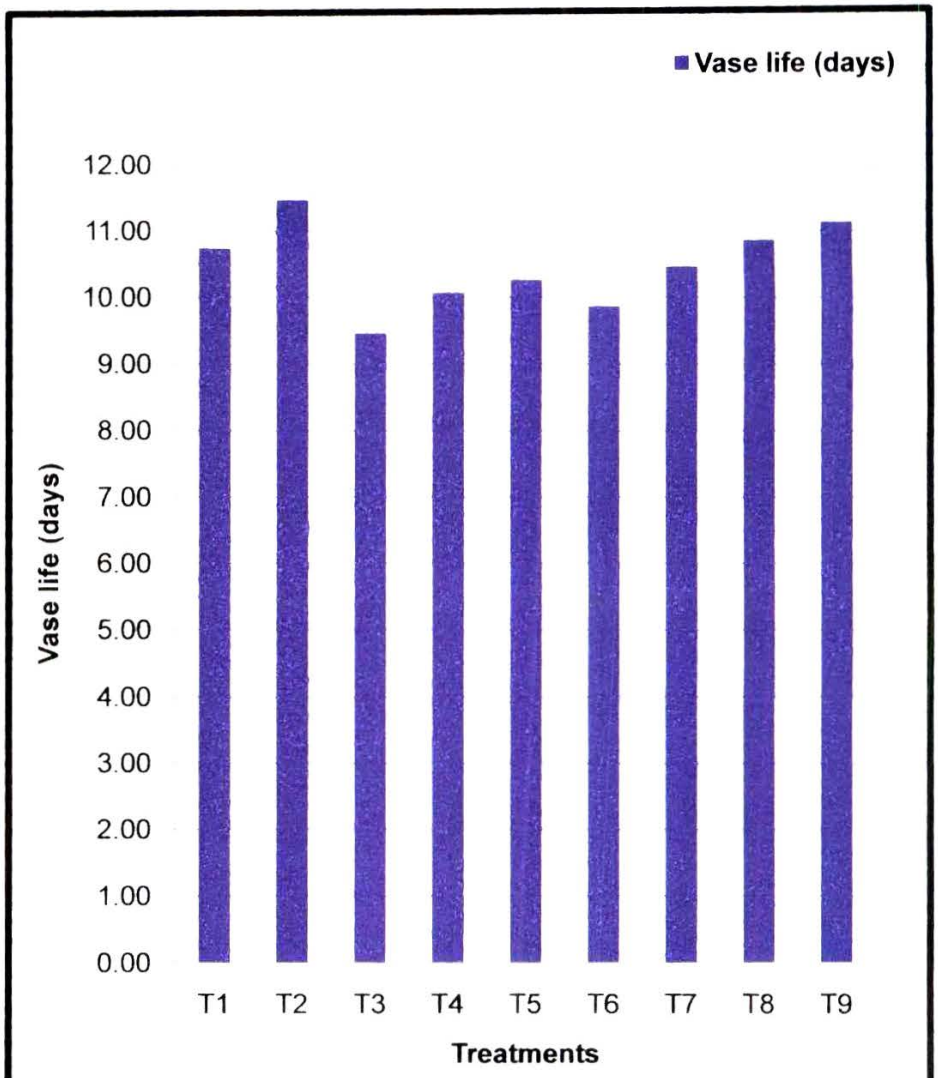


Fig. 16 : vase life as influenced by varieties of gladiolus

The data in respect of vase life of gladiolus spike presented in Table 16 indicated that, the varieties differed significantly. The vase life of cut spike was found significantly maximum in variety Yellow Stone (11.47 days) which was statistically found to be at par with the variety Jester Gold (11.13 days). Whereas, significantly minimum vase life of spike was recorded in the variety Chandani (9.47 days).

The vase life of cut flower depends on its quality and uptake of vase solution. The increased vase life of cut flower in gladiolus varieties viz. Yellow Stone and Jester Gold it might be due to an increased uptake of solution which have been enhanced the better quality spikes which maintained the stem turgidity even under the high rate of respiration. Similar variation in vase life of cut gladiolus spikes has also been recorded by Roy and Sharma (2000), Kamble (2001), Rathod (2002), Kem *et al.* (2003), Basavaraddy (2004), Rani *et al.* (2007), Ranpise *et al.* (2007), Horo *et al.* (2009), Pragya *et al.* (2010), Gawali *et al.* (2012), Mushtaq *et al.* (2013), Singh *et al.* (2013), Das *et al.* (2014), Kumar (2014) and Sarkar and Chakraborty (2014).

4.4 Yield parameters

The data obtained in respect of yield parameters of gladiolus as influenced by different varieties is presented under appropriate headings.

The data recorded on spikes yield plant^{-1}, plot^{-1} and ha^{-1} as influenced due to the different varieties is presented in Table 17 and depicted through Fig. 17.

4.4.1 Spikes plant^{-1}

The data presented in Table 17 revealed that, significant differences were observed among the gladiolus varieties with respect to spikes plant^{-1}. The variety Yellow Stone (2.67) had produced significantly maximum spikes plant^{-1} which was statistically found to be

at par with the variety Chandani (2.33), whereas significantly minimum spikes plant^{-1} were recorded with the variety Jester Gold (1.73).

Variations for yield of spikes plant^{-1} among the gladiolus varieties was might be attributed due to the variation in the production of sprouts plant^{-1} and sprouting percentage of corm, which are the genetically, controlled characters.

Table 17. Spike yield as influenced by different varieties of gladiolus

Treatments	Spikes plant-1	Spikes plot-1	Spikes ha-1 (lakh)
T_1 - Snow Princess	2.13	49.73	1.84
T_2 - Yellow Stone	2.67	64.67	2.39
T_3 – Chandani	2.33	55.33	2.05
T_4 - Nova Lux	1.80	40.40	1.49
T_5 - Flaro Sovenier	1.93	44.13	1.63
T_6 - Princess Morgerate Rose	1.87	42.27	1.56
T_7 – Pricilla	2.07	47.87	1.77
T_8 - Forta Rosa	2.20	51.60	1.91
T_9 - Jester Gold	1.73	38.53	1.42
'F' test	Sig.	Sig.	Sig.
SE (m) ±	0.12	3.50	0.12
CD at 5 %	0.37	10.41	0.38

4.4.2 Spikes plot^{-1}

The data in respect of spikes yield plot^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (64.67) had recorded significantly maximum spikes plot^{-1} which was statistically found to be at par with the variety Chandani (55.33). However, significantly minimum spikes plot^{-1} were recorded in the variety Jester Gold (38.53).

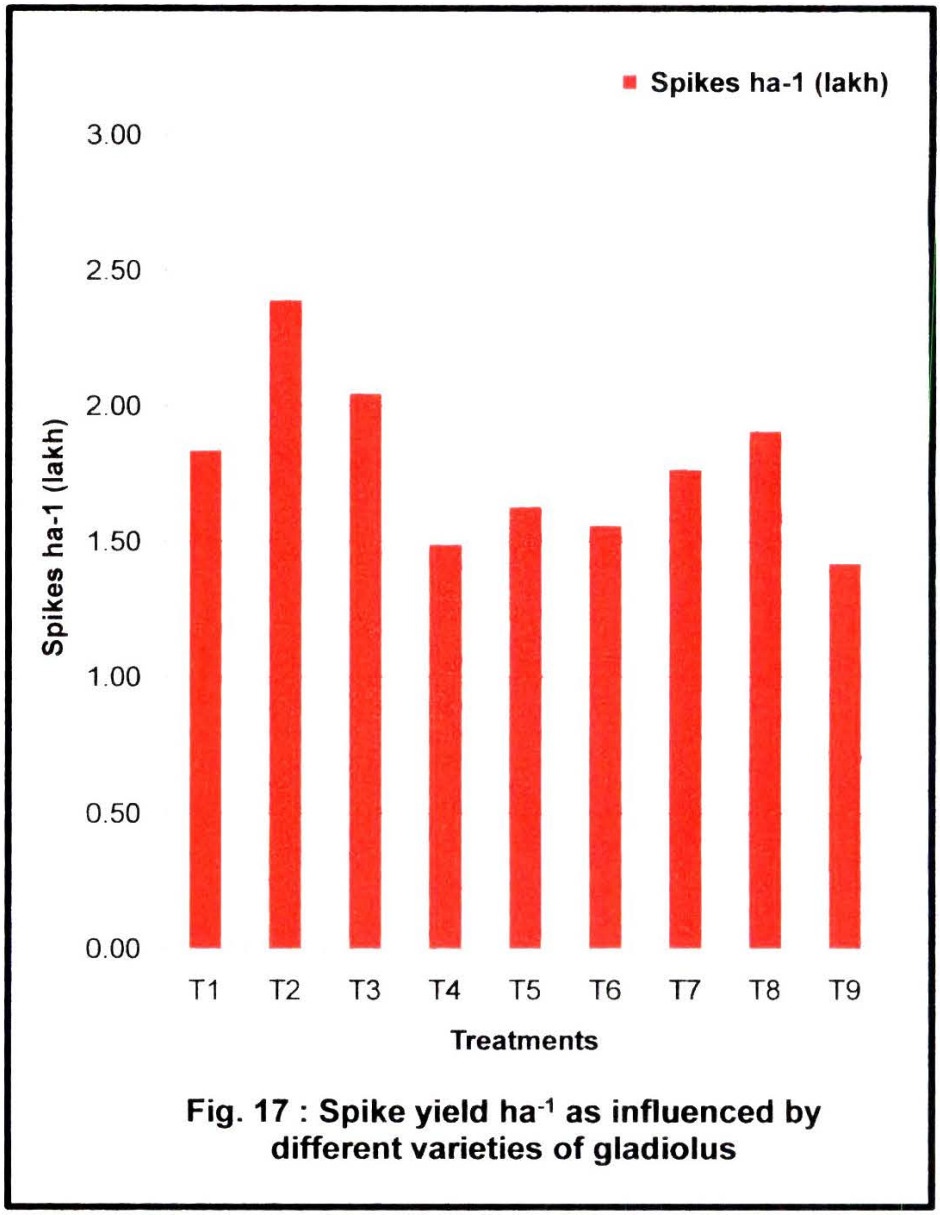


Fig. 17 : Spike yield ha^{-1} as influenced by different varieties of gladiolus

4.4.3 Spikes hectare^{-1}

The data in respects of spikes produced hectare^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (2.39 lakhs) had recorded significantly maximum spikes hectare^{-1} which was statistically found to be at par with the variety Chandani (2.05 lakhs), However, significantly minimum spikes hectare^{-1} were recorded in the variety Jester Gold (1.42 lakhs).

Production of spikes hectare^{-1} is an important parameter as it directly affects the economics of crop. In the present investigation varietal differences have been registered in respect of production of spikes ha^{-1}. This might be due to the variation in sprouting behavior of the corm and spike yield plant^{-1} which might be attributed due to the variation in yield plant^{-1} and different genetic makeup of different varieties. Similar results have been recorded by the earlier research worker like Neeraj et al. (2000), Roy and Sharma (2000), Kamble (2001), Basavaraddy (2004), Rani *et al.* (2007), Ranpise et al. (2007), Horo *et al.* (2009), Pragya *et al.* (2010), Gawali *et al.* (2012), Mushtaq *et al.* (2013), Singh *et al.* (2013), Kumar (2014) and Sarkar and Chakraborty (2014) in gladiolus.

4.5.1 Corms parameters

The data obtained in respect of the production of corms yield of gladiolus as influenced due to the gladiolus varieties is presented here under appropriate headings.

The data regarding the corms yield plant^{-1}, plot^{-1} and ha^{-1} as influenced due to the gladiolus varieties is presented in Table 18 and depicted through Fig. 18.

Table 18. Corms yield as influenced by different varieties of gladiolus

Treatments	corms plant-1	corms plot-1	corms ha-1 (lakh)
T_1 - Snow Princess	1.93	46.13	1.70
T_2 - Yellow Stone	2.63	65.73	2.43
T_3 – Chandani	2.33	57.33	2.12
T_4 - Nova Lux	1.70	39.60	1.46
T_5 - Flaro Sovenier	1.53	37.93	1.40
T_6 - Princess Morgerate Rose	1.67	38.53	1.42
T_7 – Pricilla	1.87	44.27	1.64
T_8 - Forta Rosa	2.13	51.73	1.91
T_9 - Jester Gold	1.47	33.07	1.22
'F' test	Sig.	Sig.	Sig.
SE (m) ±	0.14	3.68	0.13
CD at 5 %	0.41	10.95	0.40

4.5.1.1 Corms plant^{-1}

The data presented in Table 18 revealed that, significant differences were recorded among the gladiolus varieties with respect to corms plant^{-1}. The variety Yellow Stone (2.63) had produced significantly maximum corms plant^{-1} which was statistically found to be at par with the variety Chandani (2.33), whereas significantly minimum corms plant^{-1} were recorded with the variety Jester Gold (1.47).

Variations of corms plant^{-1} among the gladiolus varieties was mainly attributed due to the variation in the production of sprouts plant^{-1} and sprouting percentage of corm, which are the genetically controlled characters. The results obtained in this investigation are in close agreement with the finding of Roy and Sharma (2000), Kamble (2001), Safiullah and Ahmed (2001), Baweja and Brahma (2003), Kem *et al.* (2003), Salvi *et al.* (2004), Rani *et al.* (2007), Ranpise *et al.* (2007),

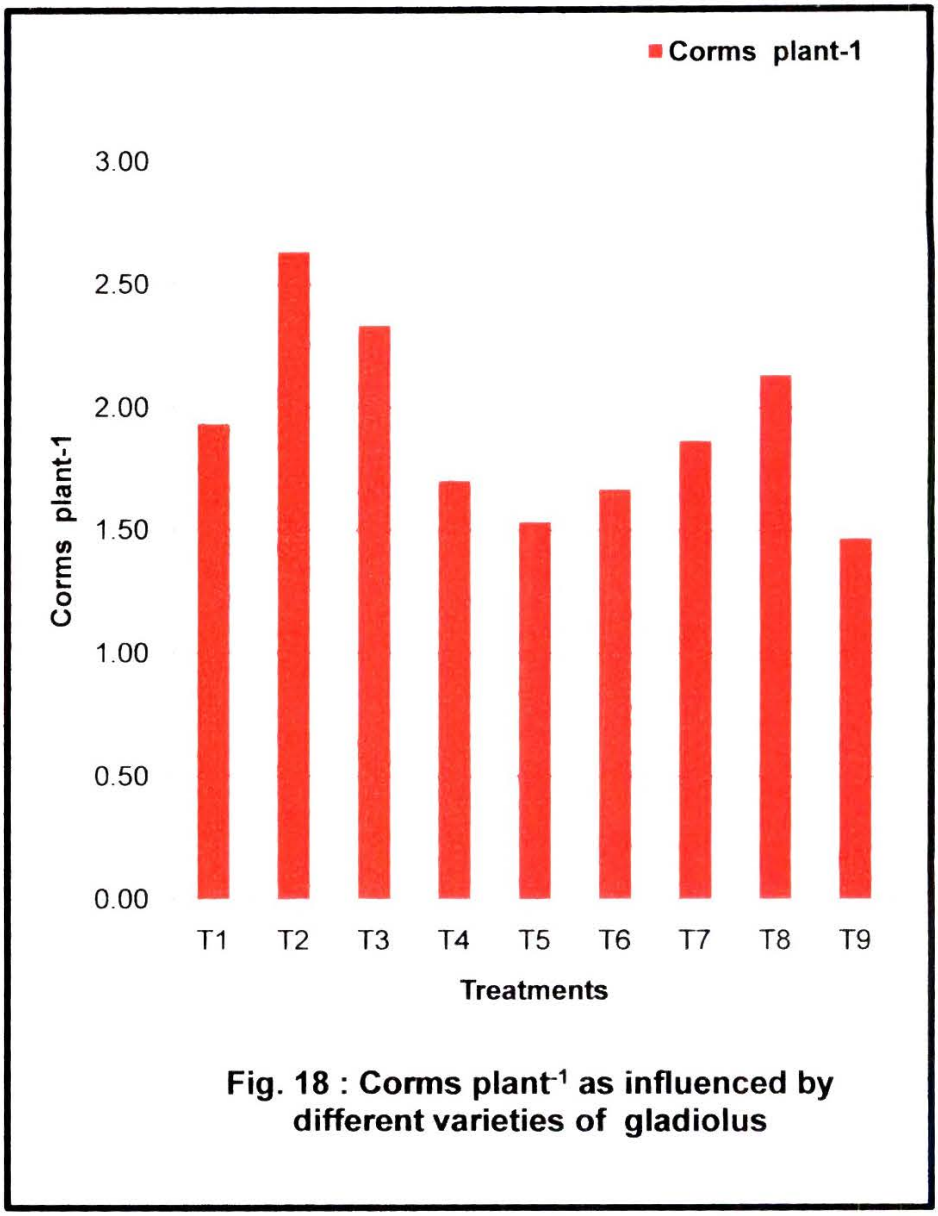


Fig. 18 : Corms plant^{-1} as influenced by different varieties of gladiolus

Pandey *et al.* (2009), Poon *et al.* (2010), Kumar *et al.* (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012) and Saleem *et al.* (2013) in gladiolus.

4.5.1.2 Corms plot^{-1}

The data in respect of corms yield plot^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (65.73) had recorded significantly maximum corms plot^{-1} which was statistically found to be at par with the variety Chandani (57.33). However, significantly minimum corms plot^{-1} were recorded in the variety Jester Gold (33.07).

4.5.1.3 Corms hectare^{-1}

The data in respects of corms yield hectare^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (2.43 lakhs) had recorded significantly maximum corms hectare^{-1} which was statistically found to be at par with the variety Chandani (2.12 lakhs), However, significantly minimum corms hectare^{-1} were recorded in the variety Jester Gold (1.22 lakhs).

4.5.2 Corm weight (g)

The data in respect of weight of corm of gladiolus as influenced due to the gladiolus varieties is presented in Table 19 and depicted through Fig. 19.

The data presented in Table 19 exhibited that, significant differences were recorded among the gladiolus varieties with respect to weight of corm. The variety Forta Rosa (48.17 g) had produced significantly maximum weight of corm which was statistically found to be at par with the variety Nova Lux (46.83 g), whereas significantly minimum weight of corm was recorded with the variety Snow Princess (30.33 g).

Table 19. Corm weight as influenced by varieties of gladiolus

Treatments	Corm weight (g)
T_1 - Snow Princess	30.33
T_2 - Yellow Stone	41.17
T_3 – Chandani	32.33
T_4 - Nova Lux	46.83
T_5 - Flaro Sovenier	36.50
T_6 - Princess Morgerate Rose	39.83
T_7 – Pricilla	43.17
T_8 - Forta Rosa	48.17
T_9 - Jester Gold	33.33
'F' test	Sig.
SE (m) ±	0.85
CD at 5 %	2.54

Similar variations due to the different cultivars have also been documented by Rai *et al.* (2000), Sidhu and Arora (2000), Patil (2002), Baweja and Brahma (2003), Kem *et al.* (2003), Kishan *et al.* (2005), Rani *et al.* (2007), Ranpise *et al.* (2007), Balaram *et al.* (2009), Choudhary *et al.* (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012), Saleem *et al.* (2013) and Kumar (2014) in gladiolus.

4.5.3 Diameter of Corm (cm)

The data regarding diameter of gladiolus corm as influenced due to the gladiolus varieties is presented in Table 20 and depicted through Fig. 20.

The data presented in Table 20 exhibited that, the gladiolus varieties showed significant differences with respect to diameter of Corm. The variety Forta Rosa (7.09 cm) had recorded significantly maximum Diameter of Corm which was statistically found to be at par with the variety Pricilla (6.33 cm), whereas significantly minimum diameter (5.24 cm) of corm was recorded with the variety Nova Lux.

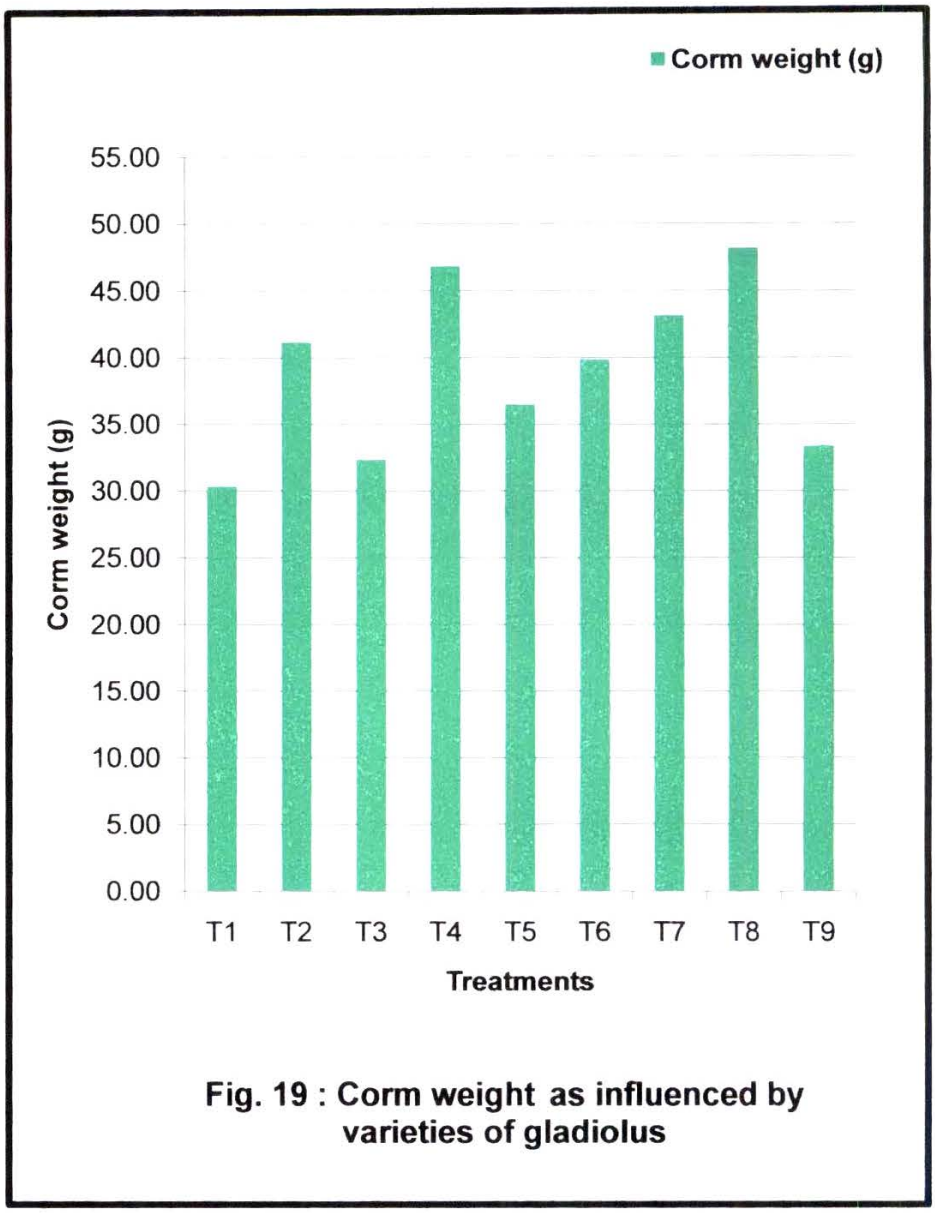


Fig. 19 : Corm weight as influenced by varieties of gladiolus

Table 20. Diameter of corm as influenced by varieties of gladiolus

Treatments	Diameter of corm (cm)
T_1 - Snow Princess	6.14
T_2 - Yellow Stone	5.48
T_3 – Chandani	5.86
T_4 - Nova Lux	5.24
T_5 - Flaro Sovenier	5.77
T_6 - Princess Morgerate Rose	5.96
T_7 – Pricilla	6.33
T_8 - Forta Rosa	7.09
T_9 - Jester Gold	6.05
'F' test	Sig.
SE (m) ±	0.32
CD at 5 %	0.95

The variety Forta Rosa had produced significantly maximum diameter of corm, which might have been happened due to the utilization of available food material for the development of minimum number of corms plant^{-1}, and thus the diameter of corm might have been increased. The results of the present study confirm the findings of Sidhu and Arora (2000), Patil (2002), Kem *et al.* (2003), Kishan *et al.* (2005), Rani *et al.* (2007), Ranpise *et al.* (2007), Balaram *et al.* (2009), Choudhary *et al.* (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012) and Kumar (2014) in gladiolus.

4.5.4 Cormels study

The data obtained in respect of cormels yield of gladiolus as influenced due to the different varieties is presented here under appropriate headings.

The data regarding cormels yield plant^{-1}, plot^{-1} and ha^{-1} as influenced due to the gladiolus varieties is presented in Table 21 and depicted through Fig. 21.

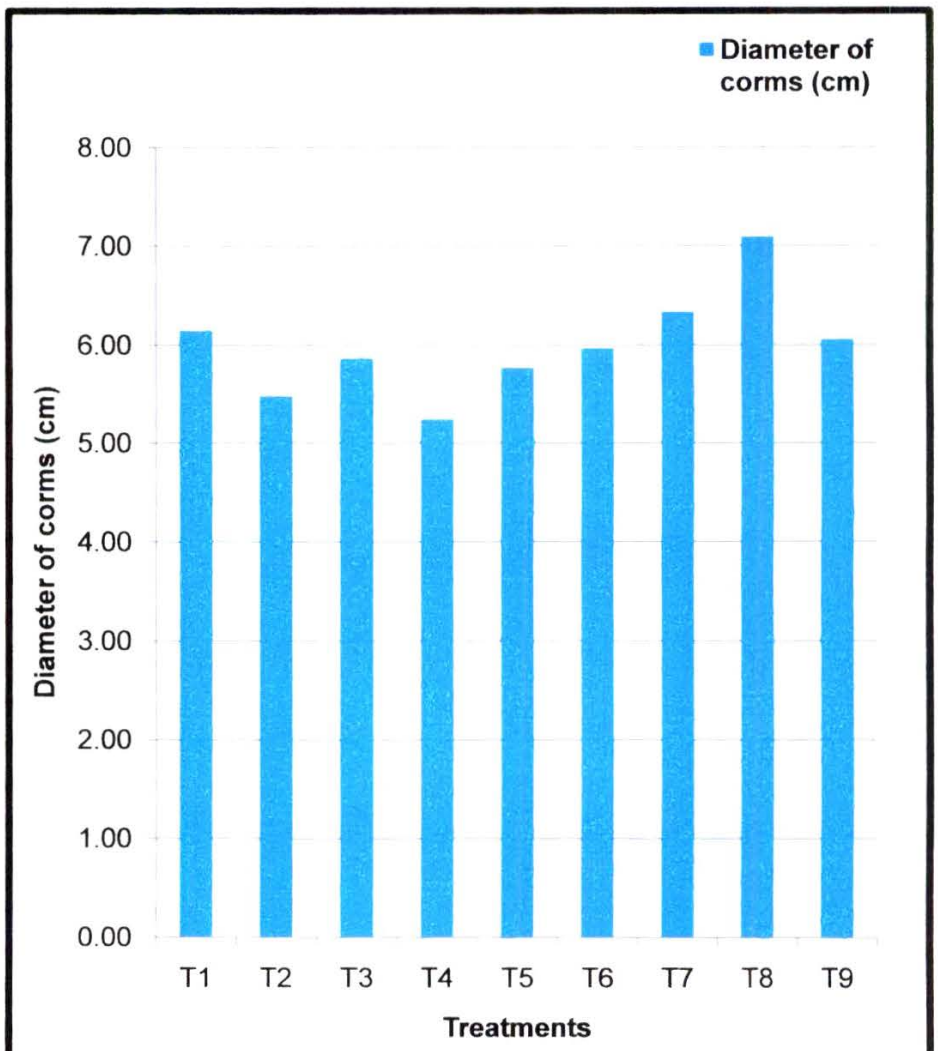


Fig. 20 : Diameter of corm as influenced by varieties of gladiolus

4.5.4.1 Cormels plant^{-1}

The data presented in Table. 21 revealed that, significant differences were recorded among the gladiolus varieties with respect to cormels plant^{-1}. The variety Yellow Stone (72.13) had produced significantly maximum cormels plant^{-1}. and it was followed by the variety Forta Rosa (60.47), whereas significantly minimum cormels plant^{-1} (33.60) were recorded with the variety Chandani.

The differential behavior of the gladiolus varieties as regards the production of cormels plant^{-1} might be due to variation in the genetic make up of the varieties studied in the experiment. Similar variation has already been reported by Kamble (2001), Safiullah and Ahmed (2001), Baweja and Brahma (2003), Kem *et al.* (2003) Ranpise et al. (2007), Pandey *et al.* (2009), Kumar *et al.* (2011), Gawali *et al.* (2012), Shaukat *et al.* (2012) and Saleem *et al.* (2013) in gladiolus.

Table 21. Cormels yield as influenced by varieties of gladiolus

Treatments	Cormels plant-1	Cormels plot-1	Cormels ha-1 (lakh)
T_1 - Snow Princess	54.13	1315.73	48.72
T_2 - Yellow Stone	72.13	1819.73	67.39
T_3 – Chandani	33.60	740.80	27.43
T_4 - Nova Lux	42.47	989.07	36.63
T_5 - Flaro Sovenier	50.67	1218.67	45.13
T_6 - Princess Morgerate Rose	58.60	1438.93	53.29
T_7 – Pricilla	44.33	1044.40	38.68
T_8 - Forta Rosa	60.47	1493.07	55.29
T_9 - Jester Gold	36.67	817.87	30.28
'F' test	Sig.	Sig.	Sig.
SE (m) ±	0.90	23.27	0.86
CD at 5 %	2.67	69.15	2.56

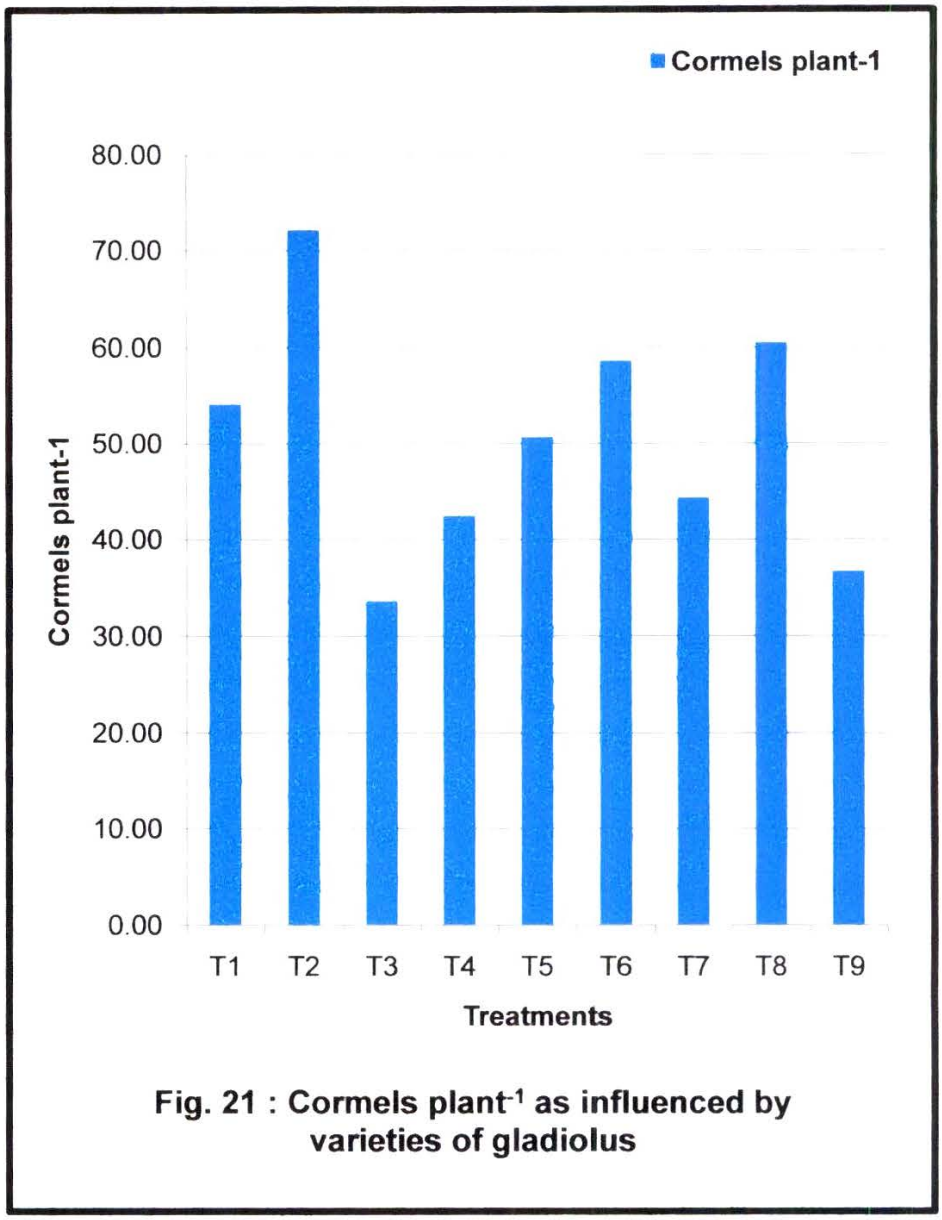


Fig. 21 : Cormels plant^{-1} as influenced by varieties of gladiolus

4.5.4.2 Cormels plot^{-1}

The data in respect of cormel yield plot^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (1819.73) had recorded significantly maximum cormels plot^{-1} and it was followed by the variety Forta Rosa (1493.07). However, significantly minimum cormels plot^{-1} were recorded in the variety Chandani (740.80).

4.5.4.3 Cormels hectare^{-1}

The data in respects of cormel yield hectare^{-1} as influenced due to the gladiolus varieties was found to be the significant. The variety Yellow Stone (67.39 lakhs) had recorded significantly maximum corms hectare^{-1} and it was followed by the variety Forta Rosa (55.29 lakhs), However, significantly minimum cormels hectare^{-1} were recorded in the variety Chandani (27.43 lakhs).

4.5.5 Cormels weight plant^{-1} (g)

The data in respect of weight of cormels plant^{-1} of gladiolus as influenced due to the gladiolus varieties is presented in Table 22 and depicted through Fig. 22

The data presented in Table 22 exhibited that, significant differences were recorded among the gladiolus varieties with respect to weight of cormels plant^{-1}. The variety Yellow Stone (36.67 g) had produced significantly maximum weight of cormels plant^{-1} which was statistically found to be at par with the variety Forta Rosa (31.67 g), whereas significantly minimum weight of cormels plant^{-1} was recorded with the variety Snow princess (10.33 g).

The increased weight of cormels plant^{-1} recorded in the variety Yellow Stone might be happened due to number and size of cormels plant^{-1} by the variety which were higher than the other varieties. The results are in close conformity with the findings of Roy and Sharma

(2000), Rathod (2002), Nair and Shiva (2003), Kishan *et al.* (2005), Ranpise *et al.* (2007), Pandey *et al.* (2009), Pragya *et al.* (2010), Choudhary *et al.* (2011), Shaukat *et al.* (2013) and Sankari *et al.* (2012) in gladiolus.

Table 22. Cormels weight plant^{-1} as influenced by varieties of gladiolus

Treatments	Cormels weight plant^{-1} (g)
T_1 - Snow Princess	10.33
T_2 - Yellow Stone	36.67
T_3 – Chandani	13.67
T_4 - Nova Lux	25.50
T_5 - Flaro Sovenier	18.83
T_6 - Princess Morgerate Rose	21.67
T_7 – Pricilla	20.67
T_8 - Forta Rosa	31.67
T_9 - Jester Gold	14.50
'F' test	Sig.
SE (m) ±	1.82
CD at 5 %	5.42

4.5.6 Diameter of cormel (cm)

The data regarding diameter of gladiolus cormel as affected due to the different varieties is presented in Table 23 and depicted through Fig. 23.

The data presented in Table 23 exhibited that, the gladiolus varieties showed significant differences with respect to diameter of cormel. The variety Forta Rosa (1.70 cm) had recorded significantly maximum diameter of cormel which was statistically found to be at par with the varieties Yellow Stone (1.66 cm) and Princess Morgerate Rose (1.63 cm), whereas significantly minimum diameter (1.27 cm) of cormel was recorded with the variety Chandani.

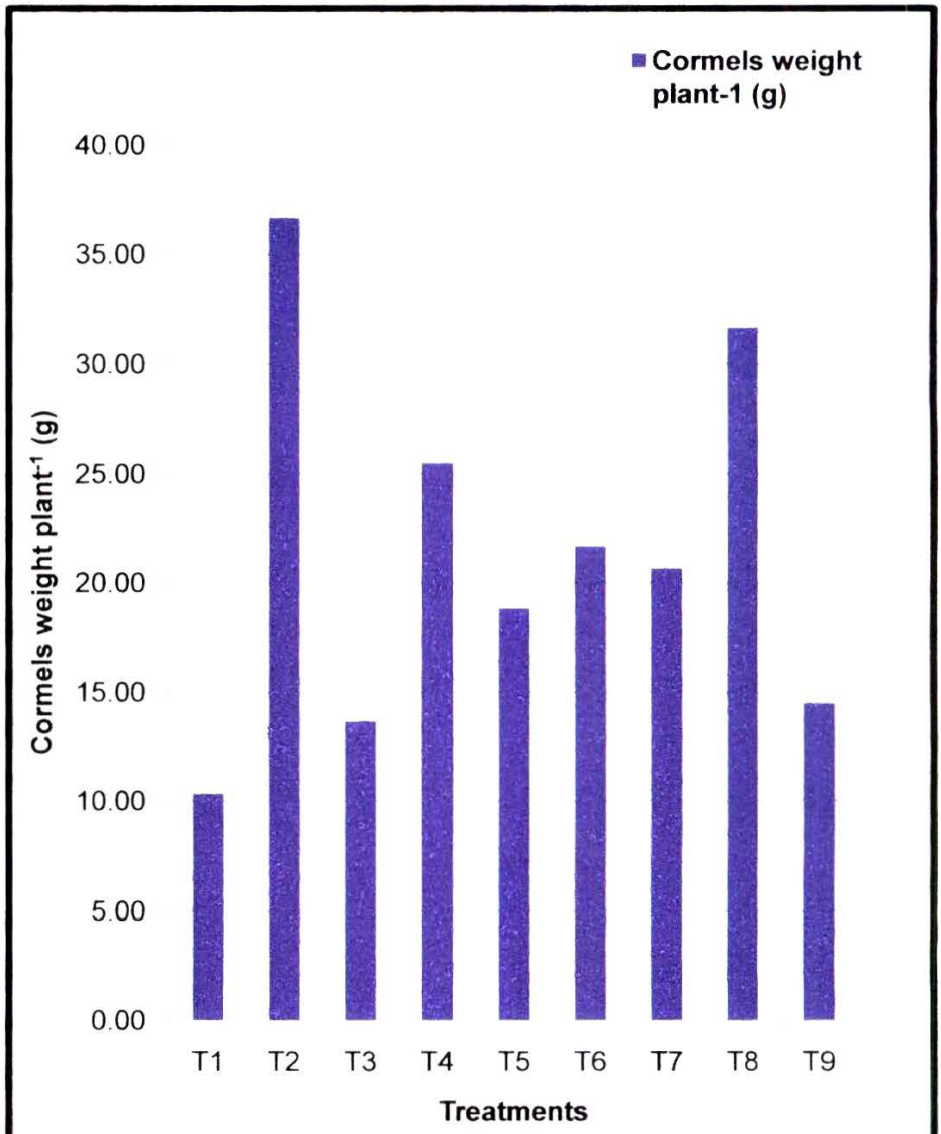


Fig. 22 : Cormels weight plant^{-1} as influenced by varieties of gladiolus

Table 23. Diameter of cormel as influenced by varieties of gladiolus

Treatments	Diameter of cormel (cm)
T_1 - Snow Princess	1.33
T_2 - Yellow Stone	1.66
T_3 – Chandani	1.27
T_4 - Nova Lux	1.47
T_5 - Flaro Sovenier	1.43
T_6 - Princess Morgerate Rose	1.63
T_7 – Pricilla	1.50
T_8 - Forta Rosa	1.70
T_9 - Jester Gold	1.29
'F' test	Sig.
SE (m) ±	0.04
CD at 5 %	0.14

The variety Forta Rosa had produced significantly maximum diameter of cormel, which might have been happened due to the utilization of available food material for the development of minimum number of cormels plant^{-1}, and thus the diameter of cormel might have been increased. The results of the present study confirm the findings of Rathod (2002), Nair and Shiva (2003), Kishan *et al.* (2005), Ranpise et al. (2007), Pragya *et al.* (2010), Choudhary *et al.* (2011), Shaukat *et al.* (2013) and Sankari *et al.* (2012) in gladiolus.

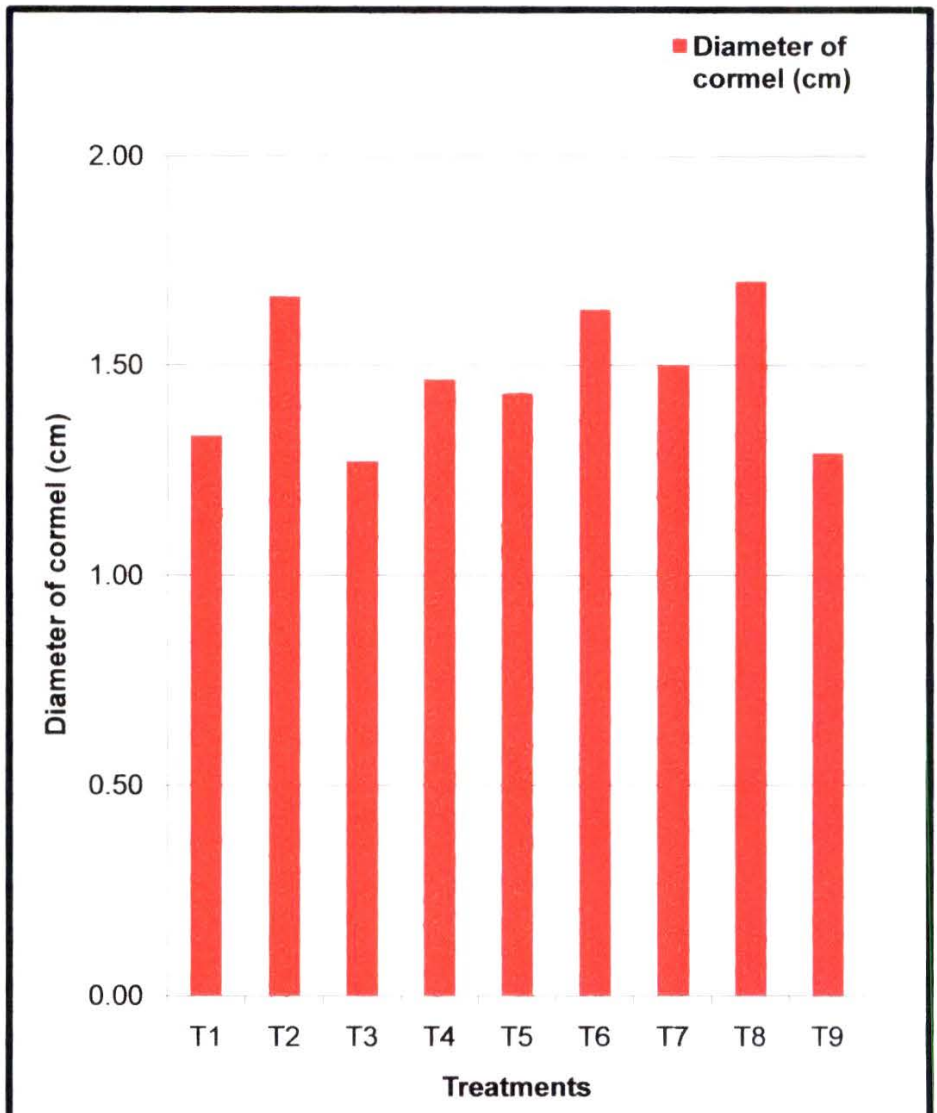


Fig. 23 : Diameter of cormel as influenced by varieties of gladiolus

been increased. The results of the present study confirm the findings of Rathod (2002), Nair and Shiva (2003), Kishan *et al.* (2005), Ranpise et al. (2007), Pragya *et al.* (2010), Choudhary *et al.* (2011), Shaukat *et al.* (2013) and Sankari *et al.* (2012) in gladiolus.

Chapter V

SUMMARY AND CONCLUSIONS

The present investigation entitled, "Performance of gladiolus varieties under Nagpur conditions" was undertaken at Experimental Field, Horticulture Section, College of Agriculture, Nagpur during November to April, 2014-15.

The experiment was laid out in Randomized Block Design with nine treatments replicated three times (Varieties. viz. Snow Princess, Yellow Stone, Chandani, Nova Lux, Flaro Sovenier, Princess Morgerate Rose, Pricilla, Forta Rosa, Jester Gold). All the treatments were provided with similar package of practices. The results obtained in respect of performance of different gladiolus varieties in the present investigation are summarized below.

5.1 Growth parameters

Maximum shoots plant^{-1} were noticed with the variety Yellow Stone. However, minimum shoots plant^{-1} were recorded under the variety Nova Lux.

Maximum vegetative growth of the plant *viz.* plant height and leaves plant^{-1} was noticed with the variety Yellow Stone. However, maximum Leaf area at 50 % flowering was recorded in the variety Snow Princess. Whereas plant height and leaves plant^{-1} were minimum under the varieties Pricilla and Flaro Sovenier respectively. However minimum Leaf area at 50 % flowering was recorded in the variety Chandani.

5.2 Flowering parameters

Minimum period for the first spike emergence, opening of first floret and 50% flowering were exhibited in variety Chandani, similarly, maximum period for the first spike emergence, opening of first floret and 50% flowering were exhibited in variety Jester Gold.

5.3 Quality parameters

The spike quality parameters such as length of spike, length of rachis and florets spike^{-1} were found maximum in variety Forta Rosa. However, vase life of cut spike and flowering span was found maximum in variety Yellow Stone and maximum diameter of floret and maximum diameter of spike was recorded in variety Nova Lux. Whereas, minimum length of spike was noted in variety Nova Lux and minimum length of rachis and florets per spike were noticed in variety Princess morgerate Rose and minimum vase life of spike and diameter of floret and diameter of spike was recorded with variety Chandani.

5.4 Yield parameters

Maximum spikes yield of gladiolus plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone. Whereas, Variety Jester Gold recorded minimum spikes yield of gladiolus plant^{-1}, plot^{-1} and hectare^{-1}.

5.5.1 Corms and Cormels parameters

Maximum corm yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone, however, maximum diameter of corm and weight of corm were noted with the variety Forta Rosa, While, maximum cormel yield plant^{-1}, plot^{-1} and hectare^{-1} and weight of cormels plant^{-1} were obtained from the variety Yellow Stone. Minimum corms yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Jester Gold. Minimum diameter of corm and weight of corm were noted with the varieties Nova Lux and Snow Princess respectively. Minimum cormel yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Chandani and minimum weight of cormels plant^{-1} recorded in variety Snow Princess.

Conclusions

From the findings of the present investigation it may be concluded that,

1. Maximum Shoots plant^{-1} were noticed with the variety Yellow Stone.
2. Maximum vegetative growth of the plant *viz.* plant height and leaves plant^{-1} was noticed in variety Yellow Stone. However, maximum Leaf area at 50 % flowering was recorded in the variety Snow Princess.
3. Minimum period for the first spike emergence, opening of first floret and 50% flowering were exhibited with the variety Chandani and maximum longevity of flower on plant and flowering span recorded with the variety Yellow Stone.
4. The spike quality parameters such as length of spike, length of rachis and florets per spike were found maximum in variety Forta Rosa. However, vase life of cut spike was found maximum in variety Yellow Stone and maximum diameter of floret and maximum diameter of spike was recorded in variety Nova Lux.
5. Maximum spikes yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone.
6. The highest longevity of flowers on plant and Vase life of cut flowers was noted with the variety Yellow Stone.
7. Maximum corms yield plant^{-1}, plot^{-1} and hectare^{-1} were obtained from the variety Yellow Stone, however, maximum diameter of corm and weight of corm were noted with the variety Forta Rosa, Whereas, maximum cormel yield plant^{-1}, plot^{-1} and hectare^{-1} and weight of cormels plant^{-1} were obtained from the variety Yellow Stone.

Thus, it can be inferred from the results that, the gladiolus variety Yellow Stone was found to be suitable in respect of number of spikes and corms yield plant^{-1}, However, variety Forta Rosa was suitable in respect of quality parameters of gladiolus spikes under Nagpur conditions.

The results inferred from the present investigation are suggestive and need to be studied further for appropriate recommendations.

Chapter VI

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Place: Nagpur

Date: 25/05/2015

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APPENDIX

Weekly weather data recorded at Observatory, Agriculture College Farm, Nagpur for the year 2014-15.

Date		Met Week	Temp °C		R.H. %		Total Rainfall (mm)	No. of Rainy days	Wind speed km/hr.	Evaporation (mm)
			Max	Min	Mor	Eve				
3 - 9	Sept. 14	36	28.9	24.3	84	78	70.8	3	5.0	3.1
10 - 16		37	27.9	23.7	85	73	32.6	6	3.3	2.0
17 - 23		38	32.2	24.6	77	61	05.2	1	5.8	3.8
24 - 30		39	32.1	21.9	69	44	-	-	1.7	3.4
1 - 7	Oct. 14	40	34.9	21.9	67	42	-	-	2.5	4.5
8 - 14		41	32.2	22.9	68	49	01.2	1	4.7	4.0
15 - 21		42	32.2	22.1	75	54	30.8	1	2.6	4.0
22 - 28		43	30.2	18.1	73	44	01.0	2	1.9	2.8
7 - 4	Nov. 14	44	31.7	16.8	67	31	-	-	1.8	3.5
5 - 11		45	31.8	17.6	59	37	-	-	2.6	3.8
12 - 18		46	31.3	20.2	60	42	-	-	2.8	2.9
19 - 25		47	30.2	12.5	50	27	-	-	1.7	2.8
26 - 2		48	30.7	13.1	59	27	-	-	1.5	2.6
3 - 9	Dec. 14	49	29.3	12.1	50	23	-	-	2.4	3.1
10 - 16		50	28.5	15.1	71	45	-	-	2.7	2.1
17 - 23		51	25.1	8.3	59	32	-	-	2.8	2.3
24 - 31		52	25.7	8.3	57	26	-	-	2.3	2.8
1 - 7	Jan. 15	1	24.8	14.0	78	52	02.4	2	4.0	1.9
8 - 14		2	26.9	7.4	58	21	-	-	2.0	2.9
15 - 21		3	26.3	9.6	53	29	-	-	2.5	2.9
22 - 28		4	28.0	14.7	71	42	-	-	2.8	2.5
29 - 4		5	28.3	11.6	57	31	-	-	3.0	3.1
5 - 11	Feb. 15	6	29.2	15.3	68	38	08.4	1	4.0	3.7
12 - 18		7	30.8	13.6	59	24	-		2.5	3.6
19 - 25		8	32.0	15.1	50	31	03.6	1	2.6	4.0
26 - 4		9	30.3	17.2	68	40	36.6	3	3.8	3.8
5 - 11	March 15	10	31.5	17.0	50	31	01.0	1	3.5	4.3
12 - 18		11	32.2	18.9	59	36	24.6	1	5.5	5.9
19 - 25		12	35.2	18.6	39	23	-	-	3.5	5.5
26 - 1		13	36.0	20.8	50	31	-	-	3.5	5.6