

The left side of the slide features a decorative vertical bar composed of several overlapping rectangular sections with different textures and colors, including a fine grid pattern and solid colors in shades of orange and red. To the right of this bar are five solid orange circles of varying sizes, arranged in a descending staircase pattern from top to bottom.

POTENTIAL CUT FLOWERS

GLADIOLUS (SWORD LILY)

Botanical Name: *Gladiolus x grandiflorus*

Family: *Iridaceae*

Origin:

Tetraploid sp.: South Africa

Diploid sp.: Europe



Pliny the Elder coined it from *gladius*
means “a sword like” on account of its sword like foliage



PECULIAR QUALITIES OF GLADIOLUS

- Grown for cut flowers, borders, bedding, pots, bouquets and floral arrangements.
- Florets open acropetally forming a natural progression of different stages of floret opening.
- Corms are very rich in vitamin C, carbohydrates and proteins.



COMMERCIAL CULTIVARS OF GLADIOLUS

- Cartago, Eurovision, Priscilla, Spic & Span, Nova, Peter Pears, Mayur, American Beauty, Sylvia, Red Beauty, Her Majesty and Topaz.



LATEST IARI VARIETIES IN 2012



Pusa Manmohak



Pusa Red Valentine



Pusa Vidushi

DHIRAJ: RESISTANT TO FUSARIUM WILT



KUM-KUM- RESISTANT TO FUSARIUM



IARI, NEW DELHI

- Agnirekha, Anjali, Archana, Bindiya, Chandani, Chirag, Dhanvantari, Gulal, Gunjan, Kamini, Mayur, Neelam, Neelkanth, Noopur, Pusa Kiran, Pusa Shubham, Pusa Suhagin, Rangmahal, Shabnam, Sanjeevni, Sarang, Shweta, Suchitra, Sukanya, Sunayana, Swapnil, Swarnima, Urmil and Vandana.
- New cultivars released in 2012 are Pusa Manmohak, Pusa Red Valentines and Pusa Vidushi.



IIHR, BANGALORE

- Arka, Naveen, Arka Gold, Arka Amar, Arka Kesar, Aarti, Apsara, Darshan, Dhiraj (Resistant to Fusarium), Kum Kum, Meera, Nazrana, Poonam, Sagar, Sapna, Shakti, Sindhoor and Shobha (Mutant).



NBRI, LUCKNOW

- Archana, Arun, Basant Bahar, Gazel, Hans, Indrani, Jwala, Kajal, Kalima, Kohra, Manhar, Manisha, Manmohan, Manohar, Menaka, Mohini, Mridula, Mukta, Pitamber, Priyadarshini, Rim Jhim, Sada Bahar, Sanyukta, Sumita, Tabassum, Tambari, Trilok and, Usha.



HORTICULTURAL EXPERIMENT AND TRAINING CENTRE, CHAUBATTIA, ALMORA

- Chaubattia Ankur, Chaubattia Arunima, Chaubattia Shobhit and Chaubattia Tripti.



LT. GOV. SHRI DAJKANG DAHADUR
SINGH BHADARI, HIMACHAL
PRADESH

- Bhadri Blue Beauty, Bhadri Bright Red, Bhadri Fortune, Bhadri Lemon Queen, Bhadri Little White, Bhadri Pearl, Bhadri Purple Queen, Bhadri's Rose Glory, Bhadri's Shimla Sunset, Bhadri Tricolour, Bhadri Yellow Beauty, May Blossom, Raj Niwas Pride, Rose of Heaven and Zakir Hussain.



IHBT PALAMPUR

- Palampur Queen, Palampur Delight, Palampur Pride, Palampur Princess, Tushar Mauli, Anurag, Cute Munni, Brick Beauty, Grace and Saint



PAU LUDHIANA

- Punjab Flame, Punjab Elegance, Punjab Lemon Delight and Punjab Glance



FACTORS FOR GROWTH AND FLOWERING

- **Soil:** Sandy loam, pH: 5.5-6.5, organic matter: about 1% and optimum soil moisture
- **Temperature** (Day:18-25°C, Night: Not less than 10°C)
- **Light** (Low light intensity is very harmful at 4-6 leaf stage and early blooming in short days during winter with less number of florets)
- **Relative humidity:** 60-70%



OPTIMUM TIME OF PLANTING

- N.I. plains: Sep.-Nov.
- Bangalore: Through out year, but good in Dec.-Jan. and June.
- Low hills: Aug.-Feb.
- Mid hills: Feb.-April
- High hills: Mar.-May



PROPAGATION OF GLADIOLUS

- Seeds
- Corms
- Cormlets
- Cormels
- Pieces of corms
- Scoring
- Micro-propagation



DORMANCY IN CORMS OF GLADIOLUS

- Cultivar
- Season (More in crop grown during summer than winter crop)
- Temperature (More when high temperature during corm development)
- Photoperiod (More in long days than short days)
- Light (More in crop grown under high light intensity)



METHODS TO BREAK DORMANCY

- Low temperature storage for 2-3 months at 4-7°C
- Ethylene chlorohydrin (4-5 drops/ litre container for a week)
- Dip corms in thiourea 500 ppm solution for 24 hours
- Dip corms in GA₃ 50 ppm solution for 30 min.
- Dip corms in BA 25-50 ppm solution or 10% H₂S for 30 min.
- Dip corms in Garlic paste for 30 min.



CHECKING DORMANCY?

- Tetrazolium test (Cut corms are put in this solution and more redness means less dormancy)
- Swollen buds or root primordia in corms
- Dormancy is due to accumulation of more abscisic acid and less growth promoting hormones.
- Dormancy is mainly due to linolenic, linoleic, stearic and palmitic acids



DORMANCY BROKEN CORMS & CORMELS



CORM TREATMENT

- Dip corms for about 20 minutes in a solution of Emisan (0.2%), Thiram (0.3%), Captan (0.2%), Bavistin (0.2%) or Benlate (0.2%)
- Dry in shade before planting or storing
- Before planting treat corms in systemic fungicide and before storing in contact fungicide.



TREATMENT OF CORMS IN DITHANE M 45 (0.2%) BEFORE STORAGE



PLANTING DENSITY AND SPACING

- Purpose of cultivation whether for cut flowers, planting material or both
- Nutrient status of the soil
- Corm size
- Cultivation in greenhouse or open fields
- Low planting density results in wastage of inputs and very high planting density leads more plant competition, thus reducing individual corm enlargement



OPTIMUM PLANTING DENSITY AND SPACING

- **IARI New Delhi: 40 x 15 cm**
- UAS Bangalore: 30 x 25 cm
- IIHR Bangalore: 30 x 20 cm
- PAU Ludhiana: 30 x 20 cm or 36-63 corms/m²
- BSI Kolkata: 20 x 25 cm
- Greenhouses: 10 x 10 cm



IDEAL PLANTING DEPTH FOR CORMS

- Planting depth depends upon the purpose of gladiolus cultivation, soil type and corm size
- It should be 2.5 times than the diameter of corms
- Planting depth of 8-10 cm is ideal for production of quality cut flowers and corms.



DIFFERENT METHODS OF PLANTING GLADIOLUS

- Flat beds in plains
- Ridges in hills




OPTIMUM STATUS OF DIFFERENT NUTRIENTS IN THE HEALTHY FOLIAGE OF GLADIOLUS

- N: 2.6%
- P: 0.24%
- K: 2.3%



FERTILIZERS AND NUTRIENTS

Place	N	P	K
NBRI Lucknow (Kg/ha)	200	200	200
MAU Parbhani (Kg/ha)	100	50	50
UHF Solan (Kg/ha)	300	200	200
BSI Kolkata (g/m ²)	20	30	30
BCKVV Kalyani (g/m ²)	50	10	20
PAU Ludhiana (g/m ²)	60	20	20
UAS Bangalore (g/m ²)	40	40	---



IRRIGATION IN GLADIOLUS

- Soil should have 60-70 per cent moisture of field capacity
- No watering is required until corms sprout
- Depending upon weather 8-12 irrigations of 2.5-5 cm depth are required
- Stage immediately after sprouting and 4-6 leaf stage are very sensitive to water deficit.



PLANTS SUPPORT IN GLADIOLUS

- Earthing up to 10-15 cm height is done when plants are at 4-6 leaf stage or when plants are 15-20 cm high
- Hoeing should not be done at swelling of flower spikes
- Staking with bamboo or wooden sticks is done in beds
- String or rope may be tied in three rows along the plant-rows to avoid lodging of plants.



WEEDING IN GLADIOLUS

- Three-four hand weeding are sufficient
- Atrazine (1.5 kg/ha), oxyfluorfen (0.5 kg/ha) are sprayed as pre-emergence.
- Stomp @ 3.3 l/ha (pendimethalin @ 1.0 kg/ha) control very effectively weeds when applied as pre-emergence and after 45 days of planting in about 3000 litre water.



DISEASES OF GLADIOLUS

- Wilt (*Fusarium oxysporum f. sp. gladioli*)
- Corm-rot (*Fusarium, Curvularia, Stromatinia, Botrytis, Penicillium spp.*)
- Blight (*Curvularia trifoli, C. eragrostidis*)
- Blue/ gray mould (*Botrytis elliptica B. gladiolorum*)
- Leaf spots (*Septoria gladioli*)
- Viral diseases



FUSARIUM



STORAGE CORM ROT



INSECT-PESTS OF GLADIOLUS

- Aphids
- Thrips
- Caterpillars
- Nematodes



FLORETS INFESTED BY THRIPS





Thrips infestation



DISORDERS IN GLADIOLUS

- Blindness (It is due to unfavourable climate)
- Topple and bud rot (Ca deficiency, spray Ca CO_3 @ 0.2-0.3%)
- Negative geotropism (It is due to uneven distribution of auxins and transport vertically)




IDEAL GLADIOLUS CUT FLOWER

- Spike length over 96 cm
- No. of florets over 15
- No. of florets open at a time over 5
- No side shoots
- Florets in single or double line, but facing one side
- Florets evenly spaced
- Balance between open, half open and close florets
- Optimum longevity
- Attractive colour
- Florets should be turgid free from injury and discolouration



GRADES OF GLADIOLUS SPIKES IN INTERNATIONAL MARKET

Grade	Spike length (cm)	No. of Florets
Fancy	More than 107	16
Special	96-107	15
Standard	81-96	12
Utility	Less than 81	10



GRADES OF GLADIOLUS SPIKES IN DOMESTIC MARKET

Grade	No. of Florets
Exhibition	14 or more
Standard	11-13
Commercial	8-10
Utility	Less than 8



STAGES OF HARVESTING GLADIOLUS SPIKES

- Local market: lower most 1-2 florets are open
- Distant market: lower most 1-2 florets are coloured



PACKAGING OF GLADIOLUS SPIKES

- Make bunches of 10, 12 or 20 spikes
- In corrugated cardboard boxes of 120 x 60 x 30 cm (L x W x H) accommodates about 180-200 cut flowers of gladiolus.



TIME OF HARVESTING GLADIOLUS CORMS

- After 40-50 days of flowering
- When 25% cormels turn brown
- Foliage start turning yellow.




OPTIMUM STORAGE TEMPERATURE

- Spikes: 1.7- 4.4°C
- Corms: 4-7°C



GRADING OF GLADIOLUS CORMS

Grade	Stock	Size/ diameter (cm)
Jumbo	Flowering	More than 5.1
No. 1		3.8-5.1
No. 2		3.2-3.8
No. 3		2.5-3.2
No. 4		1.9-2.5
No. 5	Planting	1.3-1.9
No. 6		1.0-1.3



AVERAGE YIELD

- Spikes: 2.0-3.0 lakhs (1-2 spikes per plant)
- Corms: 2.5-3.0 lakhs (2 corms per plant)
- Cormels: 15-20 lakhs (10-20 cormels per plant)

