

Gladiolus

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Gladiolus is an important florist crop, most popular as cut flower in the domestic and international market. It is relatively easy to grow and also suitable for bedding and exhibition. The fascinating spikes bear a large number of florets which exhibit varying sizes and forms; with smooth, ruffled, deeply crinkled or lacinated tepals. The flower spikes are used in flower arrangements, in bouquets and for indoor decoration. Spikes of gladiolus have good keeping quality and can be transported to long distances. Gladiolus (Tourn.) L. takes its name from the Latin word *Gladius* because of sword like shape of its foliage. There are some 226 recorded species scattered in Republic of South Africa. Some of the species of gladiolus are *Gladiolus natalensis*, *G. cardinalis*, *G. communis*, *G. callianthus*, *G. arneus*, *recurvus*, *G. tristis*. The flowers open in acropetal succession, one by one and spike lasts for 1 to 3 weeks in ordinary vase water, depending upon the season and variety. India around 1270 ha of land is under gladiolus cultivation.

Varieties : There are over 30,000 varieties of gladiolus.

Pink: America, Applause, Ben Venuto, Charm Glow, Dawn Pink, Deciso, Dresden Doll, Friendship, Frosty Pink, Great Britain, Jessica, My Love, Pink Diamond, Pink Perfection, Priscilla, Pusa Archana, Rose Supreme, Spic and Span, Suchitra, T-512, Vedi Napoli, Video and Wine and Roses.

Orange : Autumn Gold, Bonaire, Cartage, Coral Seas, Fiesta, Foxfire, Gypsy Dancer, Inca Chief, Little Mo, Orange Beauty, Orange Chiffon, Peter Pears, Ratna Butterfly, Setingsun, Sexony, Venetie.

Red : Advance, Black Prince, Carthago, Eurovision, Gerda, Hunting Song, Mascagni, Oscar, Red Bantam, Red Beauty, Redeem, Victor Borge, Victoria.

Yellow : Angila, Aurora, Chinese Lantern, Flower Song, Folk Song, Green Willow, Golden Harvest, Golden Peach, Goldfield, Jacksonville Gold, Jester, Junor Prom, Nova Lux, Vink's Glory, Yellow Stone.

White : Amsterdam, Bush Ballad, Classic, Cotton Blossom, Majorie Ann, Moon Frost, Maybride, Prof. Goudriaan, Sancere, Snowdrop, Snow Dust,

Snow Princess, Teach Inn, White Enchantress, White Friendship, White Goddess, White Oak, White Prosperity. Purple, Violets : Blue Moon, Fidelio, Her Majesty, High Style, Mayur, Monte Negro, Plum Tart, Purple Giant, Pusa Sarang, Pusa Shingarika, Pusa Urmil, Rose Delight, Royal Dutch, Tropic Sea, Wind Song.

Varieties Evolved at Indian Agricultural Research Institute, New Delhi:

Agnirekha : Fire red with saffron yellow blotch and scarlet florets. Spikes 85 cm in length with 18 florets of 9.3 cm diameter. Mid-season.

Suchitra : Florets camellia rose with vermilion and purple blotch. Spikes 80-85 cm long, florets 16-18, and 9-10 cm across. Mid-season.

Anjali : Florets pinkish white. Spikes 80cm long, florets 17 and 8.5 cm across. Late.

Archana (Creamy Green x American Beauty, 1997) : Florets scarlet pink with yellow dusting on falls. Spike 67cm long, florets 16 and 11.5 cm across. Mid-season.

Vandana (George Mazure x Eurovision, 1997) : Orange coloured variety with 9cm long spikes having 16 florets of 13.0 cm diameter. Early mid-season.

Kamini (Ave x Christian Jane, 2000) : Floret colour orange-red with fan-shaped purple red lip on light yellow base on 2 side falls. Spikes 88cm long with 14 florets per spike. Floret diameter 11.0 cm. Early mid-season.

Mohini (Ave x Christian Jane, 2000) : Floret colour red-purple with fan-shaped deep purple colour on yellow on 2 side falls. Spike length 92cm with 15 florets per spike. Floret diameter 9.5 cm. Early mid-season.

Varieties Evolved at Indian Institute of Horticultural Research, Hessaraghatta, Bangalore:

Aarti (Shirley x Melody, 1980) : Florets poppy-red with purple-red and canary –yellow blotch. Spikes 63.6 cm long with 11 florets per spike. Mid-season.

Apsara (Black Jack x Friendship, 1980) : Florets ruby-red with barium yellow flecks in throat. Spikes 97.6 cm long with 18 florets per spike. Floret diameter 11 cm.

Darshan (Watermelon Pink x Shirley) : Floret colour ruby-purple with red-purple margins having



white blotch.

Varieties Evolved at National Botanical Research Institute, Lucknow:

Priyadarshini (Lavanisque sdlg.) : Florets mauve and throat white. Spikes 45 cm long with 12 florets per spike.

Variety developed by GB Plant University of Agriculture and Technology, Pantnagar

Subhangini : A mutant of 'Fidelio' developed through gamma radiation. Spikes are 95-100cm long each with 15-18 florets. Florets are white, slightly ruffled and 12cm across. Very good multiplier.

Propagation : Gladiolus can be propagated through (i) Corms (ii) Cormels (iii) Seeds and (iv) Tissue Culture.

Through corms : Propagation of gladiolus through corms is a commercially used method. A single corm produces an average of 1 to 3 flower-grade daughter corms in a season depending upon its size and the variety. 10-15 cormels can be obtained from a single corm. Lifting of corms is carried out 6-8 weeks after harvesting of spikes. The corms should be cleaned, dipped for 30 min. in 0.3% Captan 50 WP and shade-dried at an aerated place for about 15 days. Corms are then packed in crates or in net bags and should be cold-stored at 3-7°C. From cold storage, these corms should be taken out one month prior to planting and kept at ambient conditions at an aerated place. Before planting, these are once more dipped for one hour in 0.3% Captan solution.

Through cormels : Cormels from corms are healthier planting method. The multiplication of gladiolus through cormels is an inexpensive and rapid method which enables build up of large stocks with minimum cost. The cormels also tend to escape diseases or viruses even if the parent corm is infected.

Through seeds : This method is not used commercially but is practiced only by the breeders to create new varieties.

Through tissue culture : The cormels of gladiolus can be easily produced through tissue culture. This technique is especially useful for (a) multiplying new cultivars, (b) producing disease-free cormels, and (c) for maintenance of germplasm of the elite cultivars.

Soil : Gladioli can be grown in a wide range of soils but it should be neither clayey nor waterlogged. The soil should have proper drainage facilities. It should also contain sufficient organic matter. For good results, the soil should be sandy-loam and slightly acidic. However, gladioli can be effectively grown from pH 5 to 8, whereas higher pH should be brought down by addition of organic matter and gypsum.

Field preparation: Preferably, the bed size should be 6 x 2 meters. Planting is carried out during October in plains and March-April in hills. The depth of planting of the corms

ranges from 5 to 10 cm. The row to row distance is normally 40 cm while plant-to-plant distance is maintained at 15 cm. The requirement of the corms per hectare is roughly 1-1.5 lacs.

After care: Lifting of corms is carried out 6-8 weeks after harvesting of spikes. The corms should be cleaned, dipped for 30 min in 0.3% Captan 50 WP and shade-dried at an aerated place for about 15 days. Corms are then packed in crates or in net bags and should be cold-stored at 3-7°C. From cold storage, these corms should be taken out one month prior to planting and kept at ambient conditions at an aerated place. Before planting, these are once more dipped for one hour in 0.3% Captan solution.

Cultivation: The cultivation of Gladiolus are presented in the following sub-heads:

Time of planting of corms : North Western Plains-October (first fortnight). Staggered planting can, however, be done at 10-15 day intervals from mid-August to mid-December to get continued supply of spikes over a longer period and to match the market demand. In temperate climates, the corms are planted after the winter, *i.e.* in March and April when frosts are over and climate becomes warm.

Method of planting of corms : Only the non-dormant corms should be planted. The emergence of root buds at the base of the corms shows that the corms are ready for planting. The corms should be suitably treated with fungicides before planting. When planting, the lower portion of the corm should be placed on the soil such that the bud at the top lies straight above. It is done to make sure that the stem grows erect and does not show crooked growth. At planting time, the soil should contain sufficient moisture to facilitate uniform sprouting of corms.

Irrigation : Gladiolus requires water in plenty but does not grow well under water-logged conditions. Frequency of irrigation depends upon the soil type, weather conditions and rainfall. Normally in sandy soils, the crop should be irrigated at 7-10 day intervals, whereas in heavy soils, at less frequent intervals. Irrigation should be withheld at least 4-6 weeks before lifting of corms.

Staking : Especially large-flowered varieties of gladioli grown outdoors are susceptible to lodging, hence need staking. The stems should be tied with strings to thin but strong supports. Earthing up of the plants, when the spike starts elongating, also provides sufficient support to prevent lodging. The butterfly and miniature types, on account of their small size, do not need staking, and therefore, are considered highly suitable for garden decoration.

Weed control : Pro-emergence herbicides reported for gladiolus are diuron (0.9 kg/ha) (or) linuron (3.0 kg/ha) Post-emergence herbicides, 2, 4-D @ 1.5-3.0 kg/ha has

been found to reduce weed population.

Flower production : Gladiolus takes 60-120 days to produce spikes.

Nutrition : Commonly a 12:12:18 N:P:K compound fertilizer is applied prior to planting at 1 ton per hectare. Gladiolus can be damaged by fluorine and phosphatic fertilizers containing fluorine should not be used. The crop can be top dressed as required with calcium nitrate at an application rate of 200-300 kg per hectare.

Harvesting of spikes and post harvest operations : The spikes of gladiolus generally exhibit vase life of about 7-15 days. The spikes should be harvested in the morning or evening hours when temperatures are mild. Spikes should preferably be cut with sharp knives or secateurs. While harvesting, at least four basal leaves should be retained on the plant to ensure proper development of corms and cormels. The stage at which the spike is to be cut should depend upon the transportation distance, consumer requirement and prevailing temperature conditions.

Grading and packing : Grades of gladiolus spikes as suggested by the Society of American Florists, Florida (USA).

Grade	Spike length (cm)	Number of florets (Minimum)
Fancy (Blue)	107 and above	16
Special (Red)	96-107	14
Standard (Green)	81-96	12
Utility (Yellow)	81 and below	10

In India, these grades are generally referred to as 'A', 'B', 'C' and 'D', respectively. The graded spikes are made into bunches of 10 or 12, loosely tied with rubber band and tightly packed in non-returnable telescopic boxes made of cardboard.

Harvesting of corms : It generally takes 6-8 weeks after harvesting of spikes from the corms to become mature and ready for lifting. Plant growth stops at this stage. Irrigations should normally be withheld at least 2-3 weeks before harvesting of corms. In India, lifting of corms is carried out manually with small garden forks or 'kharpas'. After lifting the corms from the soil, the upper leafy portions should be removed by twisting and breaking the stalk. The old withering mother corms attached to the bottom of the newly formed corms should also be removed similarly with the thumb. The cormels should also be separated simultaneously and handled separately. The corms usually get damaged or bruised during harvesting and cleaning operations. They should, therefore, be treated with fungicides (see Under 'Diseases and Disorder') The corms or cormels of different cultivars must be handled separately and labeling properly so that they do not get mixed up.

Storage of corms : Storage of corms at low temperature (4-5°C) is an established commercial practice. It serves three main purposes:

- It helps to break dormancy of corms raised under warmer climates,
- It helps to overcome warm and dry conditions of summer months that intervene between lifting of corms and their planting in the subsequent season, and
- It prevents premature sprouting of corms.

Cost of cultivation and income: The growing of gladiolus is a profitable venture but profits depend upon a number of variables such as varieties grown, demand of spikes in the market, incidence of diseases and pests, and type of weather conditions prevailing at the time of spike formation.

The following account gives a fairly reliable estimate of the expenditure, total income and net profits expected from the gladiolus cultivation on per acre basis.

Sr. No.	Particulars	Amount
Expenditure		
1.	Rental value of land with assured irrigation	Rs. 8,000.00
2.	Cost of planting material (60000 corms @Rs.2.25 each)	Rs.1,35,000.00
3.	Cost of preparation of land (ploughing, planking, making of beds, water channels, etc.)	Rs. 2,000.00
4.	Cost of planting of corms (20 mandays)	Rs. 2,000.00
5.	Cost of irrigations, herbicide application and a hoeing	Rs. 6,000.00
6.	Cost of fertilizers, fungicides, pesticides etc.	Rs. 5,000.00
7.	Cost of harvesting of spikes, packaging and transportation	Rs. 15,000.00
8.	Cost of digging out, cleaning and treatment of corms with fungicides	Rs. 5,000.00
9.	Cost of packing and storage of corms and cormels	Rs. 2,000.00
	Total Expenditure	Rs. 1,80,000.00
Income		
1.	Sale of spikes (60,000 @Rs.1.50 each)	Rs. 90,000.00
2.	Value of corms (60,000 @Rs.2.00 each)	Rs.1,20,000.00
3.	Value of cormels (200 kg approx. @Rs.100 per kg)	Rs. 20,000.00
	Total income	Rs.2,30,000.00
	Net income from one acre	Rs. 2,30,000.00
		- Rs.1,80,000.00
		Rs. 50,000.00

The profits will continue to increase from the third year onward as the cormels will grow to flower grade corms.