

## GLORIOSA SUPERBA Linn.

### ORIGIN AND BOTANICAL TRAITS

Family	Lilaceae, subfamily Wurmbeacoidae	
Alternate names	Methonia Superba Lamk Lindley	
	English: Glory lily Lily flower.	
	<i>Indian names</i>	
	<b>Language</b>	<b>Name</b>
	Sanskrit	Langli, Visalya
Hindi	Karihari Languli	
Kannada	Agnishike, Gowrihoo, Akkatangiballi	
Tamil	Nabhikkodi	

### Species and Varieties

The genus *Gloriosa* is comprised of about 10 to 15 known species

- \* *Gloriosa superba* Linn,
- \* *G luteo*
- \* *G plantii*
- \* *G.latifolia*
- \* *G magnifica*
- \* *G rothschildiana*
- \* *G abysstinica*
- \* *G longifolia*
- \* *G simplex*

*Gloriosa* is monobasic with a genetic base  $x = 11$ .

Out of the 10 elemental species, *G.superba*, *G.lutea* and *G.plantii* are diploids ( $2n=22$ ); *G. carsonii*, *G.virescens* and *G.richmondensis* are tetradploids ( $2n=44$ ) and *G.rothschildiana*, *G.latifolia* and *G.magnifica* are octoploids ( $2n=88$ ).

In general, octoploid species are comparatively short statured and constitute a medium group of plants.

The important species found in India are *G superba* and *G.rothschildiana*

Nature	An annual climbing perennial herb with tuberous roots
Plant type	Tuber
Height	Between 3.5 to 6 m in length The vines are tall, weak stemmed with tuberous roots
Leaves	Ovate, lanceolate, acuminate, the tips spirally twisted
Flowers	Large, solitary or may form a lax corymbose inflorescence, twisted and crisped with six recurved or reflexed petals. Blossoming yellow and changing to yellow red and deep scarlet. In the bud stage, the petals hang down over the ovary and on maturity, they assume an erect position, leaving the ovary with its stigma exposed at right angles.
Ovary	The ovary is 3 celled and it forms an ellipsoidal capsule.
Seeds	There are numerous seeds in a capsule and the seeds are warty and compressed.

### **Chemical Constituents**

Colchicine and its derivative from tubers.

Silosterol, its Glucoside and beta and Gamma Lumericolichicines.

Beta silosterol, its Flucoside and 2-H-6-MeO benzoic acid.

Flower's contain Luteolin, its Glucoside, N-Formyl-de-Me-colchicine, its Glucoside and 2-de-Me-colchicine

Content of Colchicine            0.25%

### **PRODUCT APPLICATION**

Gloriosa superba is a good abortifacient causing expulsion of foetus from the womb.

Roots are antiopierodic, purgative, cholagogue, anthelmintic:

It is bitter, acrid, astringent, anthelmintic and germicidal. It cures leprosy, swelling, piles, chronic ulcers, colic pain in bladder.

Tubers are tonic and anthelminitic when taken in doses of 5 to 10 grains. Tubers abortifacient: extract of root, ecbolic.

Paste is antidote in snake bite.

Powder of root is given for treatment of rheumatic fever.

Various plant parts are used in spleen complaints, sores, tumours and syphilis.

Extract of plant is CNS depressant.

## CULTIVATION PRACTICES

### Regions cultivated in India

It can be grown throughout tropical India, from the Northwest Himalayas to Assam and the Deccan peninsula, extending upto an elevation of 2.120 m.

In India, the herb is largely cultivated in Tamil Nadu particularly in Karur and Moolanur region.

In Karnataka, it is also commonly found growing all along the Western Ghats.

### Highlights

Soil conditions	Red soil preferred Hard soil not suitable pH of soil 6% to 7% neutral to acid, must be of free draining.
Average rainfall in a year	70 cm.
Height from sea level	600 metres preferred
Seeding and Propagation	Seeds should be sown during late winter or early spring Temperature should be between 20 deg.C & 25 deg.C for optimal germination. Offset of tubers should be taken in late winter.
Flowering time	Summer
Spacing	Spacing between plant : 30 to 45 cm
Tuber required per acre	500 kg of tuber per acre
Height	Up to 1.8m to 2.4m

Irrigation	After seeding, irrigation at the interval of 5 days Irrigation necessary at the flowering period Irrigation not necessary at the harvesting period Keep the soil evenly moist during growing season Reduce the watering after flowering
Temperature	Best growing temperatures are between 15°C and 30°C  The plant will tolerate slightly higher or lower of these.
Light	Semi-shaded to full sun position. Do not seem to grow well under artificial light indoors.
Humidity	Requires high humidity for good flowering.
Pest & Problems	Aphids are the prime pest of the plant.
Fertiliser	Organic fertiliser to the level of around 120 kg per acre

### **Propagation**

It is commercially propagated from its underground, V shaped rhizomes or sexually propagated by seeds.

The plants raised from seeds take nearly three to four years to flower. Hence, except for experimental purposes, seed propagation is not favoured by the growers.

Gloriosa produces a biforked tuber during the growing season and each of these forks has only one growing bud.

Tubers should be handled carefully, as they are brittle and liable to break easily. If the growing bud is subjected to any kind of damage, the tuber will fail to sprout. Since the vigour of the vine and its flowering and fruiting ability depends on the size of the tubers, it should not weigh less than 50-60 g.

The plants raised from smaller tubers do not produce flowers during their first year.

Large tubers can be divided into two by breaking them in the middle. The dormant tubers start sprouting from the month of May.. Planting during the months of July and August have been found to favour good growth and yield.

About 2.5 to 3.0 t/ha of tubers are required for planting.

In order to avoid rotting of the tubers before sprouting, only healthy tubers should be selected for planting.

### **Field preparation and Planting**

The field should be ploughed several times until it is brought to a fine tilth. All the grass stubble and roots should be removed.

The field must be levelled properly and drainage arrangements made to avoid water logging during the rains. The field is then divided into subplots of convenient sizes. About 15 to 20 t per ha of FYM or compost should be mixed well into the soil.

The treated tubers are planted at a depth of 6-8 cm, keeping a plant to plant distance of 30 to 40 cm, depending upon the type of soil. Closer spacing has been reported to favour cross pollination, thereby improving the fruit set.

### **Manures and fertilisers**

Though gloriosa makes satisfactory progress with little manuring and fertilisation, the addition of well decayed manure, bonemeal and fertilisers to the soil ensures a vigorous plant, stronger tubers and better flowering.

Experiments carried out on this crop have shown that a fertiliser dose of 120 kg N, 50 kg  $P_2O_5$  and 75 kg  $K_2O$ /ha is required for a good crop.

Of the nutrients, the whole  $P_2O_5$  and  $K_2O$  and one third of N is applied as a basal dose and the remaining two-third of N should be given in the first six to eight weeks after planting.

### **Irrigation**

Frequent irrigation is required during the sprouting time to keep the surface soft, so that there is no hard pan formation, in order to facilitate easy sprouting and emergence of the growing tip outside the soil.

Irrigation should be withheld until after the flowering is over, to prevent rotting of the tubers.

Excess watering is harmful to the plants and causes yellow or brown coloured patches on the leaves, which fall off prematurely.

### **Crop monitoring**

The provision of some kind of support is necessary for successfully growing gloriosa

Since the stem is very tender, when the plants are about 30 to 40 cm tall, they should be tied to wires or allowed to climb on some sort of frame.

### **Weeding**

In the initial stages, the Gloriosa plantation requires frequent weeding to control the weeds which will otherwise compete with plants for moisture and nutrients and will restrict the growth of the plant.

While weeding, utmost care should be taken to avoid any damage to the growing tip. Once damaged, it does not sprout again during the season. Chemical weed control is possible only when there is wide spacing between the rows and the plants themselves.

### **Harvesting**

Gloriosa is a crop of 170-180 days duration. When planted in June, it starts bearing flowers after 55 days and continues to flower and fruit till October. The fruit requires about 105-110 days from the set to reach maturity.

The right stage of harvest is when this capsule starts turning light-green from dark-green and the skin of the fruit shows a shrunken appearance and becomes light in weight.

At this stage, when pressed, the pod gives a crinkling sound.

### **Yield**

The yield of seeds differs greatly, depending upon the vigour and age of the plant which, in turn, depend on the size of the tuber.

The yield in the initial year will be low, but it gradually increases in the subsequent years.

Around: 600 kg to 700 kg of seed per hectare

The yield of pericarp (husk) is about 75% of the seeds.

### **EXTRACTION PROCESS**

**Parts used:** Tuberous roots

After picking, the capsules should be kept in the shade for 7 to 10 days to facilitate the capsules to open up, displaying deep orange-yellow coloured seeds.

The seeds and pericarp are separated manually and dried for a week in the shade, by spreading them uniformly over any clean, dry floor or any platform specially erected for the purpose.

At the later stages, the seeds are moved to the sunlight for a week till they dry completely. The dried seeds are then packed in moisture proof containers and stored until exported or extracted for the alkaloids.

### **DRIVING FACTORS FOR DEMAND**

Export market for the production of Colchicine, which is used in the production of drug for treatment of Arthritis

Tamil Nadu is considered as the preferred area for cultivation of *Gloriosa superba*

## DEMAND ASSESSMENT

### General details

Colchicine has been extracted from the corms of *Colchicum autumnale*, growing wild in some parts of Europe. Recently, the supplies of colchicine from the conventional sources has not been sufficient to cope with its increasing demand.

FDA-approved use of Colchicine is to treat gout (it is one of the active ingredients of ColBenemid, anti-gout tablets marketed by Merck & Co.), though it is also occasionally used in veterinary medicine to treat cancers in some animals. It is also used as an antimetabolic agent in cancer research involving cell cultures.

Among the Indian plants, the seeds of *Iphigenia stellata* contain 0.90%, the corms of *Colchicum Leuteum* contain 0.25% and the seeds of *Gloriosa superba* are found to contain 0.60% of Colchicine.

The availability from both wild and cultivated sources make the seeds of *Gloriosa superba* a potential source of Colchicine in India.

### Product importance

*Gloriosa superba* is highly valued in both traditional and modern therapies.

Its seed and tubers (active content colchicine) are used mainly for treating gout and rheumatism.

Use of its seed, which have the same medicinal use as that of tubers ensures that its plants are not destroyed in nature, being a non-destructive harvesting

## FACTORS INFLUENCING THE POSITION FOR A NEW INDUSTRY RECOMMENDATIONS

Global dominance	Largely produced in tropical India, particularly in Tamil Nadu
Application diversity	Tubers are tonic and anthelmintic when taken in doses of 5 to 10 grains.  Powder of root is given in rheumatic fever.
R & D status	Domestic demand for the product is not high since Indian Technology efforts, to use the tuber and the seed shell to make drugs to treat arthritis, is still being developed

Required focus for Indian unit	Indian production is almost entirely exported.  Scope exists for further developing the export market, by putting forth special application development efforts
--------------------------------	---



