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Tuberose (Rajanigandha): An Important Ornamental and Commercial Flower Crop

*Rishabh Shahi
M.Sc. Ag. (Horticulture) Floriculture and Landscaping, Chhatrapati Shahu Ji Maharaj University, Kanpur, Uttar Pradesh, India
*Corresponding Author's email: rishabhshahi9589@gmail.com


Tuberose (*Polianthes tuberosa* L.) is a semi-hardy, perennial bulbous plant belonging to the family *Amaryllidaceae*. It is native to Mexico and has a basic chromosome number of *n = 30*. The crop is highly valued in the floriculture industry due to its attractive white flowers and strong, pleasant fragrance. It is one of the leading cut flowers in the global market. In India, tuberose is popularly known as Rajnigandha, while it is also referred to by other regional names such as Gulchari and Sugandharaja. The crop is widely cultivated in states like West Bengal, Karnataka, Tamil Nadu, Maharashtra and Uttar Pradesh. Its adaptability to both open field and protected cultivation make it a versatile crop with high economic importance.

Uses of Tuberose

Tuberose has a wide range of uses in ornamental, industrial and traditional sectors. The flowers are commonly used for making garlands, bouquets and floral decorations due to their aesthetic appeal. They are also used in floral arrangements, rangoli and potpourri. One of the most significant uses of tuberose is in the perfume and essential oil industry. The flowers contain aromatic compounds such as geraniol, nerol and eugenol, which contribute to their distinctive fragrance. Additionally, tuberose is sometimes used in beverages and food products. In traditional practices, powdered bulbs have been used for medicinal purposes. The soothing fragrance of the flowers is known to have a calming effect on the human mind.

Morphology

Tuberose is a bulbous plant propagated mainly through bulbs and bulblets. The bulbs are composed of fleshy scales and serve as the main storage and reproductive organs. The plant develops shallow, adventitious roots. The leaves are long, narrow and grass-like, forming a rosette at the base. The flowers are borne on elongated spikes and are typically white, waxy and highly fragrant. Each flower consists of six stamens and a three-locular ovary. The fruit is a capsule containing numerous seeds, although seed propagation is rarely practiced.

Species and Cultivars

Although several species exist within the genus *Polianthes*, only *Polianthes tuberosa* is commercially cultivated. Other species are generally found in wild conditions.

Tuberose cultivars are broadly classified into three groups based on flower type.

- The single type has one row of petals and is highly fragrant, making it ideal for loose flower use such as garlands. Popular varieties include Srinagar, Prajwal and Rajat Rekha.
- The double type has multiple rows of petals, making the flowers more attractive and suitable for cut flower purposes. Common varieties include Suvasini and Swarna Rekha.
- The semi-double type has two to three rows of petals, with Vaibhav being a well-known example.

Soil and Climate Requirements

Tuberose grows best in well-drained sandy loam or loam soils with good aeration. The ideal soil pH ranges from 6.5 to 7.5. Although it can tolerate slightly saline conditions, proper soil management is necessary for optimal growth. The crop thrives in tropical to subtropical climates and requires full sunlight for maximum growth and flowering. The ideal temperature range is between 20 °C and 30 °C. Extremely high temperatures above 40 °C and frost conditions can adversely affect plant growth and flower quality.

Cultural Practices

Land Preparation and Planting: Proper land preparation is essential for successful cultivation. The field should be deeply ploughed and enriched with well-decomposed farmyard manure at the time of preparation. A weed-free and well-aerated soil condition promotes better bulb development and flowering. Bulbs are planted at a spacing of 20 × 20 cm to 30 × 20 cm and at a depth of 5-7 cm, depending on their size. In plains, planting is usually done from January to March, while in hilly regions it is carried out during April and May.

Bulb Treatment and Propagation: Before planting, bulbs are treated with fungicides to prevent diseases and with growth regulators such as GA_3 or thiourea to break dormancy and enhance sprouting. Tuberose is mainly propagated through bulbs and bulblets, as seed propagation is difficult and less reliable. Tissue culture techniques are also used to produce disease-free planting material.

Nutrient and Water Management: Balanced nutrition is essential for achieving high yield and quality flowers. Application of organic manure along with recommended doses of nitrogen, phosphorus and potassium ensures proper growth. Nitrogen is usually applied in split doses to improve efficiency. Irrigation should be done carefully to maintain adequate soil moisture without causing waterlogging. During summer, irrigation is required at shorter intervals, while in winter it can be reduced. Excess moisture, especially during sprouting and flowering stages, should be avoided as it may lead to bulb rot and poor flower development.

Weed Control and Growth Regulation: Weeds compete with the crop for nutrients, water and light, resulting in reduced yield. Regular manual weeding or the use of suitable herbicides helps in effective weed management. The use of plant growth regulators like GA_3 has been found to improve vegetative growth, spike length and overall flower quality. Combined application with growth retardants can also enhance flowering performance.

Pests and Diseases Management

Tuberose is affected by several pests and diseases that can reduce yield and quality. Common diseases include bud rot, leaf blight, leaf spot and stem rot. These can be managed through proper sanitation and timely application of fungicides. Major pests include aphids, grasshoppers, nematodes and red spider mites. Integrated pest management practices, including chemical and biological control methods are recommended to minimize damage.

Harvesting and Yield

Tuberose plants start flowering about 3 to 4 months after planting. Harvesting is done based on market requirements. For local markets, spikes are harvested when a few florets are open, while for distant markets, harvesting is done at the bud stage. The crop yields about 4-5 lakh spikes per hectare in the first year, which increases in subsequent years. Loose flower yield

ranges from 7 to 13 tonnes per hectare. Additionally, a substantial quantity of bulbs and bulblets can be obtained after the crop cycle.

Post-Harvest Handling and Storage

Proper post-harvest handling is essential to maintain flower quality and extend shelf life. Flowers are graded, bundled and packed carefully to prevent damage during transport. Pulsing treatments are often used to enhance vase life. After harvesting, bulbs are cleaned, graded and stored in a cool, dry place. Proper storage ensures healthy planting material for the next season.

Conclusion

Tuberose is a highly valuable ornamental crop with significant commercial importance in both domestic and international markets. Its versatility, fragrance and adaptability make it a preferred choice among growers. With proper cultivation practices, nutrient management, and pest control, tuberose can provide high returns and contribute significantly to the floriculture industry.