

Gerbera as a potential crop for income generation in north eastern India

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Gerbera a vibrant ornamental and cut flower belonging to the Asteraceae family, has gained considerable recognition in the global floriculture market, where it ranks fifth in international trade and sixth in India. The north eastern region of India, characterized by its unique climatic conditions and rich biodiversity, offers an ideal environment for gerbera cultivation, providing farmers with opportunities to diversify their income sources in response to the growing urban demand for ornamental plants. This chapter delves into the potential of gerbera as a lucrative crop in north eastern India, emphasizing agronomic practices, economic viability, and market opportunities. It discusses key aspects such as suitable varieties, propagation methods, soil requirements, climatic conditions, and effective management strategies to ensure optimal growth and yield. Furthermore, the economic analysis reveals that cultivating gerbera in low-cost bamboo houses can lead to substantial profits, with a break-even point achievable within the first year. By integrating sustainable practices, gerbera farming has the potential to significantly enhance the livelihoods of small and marginal farmers in the region, fostering economic development and promoting ecological balance. This comprehensive overview aims to empower stakeholders in the floriculture sector and contribute to the sustainable development of the agricultural landscape in north eastern India.

Keywords: Agronomic practices, Low cost polyhouse, Ornamental plants

GERBERA (*Gerbera Jamesonii* Bolus), a member of the Asteraceae family, is a popular ornamental flower known for its vibrant colours and diverse varieties. Originating from South Africa, gerbera has gained global prominence due to its aesthetic appeal and long vase life, making it a favoured choice in floral arrangements and landscaping. In recent years, the north eastern region of India, characterized by its unique climatic conditions, fertile soil, and rich biodiversity, has emerged as a potential hub for floriculture, particularly for cultivating gerbera. The diverse climate of north eastern India, with its subtropical to temperate conditions, provides an ideal environment for the cultivation of gerbera. The region experiences adequate rainfall, moderate temperatures, and distinct seasons, which are conducive to the growth of various floricultural crops. Moreover, the rising demand for ornamental plants driven by urbanization, changing consumer preferences, and increased disposable incomes, presents significant opportunities for farmers to diversify their income sources in this region. Additionally, gerbera cultivation aligns with sustainable agricultural practices, as it can

be integrated into existing farming systems, providing economic benefits without compromising the ecological balance. The flower's relatively low input costs, coupled with the potential for high returns, make it an attractive option for small and marginal farmers, who constitute a significant portion of the agricultural community in north eastern India.

Area and production

Among the global floriculture industry, gerbera cut flower ranks fifth in international flower trade, while it holds sixth position in India, with an area of 1,150.05 ha and a production of 25,554.76 MT, respectively. In the north eastern states of India, the production of gerbera in Meghalaya was recorded at 0.02 MT in 2021. Sikkim has an area of 0.031 ha, while Arunachal Pradesh's data reached an all-time high of 0.004 ha in 2015 and a record low of 0.001 hectares in 2025.

Varieties

The suitable varieties identified for the north eastern region include Pink Elegance, Sangria, Red Monarch,



RCGH -117



RCGH -114



RCGH -22



RCGH -28

Piton, Goliath, Rosalin, Tiramisu, Salvador, Tropic Blend, and Savannah for polyhouses. Additionally, the Gerbera hybrids developed from ICAR RC for the NEH Region, Umiam, are RCGH-12, RCGH-28, RCGH-114, and RCGH-117, which are suitable for both open and protected conditions in Meghalaya.

Propagation

Gerbera is propagated using both sexual and asexual methods. However, seed (sexual) propagation is generally not desirable due to the resulting variation and longer time required for the plants to flower. The most common method of asexual propagation involves dividing clumps. Additionally, suckers are utilized for the commercial production of flowers. For rapid, large-scale, and uniform plant production, tissue culture techniques are increasingly popular in gerbera propagation. Various explants, such as shoot tips, inflorescence buds, flower heads, capitulum, and mid ribs, can be used for tissue culture.

Soil

The optimum soil pH for growing gerbera plants should be maintained between 5.5 and 6.5. Additionally, the electrical conductivity of both the soil and irrigation water should fall within the range of 0.5–2.0 dS/cm². For ideal growth conditions, gerberas thrive in well-drained, highly porous loamy soil that is rich in organic matter. This type of soil not only provides essential nutrients but also ensures adequate moisture retention,

which is crucial for the plants' overall health. Such soil conditions facilitate better root development and allow roots to penetrate deeply, reaching depths of 50–60 cm. Deep root growth is vital for gerbera plants as it enhances their ability to access water and nutrients, ultimately contributing to stronger and more vibrant blooms.

Climate

Gerbera is typically cultivated in open conditions however, most commercial varieties are grown under polyhouses or shade net houses to ensure they meet the quality standards required for both domestic and export markets. Utilizing a 50% shade net can effectively control light intensity and solar radiation, which is crucial for optimal growth. The ideal temperature for the initiation of flowering is around 23°C, while leaf unfolding occurs best at temperatures between 25°C and 27°C. Flowering initiation can be negatively impacted by temperatures below 12°C and above 35°C. For optimal growth and flower production, day temperature should be maintained between 22°C and 25°C, with night temperature ideally ranging from 12°C–16°C. Maintaining an optimum relative humidity of approximately 60–70% inside the polyhouse is essential, as higher humidity levels can increase the incidence of diseases and lead to flower deformities. Additionally, ensuring good internal air circulation at night and adequate ventilation during the day is critical for the health of the plants in a polyhouse environment.

Soil preparation

The optimal growing medium for Gerbera requires a fine tilth soil thoroughly mixed with well-rotted farmyard manure (FYM) in a ratio of 2:1 (soil to FYM). This mixture enriches the soil with essential nutrients, improving its fertility and structure. Alternatively, a growing medium can be created by combining FYM, sand, and coconut coir, pith, or paddy husk in a 2:1:1 ratio. This combination enhances aeration and drainage, which are critical for healthy root development. Soil sterilization is a crucial step in this process, as it significantly reduces the risk of infestation by soil-borne pathogens such as *Phytophthora*, *Fusarium*, and *Pythium*. These pathogens can cause severe crop losses and hinder plant growth. The beds should be drenched or fumigated with 2% formaldehyde (100 ml of formalin in 5 L water/m²) or methyl bromide (70 g/m²) and then covered with a plastic sheet for a minimum of 2–3 days. The beds should subsequently be watered thoroughly to drain the chemicals before planting. This sealing process allows the formaldehyde to work effectively, killing off harmful pathogens.

Transplanting

Gerbera is grown on 1 m wide and 30 cm high raised beds of convenient length, leaving 40 cm space between beds. Spacing between rows and within rows should be 30 cm, in 3 rows per 1 m wide bed, accommodating 9 plants/m². Planting is done with root ball and crown is kept 1 cm above soil surface. Similarly, tissue cultured plug plants (4–5 leaf stage) should also be transplanted in such a way that their crown is slightly above the surrounding soil. The crown must be dried out between two waterings to avoid infection of fungus *Phytophthora cryptogea*. Irrigate lightly following planting.

Irrigation

Irrigation should be provided using overhead sprinklers for up to one month after transplanting, after which it should gradually transition to drip irrigation. Generally, one dripper per plant is required, with an average water requirement of 500–700 mL/day/plant (4.5–6 L/m²), depending on the season and stage of the crop.

Manures and fertilizers

Gerbera requires a plenty of organic matter (7.5 kg/m²) and essential nutrients. Application of 10:15:20 g NPK/m²/month during the first three months of planting and 15:10:30 g NPK/m²/month from the fourth month (start of first flowering) is good for vegetative growth and improved flower production. Besides major nutrients, spraying of micronutrients like boron, calcium, magnesium and copper @0.15% (1.5 mL/L water) once in a month is desirable for obtaining good quality blooms.

Plant protection (Insect pest and diseases management)

- **White flies:** Nymphs and adults of whiteflies appear on the lower surface of leaves. They suck sap, causing the plants to become chlorotic. while, excretion by

the insects promotes sooty mold growth, which interferes with photosynthesis. Spraying methomyl and triazophos at 0.05%, along with imidacloprid at 0.004%, is effective, and available botanicals can also be used.

- **Thrips:** Thrips feed by scraping the leaf or bud surface and sucking the oozing cell sap. This feeding causes white specks or stripes on ray florets, silvery or greyish spots on leaves, brown spots on leaf petioles or mid veins, and deformed flower heads. Spraying oxydemeton methyl or acephate at 0.1%, along with drenching with chlorpyrifos at 0.1%, is highly effective. The spraying of imidacloprid at 0.004% is also effective.
- **Aphids:** It causes deformities in leaves by sucking the cell sap, resulting in necrosis and lesions. Spraying metasystox at 0.1% helps in controlling the pest infestation.
- **Mites:** The visual symptoms of mite infestations include curling of older leaves, deformed and leathery appearance of younger leaves, and deformed flowers or missing petals. Spraying abamectin at 0.5 mL/L is effective against mites.
- **Leaf miner:** Maggots tunnel through the leaf, creating typical mines. Leaf mining interferes with photosynthesis and affects flower production. Spraying abamectin at 0.004% or Triazophos at 1.5 mL/L is effective. Additionally, spraying botanicals like neem or pongamia oil at 3 mL/L also helps keep the insect population under control.
- **Crown or root rot:** The pathogens responsible are *Pythium spp.* and *Rhizoctonia solani*. This disease causes the entire plant to wilt, and the crown of the plants becomes black. Soil sterilization is effective in controlling it.
- **Foot rot:** The causal agents of foot rot are *Phytophthora* and *Fusarium*. Infected plants exhibit short stems that turn black and rot, leading to the death of leaves and flowers. To manage this, avoid excessive watering and temperatures that favour pathogen growth. Monthly drenches with metalaxyl (0.15%) and captan (0.2%) can also effectively control the disease.

Harvesting

Gerbera plants start flowering about three months after planting. Flowers should be harvested when the outer two rows of disc florets are fully developed or when the outer row of disc florets is perpendicular to the stalk. In young plantations, flower stalks may be pulled loose while picking flowers. It is recommended to pull the cut flowers rather than cut them, as cutting leaves a stem stub on the growing plant that encourages disease development. The basal 5–6 cm portion should be cut using a very sharp knife before placing the flowers in a harvesting bucket containing fresh chlorinated water. Under a low-cost naturally ventilated polyhouse, the average yield is 250–300 flowers/m²/year, and properly managed healthy plants can provide cut blooms for 2–3 years.

Table 1. Economics of gerbera cultivation in low cost bamboo poly house per 100 m²

S. No	Amount	Location
A. Fixed cost (first year)		
1.	Low-cost polyhouse @450/m ²	45000
2.	Soil sterilization	3500
3.	Planting material @10/ plant (total 600 plants)	6000
4.	Total fixed cost	54500
B. Recurring cost (first three years)		
	Labour skilled (one) @₹ 300/ day) for 120 days	36,000
	FYM, fertilizers and micronutrients Pesticides, fungicides, etc.	42,950
	Total recurring cost	78950
C. Gross income (first three years)		
	Total flower production (250–300 flowers/year/1m ²	1500
	Sale of flower @₹ 5/flower	150000
	Total sucker production (4-5 suckers/plant/ year)	
	Sale of sucker @10/ sucker	30000
	Gross income	1,80,000
	BCR	1.85
D.		
	Net income = C - (A + B) First year	46550
	Net income = C - B) Second year	1,01,050
	Net income = C - B) Third year	1,01,050

Storage

For long duration storage of 3–4 weeks, dry cold storage at 40°C is preferred over wet storage.

Economics

Year-round production of gerbera under bamboo low-cost polyhouse is highly profitable. The break-even can be achieved within the first year of production. At the end of the first year of production, net income ₹ 46650 in 100 m² unit can be obtained. However, at the end of third year, a profit of ₹2,48,650 can be obtained with cost benefit ratio of 1:1.85. Further, polyhouse structure durability is up to 6 years without any maintenance cost. Estimates are indicative of approximate economic

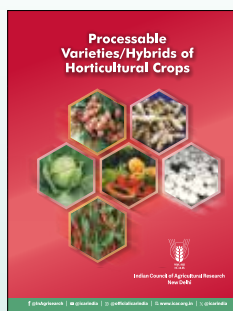
return from gerbera cultivation under polyhouse in north east region of the country.

SUMMARY

Gerbera cultivation presents a viable opportunity for income generation in northeastern India, given the region's favourable climatic and soil conditions. Through proper agronomic practices, pest management, and post-harvest care, gerbera can become a significant contributor to the local economy, enhancing the livelihoods of farmers and stakeholders in the floriculture sector.

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