

Good Agricultural Practices for Gherkin Cultivation

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The gherkin (*Cucumis sativus* L.) is a member of the *Cucurbitaceae* family. The term 'gherkin' typically refers to a savory pickled cucumber, which was introduced to India in 1990 for export purposes. The word 'gherkin' is derived from early modern Dutch, specifically 'gurken' or 'augurken,' meaning 'small pickled cucumber.'

India has established itself as a premier cultivator, processor, and exporter of high-quality gherkins to meet the increasing global demand. As of 2020-21, India became the world's largest exporter of cucumbers and gherkins, exporting 223,515.51 metric tons valued at ₹1,651.83 crores (223.05 million USD). The primary export destinations include the United States, Russia, France, Germany, and Belgium.

Gherkin cultivation in India is predominantly concentrated in the southern states of Karnataka, Tamil Nadu, and Andhra Pradesh. Karnataka alone accounts for nearly 60% of the total production, with cultivation spread across approximately 30,000 acres

involving around 70,000 farmers. Tamil Nadu and Andhra Pradesh each contribute about 20% to the total production. These regions benefit from favourable conditions throughout the year, allowing for three annual gherkin crops. Currently, over 100,000 small farmers are engaged in gherkin cultivation.

Climate and seasonal requirements

Gherkins thrive with plenty of sunlight, ideally receiving 6-8 hours of direct sunlight each day. The optimal temperature range for successful cultivation is between 18°C and 32°C. When temperatures fall below 18°C, gherkins tend to experience poor root development and reduced fruit setting.



Site Selection and Soil requirement

While gherkins can grow in a variety of soils, well-drained, humus-rich sandy loam soil with an optimal pH range of 6.0 to 7.0 is ideal for their cultivation. For higher yields, the soil should be rich in organic matter and have proper drainage facilities.

Avoid planting gherkins in fields previously used for crops like cucumber, watermelon, muskmelon, pumpkin, or gourds. These crops, along with neighbouring fields containing them, can harbour pests and diseases, increasing plant protection costs. Additionally, fields near crops that require large amounts of pesticides, such as cotton, should also be avoided.



Land preparation

Deep ploughing to a depth of 1.0 to 1.5 feet is recommended for gherkin cultivation, as it ensures easy penetration of plant roots. Prepare the land to a fine tilth to ensure proper seed germination. Level the land and then create raised beds with a width of 120 cm, leaving an interval of 30 cm between them. Ridges and furrows should be spaced 1.0 meter apart. During land preparation, apply farmyard manure at a rate of 25 tons per hectare."

Nursery raising

Pro-tray Sowing: Trays are filled with microbial-enriched cocopeat and raised in a protected structure. As a precaution against damping off, seedlings can be drenched with Bavistin (2g/L of water) or captan (3g/L) on the 10th day after sowing. Seedlings will be ready for transplanting, with one true leaf, 12-14 days after sowing.

Direct Seed Sowing: If germination is assured, direct sowing can come to harvest 7-10 days earlier.

Enrichment of FYM: Prior to using Farm Yard Manure (FYM)

as a basal dose in the main field, sieve 100 kg of moist FYM and enhance it with 1.0 kg each of *Trichoderma viride*, *Trichoderma harzianum*, *Paecilomyces lilacinus*, phosphorus-solubilizing bacteria, and *Multi-K*. Cover the treated mixture with a polythene sheet and store it in a shaded area for 15 days. After this incubation period, combine it with 9 tons of well-decomposed FYM before applying it to the field.

To safeguard the beneficial microorganisms and other organisms such as earthworms and other micro-organisms, avoid exposing FYM to direct sunlight for long periods. This method will increase the NPK content of FYM, making it twice as effective as regular FYM, and will also aid in managing major pests and diseases.

Planting requirements and planting methodology

Sow the seeds at a depth of 2.5 cm on the ridges of the channel, spaced 30-45 cm apart, with two seeds per hill. Before sowing, treat the seeds with 4g of *Trichoderma viride* and 10g of *Pseudomonas* or 2 g of carbendazim per kg of seeds. If any gaps appear, re-sow within 3 days of germination or use seedlings grown in pro-trays. Thin out closely grown plants to maintain the ideal plant population. After sowing, provide light irrigation through drip or furrows, ensuring there is no waterlogging to prevent root suffocation.

Fertilization and Manuring

Plants need fertilizers at regular intervals based on their growth stage and environmental conditions. Fertilizer should not be placed directly near the roots but rather around the plant, avoiding the collar area, or in pits between plants, and then covered with soil. Irrigate the plot immediately after fertilizer application. Apply 150 kg of nitrogen, 75 kg of phosphorus,

and 100 kg of potassium per hectare in three equal doses; at planting, three weeks after sowing, and five weeks after sowing. For fertigation, apply the recommended fertilizer dose (150:75:100 kg NPK per hectare) every third day after sowing.

Irrigation and methods of irrigation

Soil moisture plays a vital role in flower and fruit development, making it essential for successful gherkin cultivation. During the summer, irrigation should be carried out once or twice a day, though the frequency may vary depending on rainfall and soil type. It is important to avoid over-irrigation, as gherkin plants cannot withstand waterlogged conditions.

Weed management

Gherkin, being a short-duration crop and a heavy feeder of fertilizers, requires regular weeding. The field should be kept free of weeds, and the removed weeds should be disposed of far away from the field.

Intercultural operations

Top dressing and earthing up should be done immediately after weeding and repeated at regular intervals, depending on weed growth. Earthing up should be carried out 25 days after sowing.

Staking (Trellising)

Since it is a vine, the crop requires staking to keep the fruits off the ground. Staking should be done between 16 to 20 days after sowing, ensuring that each fruit gets ample sunlight, which prevents bleaching. Unstaked vines are more prone to pest and disease attacks. Staking not only helps the plant stand upright but also improves ventilation, eases cultural operations, ensures adequate sunlight, and allows for a quicker fruit harvest.

Harvesting

The crop is ready for harvest 30-35 days after sowing. The smallest fruits, about 4 cm in size, fetch the highest price, while the larger and mature fruits are less valuable. To maintain consistent quality, harvest the fruits daily. The expected yield is between 15 and 20 tonnes per hectare.

Post-Harvest Operations

Sorting

Sorting is carried out to remove broken, decayed, deformed, and spoiled fruits from the batch, typically it is done manually. During this process, it's important to ensure proper ventilation and provide protection from the sun and rain.

Transportation

It's important to transport the harvested produce to the factory on the same day before dusk for processing, as leaving the gherkins unprocessed overnight will result in a decline in quality.

Grading

Grading involves sorting gherkins by size, based on the count per kilogram. The table below outlines the grading criteria and the corresponding market value for each grade.

Size of the fruit (mm)	Order of grade (in terms of higher value)
14 mm and below	1
17 mm	2
19 mm	3
25 mm	4
> 25 mm	5

Insect pest management

1. Gherkin fruit borer

(*Diaphania indica*)

The larvae stage is the most damaging. The larvae feed on leaves, buds, and fruits.

Management

- Regularly monitor for the presence of larvae on leaves and leaf bud clusters, and remove and destroy them.
- Apply neem cake to the soil and spray a 4% solution of

NSKE (Neem Seed Kernel Extract).

- Spray indoxacarb at a concentration of 0.5 ml/l or Carboryl at 3g/l.



2. Fruit fly

(*Bactrocera cucurbitae*)

Infestation by fruit flies or cucurbit flies results in the oozing of resinous fluid from fruits, causing them to become distorted and malformed. Maggots feed on the fruit pulp, leading to premature dropping of fruits and rendering them unfit for consumption.



Management

- Collect infested and fallen fruits and bury them in deep pits.
- Expose the pupae by ploughing and turning over soil after harvest.
- Spray Carboryl at 3g/l or indoxacarb at 0.5 ml/l
- Foliar spray of 0.05% of fenthion with 5% jaggery at fruit formation/ ripening stage
- Use fruit fly traps (pheromone traps)

3. Sepentine leaf miner

(*Liriomyza trifolii*)

Leaf miners create small tunnels in the leaves, with their activity starting around 15 days after germination. Other symptoms of severe infestation include drying,

discoloration, and dropping of leaves.

Management

- Collect and destroy mined leaves 7 days after germination
- Spraying of Abamectin or Imidacloprid

4. Pumpkin beetle

(*Aulacophora foveicollis*)

Adult insects defoliate the leaves immediately after germination. The larvae feed on roots and plant parts that touch the ground.

Management

- Plough the fields just after harvesting to destroy the hibernating adults
- Collect and destroy adult beetles
- Spray indoxacarb @ 0.5 ml/l, 0.2 % carboryl or 0.05 % quinolphos.

Disease management

1. Powdery mildew

(*Erysiphe cichoracearum*)

This appears as a powdery, greyish-white growth on the upper surfaces of leaves, petioles, and even the main stems of infected plants. The affected areas first turn yellow, then brown, eventually leading to tissue death.

Management

- Proper spacing and training should be followed
- Destruct infected plant material and weeds harbouring the pathogen.
- Application of 0.1 % of carbendazim, 0.05% karathane, 0.15 % of benomyl or 2ml/l of Hexaconazole 5% SC

2. Downy mildew

(*Pseudoperonospora cubensis*)

Angular, pale green areas outlined by the leaf veins are developed on the upper surface of the leaf. These areas gradually turn yellow, become necrotic, and eventually die.

Management

- Avoid flooding and water logging in the field.

- Avoid mono-cropping or relay cropping with other cucurbits
- Provide good aeration by following the recommended spacing
- Spraying of fungicides like 0.3% copper oxychloride or 0.2% mancozeb or chlorothalonil or Ridomil gold will provide relief



3. Cucumber mosaic virus (CMV)

The disease is spread through aphids, especially *Aphis gossypii* and *Myzus persicae*. The leaves show yellow mottling, which is followed by distortion and stunting of the plants. Infected fruits develop yellowish-green mottling and blistering.

Management

- Remove weed hosts from the field.
- Remove infected plants from time to time.
- Spray systemic insecticides at weekly intervals to control vectors.