

Natural farming-based cucumber production technology under protected conditions

Mangi Lal¹, Yogesh D. Pawar², Darshan B. Kasundra² and Krishan Yadav²

¹College of Horticulture, S. D. Agricultural University, Jagudan, Mehsana – 382710, Gujarat, India.

²Department of Vegetable Science, COH, SDAU, Jagudan, Mehsana – 382710, Gujarat, India.

Email: darshankasundraa@gmail.com

Natural farming-based cucumber production under protected conditions offers a sustainable approach for enhancing yield, quality, and soil health while minimizing chemical inputs. The integration of organic nutrient sources, biological pest management, and eco-friendly cultivation practices inside protected structures improves resource-use efficiency, profitability, environmental safety, and production of healthy cucumbers throughout the growing season.

Keywords: Natural farming, cucumber, protected cultivation, organic production

Introduction

Cucumber (*Cucumis sativus* L.) is also known as “Khira” in Hindi, an important and valuable vegetable of the Cucurbitaceae family. It is a diploid ($2n=14$) species with the basic chromosome number of $X=7$. Cucumber is believed to have originated in India from its wild progenitor *Cucumis sativus* var. *hardwickii*, which is still found in the southern foothills of the Himalayas. It is commonly a monoecious, annual, trailing or climbing vine having hirsute or scabrous stems with triangular ovate leaves with shallow and acute sinuses. The nutritional composition of a 100 g portion of cucumber includes most of its weight in water, with proteins, fat, and carbohydrates as primary metabolites, and also dietary fiber that is important for the digestive system. Nutritional composition of 100 g edible portion of cucumber fruit having water 96.4 g, energy 42 KJ (10 Kcal), protein 7g, fat 1g, carbohydrate 1.5 g, dietary fiber 6 g, thiamine 0.03 mg, riboflavin 0.01 mg, niacin 0.2 mg, and ascorbic acid 2 mg.

Cucumber is widely consumed both fresh and as a processed food. Depending on the use, it may be one of three types: salad type, pickling type, and cooking type. It is mainly cultivated for its young, tender fruits, which are used as salad; mature fruits are cooked as a vegetable and pickled. In India, the protected cultivation area is around 30000 ha, which contribute 0.23% of the horticulture cropped area in India. Cucumber is a semi-tropical vegetable and grows best under polyhouse conditions. In a polyhouse under stable environmental conditions, with favourable conditions and optimum nutrients, less pest-disease infestation, and the cucumber plant grows speedily and produces greatly. The optimum temperature for better development of fruits is 14-20°C. Cucumber requires a mild

climate, and it does well under greenhouse conditions. Natural farming is a generic term that is based on basic ecological principles. At the global level, the “natural way of farming” without the use of chemicals and adopting an ecological farming approach was established by Masanobu Fukuoka, a Japanese farmer and philosopher, as a new term in his book “The One-Straw Revolution” in 1935, and “Nature Farming” was established in 1936 by Mokichi Okada. It was a turning point in modern agriculture when protest was made against the use of pesticides based on scientific evidence, when Rachel Carson, in her book, *Silent Spring*, published in 1962, created the uproar due to the influence it exerted against the use of pesticides. UNO and FAO have taken initiatives for the promotion of nature-friendly and eco-based agriculture practices to make conventional agriculture practices more sustainable and effective for local people, as well as the native agro-eco system

Ghanjeevamrut is the solid form of *Jeevamrut* and serves as a natural fertilizer. It represents an improved, cost effective preparation that enriches the soil with beneficial microorganisms.

Jeevamrut promotes immense biological activity in soil and provides the nutrients for the crop stand. By mixing cow urine, cow dung, pulse flour, and jaggery (gur), it is prepared and allowed to ferment for a week.

In India, natural farming was well developed in the past, such as the Vedas, which have specified the use of *Panchagavya* in agriculture (Fig. 1). In Sanskrit, *Panchagavya* means the blend of five products obtained from the cow, namely dung, urine, milk, curd, and ghee. Presence of naturally occurring, beneficial, effective microorganisms (EMO's) in *panchagavya* predominantly and lactic acid bacteria, yeast, actinomycetes, photosynthetic bacteria, and certain fungi, besides beneficial and proven fertilizers such as *Acetobacter*, *Azospirillum*, and *phosphobacterium*, was detected, which have the beneficial effect especially in improving soil quality, growth, and yield of crops.

Season and soil

Cucumber is sown in August, starting as a *Rabi* season crop for better production in the polyhouse in North Gujarat. It can be grown successfully on all types of soil, but well-drained loam and sandy loam soils rich in organic matter are best suited for its cultivation.



Fig. 1: Cucumber cultivation through natural farming practices in a polyhouse at College of Horticulture, SDAU, Jagudan, Mehsana, Gujarat

Selection of varieties:

In polyhouse and protected condition generally Parthenocarpic varieties are preferred because pollination is a problem in polyhouse. Several Parthenocarpic varieties are available in the market like, Punjab Kheera Hybrid 11, Pant Parthenocarpic Cucumber 1, 2, Pusa Parthenocarpic Cucumber 6 and many other private sector varieties are available.



Fig.2: Bumper bearing in Punjab Kheera Hybrid 11 under protected

Field preparation in polyhouse

The field is first ploughed with soil turning plough followed by 4-5 ploughings with country plough or harrow or rotavator. Leveling should be done after ploughing and bring the soil into fine tilth and also provide better drainage facilities. Generally, nursery beds are prepared in the size of 50 cm width and 10-15 cm height.

Nutrients as a basal

Well decomposed *Ghanjeevamrut* is properly mixed in to top soil of the bed at the rate of 7.5 t/ ha.

Seed treatment

Generally, in natural farming, seed treatment with *Beejamrut* is necessary to control soil-borne disease. Treated the seeds with *beejamrut* for some time and dried in shade after treatment.

Sowing of seeds and seed rate

The seed rate is 1.5-2.0 kg/ ha. The seeds are sown in the hills, one seed per hill is sufficient, with 100 cm row to row and 50 cm plant to plant spacing. Gap filling and thinning are to be done, if necessary, when the vine becomes 8-10 cm tall to maintain plant population. After 3-4 days of sowing, proper seed germination will start.

Nutrient management

For proper nutrient management and better production, apply 7.5-8 t/ha *Ghanjeevamrit* as a basal dose and apply 1000 l/ha *Jeevamrut* as a soil drenching with 10 days interval till the last harvesting. Follow the proper schedule of foliar spray of *Panchgavya* (4%), Cow urine enriched *Moringa* green leaf extract (30%), and Copper and Iron metal enriched buttermilk (6%) with a 10-15 days' interval.

Method of *Jeevamrit* preparation

Take 200 L of water, add 10 kg of cow dung, 10 L of cow urine, 2 kg of jaggery, 2 kg of pulse flour, and one handful of forest soil. Mix all the ingredients in a drum and keep for 4-5 days. Stir the solution two time in a day.

Ghanjeevamrit preparation

Take 100 kg of well-dried cow dung and spread it uniformly on the ground in the form of a thin layer. Sprinkle the already prepared *jeevamrut* at the rate of 10% around 10 litres over the thin layer of 100 kg cow dung and mix uniformly with the help of a spade. Now, make a heap and cover with a jute bag, and allow it to dry for 16 hours in the sunlight. After drying is completed, the powder can be stored for 6 months.

Cow urine-enriched *moringa* green leaf extract preparation

Take 10 kg *Moringa* green leaves paste, add 10 litre cow urine in 200 litre capacity drum and add water to prepare a quantity of 200 litres and keep for 7 days. Stir the solution twice a day.

Copper and iron metal-enriched buttermilk preparation

Take 3 kg of iron and 3 kg of copper metal in a 200 litres capacity plastic drum and add buttermilk to prepare the quantity of 200 litre buttermilk solution. Stir the solution twice a day.

Irrigation

Control excess irrigation in the polyhouse to prevent collar rot or stem rot. Irrigate the crops at an interval of 2-3 days with a drip system.

Staking

Staking is a must in cucumber under protected conditions. Staking in plants should be done with plastic threads and clips. Generally, staking practice are start after 20DAS. The yield and quality of fruit are improved by staking. Staking not only increases the yield and improves its quality but also reduces the infection by fungal diseases and improves aeration and light exposure to plants.

Harvesting and yield

In Punjab Kheera Hybrid 11 and other parthenocarpic varieties of cucumber under natural farming practice generally start harvesting between 35-45 DAS in protected conditions. The right stage of harvesting for fresh consumption and salad purposes is when the fruit attains 15-20 cm length and 150-200 g weight. Its harvesting can be completed in 15- 20 pickings on alternate days under protected conditions. Delay in harvesting makes the fruit over-matured, and they lose their tenderness and taste.

Plant protection

NSKE (2-3 ml/l) can be sprayed against aphids. Fruit flies can be managed by installing fruit fly traps (12/ha) before flower initiation. Use *Trichoderma harzianum* and *Pseudomonas fluorescens* to control any fungal disease. Cow urine-enriched butter milk works as an insecticide and fungicide, so apply it from time to time by foliar spray.

To control nematodes under natural farming, soil drenching with *Calotropis* leaves solution (2 kg *Calotropis* leaves, 1 litre cow urine, and 20 litres of water mixed in a drum and keep it 4-5 days). In natural farming, prophylactic measures against disease and insects are a must to prevent the entry of any disease or insect into the field.

Conclusion

Natural farming-based cucumber production under protected conditions offers a highly sustainable, eco-friendly, and economically viable alternative to conventional chemical-intensive agriculture, bridging traditional Vedic wisdom with modern greenhouse technology. By integrating high-yielding parthenocarpic varieties with systematic bio-formulations—such as Ghanjeevamrut, Jeevamrut, and Panchagavya—this system significantly enhances soil health, microflora activity, and crop nutrition while utilizing strict prophylactic measures like NSKE, *Trichoderma*, and *Calotropis* extracts to successfully



manage pests and diseases without synthetic inputs. Ultimately, this comprehensive protocol optimizes resource-use efficiency and maximizes the yield of high-quality, safe-to-consume cucumbers, providing a profitable and resilient production model for farmers that preserves the agro-ecosystem.