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Scientific Cultivation of Pumpkin (*Cucurbita moschata*)

*Shubham Kumar¹, Dr. Anshuman Singh¹, Dr. C.K. Tripathi² and
Dr. Arvind Pratap Singh¹

¹Kamla Nehru Institute of Physical and Social Science (KNIPSS),
Sultanpur, Uttar Pradesh, India

²Kamla Nehru Krishi Vigyan Kendra, Sultanpur, Uttar Pradesh, India

*Corresponding Author's email: shubhamkumara81@gmail.com

Pumpkin (*Cucurbita moschata*), a member of the Cucurbitaceae family, is an important vegetable crop grown extensively across India for its nutritional, economic, and medicinal value. Rich in vitamins A and C, minerals, and antioxidants, pumpkin is widely used in Indian households in various culinary forms, including curries, sweets, and pickles. Beyond its dietary benefits, pumpkin also contributes significantly to the livelihoods of small and marginal farmers due to its adaptability to diverse agro-climatic conditions. Traditionally, pumpkin cultivation has relied heavily on conventional farming methods, which often result in suboptimal yields and increased vulnerability to pests and diseases. However, with the advent of modern agricultural practices, there is a growing emphasis on the scientific cultivation of pumpkin to enhance productivity, improve fruit quality, and ensure sustainable resource use. Scientific cultivation involves the application of improved varieties, precise agronomic practices, integrated nutrient and pest management, and appropriate post-harvest techniques.

Climatic and Soil Requirements

Pumpkin is warm, humid condition favour healthy pumpkin particularly within 25-30°C, Excess water or frost However, can be determined. Pumpkin is sensitive to frost and waterlogging. Well-drained sandy loam or loamy soils with a pH of 6.0–7.5 are ideal for cultivation. Proper soil preparation with organic matter enhances productivity.

Variety Selection

The selection of appropriate pumpkin varieties is a crucial step in ensuring successful and profitable cultivation. Different varieties exhibit variations in fruit size, shape, colour, taste, maturity period, and resistance to pests and diseases. Therefore, choosing the right variety suited to the agro-climatic conditions and market preferences is essential for higher yields and better quality produce. Pumpkin varieties can broadly be categorized into long-duration and short-duration types. Some are preferred for table use, while others are ideal for processing due to their high dry matter content and sweetness.

- **Arka Suryamukhi** – Early maturing with good keeping quality.
- **PAU Magaz Kaddoo-1** – Known for its large seeds and high seed yield. Preferred in regions where pumpkin is cultivated for seed extraction.
- **CO-1 and CO-2** – Developed by TNAU, these varieties are known for their uniform fruit shape and good yield. Suitable for southern India.
- **Pusa Vishwas** – A semi-trailing variety with medium-sized fruits, suitable for small land holdings. It matures early and is ideal for kitchen gardening and short-duration cropping. suitable for north Indian plains.

- **Narendra Agrim** – Released from NDUAT, Faizabad (Ayodhya), this variety is known for early maturity, moderate fruit size, and tolerance to diseases, making it ideal for the eastern Uttar Pradesh region.
- **Hybrid Varieties** – Various private seed companies offer F1 hybrids like Nunhems 99, Seminis NS-295, and Mahyco Hybrid Pumpkins, which offer high yield potential, uniform fruiting, and resistance to diseases.

Seed Treatment and Sowing

For successful pumpkin cultivation, proper seed treatment and timely sowing are crucial to ensure healthy germination and early protection against seed-borne diseases. Before sowing, seeds should be treated with a fungicide such as Carbendazim or Thiram @ 2-3 g/kg of seed to prevent fungal infections. Additionally, biofertilizers like Azospirillum or Trichoderma @ 5–10 g/kg of seed can be used to enhance seedling vigour and promote early root development. To improve germination, seeds may be soaked in water for 4–6 hours before sowing. Sowing should be done at the onset of the appropriate season—June–July for the kharif season and February–March for the summer crop—depending on the climatic conditions of the region. Seeds are generally sown directly in the field using a spacing of 2.5 to 3 meters between rows and 0.9 to 1.2 meters between plants, depending on the variety. A sowing depth of 2.5 to 3 cm is recommended. Ensure that the soil is well-prepared, friable, and enriched with organic matter to support robust germination and early growth.

Nutrient Management

Pumpkin needs balanced nutrition for better growth and yield.

FYM: Apply 20–25 tons/ha during land preparation.

Fertilizers: Apply 100 kg N, 60 kg P₂O₅, and 80 kg K₂O per hectare.

Full P & K + half N as basal.

Remaining N in two splits: at vining and flowering stages.

Micronutrients: Spray 0.5% ZnSO₄ + 0.1% Borax at flowering.

Biofertilizer: Use Azospirillum and Phosphobacteria for better nutrient uptake.

Soil Test: Adjust fertilizer doses based on soil test results.

Irrigation

Proper irrigation is crucial for healthy pumpkin growth. Light irrigation should be given immediately after sowing. During early growth, irrigation every 7–10 days is ideal. Flowering and fruit development stages require adequate moisture, so irrigation should be more frequent during this period. Avoid water stagnation, especially in heavy soils, to prevent root rot. Drip irrigation is recommended for efficient water use and better yield.

Weed and Pest Management

Weeding should be done manually or chemically (pre-emergence herbicides like Pendimethalin).

Common pests include fruit flies, aphids, and red pumpkin beetles. Neem-based pesticides or insecticides like Malathion can be used.

Powdery mildew and downy mildew are major diseases, controllable by fungicides like Mancozeb or wettable sulphur.

Training and Pruning

Training and pruning are essential for managing vine growth, improving fruit quality, and increasing yield in pumpkin cultivation.

Training: Vines are generally allowed to trail on the ground, but using a trellis or bower system helps save space, improves air flow, and reduces disease.

Pruning: Involves removing old, non-productive leaves and side shoots to promote better light penetration, reduce disease, and improve fruit development.

These practices support healthy plant growth and enhance overall productivity.

Harvesting and Yield

Pumpkins are ready for harvest 90–120 days after sowing when fruits develop full colour and the rind hardens. Harvest should be done with a portion of the stalk attached to improve shelf life. Timely harvesting prevents overripening and quality loss. Under scientific management, average yield ranges from 200 to 250 quintals per hectare, depending on the variety and cultivation practices.

Post-Harvest Management

Pumpkins should be cured under ambient conditions for 10–15 days to facilitate rind hardening and enhance storability. Careful handling during harvesting and transport minimizes mechanical injuries. Storage at 10–15°C with 70–75% relative humidity ensures prolonged shelf life. Grading based on size and maturity, and packaging in ventilated crates or straw-lined boxes, aid in maintaining quality during marketing.

Challenges in Scientific Cultivation of Pumpkin in Uttar Pradesh

Farmers in Uttar Pradesh face several challenges in adopting scientific pumpkin cultivation. These include lack of awareness and training, poor soil health due to imbalanced fertilizer use, and limited access to quality seeds. Pest and disease outbreaks like fruit flies and powdery mildew are common, and modern irrigation methods like drip systems are rarely used. Post-harvest losses are high due to poor handling and storage. Additionally, price fluctuations and small land holdings make it difficult to invest in improved practices. Addressing these issues through training, better input supply, and market support is essential for improving productivity and income.

Conclusion

The scientific cultivation of pumpkin presents a promising opportunity to enhance agricultural productivity and improve farmer livelihoods, particularly in regions like Uttar Pradesh. By adopting improved varieties, balanced nutrient management, timely irrigation, and integrated pest control, farmers can achieve higher yields and better-quality produce. In addition, modern practices such as training, pruning, and proper post-harvest handling can significantly reduce losses and extend shelf life. Addressing regional challenges—such as lack of awareness, poor input availability, and limited market access—through education and support systems is essential. With its adaptability to diverse climates and nutritional importance, pumpkin cultivation can play a vital role in ensuring food security and rural development.