

Various Planting Systems Adopted in Cucurbits Cultivation

¹I. Alekhya Reddy, ²Dr.Ch. Shanmukhi, ³D. Geetha Priyanka, ⁴J. Greeshma Sai and ⁵S. Lakshmi Madhavi

^{1,3,4,5}M.Sc. scholar, Department of Horticulture (Vegetable Science) School of Agricultural Sciences, Malla Reddy University, Hyderabad, Telangana, 500043

²Assistant Professor, Department of Horticulture (Vegetable Science) School of Agricultural Sciences, Malla Reddy University, Hyderabad, Telangana, 500043

Abstract

Cucurbit crops, belonging to the family Cucurbitaceae, are an important group of warm-season vegetables widely cultivated for their nutritional and economic value. This group includes major genera such as Cucurbita, Lagenaria, Luffa, Citrullus, and Cucumis. These crops thrive under warm climatic conditions with adequate sunlight and well-drained soils. Traditionally, cucurbits require large spaces for vine growth, but the development of dwarf and bush types has made them suitable for small-scale and protected cultivation. Proper nutrient management, especially balanced nitrogen application, along with adequate irrigation and location-specific cultivation practices, plays a key role in achieving higher productivity and better fruit quality.

Introduction

Cucurbits belong to the plant family Cucurbitaceae, which includes a wide range of important vegetable crops. This family comprises about 965 species spread across nearly 95 genera. Some of the most important genera in this group include Cucurbita, Lagenaria, Luffa, Citrullus, and Cucumis. Cucurbit crops grow best in warm summer conditions, where both day and night temperatures remain consistently high. Traditionally, these crops require ample space to spread and climb. However, with the development of dwarf and bush varieties, they can now be successfully grown even in limited spaces.

For optimal growth, cucurbits need full sunlight and well-drained soil. It is advisable to test the soil before applying fertilizers. Care should be taken not to apply excessive nitrogen, as it may promote vigorous vine growth while reducing fruit development. Regular irrigation is essential—about 2.5 cm (1 inch) of water per week, applied slowly and preferably in the early morning, is ideal. Additionally, always follow variety-specific planting recommendations suited to your local growing conditions for the best results.

Popular Planting Systems for cucurbits

Growing vine crops like cucurbits can be done in several ways depending on climate, space, and management practices. Each planting system has its own advantages and limitations, influencing crop health, yield, and ease of

cultivation. Here's a simple look at some widely used planting systems:

- Common Planting Systems
- Ground trailing System
- Stake and Weave System
- Single or Double Plant Staking
- Cage System
- Umbrella System
- "T" Trellis System
- Bower System
- Overhead Vertical Line System
- Inverted "V" Trellis

Each of these systems helps improve plant growth by providing support, better air circulation, and efficient use of space.

Ground Trailing System

The ground trailing method is one of the simplest and most traditional planting systems. In this method, vines are allowed to spread naturally over the soil surface or on mulching material.

This system is easy to adopt and requires minimal investment, making it popular among farmers during the dry season. However, it comes with some challenges. Since the vines and fruits are in direct contact with the soil, crops are more vulnerable to soil-borne diseases, pest attacks, and fruit rotting. Because of these risks, ground trailing is not recommended during the rainy season, when excess moisture can worsen disease problems and reduce crop quality. Choosing the right planting system depends on your crop, climate, and available resources. While ground trailing is simple, supported systems like trellising often give better results in terms of plant health and yield.

Stake and Weave System

The stake and weave system is commonly used for crops with relatively strong stems or moderately vigorous vines. In this method, wooden or bamboo stakes are placed in the field at regular intervals, usually between every alternate plant. Twines or ropes are then tied horizontally between the stakes, creating a supportive framework. As the plants grow, the vines are gently guided and woven between these lines, helping them stay upright. This system improves plant support, air circulation, and sunlight exposure.

Cage System

The cage system involves using a mesh sheet shaped into a cylinder or cube, which is then fixed into the soil to provide support. Plants can be grown either inside the cage or around it, allowing vines to climb and spread naturally over the structure. This system offers good support and helps maintain plant shape, while also improving air circulation around the crop.

Umbrella System

The umbrella system is a simple and less labour-intensive training method that is easy to adopt. In this system, each plant is supported by a vertical wire or string raised to a certain height. Once the plant reaches the top, the growing tip is pinched to control upward growth. Most of the side shoots are removed, leaving only two strong lateral vines. These vines are then trained over the top support and allowed to hang down on either side, forming an umbrella-like shape.

After the fruits on these hanging vines are harvested, they are pruned off. Then, new lateral shoots are allowed to develop and trained in the same way. This continuous replacement of fruiting vines helps in maintaining productivity over a longer period.

“T” Trellis System

The “T” trellis system is designed to create a divided canopy, allowing better organization of plant growth. In this method, the main (primary) vine is trained to grow upright, while the flowering and fruiting side vines are guided along horizontal wires fixed on one or both sides of the trellis. This separation of the primary and lateral vines improves light penetration, ensuring that more sunlight reaches the developing fruits. As a result, crop growth and quality are enhanced. Additionally, this structured arrangement makes harvesting and intercultural operations like pruning and spraying much more convenient.

Overhead Vertical Line System

In the overhead vertical line system, the plant is trained to grow as a single main stem. All side shoots (lateral vines) are regularly pruned, allowing only one vine to develop throughout the crop's life. This main stem is guided upward along a vertical support such as a string or wire. By maintaining a single vine, the system ensures better light exposure, improved air circulation, and easier crop management.

Bower System

The bower system is a widely used method, especially among Indian farmers, for training vine crops on an overhead structure. In this system, all side shoots and auxiliary buds are removed as the plant grows, allowing the

main vine to reach the top of the bower. Once the vine approaches the structure, its growing tip is pinched about 15 cm below the bower. Then, two strong lateral shoots are allowed to develop and spread over the bower, forming a canopy. This system is easy to manage and highly productive, making it suitable for many cucurbit crops. The structure can also be made permanent, as different crops can be grown on it over time.

Inverted “V” Trellis System

The inverted “V” trellis system is formed by placing two poles at an angle and joining their top ends, creating an upside-down “V” shape. This structure is firmly fixed into the ground for stability. The inner space between the poles is covered with nylon netting or iron mesh, providing a surface for the plants to climb. The vines are then trained to grow over this netted framework, allowing better support and organized growth.

Riverbed Cultivation

Riverbed cultivation is an age-old practice, believed to have originated during the Mughal period, in which vegetables—especially cucurbits—are grown on riverbanks or basins after floodwaters recede. In South Asian countries, this system is widely followed, and a significant portion of cucurbit cultivation takes place in such areas, commonly known as Diara lands. These lands are the exposed stretches between river channels that become available for cultivation once the water level drops. In different parts of India, they are known by various local names such as Khadar, Kachhar, Doab, Dari Yari, Kochar, Nad, Tali, and Nadiari. Major river systems where this practice is prevalent include the Yamuna, Ganges, Gomti, and Saryu in northern India; the Banas in Rajasthan; the Narmada, Tawa, and Tapti in central India; the Sabarmati, Panam, Vartak, and Orsung in Gujarat; and the Tungabhadra, Krishna, Hundri, and Pennar in Andhra Pradesh. In Kerala, riverbeds of the Pamba and Manimala rivers are also used for cultivating cucurbits like bitter melon and snake melon. Overall, riverbed (Diara) cultivation is a sustainable and resource-efficient method that utilizes natural soil fertility and moisture, making it an important traditional system for cucurbit production in India.

Conclusion

Cucurbit cultivation is highly adaptable and can be optimized through proper understanding of crop requirements and management practices. Providing suitable climate conditions, proper spacing or training systems, balanced fertilization, and timely irrigation ensures healthy plant growth and improved yields. The introduction of improved varieties, including compact types, has further expanded the scope of cucurbit cultivation in limited spaces. Overall, adopting scientific and region-specific practices can

significantly enhance the productivity and sustainability of cucurbit crops.

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