
Hi-Tech Nursery Management in Vegetable Crops: Emerging Innovations

Pallavi Soni^{1*}, Gopal Chowdhury² and Pratibha³

¹Department of Horticulture, Vegetable Science, CoA, IGKV, Raipur

²Department of Plant Pathology, BCKV, Mohanpur, Nadia

³Department of Horticulture, R.C.A, MPUAT, Udaipur

Corresponding Author: pallavisoniaka@gmail.com

Introduction

In the current scenario the production of vegetable nurseries has become a highly popularized operation, where in most of the farmers purchasing their plugs from professional growers. A vegetable nursery is a place or business where immature vegetable seedlings are grown or handled until they are ready to be transplanted permanently. Some vegetable seeds are planted in nursery beds first and the seedlings from these beds are then transplanted. Apart from onion, lettuce and asparagus, these vegetables are usually small seeded crops from the solanaceous, cruciferous and cucurbitaceous families. In the future there is a wide scope for seedling transplants, especially for those crops which having a high economic value and potentially high seed cost.

Significance of vegetable seedlings production in Hi-tech nursery

- The 'baby seedlings' can be properly cared and nurtured in the nursery bed.
- The expensive hybrid seeds can be maintained better for resulting in a more uniform crop stand.
- Quality seed germination, consistent growth, minimal seedling mortality.
- Defective seedlings can be discarded throughout the transplanting process.
- There are fewer risks of pests and diseases.

Selection of site

While choosing a location for nursery production and management, the following factors should be considered-

- The terrain should be well-drained, fertile and rich in organic matter.
- The site should be free of water logging with good drainage facilities.
- To get the desired sunlight, it should constantly be placed out of the shade.
- The nursery should be located near a water source.
- Pets and wild animals should be kept out of the area.

The components and processes of modern nursery-raising technique

Seeds, seedling tray, media, mechanization, irrigation, nutrients, protected structure, light, seed pelleting and priming biological stimulation and hardening.

Raising seedlings in nurseries is the prime factor to care

Healthy seeds or seedlings result in healthier and more productive harvests. The current state of agriculture technology necessitates the production of strong and healthy seedlings. To produce healthy seedlings, farmers and nursery managers grow seedlings in plug trays or protrays. Seeds and rooting media are frequently sown in soilless

media with coco-peat, vermiculite and microbial consortia. Sowing can be done manually or with a seed sowing machine.

Seedlings Tray and Growth media

In vegetable nurseries, seedlings are grown in various sized trays with varying numbers of cells. The size of the cell is essential since it determines the media and the water storing capacity. Seedlings grown in larger cells are taller and stronger than the smaller cells. Good chemical and physical qualities of the growing media ensure better nursery production. The physical features of the media, such as water, aeration and nutrient holding capacity have a significant role in root growth.

Sterile growth media, which may or may not be inert, having adequate cation exchange capacity (CEC) with optimum pH and nutrient absorption capacity, must be applied. Coco peat usually prepared from coconut husk is a 100% natural and biodegradable material which having a high C:N ratio and it is the most important ingredient in nursery growing media along with it has antimicrobial properties. Biological agents such as bio fertilisers and biocontrol agents (*Trichoderma viride*, and *Pseudomonas fluorescens*) are commonly applied into the media to provide additional benefits to the growing seedlings.



Germination

Seed germination is influenced by temperature, which varies with the crop and should be adequate with uniform moisture in the media. For improved germination, customized germination chambers are used. After seeding a black plastic sheet is used to cover the protrays to allow warmer temperatures for promoting germination. Some

vegetable seeds require a specific temperature in the root zone to germinate. Like optimum temperature for Tomato and Brinjal 21°C to 24°C and Chilli and capsicum 28°C to 32°C.

Growth influencing factors

Different factors viz. light, irrigation and nutrients play a direct and crucial role on the growth of the seedlings. The structure of the nursery must be built in such a way that enough light is available for seedling production. For optimum growth and development, seedlings should be irrigated on a regular basis. To irrigate seedlings, a rose can or a flush boom can be used. Overwatering can also be harmful to emerging seedlings, since it increases the risk of acquiring foliar, collar and root diseases. Apart from the nutrients provided in the cocopeat or growing media, extra nutrition is essential for the growing young seedlings. Nutrients can be provided by foliar application. Phosphorus, along with a small amount of nitrogen, is essential for greater root growth. Nutritional imbalance can lead poor and stunted growth, resulting in poor performance.

Protected Structures

Young seedlings require specific care since they are fragile and tender, attracting sucking pests such as white flies, aphids etc., which may also act as vectors for the spread of many lethal viral diseases that can emerge later in the plant development phases. When seedlings are nurtured outside of a protected structure or in an open field, these possibilities increase. Young seedlings are additionally protected by the protective structure from severe climatic conditions such as rain, wind, heat, and a variety of infections.

a. Polyhouse

Polyhouses employ a transparent UV stabilized polyethylene film with a thickness of 200 microns to cover the polyhouse roof. In the polyhouse, retractable or moveable

shade nets of around 11 feet height are installed for managing heat and light. For better protection against rain splash the sides of the poly house usually covered with polyethylene film having 200 micron thickness. All the four sides of the side are coated wall up to 3 feet with 40 micron white coloured insect proof net.

b. Nurseries with Shade Nets

A shade net nursery is usually supported by GI pipes or stone slabs. At a height of 6.5 feet, a UV stabilized HDPE green or black shade net with 50 to 75 % shade intensity is employed to cover the nursery area. As a support for the shade net, a strong stainless wire grid is installed at the top of the construction. To keep insects out, a UV stabilised 40 percent nylon insect proof net mesh is placed on all four sides of the nursery.



Hi-tech nursery raising techniques

a. Covering with polythene sheets

Thatching can be replaced with transparent polythene covering to ensure early germination (150 micron thickness). Irrigate the nursery beds after seeding, up to the field capacity. The beds are then to be covered with a transparent polythene sheet and sealed with soil around the edges of the sheet. After completion of germination process, the polythene sheath can be removed.

b. Poly tunnels for normal weather

- Prefabricated tunnels measuring 3m long, 1.5m broad and 1.0m high in the centre are used to cover the nursery beds.
- UV-polythene sheath (200 micron) with 75% transmittance is clad around the semi-circular structure.
- The bed can be covered with tunnels once the seeding, covering, and irrigation are accomplished.
- If the nursery is grown in the winter, both apertures are often closed.



c. Sunken nurseries for extreme weather

Sunken type of nursery usually prepared during winter season. This type of nursery is created 10 to 15cm underneath the soil surface. The air blows across the soil surface, yet the

seedlings in the sunken bed are not affected by the breeze. Furthermore, covering the sunken bed with polyethylene sheets, which is essential to safeguard the seedlings from cool air, becomes easy. On bright days, the polythene cover may be removed and on wet days, it can be converted into a roof.

d. Naturally ventilated polyhouses

Naturally ventilated polyhouse can be used for commercial nursery production.

i. Poly bags for cucurbits : Seed propagation and in situ sowing are practiced in majority of cucurbits. Seeds can be sown in polybags and germinated under protected cover from low temperatures in some circumstances where an early crop is needed. At the 2-true-leaf stage, the seedlings are transplanted. This is a common practice in Punjab, particularly with muskmelon and it can be done on the hills to achieve an early crop in July. Cucurbits normally do not survive transplantation after this stage owing to tap root injury. When compared to in situ sowing, there is a significant reduction in seed quantity, saving approximately 50% to 60%.

ii. Plug tray techniques : For producing vegetable seedlings, plastic trays or protrays with various cell sizes are commonly used. In numerous European nations and Israel, two types of plastic protrays are primarily utilized to raise seedlings. Cucumber, muskmelon, tomato and brinjal require 187 cells of 3.75 cm (1.5") size plastic trays, but lettuce, cabbage, cauliflower, and capsicum require 345 cells of 2.5 cm (1.0") size plastic trays. These trays aid in correct germination, give a separate area for each seed to germinate, reduce mortality, promote uniform and healthy seedling growth and are easy to handle and store. They are also reliable and cost-effective to transport.

Hardening

Hardening is the process of gradually exposing mature seedlings to regular climatic

conditions after they have been protected in order to eliminate stress and transplant shock when they are transplanted to the main field.

Pest and disease management.

- The most significant role in the control of pests and infections is cleanliness and sanitation in the nursery, particularly among the crate or protrays.
- Regular sterilization of the growing media, structures, tools, and trays is required on a regular basis.
- Proper and appropriate ventilation and air flow within the nursery space may help to prevent disease.
- Pests and diseases that may restrict the growth of healthy seedlings must be identified and appropriate countermeasures must be established ahead of schedule.

Conclusion

The emergence of various nursery growing techniques has opened up new horizons for producing vegetables in every month of the year, irrespective of the vegetable crop. Growers may now produce off-season vegetables crops in any climatology condition against several stresses and can fetch remunerative prices from its product due to innovative approaches of Hi-tech nursery production.

References

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