Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 06, Issue: 02 (MAR-APR, 2026)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Benches and Containers in Greenhouses: Types and Practical Applications

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In the controlled environment of a greenhouse, the floor is rarely the best place for a plant. To maximize light interception, manage drainage, and ensure ergonomic efficiency for workers, growers rely on two fundamental components: benches (the infrastructure) and containers (the immediate environment).

Part I: Greenhouse Benches

The Framework of Growth

Benches are more than just tables; they are specialized systems designed to manipulate airflow, temperature, and space utilization. Choosing the right benching system can increase a greenhouse's production capacity by up to 25% to 50%.

1. **Fixed Benches**

The traditional choice for retail nurseries and small-scale growers. These are permanently anchored to the floor.

Pros: Highly stable and cost-effective to install.

Cons: Inefficient space usage, as permanent aisles are required between every bench.

Applications: Display areas where customer flow is more important than plant density.

2. **Rolling Benches**

A favorite for commercial production. These benches sit on rollers, allowing the tabletop to move laterally.

Mechanism: By shifting the benches, you only need one floating aisle per bay.

Pros: Maximizes "growing footprint" (the percentage of the greenhouse floor covered by plants).

Applications:

Large-scale floriculture and high-value medicinal crops.

3. **Ebb and Flow (Flood) Benches**

These feature a hard plastic liner with a series of channels. Water and nutrient solution are pumped onto the bench, held for a specific duration, and then drained back into a reservoir.

Pros: Extremely uniform watering, reduces water waste, and keeps foliage dry (reducing disease).

Applications: Potted plants, propagation, and high-density plug trays.

4. **Wire Mesh and Expanded Metal Benches**

The most common surface material.

Function: The open mesh allows for 360-degree airflow around the pots.

Benefit: Prevents heat buildup under the bench and allows for "air pruning" of roots that try to grow out of the bottom of the container.

Part II: Containers – Defining the Root Zone

The container dictates the volume of the rhizosphere, the frequency of irrigation, and the ease of transport.

1. **Standard Pots and Tubs**

Plastic (Injection Molded/Vacuum Formed):
The industry standard. Lightweight and moisture-retentive.
Clay/Ceramic: Heavy and porous. Excellent for "top-heavy" plants or those requiring high breathability (like orchids or succulents).

2. **Plug Trays and Liners**

Used in the earliest stages of a plant's life.
Design: Each cell is a miniature ecosystem. Modern trays often feature "root-steering" ribs to prevent circling roots.
Practical Application: High-volume seed starting and vegetative propagation.

3. **Grow Bags**

Typically made of UV-stabilized polyethylene or fabric.
Fabric Bags: Provide superior aeration and natural air pruning.
Poly Bags: Often used in hydroponic "run-to-waste" systems for vine crops (tomatoes, cucumbers).

4. **Specialized Hydroponic Containers**

Net Pots: Used in Deep Water Culture (DWC) or Aeroponics, allowing roots to hang directly into a nutrient solution or mist.
Dutch Buckets (Bato Buckets): Designed with a siphon elbow to maintain a small reservoir of water at the bottom, protecting the plant in case of a pump failure.

Part III: Strategic Integration and Practical Applications

Choosing the combination of bench and container depends entirely on your production goals and environmental constraints.

The Ergonomic Factor

The height of a bench is typically set at 30 to 36 inches. This is the "sweet spot" for workers to transplant, prune, and harvest without excessive bending. Proper benching reduces labor fatigue and increases the speed of crop maintenance.

Heat Management: Root Zone Heating

In colder climates, growers often install heating pipes directly beneath wire mesh benches.
The Physics: Heat rises through the open mesh, warming the containers directly.
The Result: Faster rooting and shorter production cycles, as the root zone temperature is more critical for growth than the ambient air temperature.