

Types of benches and containers used in protected cultivation



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Benches

Benches are the important components of green house and these are stable and provide well drained platforms for growing plants.

Table 1: Consideration of benches

Considerations	Particulars
Bench height	Handling plants and mechanization
Air spaces in surface	Allow water to drain off the surface and air circulation reduces disease incidence
Strength	Must support high weight loads
Compatibility with irrigation system	Adapted to irrigation technologies
Cost	Design and material needs to be economically adequate with crops being grown
Support requirement	Depending on bench surface, the type of structural support will vary (expanded metal is rigid and need less support than wire)

Advantages of benches

- Use of benches ease for carrying out of various greenhouse operations like irrigation, weeding, hoeing, care and management of crops by workers.
- Also use of benches reduces the cost of land preparation and layout as well efficient use of land in greenhouse.

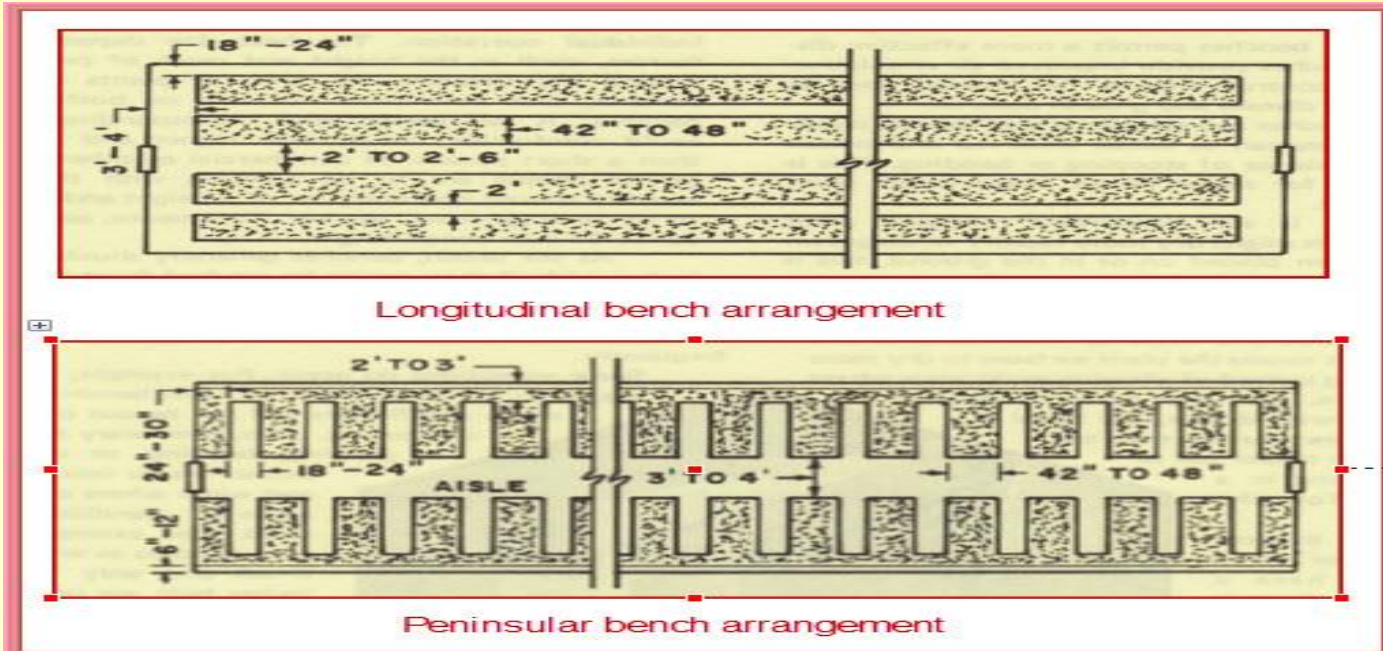
Types of benches

- **Floor as benches:**

Commonly used for bed preparation for cultivation of crops. In case of floor as bench it should be cemented and level of floor should be done for proper watering of floor when flood irrigation is under taken. For bench purpose porous concrete floors width may be extended. Main advantage is that it's low cost and works for some species. But major disadvantage is that may be difficult for workers as every time he/she has to bend.

Raised benches:

- Benches are arranged to get maximum utilization of facilities for growing crops by maximum utilization of growing areas.
- Peninsular arrangement of benches may provide more growing areas compared to longitudinal arrangement. Many plant species can be easily segregated by using raised benches which added extra benefit to small scale growers.
- But, longitudinally placed benches are having advantages over peninsular arrangement and ease for doing routine tasks like watering. Now-a-days non-stationary benches are gaining more popularity among growers which provides more growing space.



- Floor space efficacy can be increased up to 90 percent by using movable benches or rolling benches. In the side end of benches platform can be moved by help of a crank.
- By sliding the benches over the top of long steel poles platforms can be easily moved. Aisles are created to provide options to farmer for work at any time without any problems.
- Advantages of these benches are that these can be moved easily by labourer. Where plants are transferred at a regular basis this movable benches are not suitable.
- So, for small scale growers conventional benches are more suitable compared to movable benches.



Movable bench arrangements

Bench space efficiency

Benching efficiency can be defined as the square feet dimension of bench space to the floor dimension of greenhouse. This number is expressed as percentage

Bench design

Ebb and flow (flood or sub irrigation) benches is an alternative to conventional benching systems and these watertight, molded plastic trays replaced metal or wood. At regular interval fertigation of trays are carried out and nutrients are absorbed by plant capillary action mechanism. It gives bonus of reduced and uniform application of water and fertilizers. Excess amount of water and fertilizer are collected after each flood and drain cycle and can be re-circulated later. It saves water and fertilizer amount up to 50 per cent. All the benches are irrigated simultaneously which can reduce labour cost. Bench design increased production and also keep foliage dry which is extra benefits of adoption of bench system of cultivation.



Ebb and flow type of bench



Vertical cultivation of leafy vegetables on shelves

Materials used for benches

Wooden benches:

Highly resistant to decaying woods like locust, cedar, redwood, and cypress are used for benches in green houses. For improving resistance to decaying, benches are painted with copper naphthenate or other preservatives which prevents natural decaying of woods.

Concrete:

Concrete benches are durable and permanent structures and don't allow to change later. Also, it doesn't require additional treatment for prevention of decaying like wood structure. For more durability and strength of benches, steel rods can be used and for drainage facility drilling holes are made in the concrete benches.



Concrete bench

Metals:

Whole metal or steel benches are used alone or in combination with other materials. Galvanized metals are having advantages over wood in longevity and resistant to rot as well as decay. At initial the cost of installation is more compare to others but it is like one time investment followed by low maintenance cost of benches..

Temporary or portable benches

❖ Plastic

- Now plastic benches are more commonly used but due to less durable nature and unable to bear more loads it is not desirable.

❖ Pallets

- One of the inexpensive types of temporary benches, pallets is placed over cement blocks to provide support. This is cheap and easy to disassemble.



Plastic bench

Containers

- ✓ Under greenhouse cultivation selection of suitable containers is mostly depends upon the crop to be grown, characteristics of crops like growth stage, cropping duration, plant vigour, growing habit, root system, etc.
- ✓ Generally long duration, deep rooted and more vigorous crop require large containers compared to short duration, shallow rooted and less vigorous plants.

Advantages

- Increases plant productivity as well production time.
- Production of good quality produce.
- Uniform and vigorous plant growth.
- Easy to transport and handling of plants, also no transplanting shocks.
- Easy to maintain and sanitation of greenhouse.
- Easy to harvest, grading and shifting of produce.
- Good drainage and aeration facilities.
- By help of micro-irrigation like drip it's easy to analyze plant nutrient efficacy.

Types of containers

Plastic:

- The most common and cheapest type of container is the plastic planter.
- These containers are available in various sizes and shapes with different designs and colours.
- The price of plastic containers is varying from cheap to expensive.
- These plastic containers are available with or without drainage holes and with smooth or textured surfaces.
- These are water-tight and non-porous and easy to handle.



Plastic containers

Ceramic:

- Ceramic containers are slightly more expensive compared to plastic containers.
- They are also available in market with or without water drainage holes.
- The surface of ceramic containers is textured or painted and having glossy finishes. Some are hand-made and designed as imperfect with artistic.

Wood:

- They are not commonly used for cultivation and are made up of wood with various decorative finishes to give a naturalistic appearance.
- To avoid damage of wood containers from water these are lined with non-porous materials.

Fibre glass:

- This is commonly used containers for planting of crops in greenhouse.
- These are durable and designed with different shape to give any look and also sometimes painted with different colours.
- These are water-tight and are come of up drainage hole.

Metal:

- ❑ Metal planters provide a nice accent for plants.
- ❑ The most common metals used in planter construction are brass, copper, stainless steel and aluminium.
- ❑ Wrought iron is also commonly used as a decorative container. Metal surfaces range from antique to highly polish to brush. It requires more maintenance compare to other surface materials.
- ❑ As most of the metal containers are come up without drainage hole so sometimes used as outside covers for plant containers.

Clay/ Terra cota:

- As clay pots are porous so they can be used for interior display
- It is essential to place pots on a waterproof tray to avoid excess draining of water as well bleeding of water from pots

- For protected cultivation of crops, selection of proper type of benches and containers are very important.
- These should be selected on the basis of crops selected for growing under protected cultivation.
- To get maximum returns, use of more durable and easy to access benches should be selected.
- Containers should be selected as per vigour of the crops and duration.

Thank you...