

## METHODS OF WATERING GREENHOUSE CROPS

### INTRODUCTION

- Water thoroughly every irrigation
- Judge watering requirements by substrate look, feel, and weight
- Plant symptoms of underwatering:
  - Wilting
  - Slowed growth
  - Smaller leaves
  - Possible leaf burn
- Plant symptoms of overwatering:
  - Excess growth
  - Soft growth
  - Possible root damage
  - Wilts easily under strong light

### WATERING SYSTEMS

- Water is primarily supplied to the system through water mains installed underground or overhead
- Two-inch PVC pipes are commonly used in 20,000 sq. ft. greenhouses, and 3-inch pipes are used in 50,000 sq. ft. greenhouses
- Double water mains may need to be installed for fertilizer application
- Most systems can be automated
- Water efficiency can be improved with use of pulse watering system, where plants receive maximum water without runoff (i.e., boom watering)

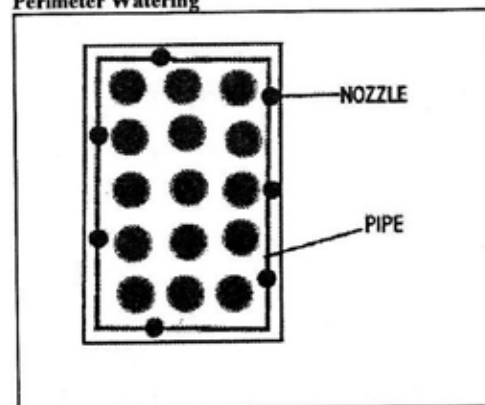
### Hand Watering

- Not economical due to labor costs
- Beneficial for spot watering
- Water supplied through hand-held field hose
- Water breaker should be installed on end of hose

### Perimeter Watering

- Plastic polyethylene or PVC pipe run along bench edges
- Water is sprayed under foliage through nozzles that are staggered along the pipe
- Nozzles can spray 180°, 90°, or 45°
- Water is projected farther into bed by 90° and 45° nozzles
- Nozzles are attached by holes punched into pipes

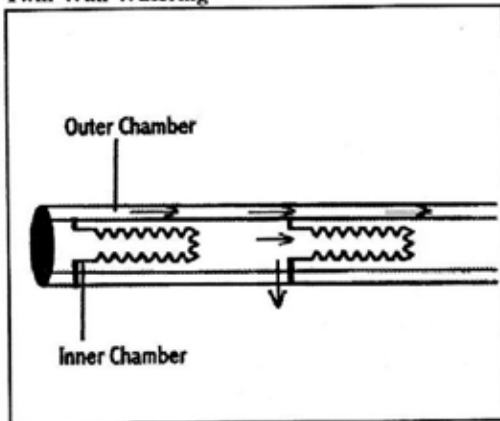
Perimeter Watering



## Twin-Wall Watering

- Good for long or sloping benches
- Constant water pressure along tube
- Tube consists of two sections:
  - Outer chamber
  - Inner chamber
- Water first enters the tube in the outer chamber through a special pipe fitting connected to the water supply
- Water moves down the length of the tube until it reaches the end, where it begins to enter small pores along the tube leading to the inner chamber

Twin-Wall Watering

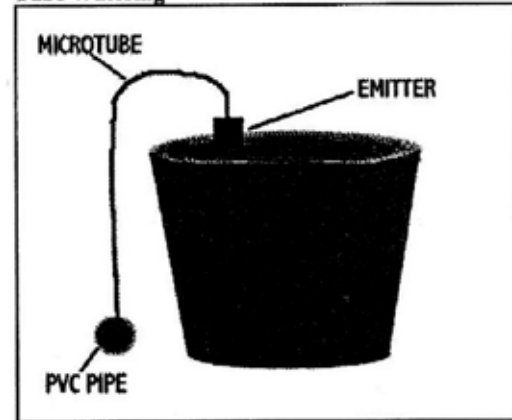


- Once water enters the inner chamber, it runs along a zigzagged path for a short distance, then turns around 180° and heads back to a small hole opposite the original pore entrance
- Each hole has its own inner chamber
- Water is forced out the small hole, where it begins watering the crop
- The zigzagged channel creates water pressure to force out any blockage that may occur
- Tubes are made from black polyethylene and are 10 or 15 mils in thickness
- Exit holes are available every 2 or 4 inches, with a slightly higher flow rate for the 2-inch space
- Tubes are placed 8 inches apart along the surface of the bench

## Tube Watering

- Polyethylene microtubes run from water supply to each individual pot
- Emitters are attached to the end of the tube
- Water is supplied by 3/4-inch polyethylene or PVC pipes run along the center of the bench
- Tubes are attached to the pipe through drilled holes
- Consistent tube length is required
- Benches should be level to insure even watering
- Method can also be used for hanging plants

Tube Watering



## Overhead Watering

- Water is applied through 360° nozzles attached to top of riser pipes
- Nozzles may be designed to rotate 360°
- Riser pipes are periodically attached to a pipe run along the center of the bed
- Riser pipes reach well above plant tops

## Boom Watering

- Boom runs along rails attached down center of greenhouse
- Boom is propelled by an electric motor
- Can be programmed to water one side only or to skip sections of the greenhouse
- Good example of pulse watering

## Mat Watering

- Good for several pot sizes
- Polyethylene sheets are placed on benches
- A 3/16- to 1/2-inch thick moist mat is placed on top of the sheets
- Pots are placed on the mat, then take up water through holes on the bottom through capillary action
- Very important that pots have bottom holes
- Once pot is lifted from mat, capillary action is broken and it becomes necessary to rewater pot from top to reestablish capillary action
- Benches should be level to insure even watering
- To prevent algae, perforated polyethylene may be placed on top of mat for pots to sit on
- Watering tubes placed 2 feet apart run down the length of the bench to supply water to the mat

## Ebb-and-Flood Watering System

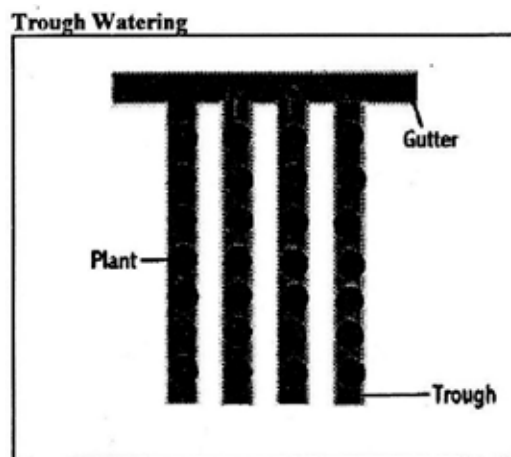
- Pots are placed in a level, watertight bench
- The bench has channels in the bottom and a hole in the center for the water to enter and exit
- A filter and a tee valve are installed in the hole
- Water is pumped into bench to a level of  $\frac{3}{4}$  to 1 inch over 10 minutes
- Pots are allowed to sit in water for 10-15 minutes
- Water is drained out over 10 minutes
- Easy to change pot sizes
- High humidity may cause problems

## Flood Floor Watering System

- Greenhouse floor is paved with a slight slope toward the center on either side and a lip that runs along the perimeter
- A drain hole is installed in the center
- Hot-water heating pipes are installed to speed up the time needed to dry the floor to lower relative humidity
- Flood greenhouse with water
- Time required to flood greenhouse will vary

## Trough Watering

- Troughs containing one row of plants are placed parallel down the greenhouse with spaces in between
  - Reduces humidity
  - Promotes dryer foliage
- Troughs are slightly sloped for the water to drain into a gutter where it is returned to a holding tank



## References

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## **METHODS OF WATERING GREENHOUSE CROPS**

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