

sizes. The most modern systems utilize a dripper, or even a pressure compensating dripper to assure that each plant receives the same amount of water. It is quite possible, in a well designed system, to achieve uniformities of 95%.

What does overhead sprinkling do?

Overhead sprinklers are used mainly for crops that tolerate wet foliage. Pipes are installed above the plants and nozzles with varying spray ranges are installed to cover all plants. The best measure of a sprinkler system is a mathematical evaluation called Distribution Uniformity, or DU. For crops highly dependent upon uniform watering, like plugs, a DU of 85% or better should be used. For less critical applications, like woody ornamentals in large containers, a DU of 75-80% can be acceptable.

Should I use boom watering?

Boom watering can function as either a closed or an open system that is used for producing seedlings grown in plug trays. This enables each seedling to grow in an individual cell when watering precision is extremely important. The boom extends from one side of the greenhouse bay to the other, propelled by an electric motor.

What is mat watering?

The mat watering system is a closed system. Potted plants are planed on a constantly moist mat that soaks up the nutrients through capillaries. All pots may be placed on a mat and no adjustment is needed when changing pot size.

How does a basic flood system operate?

A flood system pumps water or fertilizer into a bench, trough or floor long enough to reach the plant capillaries. The water/fertilizer is then drained and the whole process is repeated after a given amount of time.

How do I grow crops using a float system?

In a float system, seedlings are grown on trays that

float on a nutrient solution. After a determined amount of time, fertilizer is added until seeds form. The seeds then float on the solution in the trays and water is added when needed allowing the crops to grow.

What are the benefits of pulse watering?

Pulse watering is an open system that is used in order to save water from being over-consumed. Water or fertilizer is applied several times during a drying cycle instead of just once at the end of the cycle. However, less fertilizer is applied each time so the concentration is lower.

How do I maintain my irrigation system?

A watering system should be cleaned and sterilized; otherwise crops can become contaminated. Depending on the types of pipes used in the greenhouse you may be able to take them off and soak them in disinfectant or simply take a sponge soaked in disinfectant and apply it to the pipe and/or nozzles.

How can I find out more about irrigation systems?

You can find out more about irrigation systems by contacting the NGMA or visiting the website at www.NGMA.com.



VISIT US ON THE WEB:
WWW.NGMA.COM
20 W. Dry Creek Circle, Suite 110
Littleton, CO 80120
800-792-NGMA (6462)
303-798-1338 • FAX 303-798-1315

HELPFUL HINTS

IRRIGATION



PUBLISHED BY
THE NATIONAL GREENHOUSE
MANUFACTURERS ASSOCIATION



Why is watering so important?

Crop quality is closely tied to plant irrigation. Both the amount and the timing of watering are important, and should be carefully planned and monitored. Next to light, watering is the next most critical production factor.

What are the effects of under-watering?

Even mild under-watering causes photosynthesis to shut down. When plants lack adequate water for uptake, all aspects of plant development become stunted: leaves, fruit, flowers, stem growth are all affected. Depending on the stage of plant and degree of water stress, this stunting can have a permanent effect on the plant. Severe under-watering results in a burned appearance on the foliage and flowers.

What are the effects of overwatering?

Excessive watering can be as or more damaging to the crop as under-watering. The soil environment which is conducive to plant growth contains both readily available water and air. When soil is over-watered, the air is 'driven out' of the soil, and the roots are unable to survive very long in this condition. If persistent, the roots die, and the plants are unable to uptake the water and nutrients they need. A wet root environment also promotes many root diseases.

What are the general rules of watering?

There are three main rules of watering.

- Use a well-drained substrate. When the root substrate is drained and aerated, proper watering can be achieved, giving the plant desirable texture and structure.
- Water thoroughly each time. It is important to water all of the substrate each time the water is applied so that the water reaches the roots and produces a healthy plant.
- Water before moisture stress occurs. You should water just before moisture stress occurs. The

result is a properly aerated system as well as healthy root development.

When should water be tested?

The chemical balance in the water is crucial to the survival of the plant in the greenhouse. Anytime a new water source is established, it should be tested. During the first two years, you should test the water at least twice a year. It is best to test during a dry period and a wet period. After you have established a water quality pattern, the water needs to be tested every couple years.

How do I conduct a soluble-salt test?

The soluble-salt test measures all electrically charged ions dissolved in water. The higher the salt content, the more electrical currents are flowing through the sample. Excessively high salt levels make the uptake of water and essential nutrients more difficult for plants, resulting in water stress, and chemical deficiencies and toxicities.

What is alkalinity?

Alkalinity is a measure of carbonate amounts plus bicarbonate in water. Applying alkaline water is similar to applying limestone. An excessive alkalinity level results in an unacceptable rise in the pH of the substrate, which can lead to nutrient deficiencies.

What does hardness measure?

Hardness is a measure of the calcium and magnesium content in water. These two elements should be balanced to prevent calcium or magnesium deficiencies. When there is high alkalinity in water, a hardness test should be done.

What types of watering systems are there?

There are several methods and ways to water plants. Generally they fall into the following categories: hand watering, sprinklers and mini-sprinklers, booms, sub-irrigation, and drip. There are both closed and open systems.

What is a closed system?

A closed irrigation system is any method for growing plants in which the nutrient solution is recirculated. Nutrients are not allowed to leach into the ground.

What is an open system?

An open irrigation system is any system for growing plants in which nutrient solution is allowed to pass through the root zone and out into the environment.

Why is hand watering uneconomical?

Hand watering is considered uneconomical because it is labor inefficient, and automated systems are relatively inexpensive. Further, this task is often left to the least skilled laborers, and the economic impact of careless watering on the quality of the plants can quickly be re-paid by most automated systems.

What are the different watering systems for cut flowers?

The different types of fresh-flower watering systems are perimeter watering and thin wall dripperline, often called 'tapes'. Perimeter watering is a plastic pipe around a perimeter of a bench with nozzles that spray water over the substrate surface below the foliage. The thin wall dripperline system is popular because long lengths of bench can be handled from a single header, and the humidity of the canopy is reduced, decreasing the incidence of disease. They are both typically open systems. Bag culture of cut flowers is usually watered by drippers or spray stakes.

What types of containerized-plant watering systems can be used in a greenhouse?

Containerized-plant watering systems include drip, overhead sprinklers, boom watering, flood and float systems, and pulse watering.

How does drip watering work?

Drip watering is a standard open system used when automatically watering potted plants. The water is carried to each pot by a thin tube available in various