

grower 101

Flood Watch

Flood floor growing is an alternative irrigation method that can save water, fertilizer, physical space, labor and energy. Is it right for your operation?

By Andrew Van Geest

To understand the basics of flood floor growing, you must first understand the advantages of subirrigation. In every subirrigation system, the plants draw up only what is required. Capillary action determines the water retention of the plant, based on growing media as well as irrigation control.

The grower's focus is the root zone. Healthy roots means strong, healthy plants. The ability to provide the correct EC and pH of the water at the root zone level plus the ability to provide a heated root zone surface makes flood floors an obvious choice for quality growers.

Traditional Versus Cascading Design

A flood floor consists of 4 inches of concrete poured over a base of gravel. The concrete lies over a steel mesh that is interlaced with heat tubing and then screed to a near perfect slope using laser equipment. When designing a flood floor, you must first decide what style is right for your situation. There are two basic designs available: traditional and cascading.

Traditional. This style of floor is well suited for growers of larger pots and/or nursery stock because of the depth of water that can be achieved. This design features concrete poured in a shallow "V" shape in the growing area, which fills and drains to the center. The center of the "V" is usually 1-1½ inches lower than the edges. Water is pumped up the buried supply until the depth at the top of the "V" has been achieved. It is then allowed to drain through that same supply pipe back to the tank from which it came.

Typically, this system takes about five minutes to fill with enough water to reach the pots on the edges and seven minutes to drain away (this varies by floor size and pump sizing). The capillary action of the plants allows them to draw up only what is required to reach the saturation point of the media even though the plants in the center of the floor are in water much longer than those at the edges. With the proper configuration, they should all get an equal amount of water.

Cascading. If you intend to grow smaller pots (6 inches or less), tray liners, propagation or rockwool cubes, this system is for you. It supplies water to the high side of the growing area and runs a ¼- to ⅜-inch depth across the floor. The water then runs immediately into the drain piping and is returned to the tank that supplied it. It takes 30 to 45 seconds for the water to cross the floor and enter the drain line.

This system waters evenly across the crop even if the grower reduces the irrigation cycle to restrict the amount of capillary action to hold back the crop. Unlike the traditional style, unfiltered water never enters the supply line. The drain line does not require any valving as it is

always open, and smaller tanks can be used because water begins to return almost immediately to the tank system with little to no time between watering floors.

Both systems use in-floor heating, creating a microclimate that stimulates root growth and dries the floors to control humidity at the plant level. And they're energy efficient: The in-floor heat accounts for about 30 percent of the heat load required, allowing the grower to lower the greenhouse's ambient temperature.

Tank Systems

Another design consideration is the tank system. As multiple floors of up to 3,200 square feet are not uncommon, each need to be watered in a reasonable amount of time. These tanks can be buried cisterns or above-ground water storage silos. Typically, three "recipes" for irrigation are used: high EC, low EC and fresh water. After deciding how many recipes will be used, there will need to be storage for each. The grower, through computer control, allows one of the recipes to enter the fill tank, where it pumps the designed flow rate to the floors. When the drain water returns, it is sent to a drain pit. From here it is pumped over a filter and directed back to the supply tank it came from.

In the past, cascade filters were used, which consisted of a curved stainless-steel screen that removed debris as water fell through it. These filters typically filtered 300-400 micron. Recent projects have embraced cloth filtration, which cleans water at a much finer (20-30 micron) level than cascade filters or even sand filters. In real estate, you want "location, location, location," but growing in closed-loop irrigation systems calls for "clean, clean, clean"! If you keep everything clean — from fertilizer stock tanks to floor surfaces and storage tanks — you will dramatically reduce the presence of disease. Not enough can be said for good filtration!

Labor and Energy Savings

Flood floors are an investment that will last as long as your structure, and you have to consider the payback for any project before the shovel meets the soil. The areas of payback to this system may seem to be only in the water and fertilizer savings, but these are actually the smallest portion of the payback; the real payoff is in labor and energy savings.

If you live in a northern climate and are cur-



Top: Flood floors use in-floor heating, creating a microclimate that stimulates root growth. **Bottom:** When designing a flood floor, the first step is to decide which style works best for your greenhouse.

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rently growing in a poly-covered greenhouse, then you will also know what it looks like to have condensation caused by humidity on your roof. This condensation zaps a considerable amount of your solar radiant heat. A concrete floor takes up to 90 percent of that condensation out of play, and the in-floor heat will yield considerable heat savings.

Labor-saving possibilities are unlimited. From rolling your shipping carts right out to the where the product is being grown, to portable or stationary conveyor belts, to custom forklift systems for spacing and transportation, the wide-open growing area is perfect for automation and product movement. For seasonal crops, cleared floors can serve double duty as storage and staging areas for shipping — something that can't be done with benches!

Maximizing the growing area by minimizing the space lost to walkways allows for more product per square foot of greenhouse. It is even possible to eliminate walkways completely when using a monorail boom with a catwalk.

A flood floor installation represents more than just an investment in concrete and pumps. It's an investment in the long-term viability of your operation and offers the best method of efficient, cost-effective top-quality production. As in any system, the best design and equipment will provide the best results for years of growing. **GPN**

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