

GROWERTALKS

Cover Story

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A New Slant on Subirrigation

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Flood floors are one of the most widely adapted new irrigation systems to come down the pike. They're efficient in terms of water, labor, space use, heat—you name it.

In fact, they seem to have just two drawbacks: First, they're "all or nothing" when it comes to water. You can't give your crop a light or quick irrigating with a flood floor. Second, because the floor fills and drains from the center, the center plants are exposed to more water for a longer period than those near the sides. The result is heavier pots in the center and drier pots at the edges.

There's another, little-known subirrigation system on the market that solves these two problems: troughs. Troughs are shallow gutters on benches into which you set your pots. Each trough is wide enough to hold a single row of pots. The troughs are sloped slightly; water flows in at one end and out the other, flooding the pots with a shallow (1/4 to 1/2 in.) stream of moving water (and nutrients, if desired).

Widely used in Canada, especially in the Niagara Peninsula region, troughs provide uniform watering. And they allow for quick, light waterings for delicate crops. But alas, they're still mounted on benches, with a bench's inherent space and labor inefficiencies.

Golly, if only there was a way to combine the benefits of both systems into one ...

The "Cascading" floor

Enter Zwart Systems. The greenhouse irrigation specialist from Ontario, Canada, has been working for much of the last decade on a new type of floor irrigation system that does just that: the cascading floor.

A cascading floor is similar to a flood floor in most ways: concrete construction with (usually) heat tubes built in. But instead of being shaped in a shallow V with a combination supply and drain pipe at the deep part of the V, a cascade floor is perfectly flat, but tipped very slightly from one side of the bay to the other. The supply pipe is at the post row at the high edge of the floor, and a separate drainpipe is at the post row along the low

edge. The result is a film of water that runs across drainpipe of the bay at a depth of just 1/4 to 1/2 in.

Andrew Van Geest of Zwart Systems is co-developer of the concept, along with Al Brouwer of Tradewinds Construction, which handles the meticulous concrete work for the system.

According to Andrew, the concept came about around 2002 after casual coffee-cup discussions with local growers who were looking for ways to improve upon the flood floor concept. “All the best ideas come from our growers who are struggling with problems in their operations,” says Andrew. “As we started looking at it, we thought, ‘Why can’t we marry a trough to a floor?’”

However, no grower wanted to risk the money to prove the theory. So Zwart invested in pouring several test floors. The first one was a noticeable failure, but they learned from it and built several more test floors, finally nailing the critical slope angle and other details.

Boeckestyn Greenhouses of Jordan Station, Ontario, put in the first 6,000 sq. ft. of cascading floors, proving the system was commercially viable. Since then, Zwart has done two other installations, the largest at 90,000 sq. ft.



Performance

The end product delivers water exactly as Andrew and his napkin-doodling growers had hoped: The water flows down the slope at a depth of 1/4 to 1/2 in., taking 30 to 45 seconds to cross the floor. It's easy to provide just a few minutes of water for a light irrigation, or more duration for a heavier water. You can even water lightly several times a day.

An interesting aspect of the fluid dynamics of the floor is that, unlike a flood floor that completely fills and drains regardless of

how many plants are on it, the water flow of a cascading floor is influenced by the pots, which, like small islands in the stream, cause swirls and eddies that bring water to all the surfaces of the floor. Areas without pots may not get completely wet due to the concrete's surface tension, but those with pots will.

Another benefit to a cascading floor is that it's somewhat self-cleaning. With a flood floor, you can get what Andrew calls a “bathtub effect,” where debris tends to cling to the surface rather than wash down the drain. In a cascading floor, the continuous flow of water tends to wash perlite and other debris into the drain line, where it's then filtered. Also, because the system uses separate supply and drain lines, unfiltered water never enters the supply line, helping prevent spread of disease. Each bay gets its own supply line; however, two adjacent bays can share a common drain line (a saw cut, with a rubber wall inserted, bisects the drain holes).

Technology and cost

Equipment-wise, Andrew says, a cascading floor has the same requirements for pumps, tanks and flow capacity as a flood floor. But because it's a “live” system with water constantly flowing rather than needing to completely fill a bay to a depth of several inches, you can use smaller recipe tanks for your feed. And you can begin to water the next floor sooner.

Cost-wise, the price is “mildly higher” he says, due primarily to additional piping (since there are separate supply and drain lines). In addition, the floor’s flatness is critical to a good flow of water across its surface. Even the most skilled concrete contractor can’t account for movement in the floor as it cures and dries, so Zwart includes grinding of high spots in the contract.

Oh, and if you want to know the exact angle at which the floor is poured, forget it: Andrew won’t divulge that hard-earned secret.

Spring Valley’s cascading floor

John Van Koevering of Spring Valley Gardens in St. Catharines, Ontario is one of three cascading floor owners, and he has the largest one, at about 90,000 sq. ft. But more importantly, he has an equal area in flood floors and more than a decade’s worth of experience growing on them, so he’s the right guy to offer a comparison. John was one of those early brainstormers of the flood floor/trough-bench hybrid, and once Zwart had built a commercial model that John could see in action, he decided to replace a section of wooden benches and drip tube irrigation with 34 cascading floors.

“We’d had a bit of experience with flood floors and with trough benches, and this cascading floor is basically the same principle as a trough bench,” John says. “Growers can argue that there are advantages to trough bench-type watering over flood floors, but we hate benches. They’re great for propagation, but when it comes to production—units in and out—I can’t drive over my benches with carts. Concrete floors are what we like.”

When it comes to flood floors, John lists the same drawbacks as mentioned earlier: all-or-nothing irrigation and uneven watering due to various exposure times. He says the cascading floor works just like a trough bench, giving each pot an equal amount of water for an equal amount of time.

“My grower says, ‘I just program the system early in the morning and let her go. Twice a day and don’t ask any questions.’ Especially in the summer, in the heat. We’ve got a fair number of mums and hibiscus on the cascading floor at that time of year, and you really can’t overwater them with a cascading floor system.”

We asked about disadvantages compared to flood floors. John thought for a moment, then replied, “Pots in heavy webbed shuttle trays that elevate the pots. You may not necessarily get the water in there with the cascading floor.” The same goes for his potted bulb crop, which he grows in Dutch crates from cooler to finishing. The crate bottoms elevate the pots too high off the ground for the shallow cascade of water to reach them. (Andrew Van Geest says they’ve tested standard shuttle trays with the system, and they work fine.)

What about large containers?

“Reason would tell me that a traditional flood floor would probably work better,” he speculates, “but my experience with the 13-in. poinsettia crop, I had no problem getting them wet. And with 10-in. poinsettias, the cascading floor worked very well.”

He said the floor works especially well with his poinsettia crop during the low light and cool temperatures of November, “when a little bit of pythium can creep in if you’re not careful on a flood floor. The cascading floor is more forgiving.”

So the verdict? Would he built more?

“I love my cascading floors,” John replies. “Would I do it again? I think it depends on the crops you’re going to grow.” John lists any potted crop of any size as good candidates for cascading floors. But if you’re using thick shuttle trays, flood floors would be better.

“I think there’s a place for both [styles of floor],” he concludes. “The cascading floor solves your logistics issues, allowing you to move large volumes of product in and out of the greenhouse quickly with carts or spacing forks, and it gives you the benefit of a trough-bench style watering.” **GT**