

GROWERTALKS

Cover Story

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Chasing Efficiency: Benches vs. Floors

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If you had three pristine acres and a blank check, how would you plan a new greenhouse? Sounds like a fun exercise with limitless options. It also sounds like a very difficult challenge, due to those same options. One of the earliest considerations you'd have to tackle is where to grow the plants—on benches or on the floor.

Within each of these two basic systems are plenty of nuances because flood floors can be concrete, porous, level or sloped, and benches can be stationary, rolling or equipped with trays for transport. A thorough cost-and-benefit analysis is required, while keeping plant growth and quality top of mind.

The case for space

Wasted space is wasted money and although the scenario posed above comes with a blank check, planning production space never actually does. Research has been done for years, by universities and manufacturers, with consistent results. Both bench systems and floors can be installed to maximize space, but flood floors have the edge by as much as 10%.

Pictured left, top: Rolling benches at West Coast Floral in British Columbia allows them to optimize labor efficiency, while also achieving 85% to 90% space utilization. They've converted much of their production to flood irrigation tables. Left, bottom: Growing on flood floors allows you to maximize the space, gives you easier access for automation and machinery, and doesn't require as many workers to tend the crop.

Data shows bench systems will achieve between 75% to 85% space utilization, with rolling benches on the high end and stationary benches on the low end, while floor production tends to use space at a 90% or greater efficiency.

Heartland Growers in Indiana uses both benches and flood floors in their operation, growing a wide range of crops from young plants, potted annuals and many seasonal crops. President Nick Gapinski says they choose systems to

maximize every square foot they can because it's expensive to build new greenhouses.

"You lose efficiency with benches—maybe 8% to 15%—but hopefully, we gain this back in labor efficiency," he says. Shorter crops with high turns are often grown on benches at Heartland, as well as stock plants for taking cuttings. Nick feels this is beneficial for the greenhouse team because they don't have to bend over constantly when performing repetitive tasks.

A new movement

With so many crops turning quickly, moving them in and out of a greenhouse becomes very critical when deciding between benches and floors. Dave Dickman, owner of Dickman Farms in New York, explains that using flood floors at their operation allows the team to access every square foot of the facility with carts and forklifts.

"This allows us to turn the space very quickly, achieving nine turns per year in much of it," he explained.

This is echoed by Glenn Harrison, operations manager at Cavicchio Greenhouse in Massachusetts, who uses two different flood floor systems—cascading or flow floors and level flood floors—to produce a diverse range of products from young plants to 12-in. patio pots and even perennials.

"We try not to manually handle anything," he says. "Without automation during peak season, we wouldn't be able to keep up with the labor requirements if plants were moved by hand."

Glenn explains because of the floor systems in place, they can use forklifts and tractors to move large blocks of plants at one time onto wagons, which transport them from the greenhouse to the field very efficiently. This wouldn't be possible with benches.

Requiring fewer growers per acre is a very clear benefit of flood floors compared to other systems. Rainbow Greenhouses in British Columbia has installed a relatively new vertically drained floor system (at least it's new in North America) developed by the ErfGoed company in Holland (for more on the system, see "How Good is ErfGoed" on the next page). Head grower Rob O'Hara explains that flood floors are very reliable and trustworthy.

"With flood floors, you simply program your bays and move on to other things," he says. "We also produce a very uniform crop, so picking crews can pick and ship faster at the time of sale, saving labor."

He adds that flood floors allow greenhouses to incorporate extra labor-saving tools, such as spacing machines or conveyor belts, within the system.

On the flip side, West Coast Floral Growers in British Columbia uses benches and smaller greenhouses to optimize labor efficiency, while also achieving 85% to 90% space utilization. Small houses and quick turns are the focus for this innovative operation that's converted much of its production to flood irrigation tables. General manager Jason VanderMey believes for his operation, it's all about flexibility.

"Using small houses with benches and matching up crops allow us to grow pot tight and turn six to seven times a year," he says. "For example, using flood tables, one grower can turn a fern crop every 12 weeks." Jason says maximizing space requires keeping greenhouses at a high level of utilization.

At Ball Tagawa Growers in California, the system used is entirely based on trays placed on aluminum rolling benches, according to production manager Laura Wulff Garcin, and labor efficiency is a key consideration for the propagation business.

"The rolling bench system has greatly reduced our labor," she says. "We can move 30 trays at a time with each bench."

Moving to trays from standard benches has allowed them to go from six people moving trays during peak to four.

And benches in production put plants at a convenient height for Ball Tagawa workers in all departments, from seeding to moving and transplanting through to shipping.

Plant health is paramount

When discussing crop production and the systems used, the health of the plants can be impacted by multiple factors, but at the top of the list are disease management and irrigation. Let's assume for this discussion that sanitation protocols are in place, no matter if the crop is on benches, floors, ground cloth or any other system.

"What would I do without [flood floors]? I'd be lost," Nick said. "I'd need to hire 50 more people to water poinsettias, alone!"

"What we have found with production systems of all kinds is the importance of labor. Can we re-allocate labor more efficiently to something of value by taking mundane tasks away?"

Heartland uses acres of flood floors for longer-term crops like poinsettias, mums and containers. For some crops, they use subirrigation, and for others they use irrigation booms, but, in both cases, they've seen great benefits on crop health and presentation.

"For mums and poinsettias, we use the flood floors," Nick says. "It's definitely better to water underneath because we can send product to retail with no spots from overhead watering."

This improves retail appearance and reduces shrink. Subirrigation using flood floors has also shown to positively impact disease issues because water isn't applied to foliage, reducing mildews and Botrytis.

Nick goes on to explain that with flood floors, Heartland can sterilize and sanitize after every crop. "This takes time, but our diseases like Pythium are down to zero."

For Cavicchio Greenhouses, some of the key benefits realized from their flood floor system revolves around consistency.

"The biggest strength is irrigation consistency and crop uniformity," Glenn says. "This system brings every pot up to the full container capacity."

In addition to standard flood floors, the operation also uses a sloped floor system that fills on one end and cascades across to the other end. He explains this is more flexible and allows for light watering because using capillary action, a quick burst of water can be released to water in a way that's impossible with his level flood floors.

Using the tray and moveable bench system in place at Ball Tagawa has resulted in significant crop health and quality benefits, according to Laura.

"It allows for bottom heat for improved rooting," she says. "Having the plants above-ground allows for improved air circulation that prevents disease since water drains off the trays."

Fewer PGRs and other chemicals save money and improve crop performance due to their ability to move plants easily to areas with higher light, lower temperatures and more air circulation, she says. And an added benefit is faster grow out for Ball Tagawa's plug customers, thanks to fewer growth regulators used.

On benches, there are also efficient options and flexibility related to irrigation. Overhead watering is common and can be used with rolling or stationary benches, allowing for effective irrigation of just about any crop. Subirrigation is also widely used, requiring a molded bench top that can be flooded to bring water levels up to the optimal level. This is beneficial for many growers because pots of various sizes can be used, from bedding flats and packs to pots of any size.

Learning curves

Challenges are somewhat operation-specific, but here are some things to watch out for when making the bench vs. floor decision:

“Nutrient management on a complete, closed recirculating system is a challenge,” said Rob. “Monitoring EC, pH and nutrients is critical to make sure things are not getting off track.”

With labor reallocated from mundane tasks to more value-based endeavors, taking time to dial in nutrition practices will be much easier. Even when a specific system of benches or floors has been selected, there’s a need to build in some flexibility. Glenn warns growers that some crops don’t respond well to subirrigation.

“Every bay we build has irrigation booms and backup hoses,” he says. “You need to determine the most appropriate method for the crop.”

Another tip from Glenn is that when building flood floors, they must be absolutely perfect when the concrete is poured. Uniformity can be lost quickly if it’s wrong. Slight errors in the grade can be invisible to the naked eye, but will quickly be seen when the water flows.

With rolling benches, Laura feels the rolling bench and tray system does come with a higher cost than stationary benches, but also lasts longer. The one downside she mentions is the wheels: “Wheels are the biggest repair cost due to bearings that rust or seize up.”

Another challenge using floor systems includes the possibility of puddling or channeling when it comes to water flow and drainage. And if the system isn’t a closed loop, there can be issues with buildup in the dead ends that will need to be cleaned out regularly.

Above all, be flexible

These days, with trends changing rapidly, the North American style of growing diverse ranges of crops and an uncertain labor situation, the need for flexibility has never been greater. This is reflected in some final words of advice offered by just about every grower we talked to for this story. Here are two that sum up the comments shared by all:

“Everyone’s situation is so different, including facilities and crops,” Glenn says. “So you have to start with what you are planning to do with the space. This drives everything.” Consider where you are today and where you want to be in the future when deciding the best systems for your business, including (but certainly not limited to) whether you build using benches or floors.

Rob agrees, adding, “When deciding what system to go with, you have to consider your budget, all the crops you need to grow and the climate or area you grow in.” He feels the system they’ve installed allows Rainbow to grow many different crops at a high quality.

So plan and take plenty of time to map out your goals and where you’re headed. There are plenty of resources available, from academic research to greenhouse planning and manufacturing experts well versed in all systems.

And talk to other growers. Go visit greenhouses using the systems you’re considering and meet with the owners, operations managers and growers who use the systems daily. It’s almost guaranteed you’ll walk away with questions answered and be well on your way to choosing the system that will drive your business into the future.

How good is ErfGoed?

You may have heard about greenhouses in North America that have installed the ErfGoed system, a vertically draining porous floor for plant cultivation. It's a system that's been used in Europe that incorporates a flood floor with a multiple gravel layer base covered with a capillary mat and using ground cloth as the growing surface. This allows growers to gain the benefits of a flood floor system, complete with water recapture and recirculation, while also creating a ground level microclimate and even its own biosphere that includes living organisms to help fight disease.

Tony Van Oort, sales manager at Qualitree Propagators in British Columbia, currently uses the system at their farm and sees many benefits, from ethical to practical. From an ethics perspective, he feels the floors allow Qualitree to tell a very positive story that includes sustainability and attention to green practices, especially when it comes to recapturing all water and producing crops in an eco-friendly way.

"We are creating a positive culture for young employees before we are legislated to do it," he says. "And it's easier to drive productivity in a comfortable building."

What are some of the lessons learned so far with the new system? Any equipment moving in and out of the greenhouses on the gravel floor must be on pneumatic tires, Tony says. And Qualitree had to make decisions about pot sizes they produce to maximize efficiency in such an open space.

"We moved some production from 5-gallon to 2-gallon and 1-gallon to 6-in.," he says. "Our approach is now intensive culture and high volume."

Asked whether he'd install this system again, Tony quickly says that Qualitree won't use anything else in the foreseeable future. "In 10 years, the operation will be completely ErfGoed for production."

Watch for more on this system in future *GrowerTalks* articles and digital media. **GT**