

Ultimate Greenhouse Series

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Benches

The ultimate bench depends on the crop and the facility layout.

By Kelli Rodda



A two-tiered bench system is fairly common in European greenhouses. It's yet to make waves in North America.

To bench or not to bench. It's not a coaching dilemma, it's a greenhouse decision. Some argue that growing on the floor is the best use of space. But if you're from the school of thought that prefers benches, there are several materials and systems to consider. Benches are available in wood, metal and plastic. Some are mobile and some are stationary. They're available with solid tops, mesh tops and ebb-and-flow trays. The ultimate bench depends on the crop and the facility layout.

Space utilization

"The key to benching is to get as much usable space as possible," said John Bartok Jr., extension professor

emeritus at the University of Connecticut's Natural Resources Management and Engineering Department. "With benches, a grower needs to consider how the plants will get in and out of the greenhouse. If you spec so many plants that you can't move around and have to carry them by hand, you're defeating the purpose."

The moveable tray system is becoming more popular with growers, but the system can present a logistics problem, Bartok said.

"There's a problem getting plants out of the middle of the greenhouse if you want those plants first," he said.

Solution: a gantry system that allows growers to pick up a tray anywhere in the greenhouse, he suggested.

Benches: A space continuum

Now that you can maintain the perfect environment for growing, where are you going to put the plants — on benches, trays, pallets or the floor itself? And what about using the space above the floors or benches?

Maximum space usage without sacrificing plant quality is the goal of every grower. If you choose a benching system, you want it flexible enough to accommodate the plants as well as the equipment and workers who will be handling the crops. The system should be fluid from planting to shipping without any snags or hang-ups.

This month we look at the Ultimate Greenhouse Benches. This is the fifth in a 12-part series that will discuss the "what if," with comments from industry representatives about what they think the ultimate greenhouse would (and could) look like. You, too, have the opportunity to tell other **GMPRO** readers about *your* ultimate greenhouse at www.greenbeam.com and in our Green(house) Dreams contest.

DAVID KUACK



greenhouse gems

Problems with aphids, whiteflies and spider mites can be alleviated by not over-fertilizing plants, particularly with nitrogen-based fertilizers, according to Raymond Cloyd, entomologist at the University of Illinois. For example, higher numbers of whitefly eggs are laid on poinsettias that are fertilized with ammonium nitrate than those fertilized with calcium nitrate.

tips on-the-run

Consider alternative energy sources such as wind, water or solar. In some areas it's possible to sell excess electricity back to the local utility.

Natural ventilation systems use a lot less electricity and produce some noise only when the vent window position is changed.

"It's probably the ultimate system available now," he said. "The system can be run by computer. Each bench and tray has a number so the grower can keep track of all the trays, know when each area will mature, etc."

wish list

If Mike Kanczak, sales manager at AgriNomix Inc. in Oberlin, Ohio, designed the ultimate bench system, it would be supported by total automation.

His bench would be an aluminum-framed rolling container with interchangeable wire mesh and plastic ebb-and-flow bottoms. In the production area when the container-loading robot calls for an empty container, the crop scheduling control software would configure the container for the best irrigation method based on the plants to be loaded, he said.

"Each container would have a programmable computer chip that would record the optimum growing recipe for the plants it contains," Kanczak said. "From the crop scheduling control software program I could get real-time inventory tracking and automatically control the movements of the container from one greenhouse control environment to the next."

The production, growing and shipping areas would be connected with smart motorized conveyors and pusher units that read the computer chip and send the container to the proper destination.

"Digital cameras in the greenhouse would allow me to inspect the crop from the comfort of my office," he said.

Walkways in the greenhouse would be unnecessary because each bay would have its own overhead crane so the grower could select any container with a hand-held PDA and bring it to the aisle.

The shipping area would be a specialized greenhouse where plants are unloaded from the rolling containers, graded, sorted and stored on belts in an inventory buffer.

"Sound far-fetched? Each of the internal plant logistics systems described is in use today in greenhouses in North America and Europe," he said.

◆ **For more:** Mike Kanczak, AgriNomix Inc., 300 Creekside Drive, Oberlin, OH 44074; (440) 774-2981; www.agrinomix.com.

Other good use of space includes hanging plants above the floor or the benches, but growers must be aware of light levels, Bartok said.

"Some growers are using a row of short hangers and a row of long hangers above the benches and getting a three-tiered growing system," he said.

Another space-saving technique involves the concept of moving benches outside during spring, summer and fall, he said. For example, a grower might have plants growing on the floor and a second level on benches. The benches roll outside during a nice day and roll back in at night.

"It would work well in the spring, summer and fall, but not in winter,"



The pallet system from Rough Brothers is a network of bench supports with rollers, transport lines and conveyors. The bench tops, or pallets, glide on top of the system.



Paul Boers designed its new benches with rounded corners. The legs are adjustable for height and equipped with a hose drag roller.



Lighten the load

Lou Schenck decided his benches were too big and bulky. Schenck, owner of Schenck Farms & Greenhouses in St. Catharines, Ontario, Canada, thought the bench designs used too much steel, so he asked Paul Boers Total Growing Systems in Vineland Station, Ontario, Canada, to re-engineer some benches without all the extra steel.

"That was very fortuitous because the price of steel is going crazy right now," Schenck said.

Paul Boers came up with 6-foot rolling benches that are flexible, lighter and easier to ship.

"The benches are quite flexible. We use them to grow potted plants and for propagation," he said. "We use some of them with ebb-and-flow plastic liners and others have expanded metal tops."

Schenck grows potted crops including geraniums, kalanchoes and begonias. He uses three of the 6-foot benches in a Venlo greenhouse with standard 21-foot bays.

"The benches give us 18 feet of growing space plus two 18-inch aisles, and we can work on both sides of the bench at the same time," he said.

The benches also were designed with rounded corners "so workers aren't catching clothing on them," he said.

The corners are made of a polyethylene material. The bench legs have a height adjustability feature and a hose drag roller.

◆ **For more:** Schenck Farms & Greenhouses, RR 3, St. Catharines, Ontario, Canada L2R6P9; (905) 684-5478. Paul Boers Total Growing Systems, 3500 South Service Road, Vineland Station, Ontario, Canada L0R2E0; (905) 562-4411; www.paulboers.com.

A high-starting growing medium EC can cause problems with root development, especially in sensitive crops such as New Guinea impatiens.

Because plants use more water at higher temperatures, plants will benefit from more dilute fertilizer rates under warmer conditions.

Keep incoming plant material separated from the rest of the crop until you're certain it's insect and disease free.

he said. "It makes better use of heated or controlled space."

Let it roll

C. Raker & Sons in Litchfield, Mich., solved space and labor issues with the design of its pallet bench system. The system was designed by representa-

tives of Raker and Rough Brothers.

The tops of the benches are made of galvanized, expanded metal. The tops measure approximately 5½ feet wide by 17½ feet long and hold up to 60 plug trays, about double the amount a Hawe rolling bench system holds, said Robert McKnight, facili-



ABOVE: The Dura-Bench from Southwest Agri-Plastics is made of UV-treated polypropylene.

ABOVE RIGHT: A moveable tray system saves labor, but it can make it tough getting plants out of the middle of the greenhouse.



Moss Greenhouses in Jerome, Idaho, grows most of its plants on the ground for better use of space.

Lower level

Benches aren't always the best use of space, so some greenhouse floors are filled with pots and flats. Moss Greenhouses in Jerome, Idaho, grows most of its crops on the floor. Moss grows bedding plants, plugs and hanging baskets.

"Growing on the floor is a better use of space for us," production manager Susan Harris said.

Growing on the floor also is cost-effective for the greenhouse.

"We have houses with our spring crops that are only being used for five or six months out of the year," she said. "It's not worth the expense to put benches in a house we don't use year-round."

Harris uses crushed lava rock covered with ground cloth on the greenhouse floor.

There are a few disadvantages to growing on the floor, such as reduced drainage and airflow. For crops like portulaca that are sensitive to the reduced airflow, Harris sets an empty tray upside down on the greenhouse floor and places the planted trays on top.

"At least that gets the sensitive crops off the ground a couple of inches," she said.

The company has a few areas with benches – some with metal mesh tops and some wooden benches in the older quonset houses. Some of the plugs are grown on benches and the hanging baskets are grown on an Echo system, she said.

Moss Greenhouses has about 6 acres under cover and grows plants varying in size from plug trays up to 3 gallons and hanging baskets up to 16 inches.

◆ **For more:** Moss Greenhouses, 269 S. 300 East, Jerome, ID 83338; (208) 324-1000.

ties manager at Raker. The benches also roll from one end of the facility to the other, McKnight said.

"Raker was looking for a system that would move in all different places in the house," McKnight said. "The Dutch system was a lot smaller and we needed something bigger and fewer benches to move."

Raker previously used the roll-flow system with benches on pipe that didn't move more than 18 inches.

"One of the key things we wanted was to bring work to the people. For instance we weren't going to move the sowing line, instead we want to move product where it needs to be," McKnight said.

An automated system moves the benches anywhere in the greenhouse.

Raker also uses a bench location system so growers can locate any bench and know what plants are on it, McKnight said. Radio frequency

big dreams

"Growing on the floor"

is probably the best use of greenhouse space because you can fill up the entire floor with only a small space needed for walks. If you use the floor instead of benches, you need heat in the floor for good root-zone growth."



— John Bartok Jr., extension professor emeritus, University of Connecticut's Natural Resource Management and Engineering Department, Storrs, Conn.

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We want to move product where it needs to be."

— Robert McKnight, facilities manager, Raker & Sons, Litchfield, Mich.

"[In my ultimate greenhouse] walkways in the greenhouse would be unnecessary

because each bay would have its own overhead crane so the grower could select any container with a handheld PDA and bring it to the aisle."



— Mike Kanczak, sales manager, AgriNomix Inc., Oberlin, Ohio



identification (RFID) tags are fastened to each bench.

Besides labor and space concerns, the plug and liner grower also wanted a bench that would not cast a 3- or 4-inch shadow around the edge.

Palletize plants

Raker's pallet system is a network of bench supports complete with rollers, transport lines and conveyors where bench tops, also called pallets, glide on top of the system, said Sara Grosser, marketing manager and estimator at Rough Brothers in Cincinnati. At the end of each run of bench supports there is another series of supports with rollers to permit perpendicular movement of pallets.

"Bench tops are constructed similar to a standard bench top and can be virtually any size, ensuring efficient use of pallets in any size greenhouse," Grosser said. "The growing surface of each pallet is either expanded metal or ebb-and-flow tray."

With the pallet bench system, a grower can lay out the propagation trays on each pallet, roll the pallets into the germination chamber, then

out to the greenhouse for growing. Once the material is ready for shipping, the pallets are moved to the shipping area.

"The completion of crop management is accomplished without a person touching a single tray, but rather a group of trays at once. The pallet maneuvering system also can be automated like the one at Raker's," she said. "With a pallet bench system, a season of plants can be moved with little effort compared to the labor-intensive procedure of loading material onto carts, unloading each by hand, then reloading the cart and unloading in shipping."

The pallet bench system is ideal for growers of large quantities of crops, she said.

Plastic preference

Mike Pope, co-owner of Pope's Plant Farm in Marysville, Tenn., wanted an alternative to wood benches for his annual plug production.

"We were dead set against using a wood surface since it rots," Pope said. "We noticed a lot of people at tradeshow were promoting plastic and resin bench tops, and we saw that Wal-Mart and Home Depot were using plastic surfaces for displays. We figured all these people couldn't be wrong."

Pope chose Dura-Bench, a plastic bench top from Southwest Agri-Plastics. The bench tops are made of non-porous polypropylene with 1.1-inch by 1.1-inch holes. The benches are treated to resist damage from ultraviolet light and contain an antibacterial additive, said Paul Phillips, vice president of Southwest Agri-Plastics.

"The UV protection and antibacterial protection won't wear off, even

if the product is scratched or marred," Phillips said.

Pope initially purchased enough 2-by-4-foot Dura-Bench panels to create 160 4-foot-wide by 96-foot-long tables.

"The sections were easy to configure and construction was simple," Pope said. "We're using metal legs, so this structure is strong and durable."

Predrilled construction holes provide quick and easy assembly and disassembly without damaging the bench top, Phillips said.

The polypropylene material and the UV protection hold up in extreme weather, according to Michael Nack, owner of Four Seasons Nursery in Denton, Texas.

"It doesn't get hot like steel, so it won't burn workers who have to move the sections. Even with our extreme Texas weather — hot for nine months and cold for three — the Dura-Bench sections won't crack or chip," Nack said. "It's also not as heavy as steel, so it's easy to move around, but still strong enough and tough enough to bear up under the weight of very heavy pots and the constant scraping from sliding pots and racks across them."

The bench tops are peak load tested at 630 pounds.

◆ **For more:** John W. Bartok Jr., University of Connecticut, College of Agriculture and Natural Resources, 1376 Storrs Road, Storrs, CT 06269-4036. C. Raker & Sons, 10371 Rainey Road, Litchfield, MI 49252; (517) 542-2316; www.raker.com. Sara Grosser, Rough Brothers Inc., 5513 Vine St., Cincinnati, OH 45217; (513) 618-7214; sgrosser@roughbros.com; www.roughbros.com. Pope's Plant Farm, P.O. Box 187, Greenback, TN 37742; (865) 856-8099. Southwest Agri-Plastics, 16400 Midway Road, Dallas, TX 75001; (800) 288-9748; www.swapinc.com. Four Seasons Nursery, 3333 University Drive, Denton, TX 76208; (940) 566-2172. **GM PRO**

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