



JOHN SCHMITZ

# Piped-in nutrition

Rich Baughman manually fertigates liner trays at Heirloom Roses in St. Paul, Ore. The company offers more than 2,000 rose varieties.

Greenhouse growers can use fertigation to apply water and fertilizers to their crops at the same time

## *By John Schmitz*

Fertigation is defined as the application of fertilizers, soil amendments, and/or other water-soluble products through an irrigation system.

It is sometimes confused with chemigation, which is the application of chemicals, such as pesticides, through an irrigation system. While both terms are sometimes used interchangeably, this article deals mainly with fertigation and only in a greenhouse environment.

Accepted as a common practice for several decades now, fertigation has become the preferred method in the

Oregon nursery industry for delivering macro- and micro-nutrients to plants in a greenhouse environment. It's estimated that about 90 percent of Oregon greenhouse growers use fertigation.

## **A small investment**

With the irrigation infrastructure already in place, the only cost involved in using fertigation in greenhouses is the installation of some kind of injection system, said Raul Moreno, an agronomist with OVS Aurora. He often recommends an injector that starts at around \$300.

"Once people have invested in the right kind of targeted irrigation, they're almost always on the right track to use



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OV5 crop consultant Raul Moreno and Kathleen Baughman, plant health manager at Heirloom Roses, discuss a portable fertigation injection system outside one of Heirloom's greenhouses.

liquid fertilizers,” said Patrick Peterson of Marion Ag Services.

The beauty of applying fertilizers through irrigation lines, Peterson said, is that “you can control the precise amount you want delivered to the plant, both in quantity of fertilizer and also quantity of water. That is by far the biggest advantage.”

Moreno put it another way: “Fertigation is an excellent tool that allows growers to more precisely manipulate plants.”

When is the best time to fertigate? Generally, “when you irrigate,” Moreno said. But some growers fertigate less often, in which case higher concentrations of nutrients are needed.

Fertigation applications are predicated not on the components in solution but on the plant’s need for water at various stages of the day and the growth cycle, Moreno said.

What’s really important, much more than the type of plant being fertigated, Moreno said, is the growth stage of the plant, as the plant’s nutritional needs change throughout development.

As fertigations progress, formulations, or “recipes,” and dosages change, Moreno said.

“At one stage, the plants need nitrogen; at another stage, you’re going

to be pulling the nitrogen and applying more phosphorous and/or potassium,” he said. “It’s more like something you can be dialing up (ppm) all the time.”

Generally speaking, there are three blends to serve the various stages of plant development: during plant establishment, rapid growth and the hardening phase.

### Fertilizer forms

Fertilizers are available in several forms. Growers can order a concentrated nutrient solution from suppliers and make the secondary dilutions themselves, or they can order the liquid fertilizers fully “melted” in solution and ready to send to plants. A third alternative is buying formulated nutrients in dry form and going from there.

One common mistake greenhouse growers can make is becoming complacent and “relying on the recipe,” and assuming that the injector is correctly calibrated. “I strongly advocate that you test the solution as it comes out of the nozzle with an electrical conductivity (EC) tool,” Moreno said.

He also recommends doing tissue analysis as plants mature to make sure they are taking up the nutrients in the right amounts.

The worst thing that can happen

to a fertigation system is the formation of algae and other substances that clog lines.

“We generally use the dark grey schedule 80 PVC pipe, and white PVC fittings to reduce the amount of sunlight that can penetrate and cause algae to grow,” said Val Tancredi, Stettler Supply Company. “White PVC pipe is a non-starter. Bacterial slime will still grow, even in the winter when the system is used less. Over time this builds up inside the pipes and will flake off in the spring start-up and cause clogging of the last sprinklers on the line.

“We encourage the growers to anticipate this and remove the last few sprinklers and flush the lateral hard, then replace the heads and use. During the growing season, regular maintenance through flushing and water treatment can reduce this.”

Unless it becomes too much of a problem, algae and other contaminants are usually removed at the end of the season with a system flush with a gentle detergent. “It cleans it real quick without a lot of contacts,” Peterson said.

Tancredi said that flushing is a requirement in all drip systems. “We include flush valves on the mainline and submains that supply the drip tubing,” he said. “All poly drip tubing with emitters must be able to be flushed as well.”

These flush points allow the elimination of construction debris from PVC pipe cuttings, dirt and other sources. They also eliminate sediment from non-soluble fertilizer, and organic material (bacterial slime) that may grow in the dark, moist, warm, fertilized environment. This slime must be flushed from the system after water treatment kills the bacteria.

“Bacterial slime is a fact of life in all low volume drip/micro irrigation systems without water treatment,” Tancredi said. “Selecting appropriate fertilizers or acids that lower the pH of irrigation water can control this slime.”

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## ▲ PIPED-IN NUTRITION



Kathleen Baughman, plant health manager at Heirloom Roses, prepares liquid fertilizer prior to fertigation at the nursery, located near St. Paul, Ore.

If one is not using fertilizer, slime may be controlled with oxidizers or sterilants. One of the most common low cost oxidizers is chlorine. Flushing is required to eliminate the slime from the system.

"The frequency of flushing is developed by the operator by observation," Tancredi said. "We encourage the operator to monitor system water quality by catching flush water in a white bucket. This way he knows what's in the system and when it has been flushed clean. We flush as often as required.

"The water source has a lot to do with this. Clean, cold well water with no sand or minerals is not as common as we would like it to be. We evaluate irrigation water for quality to determine the filtration, chemical treatment and flushing frequency that the operator will need to manage. Water quality is evaluated by its contaminants; either physical (suspended silt), organic (bark, seeds, eggs, slime) or chemical (pH or salts) properties."

Instead of cleaning out lines once or twice a season, Moreno said he knows of some greenhouse growers who flush them with a disinfectant or an oxidizer after every fertigation. One product he recommends is Zerotel, which contains hydrogen dioxide. The treatment not only cleans out lines, it also disinfects plants, walkways and walls, Moreno said.

Chris Guntermann of Horticultural Services Inc. said that water quality

going into fertigation or irrigation systems is very important. As an example, he said that iron bacteria can grow inside the pipes, even in the dark, and plug things up. What's more, the nutrients in fertigated water can speed up that process.

Unlike applications of dry fertilizers, fertigation is an ongoing process.

"You will be applying just the sufficient amount of fertilizer that the plant needs for that time," Moreno said. "That's where efficiencies come into play."

### Doubling up

When it comes to installation of fertigation lines, Guntermann recommends double the number of lines. "This way, you'd have a clear water line and a fertilizer water line," he said.

This allows growers to irrigate with clear water anywhere in the greenhouse, which, in addition to other times, is often done just before shipping. A second water-only line also makes clean water readily available for clean-up and drinking. ☺

*John Schmitz is a freelance writer who lives in Salem, Ore. He has written for over 40 publications, including the Capital Press, and is the editor/co-writer of Oregon Seed Grower News, Oregon Blueberry Newsletter and Lookout, a publication that goes to Oregon and Washington Christmas tree growers. He can be reached at johns6869@msn.com.*