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Floral Notes

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Sign-up for the UMass Extension Subirrigation Project

In 1991 the Floriculture Team piloted a subirrigation project to introduce growers to the technology and cultural methods needed to grow pot crops in a subirrigation system. During the last four years, free standing, 6x12 foot "ebb and flood" benches have been placed in the greenhouses of cooperating growers for one crop cycle. We are expanding this program with the help of an Agro-environmental Technology Grant from the Department of Food and Agriculture with matching support from UMass Extension, Massachusetts Flower Growers Association, and Rough Brothers.

Paul Lopes and Tina Smith will assist growers in the initial set-up of the subirrigation benches and monitoring operation during a 6-8 month trial period. During the trial period the grower will use the bench to grow a crop of his/her choice. Irrigation solution fertility level and fungus gnats and shoreflies populations will be monitored and advice on management will be provided if necessary. Overall, the intention is to demonstrate the feasibility of using subirrigation to grow greenhouse crops in Massachusetts.

If you are interested in being part of the subirrigation project, contact Paul (508-295-2212), Tina (413-545-5306), or Doug Cox (413-545-5214) today!

Greenhouse Management

Trough Irrigation from a Grower's Perspective

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Since 1988, the Sustainable Agriculture, Research and Education Program (SARE) has funded hundreds of projects to explore and apply profitable, environmentally sound agricultural systems. Paul and Stacey Chapley of Chapley Gardens, Deerfield, MA received a SARE Producer Grant in 1994 to compare the use of trough irrigation to hand watering. They conducted the project on their crop of vegetatively propagated zonal geraniums in a greenhouse measuring 30 ft. X 96 ft. (2,800 sq.ft). The amount of water, labor, fertilizer and pesticides used, and the quality of the plants at time of sale were compared. They just completed their report for the grant and volunteered to share their experiences for this article.

About Chapley Gardens

Paul and Stacey Chapley own and operate Chapley Gardens, a retail stand for spring and fall markets in Deerfield MA. They manage 10,464 sq.ft. of greenhouse space and operate the business with the help of Paul's father, Paul Sr. and one part-time employee. The Chapleys grow spring crops and fall mums for their retail stand and specialize in plants, fish and equipment for water gardens. Watering plants by hand always took a considerable amount of their time and was a major expense for their business. This expense, along with an increased time commitment for their growing family (four young children) persuaded the Chapley's that something had to be done to water plants more efficiently.

B.T. (Before troughs)

During the 1994 growing season, prior to the installation of the trough system, they grew 2,946 geraniums in 4.5" pots on wooden pallets elevated with lumber and cement blocks. Plants were watered by hand, which was their largest expense. Each watering cost about $26.00 (3 - 4 hours x $6.50/hour). From mid-February to mid-June, 253 hours were tabulated for a total cost of $1,644.50 to water the geraniums. The Chapleys also had problems with fungus gnats, root rots and botrytis that resulted in the application of five pesticide treatments. Even after fungicide treatments, 53 geraniums were lost to root rot.

Building the trough system

To prepare the SARE grant proposal, they began gathering information about subirrigation systems from a variety of sources including UMass Extension and salesmen. Next they visited several growers in New Hampshire who were successfully using troughs in their greenhouses. Once the grant was approved, they sat down and began to design a system.

After a considerable effort to produce a layout design to retrofit existing benches for a trough system, Paul and Stacey decided to scrap that idea. Instead they decided to install a rolling bench system to replace their existing benches. Their pallet benches on concrete blocks would not allow the troughs to drain properly. The installation of rolling benches provided proper drainage for the system and, as an added benefit the rolling benches increased their growing area from 2,182 sq.ft. (75% of greenhouse space) to 2,430 sq.ft. (84% of total greenhouse space).

After the rolling benches were installed, the recirculating trough irrigation system was assembled, just in time for the 1995 growing season. A 300 gallon holding tank was installed under one of the benches. A pump (one-half horsepower) was used to deliver 70 gallons of water/fertilizer solution from the holding tank to the troughs that were erected on 30 rolling benches.

As a result of the rolling benches and trough system, 5,025 vegetatively propagated geraniums in 4.5" pots were grown. This was an increase in production of 41% compared to 1994. Water was pumped to the benches through a main line measuring 1-1/4", then to each of the benches through a line measuring 3/4". A spray bar measuring 1/2"dispersed water at each individual trough. The water trickled down the trough, for 20-40 minutes, until pots were about 75% saturated, then the system was turned off. Water continued to be taken up by plants after the system was shut off, fully saturating the pots. Any remaining water, not absorbed by the plants drained into a vinyl gutter measuring 4". The gutter drained into a sewer return sludge pump, through a nylon stocking filter, and back into the 300 gallon holding tank.

Comparing the old system with the new system

Based on their experiences, the Chapleys made the following comparisons between hand watering and using subirrigation troughs:

Activity/ material	Hand-watering	Trough system
Labor (per watering)	$26.00 (3-4 hr. X $6.50/hr.)	$6.50 (0.5-1 hr. X $6.50/hr.)
Pesticides (one trt. each)	Banrot (root rot)	None
	Ornalin (botrytis)	None
	Gnatrol (fungus gnats)	None
	Talstar (fungus gnats)	None
	Malathion (fungus gnats)	None
Fertilizer (lbs. 15-16-17 per growing season -applied at 200 ppm N)	400	300

A precise measurement of water use was not possible because there was only one water meter for the entire greenhouse range, but the Chapley's estimate they used about 60% percent less water using the trough system versus handwatering.

A summary of expenses is as follows:

Material	Cost
Troughs	$2632
Vinyl gutter and hardware	139
Ball valves	105
Plumbing (water return and recirculation)	439
Holding tanks	241
Hardware	251
Recirculating pump	596
Sewage tank	450
Total	**$4, 855**

The total cost of the trough subirrigation system was $4,855.85. The savings from the labor, pesticides and fertilizer was $1457.00. Based on this information the return on investment for the subirrigation system (not including the rolling benches) is 3 years, 4 months if one crop of geraniums is grown. If a second crop was grown, the savings would be realized even sooner.

In addition to the cost the cost of the subirrigation system, it should be noted that the cost of the rolling benches was $4,617.00.

Summary of the Chapley's Experiences

The following observations were made after our 1995 growing season:

✓ The amount of time it took to irrigate the crop decreased 75%.

✓ The amount of water used to irrigate the crop decreased about 60%.

✓ There was an unexpected decrease in the populations of fungus gnats and shoreflies.

✓ Fertilizer use decreased about 25%.

Based on the Chapley's experiences, this system is easy to learn and can be adapted to a variety of crops. The decrease in labor helped free up workers to do other tasks. By using a closed system, water usage decreased about 60% and no fertilizer was