



Vegetarian Newsletter

A Vegetable Crops Extension Publication
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University of Florida
Institute of Food and Agricultural Sciences
Cooperative Extension Service

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Events Calender

American Society for Horticultural Sciences. (in conjunction with XXVI International Horticultural Congress). Toronto, Ont., Canada. August 11-17, 2002.

Florida Tomato Institute. Ritz Carlton Hotel, Naples, Fla. Begins September 4, 2002. Contact Charles [Vavrina](#) for information.

Cucurbitaceae 2002. Naples Beach Hotel and Golf Club; Naples, Fla. December 8-12. Contact Don Maynard (941)751-7636 x239 or dnma@mail.ifas.ufl.edu .

Commercial Vegetable Production

In-field Soilless Culture of Tomatoes and Peppers as an Alternative to Methyl Bromide

One alternative to finding new soil treatment systems to replace methyl bromide is to use cultural systems that do not depend on soil. Soilless, hydroponic culture of vegetables is commonplace in greenhouse production but has not been used in large-scale, commercial, field production. Soilless systems for outdoor culture of tomato, pepper, strawberry and herbs have been evaluated at the North Florida Research and Education Center - Suwannee Valley in Live Oak for several years with good results.

In 2000/2001, a small field trial (~0.3 acres) of tomatoes, peppers and strawberries was set up at Triangle Farms in Fort Pierce. Plants were transplanted into 4 ft poly bags of perlite laid on top of mulched raised beds with irrigation provided through poly tubing and stick emitters (1/plant). All fertilizer was provided through the irrigation system. Comparable field plantings were used for yield and quality comparisons. Although control of water and fertility were a problem, sap analysis of nitrogen and potassium was at or above the recommended values throughout the season. While costs were high for the system, yields and quality of the fruit were sufficient levels to expand the trial in the next season.

In 2001/2002, a larger trial was planted at Triangle Farms, with approximately 3 acres of tomatoes and 2 acres of peppers. Poly tubes were mechanically filled with perlite in the field with drip tape enclosed within the tube for irrigation and fertigation in order to reduce costs. Individual tubes were filled the length of the row (~600 feet) then cut at the shovel ditches, while the drip tubing extended the entire length of the row. Poly tubes for both crops were placed on top of mulched raised beds. Tomatoes were grown in a single row of tubes per bed and peppers were grown in a double row of tubes per bed, at typical plant densities for field production. Both crops were staked and tied, with stakes inserted in the beds, not the tubes. No equivalent commercial plantings were available for comparison in 2002. The test plots were harvested as a part of the commercial pick-your-own operation.

Consistent fill of poly tubes required practice. Poly tubes that were not sufficiently filled resulted in weaker plants, due to the limitation of the root volume. Monitoring of plant nutrient status is useful to track changes in the plant but frequent observation is essential. The lack of water or nutrient buffering in the soilless system means that flexibility in irrigation and fertigation systems is essential. In 2001/2002, pepper yields and quality were excellent. A severe *Fusarium* outbreak and nutritional stress limited tomato yields and quality. However, customers at the farm market preferred the hydroponic tomatoes over the conventional fruit. The trial will be continued in the Fall, planting a second crop in the same poly bags as a cost saving procedure.



(Lamb, David Neill, G. Hochmuth, R. Hochmuth, Suzanne Stapleton, Cesario Chaverria, Sargent - Vegetarian 02-07)

Florida Water Conservation Initiative Executive Summary

The context of this initiative was presented in the October 2001 issue of 'The Vegetarian'. The full-length final report was released in April 2002 and is available at <http://www.dep.state.fl.us/water/waterpolicy/index.htm>. Below is a summary of the report from the Agriculture Irrigation Work Group.

1. Summary of the 2001 efforts

In response to growing water demands, water supply problems, and one of the worst droughts in Florida's history, the Florida Department of Environmental Protection led a statewide Water Conservation Initiative (WCI) to find ways to improve efficiency in all categories of water use. The WCI evaluated how Floridians use water, and what can be done to make significant, permanent, cost-effective improvements in water use efficiency. The most important conclusion of the participants was that Florida must and can do more to use water efficiently.

The volunteer participants at the WCI public workshops formed six Work Groups to identify and investigate a variety of technological, behavioral, educational, regulatory, and economic methods of improving water use efficiency. A total of 51 recommendations (22 high, 20 medium, and 9 low priorities) are included in this report (Table 1).

Some highlights:

Agricultural Irrigation (for those interested or involved in row crops, citrus and tropical fruits, sugarcane, sod, ornamental growers, and any other type of plant production requiring irrigation.) presents many opportunities for improved efficiency. Key among these are cost share programs to implement irrigation Best Management Practices, more use of mobile irrigation labs to evaluate irrigation efficiency, improvements in the recovery and recycling of irrigation water, and greater use of reclaimed water for irrigation.

Landscape Irrigation (formerly Non-Agricultural Irrigation; this group was suggested for public or private water suppliers, local governments, golf courses, builders and developers, landscapers, irrigation installation and maintenance companies, hotels, and resorts) for watering lawns, ornamental plants, and golf courses can significantly reduce water use through more efficient irrigation system design, installation, and operation, and by reducing the amount of landscaping that requires intensive irrigation.

Water Pricing (suggested for public and private water suppliers, local governments, economists, and rate consultants) is fundamentally important. Florida should implement water conserving rate structures that will reduce wasteful use both in ordinary times and during droughts. Conservation and drought rate structures, informative utility billing, and other techniques can send appropriate price signals to encourage water users to conserve water.

Industrial, Commercial, and Institutional (suggested for industrial, manufacturing and other commercial businesses, paper mills, mining companies, electric utilities, state and federal facilities, schools and other institutions, hotels, resorts, and restaurants) users can improve their efficiency through certification programs for businesses that implement industry-specific Best Management Practices, and through water use audits, improved equipment design and installation, and greater use of reclaimed water.

Indoor Water Use (formerly Indoor Use and Water Features; was suggested for public and private water suppliers, local governments, plumbers, builders and developers, pool and water feature companies, hotels, resorts, restaurants and theme parks) is a growing water use sector. The greatest potential for conserving water in this sector is through increasing the proportion of Florida homes and businesses that use water-efficient toilets, clothes washers, showerheads, and dishwashers.

Reuse of Reclaimed Water (suggested for public and private water suppliers, wastewater utilities, golf courses, agricultural interests, industry, and manufacturing companies) can be made more widespread and efficient by proper pricing, by more metering of its use, and by making progress on increasing reuse in Southeast Florida.

Table 1. Summary of Recommended Water Conservation Alternatives by the Agriculture Irrigation Work Group¹

Water Conservation Alternative	Priority	Total Score	Amount of Water Saved (1 to 5) ²	Cost-Effectiveness (1 to 3) ³	Ease of Implementing (1 to 3) ⁴
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Agricultural Irrigation					
AI-1: Cost share and other incentives	High	10	●●●●●	\$\$\$	✓✓
AI-2: More mobile irrigation labs to achieve water conservation BMPs	High	10	●●●●●	\$\$\$	✓✓
AI-3: Increase rainfall harvesting and recycling of irrigation water	High	9	●●●●●	\$\$\$	✓
AI-4: Increase the reuse of reclaimed water	High	9	●●●●●	\$\$\$	✓
AI-5: Improve methods for measuring water use and estimating agricultural water needs	Medium	8	●●●●	\$\$	✓✓
AI-6: Conduct additional research to improve agricultural water use efficiency	Medium	8	●●●●	\$\$	✓✓
AI-7: Increase education and information dissemination	Medium	8	●●●	\$\$	✓✓✓
AI-8: Amend WMD rules to create incentives for water conservation	Medium	8	●●●●	\$\$	✓✓
<p>1 The "scores" assigned to each alternative have been made by the Department of Environmental Protection, with the benefit of the recommendations of participants in the Water Conservation Initiative.</p> <p>2 A score of 1 indicates the least water saved, 5 the most.</p> <p>3 A score of 1 indicates the least cost-effective, 3 the most cost-effective.</p> <p>4 A score of 1 indicates relatively difficult to implement, 3 relatively easy.</p>					

2. Details of the Water Conservation Alternatives proposed by the Agricultural Irrigation Work Group that involve research or Extension

Through research and Extension, IFAS is likely to be involved in 2 of the 8 proposed water conservation alternatives.

AI-6: Conduct additional research to improve agricultural water use efficiency

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)	Cost-Effectiveness (1 to 3)	Ease of Implementation (1 to 3)
Medium	8	●●●●	\$\$	✓✓

Background and general information

Scientific research has played a significant role in the development of agriculture. This university research has been responsible for

numerous advances in agriculture in such areas as pest resistance, production, quality, nutrient use, and cultivation and irrigation techniques. The university system has produced many publications on irrigation and drainage issues as they apply to agricultural commodities produced in Florida.

Specific recommendation

The State University System should work closely with the agricultural community to pursue applied research in agricultural water conservation. This research should be specific to particular commodities and locations of the state, and target agricultural areas with limited water resources. Research should focus on:

- Determining the most efficient irrigation management practices for specific crops.
- Development and testing of new efficient irrigation technologies.
- Field-testing and/or development of more drought-tolerant and water-efficient crop varieties.
- Development of cost-effective freeze protection measures that use less water.
- Development of methods to reduce water use for crop establishment.

What are the advantages and disadvantages?

Based on past success, research can result in significant long-term water conservation benefits. Previous advances have significantly reduced water use for certain agricultural commodities while maintaining productivity and product quality, and reducing costs. Research requires long-term monetary commitments, and the benefits of this work (water savings) may not be realized for many years.

Who should implement it?

Institutions like the University of Florida and Florida Agricultural and Mechanical University are available to conduct research for improving agricultural water conservation. They should continue to work closely with the water management districts to target water conservation research to agricultural areas of the state with limited water resources. Additionally, they could work closely with the agricultural community to ensure that projects selected for research are applicable and realistic. DACS, the water management districts, and grower organizations should collectively fund these research efforts.

What must be overcome for this alternative to succeed?

Research often requires long-term monetary commitments. Additional funding may be needed. Even the best research on efficient irrigation will fail unless the findings are properly implemented. Efficient systems that are used improperly will still result in inefficient use. Research must be connected to actual irrigation management in Florida.

AI-7: Increase education and information dissemination to water users, water managers, and the public

Overall Score: 8 out of a possible 11 points

Priority	Total Score	Amount of Water Saved (1 to 5)	Cost-Effectiveness (1 to 3)	Ease of Implementation (1 to 3)
Medium	8	● ● ●	\$ \$	✓ ✓ ✓

Background and general information

Agricultural water users, policy makers, and the general public need to be informed about agricultural water conservation opportunities. Many agricultural producers still lack the information about conservation measures that can be taken to improve irrigation efficiency and the costs/benefits associated with these measures. As previously mentioned, Mobile Irrigation Labs (MILs) are an excellent mechanism for transferring this type of information to growers.

Specific recommendation

Educational programs related to agricultural water conservation should be improved and expanded. The Florida Cooperative Extension

Service, MILs, and grower organizations should play a more active role in this arena.

What are the advantages and disadvantages?

Educational programs could result in significant long-term water savings; however, education by itself may not be adequate to motivate agricultural producers to change irrigation practices. Education will work best when combined with regulatory and financial incentives.

Who should implement it?

Water management districts, the University of Florida Cooperative Extension Service, NRCS, public utilities, and the Mobile Irrigation Lab operators currently provide educational information on water conservation opportunities. Information developed through these programs (which typically includes reports, posters, brochures, fliers and other informational materials) is provided to the agricultural community through WMD and state funded programs.

Trained MIL operators should be the primary means of providing irrigation system operators with technical information.

What must be overcome for this alternative to succeed?

Programs must be consistently funded and funding should be increased to make MILs available to all agricultural producers using irrigation. Interagency cooperation and coordination could be improved to maximize delivery of conservation information and avoid duplication of educational materials.

What mix of incentives and mandates would be best?

As previously stated, education will be most effective if combined with regulatory programs and incentives for water use efficiency, and financial assistance when appropriate.

(Simonne - Vegetarian 02-07)

New TPR Label for Dual Magnum on Pepper

Dual Magnum has just received a pretransplant application label for use on pepper through TPR Inc. The label now reads:

Pre-Transplant

For pre-transplant application, apply as a directed spray to pre-formed beds. Apply to the soil surface of the bed as the last step immediately prior to the plastic laying operation. Apply using non-air assisted ground application field sprayers only, a maximum rate of 0.64-0.95 lbs A.I. (0.67-1.0 pint) per acre in a minimum of 10 gallons of water per acre.

Post-Transplant

When applying post-transplant, apply as a directed, shielded spray to pepper row middles between plastic rows. Spray must be directed at the pepper row middles (away from pepper plants with minimal contact to the plastic). Apply with ground application equipment at a maximum rate of 0.95 lbs A.I. (1.0 pint) per acre in a minimum of 10 gallons of water per acre. Do not apply when conditions are conducive for drift.

Do not harvest within 60 days of Dual Magnum application. Do not make more than two applications per crop. For banded applications use proportionally less spray mixture on the soil area actually sprayed. The use of Dual Magnum on pepper without having a signed authorization and waiver and limitation of liability agreement is a misuse of this product. Authorization and waiver agreements must be obtained from TPR, Inc. and signed prior to this use.

(Stall - Vegetarian 02-07)

Vegetable Gardening

Seed Savvy for Starting Transplants

STARTING FROM SEEDS IS A dollar-saving, fun way to begin the edible landscape. Most vegetables, herbs and a few tropical plants can be sown in containers or directly in the ground to begin the next planting. You control what varieties will grow, selecting the very best for flavor, yield and pest resistance.

Begin the edible landscape using the most basic of horticultural skills. Whether it is a broccoli plant or basil, it is exciting to carry a germinated seed to the transplant stage then on to production.

Transplants from the nursery provide a quick start for the garden, but the varietal selection is often limited. One section of seedlings simply may be marked "cabbage," rather than Gourmet, Marion Market of King Cole – varieties recommended for Florida.

Gardeners in search of fancy herbs and unusual vegetables often must start these plantings from seeds because transplants rarely are offered for sale. Seeds are fun and easy to sow. Most produce transplants in four to six weeks.

Garden centers are a good source of fresh seeds, but mail-order companies typically offer a more extensive selection. Seeds also can be found at some grocery and hardware stores. Seeds should be packaged and tested for the current or upcoming year.

In Florida, seed racks are replenished with fresh seeds at least once a year, typically during the summer. These seed packets will be marked for planting the following year. This just means the seed is extra fresh. Good germination should be assured if the packets have been kept dry and at normal room temperatures.

It is not important to find locally grown seed; depending on the crop, conditions for growing many seeds are better in the western United States or abroad.

It is important, however, to choose at least some varieties that have been tested and are recommended by the Institute of Food and Agricultural Sciences at the University of Florida for growing in the state. These often demonstrate extra vigor, improved pest resistance and are likely to do well.

Soil Matters

Fresh seeds are full of vigor, ready to germinate in a warm, moist growing medium. However, germinating seeds are vulnerable to many pests, the worst of which are fungal rots that attack tender roots and shoots. These rots cause a condition called damping off, which can prevent seedlings from emerging or enable them to grow only a few inches tall, then wither and die. Soil gathered from the yard is likely to contain organisms that cause damping off, as well as weeds, insects and nematodes.

Soilless seeding mixtures can be bought at garden centers or from mail-order companies, but the mixes are easy to make at home. Main ingredients are sphagnum peat moss and vermiculite; dolomitic lime often is used to adjust the pH. Fertilizer either can be added to the mix or applied after the seedlings sprout.

How to Sow

Plant seeds in shallow containers. Young plants need little room, and an inch or two for roots is ample during the first few weeks of growth. Innovative gardeners make seeding trays from egg cartons, cottage cheese containers, and fast-food salad, burger and hot dog packaging that have been provided with few holes for drainage.

Recycled pots, market packs and seeding flats also can be used but first should be cleaned of loose soil and potential pests. Soak previously used clay and plastic containers for 10 minutes in a solution of one part laundry bleach to 10 parts water, then brush clean. Wear gloves while working with the bleach solution and allow containers to dry before using.

Fill containers with planting mix to within half an inch from the top to allow space for watering; wet thoroughly.

Before sowing, determine how many transplants are needed. Germination is usually 80 to 90 percent. Where only a few plants are needed, count out and sow one or two seeds to a small pot, section in a market pack or cell in an egg carton to save time needed for transplanting later. Plants should be ready to move to the garden four to six weeks after germination.

Cover large seeds with growing medium to a depth equal to that of their thickness. For seeds the size of sand grains or smaller, simply scatter over the growing medium and gently water.

Moisture triggers germination, but light also is needed by some crops. The seed packet should outline specific cultural requirements.

Where light is not a factor, hold in moisture by covering the container with another pot or tray, a sheet of damp newspaper, a pane of glass or a plastic bag. If the covering is transparent, keep trays out of direct sun or the seeds will bake.

Seeds germinate rapidly in warm locations. A south-facing window with good ventilation, a warm kitchen, a greenhouse or any bright spot where temperatures remain between 60 and 80 degrees is ideal.

Check daily for signs of growth and for moisture; water is the soil begins to dry. Many seeds are quicker to emerge than the gardener expects. In warm, moist conditions seeds of cabbage, collards and broccoli germinate in three to four days; tomatoes and eggplants emerge in five days. Pepper plants should appear in 10 days and parsley, 14.

Remove the covering as soon as green shoots appear; young plants need full sun or bright light.

Seedlings grown outdoors or in the greenhouse generally are the most durable. The direct sun exposure as well as gentle winds and rains toughen the seedlings, making the transition to larger containers or the garden easier. Care for young plants grown indoors and outdoors will be the same.

Care of Seedlings

Fragile, young seedlings can grow rapidly. Within a week, true leaves follow the first pair of seed leaves. Root systems are shallow during early growth, so it is essential the soil is kept moist. Water gently from a fine nozzle, sprinkling can or misting bottle.

As the seedlings grow, check once or twice a day for moisture. When the soil surface feels a bit dry, water until moisture appears from the drainage holes. If the soil stays constantly wet, the root and stem rots that cause damping off multiply. Also make sure that ventilation is good – heat and humidity encourage disease.

If the seeding medium lacked nutrients, begin fertilizing a few days after plants emerge. Use either houseplant fertilizer or a formula made specifically for young plants. A 20-20-20 formula mixed at a rate of a teaspoon to a gallon of water can be used once a week. Feed immediately after watering thoroughly. A medium enriched with nutrients before seeding will not need additional feedings for two to three weeks.

Transplant time

Seedlings started as groups in flats or large pots will be ready to transplant into individual containers in about two weeks. This may seem early, but if a plant has only a few leaves and a shallow root system, the move is easy. When plants are more than an inch or so tall, roots will be intertwined; separation at this stage will injure the plant and slow future growth.

To transplant, gently loosen the seedlings from their container. The plants should pull apart easily if some attempt had been made to space seeds when sowing. A few roots will be broken and torn, but seedlings are tough at this stage. Hold each plant by a leaf for the move to an individual space or container and add potting soil.

Thoroughly water the potted-up transplants and place in full sun. If the weather is hot, transplants may need some shade for a day or two. Almost overnight, however, the seedlings that sagged after transplanting perk up and stand tall, ready to grow.

The best location for developing plants is in full sun, outdoors or in the greenhouse. Outside, a clear plastic cover fixed a few feet above the plants will let in the light but protect the seedlings from storms. Leave two or more sides open for good ventilation.

Water to keep the soil moist. When the surface begins to dry, water. Transplants will use more water as they grow; so check several times a day to be sure the soil is moist but not soggy.

Fertilize regularly with a 20-20-20 or similar formula. Encourage good growth with a weekly application of a solution of a tablespoon of fertilizer mixed with a gallon of water.

Keep plants in full sun to prevent stretched and lanky growth. Most seedlings escape pests, but watch for and treat insects and diseases as needed.

A stocky new plant is ready for the garden after two to four weeks in the transplant container. Plants grown outdoors or in a greenhouse can go directly into the ground.

(Tom MacCubbin, ext. agt., Orange County - Vegetarian 02-07)

The Number One July Gardening Question

Santa Rosa County responds to over 2,000 requests from vegetable gardeners each year. Some questions are of a general nature, including such topics as planting dates, variety selection, fertilization and pest control. Many others require the diagnoses of vegetable plant disorders and recommendations for control.

Though plant disorders run the full gamut, there is one that stands out as most frequently experienced by area vegetable gardeners during early summer. To quote several hundred gardeners each year: "My tomatoes were beautiful, but just before they started getting ripe, they developed these big, black spots on the ends." As agents we see and hear about blossom-end rot each spring and summer. Blossom-end rot is described as a calcium deficiency, but what is really happening in home gardens is often more complicated.

Most soils within the County are acidic and low in calcium by nature. Sometimes the problem is simply due to lack of sufficient calcium in the soil. Calcium or "blossom-end rot" sprays are sometimes used, but should only be considered as stop-gap measures. Soil testing helps to identify the calcium level and the correct amount of lime to be applied for future plantings.

Even with sufficient calcium levels in the soil, it is possible to have severe blossom-end rot problems. This is usually due to poor irrigation practices.

Once the soil around tomato plants becomes extremely dry, calcium can suddenly drop out of solution and become unavailable to the plant. Since calcium has a low solubility, it might not become available again during the critical fruit development stage.

Since cell division, differentiation and enlargement occurs at the blossom end of tomato fruit, any interruption in the availability during this stage can result in blossom end rot. It appears that home gardeners are able to water enough to grow a sizeable "bush", but when tomato plants set fruit there is a sudden increase in the need for water. If sufficient moisture is not maintained, or if the soil dries out even one time, a deficiency of calcium can result.

Blossom-end rot in the home vegetable garden is therefore better described as a calcium movement problem, rather than a calcium deficiency. Controlling blossom-end rot involves a two-pronged approach. The soil should be tested in order to maintain an adequate level of calcium, and the irrigation amount and frequency should be increased to keep calcium moving within plants.

(Daniel Mullins, ext. agt., Santa Rosa County - Vegetarian 02-07)

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