



# **Greenhouse Committee Report:**

## **A Study to Determine the Feasibility of Constructing an Operational Greenhouse at the Leon County Cooperative Extension Office Tallahassee, Florida**

December 2006



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## **Background**

In July of 2005, the Board of Directors of the Leon County Master Gardeners Association and David Marshall, our Master Gardener coordinator, sanctioned the formation of a committee to examine the feasibility of constructing an operational greenhouse at the Leon County Cooperative Extension Office, Paul Russell Road, Tallahassee, Florida.

Ed Oaksford agreed to act as committee chair and interested master gardeners were solicited to participate. The initial committee members included; Kathy Carmichael, Bill Crosswell, Betty Jo Cutchen, Loretta Denes, Linda Lanier, Barbara MacDonald, Lillian Miller, Cheryl Naylor, Dave Voss, Martha Weinstein, and Tricia Yates. Brittany Harris, Darlene Horton, Vicky Schwartz, John Stimel and Bob Douglas joined in later.

The objective of the group was to determine the beneficial functions a greenhouse could provide to the master gardener program and the feasibility of constructing such a structure at the site of the Cooperative Extension Office.

The approach the committee took to accomplish its goal was to conduct individual research and share findings at periodic meetings to share results. In addition, it was determined that field trips to local master gardener and institutional greenhouses would be conducted to gather additional first hand information from actual greenhouse owner/operators.

## **Findings**

Members of the committee unanimously agreed that an operational greenhouse at the Extension Office would provide a real educational benefit to the program providing students with hands-on experience in propagating plants in a greenhouse environment. Furthermore, it was felt that the plant propagation efforts of master gardeners could further the Master Gardener program mission of sharing desirable plants suitable for our area with the larger community by offering these plants for sale or for free at Spring and Fall Open House Events.

With that in mind, the committee forged ahead, thinking that building and operating a greenhouse would be easier than we ultimately found out it would actually be. Research from literature and our field trips uncovered a number of critical considerations that make the pursuit of a fully functional greenhouse something that requires a great deal of planning and a fervent commitment to operation and maintenance long after the greenhouse itself is constructed.

A list of the key considerations necessary to resolve are included below:

1. Greenhouse Siting – This includes locating, orienting, providing for drainage, providing support facilities, providing for flow of materials and product, providing for potential expansion, and acquiring necessary building permits.
2. Design Issues – This includes determining greenhouse size, shape, and skin material.
3. Greenhouse Temperature Control – This includes heating and ventilation with the associated automatic controls as well as provisions for shading. This also includes the need for electrical service being supplied and possibly a propane gas supply if gas heat was chosen. Both heating and ventilation are both relatively costly because greenhouses are so poorly insulated due to the nature of their design function.
4. Plumbing for Water Service – This includes the need to provide water for plants with an adequate number of outlets and potentially installing an automatic watering and misting system to water plants and cuttings.
5. Flooring, Benches and Bench Stands – For flooring this includes the choice of material that allows for good drainage and is comfortable to work on. For benches this includes the choice of material and ultimate layout to maximize growing space in the greenhouse. In addition overhead support for plants must be considered if hanging baskets will be utilized.
6. Recurring Costs – This includes all those materials that must be purchased to maintain the greenhouse operations. This would include everything from potting soil and fertilizers to covering repair costs and paying monthly utility bills to cover gas, water and electrical charges.

As a result of our research, it became imminently clear that an investment in a greenhouse was quite a commitment. Our discussions with greenhouse owner/operators provided copious advice on the need for careful planning and execution of greenhouse construction plans and without exception, advised that the commitment to maintaining a smoothly operating greenhouse is something that needs to be just as carefully planned for and programmed.

Field trips allowed the committee to visit two distinct types of greenhouses with distinctly different missions in terms of producing plant product. One was at the residence of a committee member (Cheryl Naylor) and represented a high end homeowner greenhouse, and the other was a much larger production scale greenhouse at a local institution (Goodwood Plantation) dedicated to propagating heirloom plant varieties. The pictures that follow were chosen because they address certain aspects of the critical issues discussed above that need consideration when deciding to build a greenhouse.



Cheryl Naylor's freestanding greenhouse was 14 by 22 feet and was constructed of fiberglass supported by metal framing. As you can see from this photo, what was once a location bathed in sunlight has become dappled sunlight due to the growth of trees on the property. However, because cooling can be so difficult in the summer having the shade of deciduous trees can be a benefit.

This greenhouse has come to be used primarily as a shelter for delicate plants in the winter.

An electric heater that is suspended from one corner of the greenhouse provided heating. A fan on one side of the greenhouse and companion vent louver system, that opened when the fan was on, provided ventilation. Both of these systems are automatically switched



on and off by thermostatic control. Automatic watering capabilities were not installed in this greenhouse and all watering is accomplished

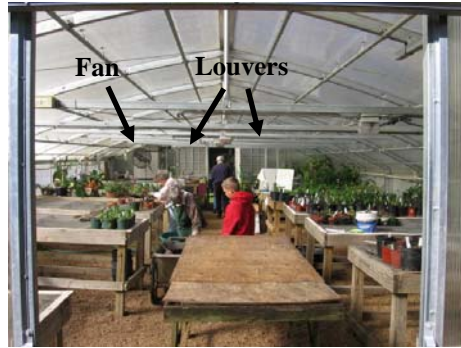
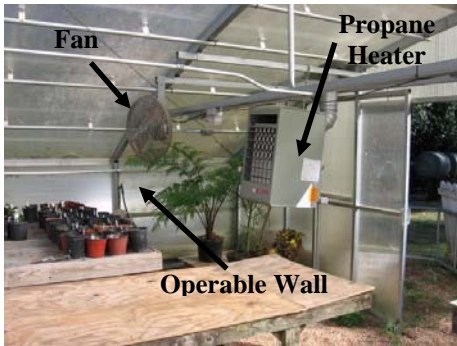
manually via hose connection to interior water spigot. The floor of this greenhouse is sand which provides good drainage.

The Goodwood greenhouse is clearly designed and used for more production scale propagation activities. Shown below, this 24 by 48 feet greenhouse was also installed with adequate structure to provide overhead support for plant containers.

Greenhouse Feasibility Study



This greenhouse is constructed with a tubular framework onto which triple walled polycarbonate sheets were attached. This greenhouse is ten years old and cost in excess of 20,000 dollars when installed. Heating for this greenhouse is provided by a propane gas heater suspended from the tubular framing. Summer ventilation is achieved with large fans, louvers and operable side-wall panels that open to let in fresh air. Both heating and ventilation are controlled automatically by thermostat. As an example of the magnitude of expenses incurred for heating a greenhouse in the winter, this facility paid approximately \$1,200 dollars a year for the necessary propane.



Watering capabilities are enhanced in this operation where watering is controlled by automatic timers with multiple zones and multiple cycles during the day. Special misting spray heads are used for keeping cuttings moist. Mister cycles for instance, can be set to come on every half hour for thirty seconds.



## Greenhouse Feasibility Study



Facilities at this site also include a smaller 16 by 24 foot shade house constructed with a tubular framework, covered with shade cloth, and enclosed on each end with fiberglass siding with openings for access. This structure provides space for plants that are being moved from the greenhouse to harden off in a more protected environment.

On-site composting is accomplished at this site with two large commercially available composting bins that provided the capability to produce a nutrient rich supplement their potting mixes.



In summary, research clearly showed the benefits of having a greenhouse but underscored the necessity for careful planning and execution of the building and ultimate operation and maintenance of the structure.

Information gathered from greenhouse owner/operators during actual field visits supported those findings and underscored the underlying importance of

acquiring and maintaining a high level of financial and staffing support for any greenhouse operation. The greenhouse staff at Goodwood demonstrated just how much can be accomplished by a group of well coordinated and dedicated volunteers.

### **Committee Recommendations**

As a result of this research, the greenhouse committee would like to recommend to the Master Gardener Board of Directors that the Master Gardener Program proceed with efforts to construct greenhouse facilities at the Leon County Cooperative Extension Office in Tallahassee, FL.

The committee would like to recommend that efforts be made to move ahead on considering a small-scale production greenhouse (on the order of 16 by 32 feet) to provide educational opportunities to the Master Gardener Program, outreach opportunities to the public and plant production opportunities to supply plant material at Open House events. Further discussion with board and David Marshall is needed with regard financial arrangements for the construction and continued maintenance of any greenhouse program.

The committee would also like to recommend that a low-end, small-scale (8 by 10 foot) home-owner type greenhouse (with no utilities installed) be constructed and maintained on site in order to demonstrate to the public, during Open House events, how such structures can be incorporated into the suburban landscape. This structure could also be used as transition space for plants being moved from the proposed production greenhouse to harden off before planting much like the shade-house facility was used at Goodwood Plantation.

To accomplish the recommendations discussed above, the committee recommends that a formal standing greenhouse committee be formed to further pursue the specifics and fine details required to pursue the actual design, construction, and operation of the proposed greenhouse facilities proposed for the Leon County Extension office site should the Board decide to proceed with a greenhouse project.

The recommendations provided by the greenhouse committee are tempered with the caveat that committee members are not experts in the field of greenhouse construction or operation but have learned a great deal in the pursuit of this endeavor. In keeping with that premise the committee submits these recommendations to the Board for their consideration and further input based on their experience and knowledge of greenhouse operation and actual commitments that can be made by the Master Gardener program.