Design, Development and Use of an Ornamental Teaching Garden at the Indian River Research and Education Center, University of Florida

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Keywords: education, outdoor laboratory, environmental horticulture, instruction

Abstract

In 1997, a new University of Florida (UF) teaching program was established at the Indian River Research and Education Center (IRREC), Fort Pierce, FL, USA. Increased student enrollment and the need for hands-on laboratory activities outdoors inspired the idea of transforming a 0.81 ha piece of fallow land into a teaching garden. The north half of the garden was developed as a subtropical fruit demonstration block displaying 88 specimens of mango, lychee, avocado, citrus and other tropical fruit. The south half of the garden was designed as an ornamental display garden. Site preparation required elevating the plot, installing an underground French-style drainage system, and creating berms for accent and definition. The 8-zone irrigation system was professionally designed for maximum versatility and appropriate water usage. The walking areas of the garden (approximately 740 m^2) were sprigged with seashore paspalum (*Paspalum vaginatum* 'Sea Isle 1') selected for its drought tolerance, wear tolerance and chinch bug resistance. Features of the ornamental teaching garden include a pond containing native aquatic plants, a rose garden, and a collection of salt tolerant species. In addition, students enrolled in Florida Native Landscaping and Annual and Perennial courses designed and installed a native plant garden and an annual and perennial display entrance. For teaching purposes, all plants are identified by family, genus, species, and common name. The garden is intended to serve as an outdoor teaching laboratory available to many classes offered at IRREC. It also serves as an ideal location for variety trial testing, master gardener training, as well as leisurely visits from the general public.

INTRODUCTION

While plant collections of a botanic garden can be used as an educational tool of various forms, some plant collections have been specifically developed for the purpose of teaching. For example, the collections of the W.J. Beal Botanical Garden were created by its founder, Professor W.J. Beal to supply living plant material for his classroom teaching program, which was based on observation and experimentation in the laboratory (Telewski, 1999). Many other plant collections affiliated with universities are integrated into the curricula of courses in landscape design, landscape construction, herbaceous and woody plant identification, and turfgrass management (VanDerZanden and Cook, 1999; Hamilton, 1999; Olsen et al., 1999).

Over the years, the University of Florida (UF) has developed satellite programs throughout the state where various undergraduate degrees in agriculture are offered. These programs provide the opportunity for place-bound students to earn a baccalaureate degree from the College of Agriculture and Life Sciences in several different disciplines and the opportunity for enrollment expansion outside the boundaries of the main campus in Gainesville. The opportunities and challenges of developing off campus research and education centers have been well discussed (Verkade et al., 1988; Tignor and Wilson, 1999; Klock-Moore et al., 2000; Wirth and Thornsbury, 2001). One challenge encountered, particularly for environmental horticulture courses, was the lack of on-site plant

Proc. XXVI IHC – The Horticulture Knowledge Business
Eds. C.R. Rom and G.R. Dixon
Acta Hort. 641, ISHS 2004
Publication supported by Can. Int. Dev. Agency (CIDA)

collections or botanical gardens for hands-on laboratory exercises. It has been well documented that students retain more when actively learning (Bonwell and Eison, 1991). By definition, learning is the process whereby knowledge is created through the transformation of experience (Kolb, 1984). Students tend to learn what they care about and remember what they understand (Ericksen, 1984). The teaching gardens at IRREC were developed as an outdoor teaching laboratory in an effort to link learning, thinking, and doing. Other UF research and education campuses throughout the state have already developed or plan to develop teaching gardens for similar purposes. In addition to serving as a hands-on learning site for class labs and projects, beautifying the campus, and bringing positive exposure to new teaching programs, the establishment of ornamental gardens creates a unique opportunity for trialing plants in different temperature zones throughout the state.

MATERIALS AND METHODS

A 0.40 ha fallow piece of land adjacent to the IRREC teaching greenhouses (Fort Pierce, FL) was transformed into an ornamental teaching garden over the course of three years. The materials utilized and processes involved are outlined in Table 1. Many of the items listed were donated but the estimated cost is shown to illustrate how costly professionally creating even a small garden can be.

Initial Site Preparation

Site preparation required elevating the plot, installing an underground French-style drainage system, and creating berms for accent and definition. The drains were located 12.7 cm deep (with increasing depth) every 12.2 m running south to north of the garden. The 10 cm corrugated plastic leach pipe was embedded in gravel and surrounded with a ground cloth to allow water to percolate to the pipe and drain to the north ditch.

Irrigation

An 8-zone irrigation system was designed for maximum versatility and appropriate water usage. A 5 cm diameter pvc sub-main line was inserted along the central east/west axis of the garden. Nine 2.5 cm, full flow, low voltage irrigation pvc valves were teed directly on the main line: 8 for the irrigation zones and one for the pond. The irrigation on the berms was comprised of poly tubing for easy adaptability. Hunter rotor heads were placed in shrub and tree areas and mist heads were used in the lower growing herbaceous areas.

Plant Material

Large trees and palms were relocated on site to create immediate height and shade. Other foundation trees and shrubs were acquired and planted based on landscape design specifications. This created the foundation of the garden, to which other hardscapes and plantings were added.

Features of the ornamental teaching garden include a pond containing native aquatic plants, a Florida native garden, a rose garden, and a collection of salt tolerant species.

Turf

The walking areas of the garden (approximately 740 m^2) were sprigged with seashore paspalum (*Paspalum vaginatum* ‘Sea Isle 1’) selected for its drought tolerance, wear tolerance and chinch bug resistance (Duncan and Carrow, 2000). Sprigs (300 bushels) were hand spread and embedding into the soil with a straight disk. A roller was attached to the back of the disk to compact the soil around the sprigs.

Signage

Plant material was labeled with signs designating the family, scientific name, and common name. Plant identification and informational signs were engraved on UV stable

and weatherproof, non-glare laminated impact acrylic material sheets using a computerized engraving system (Xenetech, Baton Rouge, LA). Signs were cut to size using a table shear and inserted into metal sign/stake holders. Plants native to Florida were designated as such with a mechanically sketched outline of Florida. This style of signs was chosen for maximum flexibility so that cultivar names can be readily replaced, botanical names can be updated based on new taxonomic classifications, and so that the plastic portion of the sign can be readily turned backwards during student plant identification quizzes. The material cost to manufacture each sign was approximately US$3.50.

RESULTS AND DISCUSSION

Construction Costs

The cost of the gardens to date is estimated at US$28,700.00 (Table 1). A multiplication factor of 2.5 was added to account for labor and equipment, resulting in a final total of US$71,640.00. The majority of this cost was covered by donations and use of on-site agricultural assistants and equipment.

Educational Value

A number of courses offered at IRREC will utilize various aspects of the garden (Fig. 1, Table 2). Evaluation results from students enrolled in Florida Native Landscaping (ORH 3815C) are shown in Fig. 2. On average, the students surveyed rated the teaching garden as an excellent outdoor laboratory resource with a broad range of applications for other courses. On average, students felt that the teaching garden served as a very good to excellent tool for illustrating bedding preparation, maintenance, and landscape design principles. All students rated the gardens as excellent for improving retention of plant material and reinforcing lecture and lab concepts. Overall, the value of the teaching gardens was rated by students as very good to excellent. Similarly, VanDerZanden and Cook (1999) reported the multifunctional use of a horticulture teaching garden established at Oregon State University. They found that because the students used the garden for a number of classes and were significantly involved with how it developed, they had a sense of ownership in the garden and viewed it not only as a learning laboratory but also a reflection of the skills they developed during their undergraduate horticulture education.

Student Recruitment

As a new teaching program, alternative ways to bring IRREC exposure and recruit students are continually explored. During the past year, aspects of the teaching gardens have been highlighted in newspaper and magazine articles, and radio and television shows (Table 3). These promotional presentations help to highlight IRREC for its excellence in teaching, research, and extension and in turn attract new students to our undergraduate and graduate programs.

ACKNOWLEDGEMENTS

College of Agricultural and Life Sciences Journal Series No. - pending.

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Tables

Table 1. Components involved in creating the Indian River Research and Education Center (IRREC), University of Florida, Fort Pierce, FL, USA, teaching gardens with actual cost or estimated donation value.

	Description	Company/source	Estimated cost or donation (US$)
1	Initial elevation and grading; Installation of French-drainage system with eight north to south trenches spaced 40’ apart	River Country Citrus, Ft. Pierce, FL	$ 2,664.48
2	Irrigation & electric	Boynton Pump & Irrigation Instant Lair, Ft. Pierce, FL Home Depot, Ft. Pierce, FL Park’s Rental	$ 5,084.47
3	Trees/shrubs	Plant Haven, Ft. Pierce, FL Tripson Trail Nursery, Vero Beach, FL Hackberry Hammock Nursery, Ft. Pierce, FL Horizon Nursery, Vero Beach, FL Skinner Nursery, Palm Beach Gardens, FL Rockledge Nursery, Rockledge, FL Oasis Tree Farms, Pahokee, FL	$ 3,299.50
4	Pond and aquatic garden	Gordon Barney & Assoc., Baton Rouge, LA International Stone & Marble, Ft. Pierce, FL Home Depot, Ft. Pierce, FL Earthwise Mulch, Stuart, FL	$ 2,203.12

5	Native garden	Environmental Equities, Inc., Hudson, FL Hackberry Hammock Nursery, Ft. Pierce, FL Maple Street Natives, Melbourne, FL Plant Haven, Ft. Pierce, FL Indian Trails Native Nursery, Lake Worth, FL Mesozoic Landscapes, Inc., Lake Worth, FL The Natives, Inc., Davenport, FL Green Images Nursery, Christmas, FL Native Plant Society, Stuart, FL Sanibel Captiva Conservation, Sanibel, FL	$ 1,339.30
6	Annual and perennial beds	Emerald Coast Growers, Pensacola, FL Speedling, Sun City, FL St. Lucie Co. Master Gardeners, Ft. Pierce, FL Home Depot, Ft. Pierce, FL The Crape Myrtle Nursery, Gainesville, FL	$ 593.00
7	Rose garden with fountain	Whitten's Landscape, Ft. Pierce, FL Sam's Club, Ft. Pierce, FL Home Depot, Ft. Pierce, FL	$ 282.13
8	Salt tolerant native garden	The Natives, Inc., Davenport, FL Indian Trails Native Nursery, Lake Worth, FL Mesozoic Landscapes, Inc., Lake Worth, FL Green Images Nursery, Christmas, FL	$ 232.70
9	Soil amendments and mulch	Earthwise Mulch, Stuart, FL Universal Enterprises, Pompano Beach, FL Home Depot, Ft. Pierce, FL Florida Pine Straw, Mayo, FL	$ 3,063.39
10	Garden hardscape (concrete path, trellises, benches, etc.)	Trellis Structures, Beverly, MA Tidewater Workshop, Egg Harbor City, NJ D&M Concrete, Inc., Ft. Pierce, FL Home Depot, Ft. Pierce, FL	$ 4,533.71
11	Signage (University of Florida logo and plant signage)	UF Work Management, Gainesville, FL Johnson Plastics, Atlanta, GA Collier Metal Specialties, Garland, TX	$ 2,431.46
12	Turf (*Paspalum vaginatum* 'Sea Isle 1')	Emerald Island Turf Inc., Punta Gorda, FL	$ 2,400.00
13	General supplies (fertilizer, soil, chemicals)	BWI, Apopka, FL Agro Distribution, Plant City, FL UF Soil Testing Lab., Gainesville, FL Home Depot, Ft. Pierce, FL	$ 530.37
Subtotal			$ 28,657.63
X 2.5 (multiplication factor)			$ 42,986.45
Total Estimated Cost			$ 71,644.08

Table 2. Courses offered at the Indian River Research and Education Center, University of Florida, Fort Pierce, FL, USA, that can utilize the teaching gardens.

Prefix	Course Title
ORH 3815C	Florida Native Landscaping
ORH 4804C	Annual and Perennial Gardening
ORH 3050C	Principles of Floral Art
PLS 3221C	Plant Propagation
HOS 3013C	General Horticulture
PLP 3002C	Fundamentals of Plant Pathology
ORH 3513C	Environmental Plant Identification
FRC 3252	Tropical and Subtropical Fruits
ENY 3005C	Principles of Entomology

Table 3. Various resources used to promote the Indian River Research and Education Center (IRREC), University of Florida, Fort Pierce, FL, USA, gardens and recruit new students.

Media exposure	Title	Date and source
Magazine article	"University of Florida IRREC teaching garden"	Aug., 2002; by Peter Chapin, editor, 50 Plus Magazine, Fort Pierce, FL
Internet & CD virtual tour (www.i-ota.net/uftg.htm)	"Panoramic view of the teaching gardens"	June 11, 2002; by John O'Connor, www.i-ota.net/uftg.htm, Panometrics technical imaging, Fort Pierce, FL
Newspaper article	"Touring the teaching garden"	May 9, 2002; by Strelsa Schreiber, columnist, The Tribune, Fort Pierce, FL
Television	"Plants out of place, part II"	May 6, 2002; by Karen Diamond, producer, Information Television Network, Palm Beach, FL
Newspaper article	"New teaching facility dedicated"	April 17, 2002; by Paula Holzman, staff writer, The Vero Beach Press Journal, Vero Beach, FL
Newspaper article	"The garden of knowledge"	April 17, 2002; by Chris Matula, staff photographer, The Palm Beach Post, Palm Beach, FL
Newspaper article	"Institute dedicates new teaching facility"	April 17, 2002; by Paula Holzman, staff writer, The Stuart News, Stuart, FL
UF/IFAS news	"Native plants in the garden"	March 12, 2002; by Tom Nordlie, staff writer, UF/IFAS news, Gainesville, FL
Newspaper	"Take a trip to the IRREC teaching garden"	Dec. 1, 2001; by Robin Koestoyo, guest columnist, The Tribune, Fort Pierce, FL
Radio interview	"The treasure chest"	June 3, 2001; by Charlie Neeld, news director, WPSL-1590 AM, Fort Pierce, FL

Figures

Fig. 1. Undergraduate students taking a plant identification quiz for Florida Native Landscaping (ORH 3815C), Indian River Research and Education Center, University of Florida, Fort Pierce, FL, USA.

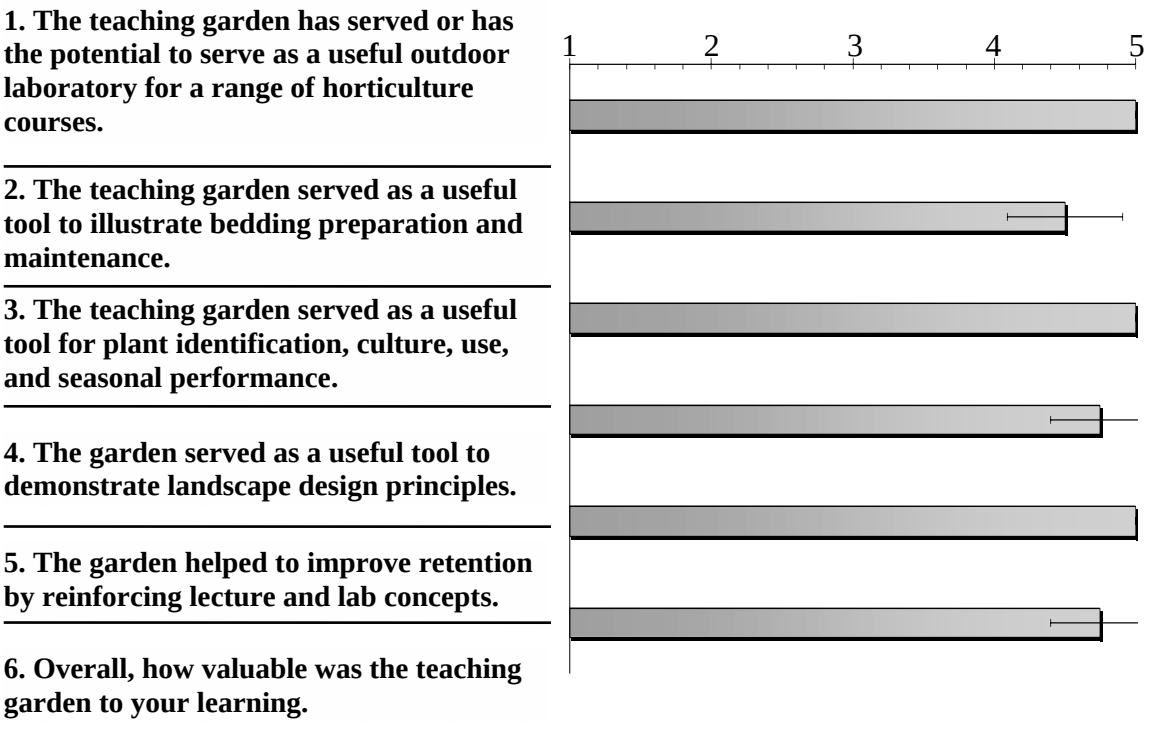

Fig. 2. Student assessment of the value of the gardens as a teaching tool, Indian River Research and Education Center, University of Florida, Fort Pierce, FL, USA. Student responses were averaged based on a scale of 1-5 (1 = poor and 5 = excellent).