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## SFA Gardens Newsletter, Mar 1993

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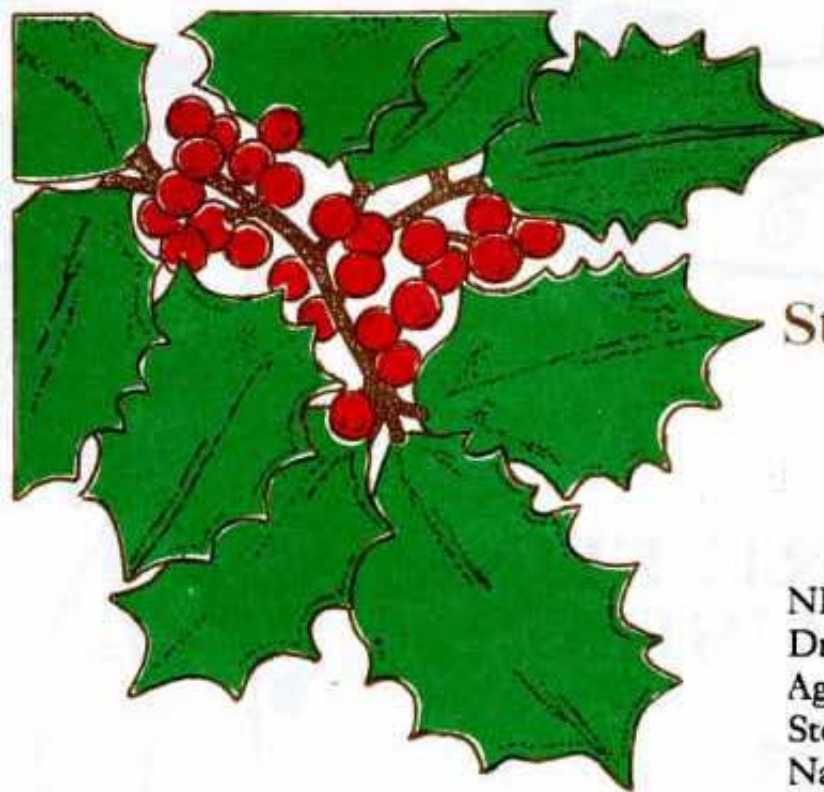
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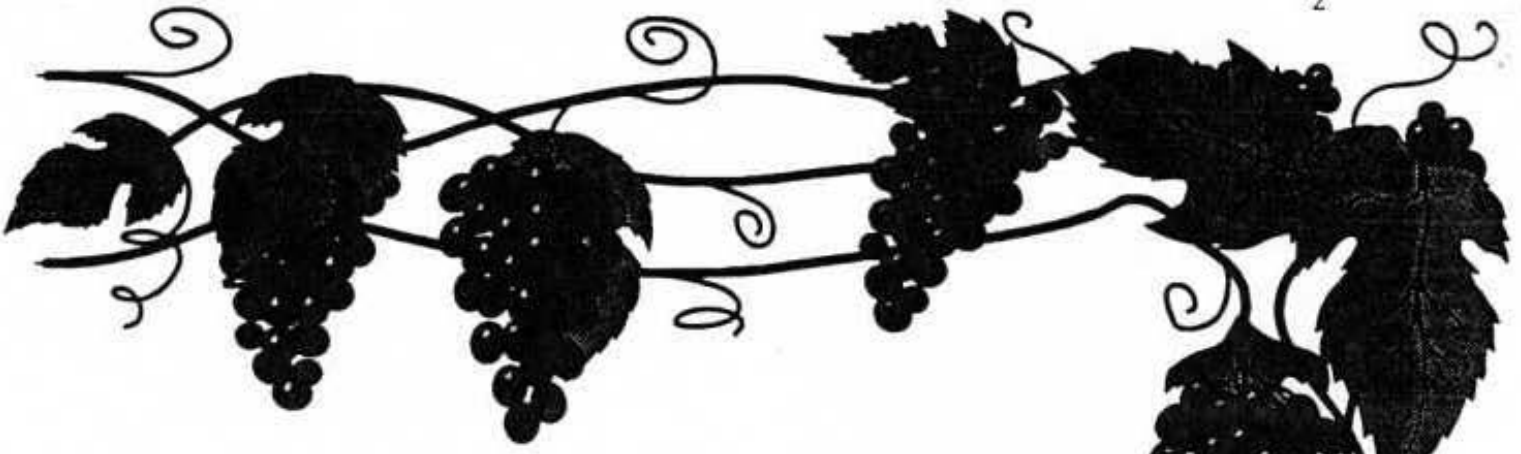


# Friends of the Stephen F. Austin State University Arboretum

NEWSLETTER NO. 12, MARCH, 1993  
Dr. David Creech  
Agriculture Department, Box 13000  
Stephen F. Austin State University  
Nacogdoches, Texas 75962  
(Telephone: 409-568-4343)

## TABLE OF CONTENTS

NOTES FROM THE GARDEN .....	3
THE LATEST DEVELOPMENT PROJECTS .....	3-5
THE DAYLILY AND IRIS GARDEN .....	5-6
TEXAS HERITAGE GARDEN .....	6
THE PERENNIAL BORDER .....	6-8
THE DRY GARDEN .....	9-10
THE FERN GLADE .....	10-13
THE ROCK GARDEN .....	13-14
THE BOG GARDEN - Peter loos .....	14-16
THE HERB GARDEN - Kurt Whiting .....	16-17
ARBORETUM GARDEN GALA DAY - MAY, 1992 .....	17
ASHS MEETING AND THE HORT CLUB VICTORY .....	17-18
ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF BOTANICAL GARDENS AND ARBORETA .....	19
NEGLECTING OUR NATIVE PLANT TREASURES .....	19-20
DECIDUOUS CONIFERS FOR TEXAS .....	20-22
REGIONAL ARBORETUMS FOR TEXAS? .....	22-26
PLANTS AND PEOPLE .....	26-27
THE ECOLOGY OF THE TWO KNOWN TEXAS COMMUNITIES OF SILKY CAMELLIA, <i>Stewartia malacodendron</i> L. - by Peter Loos .....	27-33
GEOGRAPHIC INFORMATION SYSTEM TECHNOLOGY (GIS) : APPLICATIONS FOR HORTICULTURE - by Darrel McDonald .....	33-36
UNDERSTANDING THE LANDSCAPE ECOLOGY OF NACOGDOCHES .....	37-39
BOOK REVIEWS .....	40



# SFASU ARBORETUM OPEN HOUSE

MAY 29, 1993  
9 AM TO 5 PM

- 1. GUIDED TOURS
- 2. REFRESHMENTS
- 3. PLANT SALE

THE HORT CLUB IS FEATURING  
A CLEARANCE SALE - PERENNIALS,  
RARE WOODIES, TROPICALS, ETC.





## NOTES FROM THE GARDEN

According to Webster's, an arboretum is a collection of woody and herbaceous plants assembled together for scientific and educational purposes. According to me, an arboretum's a place where there's always too much to do, too many weeds to pull, a plant to plant, or a surprise to behold. Since the last newsletter (please don't remind me how long ago that was!), the arboretum has grown by leaps and bounds. New plants and garden spots abound and it's amazing just how much can be done on limited resources with an enthusiastic cadre of students and supporters. The SFASU Arboretum mission is to promote the conservation, selection, and use of the native plants of the south and to promote diversity in landscape.

Doremus Nursery, Tree-Search Farms, Anderson Nursery, Texas Native Nursery and many others are due a special note of thanks for donating plant materials to our collection. Now that the arboretum is well-established, we are able to trade plants and cuttings with enthusiasts everywhere. Our only limitation is that there's not enough hours in a day.

### THE LATEST DEVELOPMENT PROJECTS

Since the last newsletter (January, 1992) we have added many new features. See facing map.

A new Iris display garden now rests just to the south of the herb garden and borders the stream that separates the arboretum from the Intramural field.

At the front of the arboretum, Rick Walston and Kevin Borowski added an interesting cedar-shake roofed kiosk to display maps behind plexiglass and house handouts, announcements, and brochures. We think they did a super job.

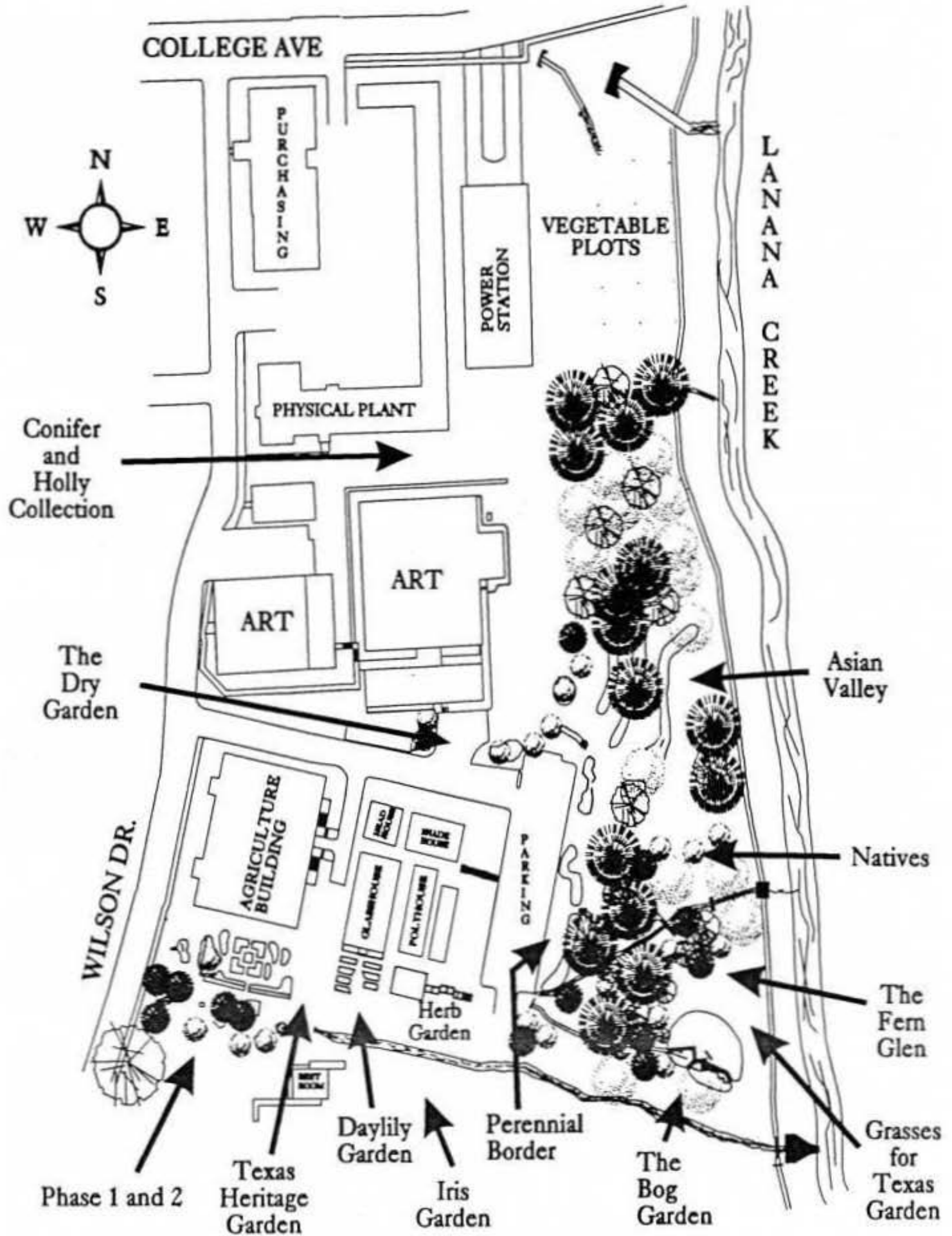
The Texas Heritage Garden structure was a major effort by Shannon Short, Kevin Borowski, Rick Walston, Cleve Moore and many others. The twelve-by-twenty-foot structure features six, twelve-inch thick cedar posts that support a roof of old-timey cedar shakes. The shakes were donated by George Millard of Nacogdoches. Each post is home to an old climbing rose - gifts of the Antique Rose Emporium near Washington on the Brazos..

We have added a heavy-duty bridge on the LaNana creek trail, the arboretum's second eagle scout project. The Arboretum provided the materials (treated lumber, railroad ties, and fittings). The kids and more than a few dads provided the labor. Solid enough to support a small tractor, the bridges cross two main drainways that carry runoff from the arboretum into LaNana creek.

A new theme garden has been give form just to the north of the bog in the shade of our forest: the fern glade. An outdoor sitting area, small footpath bridges, and raised garden beds are key features. The project was accomplished primarily with the help of two Youth Opportunity Unlimited (YOU). YOU is a great program to help disadvantaged, high-risk

# THE SFASU ARBORETUM

## APRIL 1993



kids who spend about eight weeks on the SFASU campus each summer. The kids enjoyed the hard work because they were creating something that would last.

We expanded our collection of perennials throughout the garden with a generous donation of about 300 railroad ties from the Texas State Railroad, Rusk, Texas. Thank you, Curtiss Pruitt and Curtis Merchant!

### DAYLILY AND IRIS GARDEN

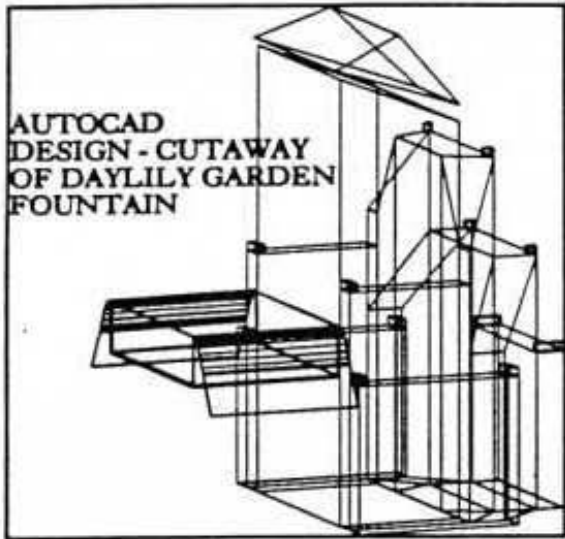
The Daylily garden received a transfusion of new varieties, a little expansion, and improved labels. We will soon install a heavy bronze plaque, a recent gift from the local chapter and testimony to the perpetuity of this interesting display garden. Thanks go out to Jean Barnhart, Delores Jones, Carlita Arrant, Jean Stephens and others for supporting this showcase.

Most important, the fountain, the centerpiece of the daylily garden, is finally running. The cutaway figure of one-half of the daylily fountain was drafted in AutoCAD by Jason McCormick, a CAD student at SFASU. First initiated in the spring of 1991 with a project completion goal of six months, the fountain project developed an odd and complicated life of its own. The

"kinetic/or  
g a n i c

piece" is the central feature of the daylily garden and is a generous gift from the local chapter of the American Hemerocallis Society. Susan Elking, Mario Grabar, and the work-study crew deserve the credit for seeing this project to completion. One and a half years of on-site modification, politics, social skills, and design headaches taught us the virtue of patience, and fine tuned our sense of humor.

As part of the Iris garden project, Peter Loos, Susan Elking and an army of volunteers erected a railroad tie retaining wall on the south side of the daylily and herb garden. The vertical eight-foot wall that defines the southern edge of the daylily garden is deadmanned, cabled and drained. After backfilling and a few heavy rains, it never moved an inch. We have more than once suffered through the experience of repairing walls that have fallen, leaned or just blown out. Not this time.





Peter Loos' work on the Iris garden yielded hundreds of square feet of new growing space. Peter was the recipient of the American Iris Society's 1991-21 graduate scholarship for a proposal to establish an Iris research and display garden in the arboretum. He's laid a fine foundation for the future. Jean Barnhart donated 31 registered hybrids of Louisiana Iris and we've set them in a wet area just to the south of the herb garden. Don Curtis, School of Business at SFASU, donated a wonderful collection of Louisiana and Japanese Bearded Iris.

## THE TEXAS HERITAGE GARDEN

The garden was dedicated on May 23, 1993 as a part of the afternoon events of the SFASU Arboretum Garden Gala Day. A gift of the Daughters of the Republic of Texas, the garden features a display of the landscape plants popular during the days of early settlers. A zig-zag cedar post fence encircles the garden and provides an old-time backdrop for beds of old-timey shrubs and garden plants. Unable to find or finance a rustic log cabin, we settled on a pergola. Ten by twenty feet, the structure is a rustic spot to rest and smell the roses. Bourdark beams add a touch of the 1800's and useful benches in this garden. Old-timey plants like hollyhocks, nasturtiums, johnny jump-ups, evening scented stock, four o'clocks, bachelor buttons, flags, old daylilies and hardy red and white amaryllis, provide an interesting mix to the woody backbone of this theme garden. Other interesting plants include a Vitex (taken as a sucker from a tree planted in 1848 near Alto, Texas), a tulip tree (*Liriodendron tulipifera*) from seed collected at Mt. Vernon from trees planted by George Washington (a gift of H.G. Hitchcock, long-time friend of the arboretum), and 8 antique climbing roses (a gift of the Antique Rose Emporium).



## THE PERENNIAL BORDER

The arboretum's collection of perennials has continued to expand into new areas. There are plenty of standouts.

*Cheiranthus* 'Bowles Mauve' - may also be referred to as *Erysimum linifolium* 'E.A. Bowles': a special bushy mound that has been evergreen in the arboretum through two over two winters. Semi-woody at the base, the plant appears to respond to light shearing. Our original plant was set in the fall of 1991 as a small set and is now a uniform globe three feet

in diameter and almost that tall. Erect stems are clothed in stiff gray-green linear leaves. Half-inch flowers are a clear mauve and arranged in elongating racemes. The plant has a tendency to appear a bit on the straggly side at times but its evergreen habit, long-season blooming, and unique habit are worth the effort.

*Penstemon triflorus* and other Penstemons - the Beard-Tongues - are very showy in bloom and it's apparent that there are many species that can thrive in our climate. The general consensus is that even the most tolerant types demand sharp drainage. Some even perform well only when placed in a gravelly sand root medium. In general, light fertilization is preferred and mulch should be avoided, except perhaps for a light coating of sharp gravel. A good seeding date for greenhouse production would be in early to late fall with output in March of well-filled out 4-inch containers.

*Veronica* 'Sunny Border Blue' - is another standout. Acquired as a single plant from an east coast specialty nursery, we have multiplied this plant and planted it at several spots in the arboretum. This plant was voted as the Perennial Plant Association's 1993 Plant of the Year and for good reason. The plant has an interesting history. Bob Bennerup of Kennington, Connecticut made a trip to Denmark and returned with several varieties of *V. spicata* and *longifolia*. He hybridized these and *V. 'Sunny Border Blue'* was born. Unfortunately, this was at a time when perennials were losing favor and the plant soon disappeared in the trade and the original stock was lost. Ron Chiabotta of Potomac Nursery, Potomac, Maryland found some growing at Carrol Gardens, Westminster, Maryland, in 1977. Rob propagated the plant, distributed it and the clone was saved. Easy blooming over a long season, the clone appreciates a well-drained organic loamy soil, and full sun to part shade conditions.

*Salvia coccinea* or Texas Sage reaches 3', and is periodically cloaked in blooms. The plant has neat ovate to heart-shaped one to two-inch leaves, somewhat pubescent, with small rounded teeth on the margins. Native to southern U.S. and Mexico. Used as an annual in the north; we can grow it as a perennial if mulched. We have several color forms. 'Pink Glimmer' is very floriferous; we had masses in several parts of the arboretum blooming heavy off and on spring, summer, and fall. We have a salmon-colored form that looks promising and a new 'white' fills out the color spectrum available in this species.

*Salvia farinacea* or Mealy-cup sage is a fine Texas native that deserves a place in every garden across the south. We have several varieties under test with either blue or white flowers. The species returns from the crown dependably if mulched through The winter.

*Salvia greggii*, another fine Texas native, is somewhat woody in our location. A sub-shrub to three or four feet, the species is now available in a range of color forms. Texas Native Nursery, Austin, Texas, has donated to the arboretum a fine collection of color finds that include various hues of red, pink, salmon, and, most recently, a yellow-flowering form. While the yellow is a not dramatic (almost a cream) it is a new find and fills out this fine species. The plant responds to a well-drained soil, full-sun location and appreciates an occasional dead-heading.



*Salvia guarantica* is from Brazil with long inflorescences sporting dark blue-purple blooms, some reaching 12 inches in length. Often used as an annual, the species will return after mild winters if mulched. Another full-sun, well-drained soil species, the plant deserves a spot in every east Texas garden. We have also acquired *S. guarantica* X *gesnerifolia* that is similar to the species in most respects although it is reported to have greater hardiness and slightly longer inflorescences.

*Salvia leucantha* or Mexican bush sage is a mixed bag in terms of landscape value. I mention it because of the number of folks that called about the plant when it was in bloom this last fall. Heat-loving, this species fails to make much of a showing until late spring and early summer and then only with a cloak of leaves and stems. A fall-bloomer, the plant is kind of blah throughout most of the year. I guess the fall show is probably worth it. Our masses of *S. leucantha* use the two known forms available. The species type enjoys a show of long slender flower spikes of lavender flowers touched with white. We also have 'Royal Purple', an all-purple form. Both forms develop into vigorous plants that compete well with weeds. The fall bloom lasts six to eight weeks and can be prolonged by an occasional deadheading of the spent blooms. Drought and pest-resistant, the species prefers a full-sun, well-drained location. Mulch lightly during the winter and prune to a few inches above the ground. This plant is native to Mexico.

*Salvia* 'Van Houtteii' is a new form for us. Recently available in Texas, we have found this species to be very competitive with weeds. Reaching four feet by early summer, the plants take on a cloak of bright red blooms through the summer and fall. The variety responds to periodic hedging of the spent blooms.

*Salvia discolor* is a departure from many of the Salvias; it has striking gray leaves and stems, both are very sticky to the touch and the blooms are almost black. I have not found the species in any of my references (an east coast specialty nursery purchase) and I am not sure of its ultimate hardiness.

*Salvia azurea* or Blue Sage has been a dependable returner in the arboretum. Native to Texas, the species reaches three feet and remains cloaked in blue flowers through the summer and fall.

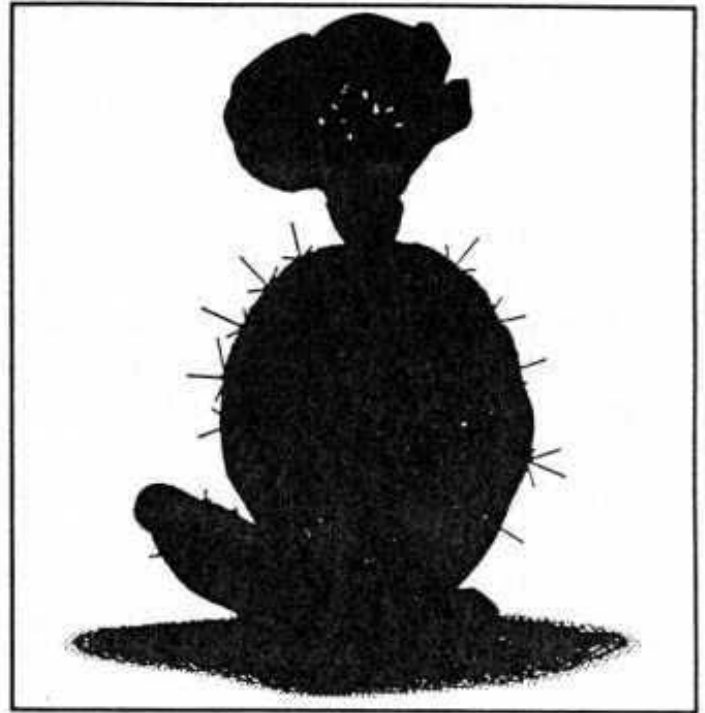
*Salvia argentea* or Silver Sage has unique woolly leaves, almost white when they are new and unfolding. The species prefers a very well-drained soil and full sun.

*Salvia elegans* or Pineapple sage acts as an annual in most years. We have had a few return in mild winters.

## THE DRY GARDEN

One of my favorite gardens, the dry garden is the easiest to maintain. We've settled on a bi-annual weeding and pruning and we use a backbone of *Lantana* and *Sabia* species as a groundcover to compete with weeds.

Standout performers have been the Mexican cone-hats, standing cypress, the tiny *Ruellia*, several *Scutellarias*, *Penstemon triflorus*, *tenuosus*, *murryanus*, and *cobea*. As our dry-loving trees, shrubs, cactus, agaves and others get a little stature, we intend to reduce some species to make room for more diversity. There are many woodies that deserve mentioning. A fastigate oak from Mexico courtesy of John Fairey and Carl Schoenfield of Waller, Texas is a very interesting addition to our collection. An *Amelanchier* ? from Mexico dates back to a 1987 expedition to Mexico and is about the slowest grower I have ever seen while still looking healthy and sporting blemish-free leaves. There about six *Ilex deciduas* collected as seed from the San Madre Oriental mountain range in 1988 that finally look well established. We need more garden bed space for dry-loving plants. For instance, Scott Reeves, a former student of mine now finishing a Master's degree at Colorado State University, has provided us with 15 different *Penstemons*. *Penstemon procerus*, *P. smallii*, *P. rydbergii*, *P. virgatus*, *P. strictus*, *P. glaber*, *P. 'Husker Red'*, *P. 'Prairie Dusk'*, *P. 'Utah State'*, *P. 'Mesa'*, and other hybrid selections. We have developed thirty flats in the poly house and look forward to their performance in the hot sunny dry garden border. The only fertilization in the dry garden border this year was a few wheelbarrow loads of well-composted chicken litter lightly sprinkled around plants and on top of a one inch layer of bark mulch. We did give some of the dry garden two heavy irrigations during the almost two-month summer drought. Some areas received no supplemental moisture and never missed a beat.



Most impressive is the continued good performance of *Conradina canescens*, a sub-shrub from Florida that shows great promise as evergreen, fine-textured, two-foot tall shrubs; they are perfect for edging or massing in garden beds. The following is a description of the species that appeared in a *Gardens and More* article by the author.

*Conradina canescens*

Landscapes that use less water are definitely becoming more popular as pressures on city water supplies in Texas increase. We are being educated at every turn about plant selections for dry landscapes and new plants are being added as candidates all the time. *Conradina canescens* is a diminutive sub-shrub member of the Labiatae family, and one of

four species native to the sandy coastal flatlands of Florida and Alabama. It looks well adapted to the sandier well-drained and droughty soils of central and eastern Texas. We have acquired a small collection of *Conradina* species from Woodlander's, a rare plants nursery in Aiken, South Carolina, and look forward to their performance in the dry garden.

The plant is described as a much-branched low shrub to three feet with dense clusters of grayish-green, needle-like leaves. Flowers are numerous, small and showy with color forms of white, lavender and purple reported. The bloom display is striking in early summer and lasts several weeks. The plant exudes a mild, pleasant fragrance when the leaves are crushed. We have been evaluating a white and blue-flowering form of the species for several years. In the SFASU Arboretum, the colony is established in a very-dry, full sun, raised bed location on the north side of a hot parking lot. Once established, *Conradina* can do fine with no supplemental water in east Texas. The bed is kept lightly mulched with pine bark and hand-weeded. The first plant in the arboretum was set as a small one-gallon plant in 1988 and is now four feet in diameter. The species provides good shade beneath the foliage and is fairly easy to keep weed-free in a dry environment. *Conradina* is a strong evergreen and can be cut back lightly during the growing season to encourage a wave of new growth. In the hard freeze (zero degrees fahrenheit) of December, 1989, *Conradina* lost most of its leaves but suffered only minor stem die-back and recovered quickly in the early spring, 1990. The plant needs no more pruning than any other landscape shrub. Cuttings under mist are easy with or without hormone and need to be removed from mist just as soon as roots emerge. We quickly created a border of the species for the raised bed by planting on two foot centers. The plant is fine-textured and needs only an occasional light pruning to keep it clean and showy. We have not experienced any disease or insect problems. The plant makes a fine companion to the coarser-leafed *Salvias*, *Penstemons*, *Lantanas*, and other dry-loving plants. Will Fleming of Houston notes that the species may need to be replanted every four to five years because it gets woody and straggly.

Several nurseries in Texas have stock and are increasing numbers. If you've got a bright, sunny, well-drained, and very dry spot in your garden, or if you're looking for a short-statured flowering shrub or just something a little bit different, then you may want to try a *Conradina*.

## A NEW FERN GLADE

Jack Price is a special plantsman living in a beautiful setting in the woods near Blanchard, Louisiana. Jack, a retired gunsmith and bonafide plant and conservation advocate, donated a fine collection of ferns to the arboretum in August, 1992. Jack also gave the arboretum a wide collection of native trees and shrubs including Bigleaf magnolias, cucumber magnolias, sweetspires, silverbells, and others. Until recently, Jack operated a small specialty plants nursery, specializing in ferns and uncommon native plants. Erin Smith has been quietly placing plants in the shade garden this spring. Species





added include Pentas, two cultivars of *Ardisia japonica* that we propagated last fall (NCSU #803 and Chirimen), an unknown *Veronica*, Black monkey grass, various violets, a creeping Mazus, and many others. Should be one of the prettier places in the arboretum in just a year or two.

The new fern garden rests just to the north of the bog in the shade of a mixed forest. Four workers in the Youth Opportunities Unlimited (YOU) program had a big hand in laying the railroad tie steps, preparing the beds, and mixing in copious wheelbarrow loads of compost. An interesting sitting area is a key feature. Ferns were placed into two collections: native ferns (native to the south) and exotic. The following species are included:

#### Natives:

Netted Chain - *Woodwardia areolata* - deciduous, prefers shady wet area, makes a good ground cover and spreads well in good sites.

Virginia Chain - *Woodwardia virginica* - deciduous, grows almost anywhere if soil is wet.

Sensitive Fern - *Onoclea sensibilis* - deciduous, will take some sun if good moisture, makes a fine ground cover.

Christmas fern - *Polystichum acrostichoides* - evergreen, grows to 30 inches, prefers a good shade.

Log Fern - *Dryopteris celsa* - evergreen, likes shady damp area, to thirty inches tall in two years.

Woodfern - Southern Shield - River fern - *Theolyperis normalis* - also known as *Thelypteris kuntii* and *Dryopteris normalis*, grows almost anywhere, needs some sun, deciduous, gets larger and thicker each year, fronds to thirty inches.

Marginal Woodfern - Leatherwood Fern - *Dryopteris marginalis* - shady, wet areas, needs good moisture in summer.

Southern Maidenhair - *Adiantum capillus* - shade or filtered light, needs good moisture in summer.

Northern Maidenhair - as above but from north.

Lady Fern - *Athyrium filix-femina* - deciduous, filtered light, easy to grow, delicate, rare.

Royal Fern - *Osmunda regalis* - deciduous, shady moist areas, will tolerate sun if moist.

Interrupted Fern - *Osmunda claytoniana* - partial to full shade, damp.

Cinnamon Fern - *Osmunda cinnamomea* - deciduous, shady wet area, will tolerate some sun if soil is moist.

Beech Fern - *Thelypteris hexagonoptera* - deciduous, shady moist areas.

Blunt -lobed Woodsia - *Woodsia obtusa* - shady damp areas.

Ebony Spleenwort - *Asplenium platyneuron* - evergreen, good for small gardens, prefers strong shade.

Southern Woodfern - *Dryopteris ludovicana* - shady wet areas, rare

Holly Fern - *Cyrtomium falcatum* - evergreen, grows to thirty inches, will tolerate some sun.

Victorian Brake - *Pteris ensiformis* - moist, shady area

Toothed Wood Fern - *Dryopteris spinulose* - shady area.

Silvery Spleenwort - *Athyrium thelypteroides* - shade to partial shade.

Mariana Maiden Fern - *Thelypteris torresiana*

Ressurrection Fern - *Polypodium polypodioides*

#### Exotics:

Korean Rock Fern - *Polystichum tsus-simense* - long used in the south, dark green, good in small areas and garden pockets, grows to 12 inches tall.

Shaggy Shield Fern - *Dryopteris atrata* - evergreen, growth to 24 inches, prefers filtered light, native to China.

Tassel Fern - Japanese Lace Fern - *Polystichum polybelpharum* - also commonly referred to as *Polystichum setosum*, evergreen to 24 inches in shady areas.

Chinese Woodfern - *Thelypteris decursive pinnata* - also known as *Dryopteris decursive pinnata*, shady areas with good summer moisture, native to China.

English or Hedge Fern - *Polystichum setiferium* "Rotunda cristata" - filtered light, medium shade

Wallich's Fern - Himalayan Woodfern - *Dryopteris wallichiana* - shade to partial shade, medium moisture, will grow to four feet tall in good garden sites.

East Indian Holly Fern - *Arachnoides aristata* - shade to partial shade, medium moisture.

Japanese Climbing Fern -

Sword Fern - *Nephrolepis* -

*Thelypteris dentata* - also known as *Dryopteris dentata*

Japanese Painted Fern - *Athyrium nipponicum* "Pictum" - deciduous, fairly easy to grow, coloration pink to burgundy, stems with grey pinna tinged blue and rose. Best for color in shade.

Autumn Fern - *Dryopteris erythrosora* - evergreen, grows to 30 inches, new fronds emerge in a copper color, turn deep green when mature and returning to copper color in fall. Native to Japan and China.

Lace Fern - *Microlepia strigosa* - a hardy, creeping fern from Japan and China. Easy to grow, requires occasional division of clumps and removal of dead fronds.

English Painted Fern - *Athyrium otophorum* - deciduous, to 24 inches, wine-red croziers with silver fronds, mature through stages of gold-green, finishing a glossy dark green, reported to be hard in all zones.

## UNDER CONSTRUCTION: THE ROCK GARDEN

Susan Elking has tackled a large theme garden just to the south of the herb garden. The project serves as the thesis for a Master's of Fine Arts and integrates art and landscape through the medium of rocks, wood, steel, water, earth, and plants. I'm not an artist but I respect Susan's ability to deliver on a project when she sets her mind to it. First, Susan was able to persuade a limestone rock quarry near Cleburne to donate a substantial tonnage of rock to the arboretum. Five twenty-five ton loads are on the site and three loads carrying large five-ton boulders are set to arrive in the next few weeks. While the rock was donated, trucking was not. Susan persuaded two companies to haul at below state-regulated rates and then discovered that she need an exemption for this effort through the Texas State Railroad Commission. After months of conversation and a little help from Senator Bill Haley, Susan was able to get the exemption certificate into the hands of the trucking company and rock was soon on its way. The garden will eventually be a "room" comprised of stone and plants, the sound of water never far away.

Thanks go out to Tom Crossett of Central Point Rock Quarry for the generous donation of stone to the arboretum. Lucille Brewer has donated seven large landscape rocks with special character; these rocks are smooth and curvaceous, the result of eons of time in swift, running water. David Dyson of LaFarge Quarry was of great help in securing these pieces. Atlas and Empire Trucking companies are also due a note of thanks for their patience and willingness to haul at less than half the state mandated rate. George Elking, Susan's father, of Slay Industries in Dallas, was also of great help in working out trucking details. Senator Bill Haley took the time to get the Railroad Commission on our side for this worthwhile cause and, finally, John Rulfs and James Harkness of the Physical Plant at



SFASU, came through for the payment on all trucking costs, a pilot project for additional rock that may be added to the campus landscape in the future.

## NOTES FROM THE BOG - by Peter M. Loos



I received my Masters degree from SFASU in May, 1992, so I am no longer working at the arboretum. While there, I was witness to a lot of theme garden development. With the help of the arboretum staff and two very special personal friends, Joe Tate of Houston and Susan Elking, SFASU Art graduate student, the new Iris garden was built. In 1992 the bog garden was expanded to include a Gulf Coast Grassland prairie planting and a deciduous azalea collection consisting of native-to-the-south deciduous azaleas and some selections that have been made of some of the said species. Several new species found a home in the bog, some of the most exciting include: *Sarracenia purpurea*, Pitcher plant;

*Ilex glabra*, Whiteberry Inkberry Holly; *Lobelia cardinalis* 'Pink Heather', a Pink Cardinal flower; *Sabatia kennedyana* (listed in North Carolina as an endangered species), Meadow Pink; *Hibiscus dasycalyx* (listed as an endangered species in Texas); and many new species were introduced to the knolls surrounding the bog. Finally I would again like to thank Dr. David Creech for all the opportunities and experience during my eighteen months as Assistant Director and graduate student.

The native Southeastern deciduous azaleas (*Rhododendron* spp.) are a showy group of shrubs that warrant more use in the landscape. First, before I describe the genus and the species, I need to point out that because of their habitat needs, use of these plants is limited to east Texas and the pineywoods (to include the sandy soil sites in Houston). The group of azaleas that are deciduous (and the evergreens) are members of the *Ericaceae* or Heath family and belong to the genus *Rhododendron*. There is some disagreement as to the number of species found in Texas; this article covers the two most accepted, *R. canescens* and *R. oblongifolium*. All the deciduous azaleas



are erect and spreading, thinly branched shrubs to approximately ten feet tall, and of various flowering times and bloom color. The leaves are two to three inches long and one-half to one inch wide. They are found in habitats that are moist acidic sandy soils with an overstory that provides light, dappled shade. In east Texas, azaleas are common to the edges of bogs and seeps. The species are found eastward to Florida and North to Delaware and west to Ohio. *R. viscosum*, is found from Mississippi east to Florida and as far North as Cape Cod in Massachusetts and Maine. Propagation can be accomplished by seed collected and planted in Fall or cuttings (semi-hardwood).

*Rhododendron canescens*, Piedmont Azalea is native to East Texas and is one of the most attractive species. The pink fragrant one to two-inch blooms are found in clusters in early Spring (mid to late March) and appear before, or with, the leaves making them even more showy. Although one of the easiest to grow, it still needs specific habitat conditions which are moist sandy soil (wet but well drained) that is acidic, and because of summer heat, preferably with some shade.

*Rhododendron oblongifolium*, white Azalea or Honeysuckle Azalea also found in Texas where its the most wide spread and latest flowering azalea in East Texas and Western Louisiana. It averages eight feet tall and can be found blooming from April to September (usually late May to early June) with a few to several, in showy terminal clusters, white 1"-1 1/2" long flowers. This azalea tolerates even wetter conditions than the piedmont azalea. Some texts list a shorter (1'-3') more rhizomatous species called *Rhododendron coryii*. In fact, Cory Azalea in Texas may be a variety of *R. oblongifolium*.

*Rhododendron alabamense*, Alabama Azalea is another early bloomer having blooms before or as it leafs out. The blooms are white with a blotch of yellow on the upper lobe of the tube shaped flowers. It can be found growing in mixed, well-drained Woodlands in Alabama, Georgia, Florida, and North to Tennessee. Where it grows with *R. canescens* intermixed or in close proximity, hybridization apparently occurs; the flowers of the putative hybrids are generally pale pink and have 1,2, or 3 of the lobes blotched with yellow.

*Rhododendron austrinum*, Yellow Azalea or Florida Azalea has very showy yellow to reddish tube like flowers that appear in clusters, before or as shoots of the season develop, and is sometimes fragrant. It is also limited to the wooded bluffs and slopes or banks of small woodland streams in far East Mississippi to the Florida Panhandle including Southwest Georgia. Because of the March/April bloom period, this azalea is perfect planted with the piedmont azalea.

*Rhododendron prunifolium*, Plumleaf azalea has blooms that appear in summer after the shoots of the season are mature. The 1" to 3" long tube-like flowers are pink to crimson in clusters. It is also found in ravines along streams in Alabama and Georgia. It has been widely planted at Calloway Gardens in Pine Mt. Georgia where it must be native or from close by. The contrast of the red blooms make it work very well with *R. oblongifolium*. My experience with this azalea has shown me that in Houston it needs to be planted in almost full shade and even then the leaves may "burn off" in late Summer (August) but doesn't seem to damage the plant severely.

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*Rhododendron serrulatum*, Summer Azalea, Swamp Azalea, or Swamp Honeysuckle is a lot like *R. oblongifolium*. In Mississippi it can be found growing along the edges of Pitcher Plant Bogs. The flowers are only 1/2" to 1" long in terminal clusters and white but occasionally marked with pink. This is one of the latest bloomers, blooming after the shoots of the season in late Summer (July-September). I have seen this species bloom as late as early October in Houston. This species is sometimes listed as *R. viscosum* var. *serrulatum*, Clammy Azalea Variety.

*Rhododendron viscosum*, Clammy Azalea or Swamp Azalea is also a late summer white or pink tinted flowered shrub. As stated earlier, this azalea can be found growing in the wild as far North as Maine. In the Southeast it is found in swamps, wet woodlands, bogs, shrub-tree bogs and bays, or seasonally wet pine flatwoods.

There is one other azalea that deserves mention, *Rhododendron chapmanii*. Chapman's Azalea is the only evergreen azalea native to the South U.S. and is worthy of cultivation in East Texas. The foliage is the same shape and size as the deciduous species. The tube-like 1"-2" pink blooms appear in clusters in late spring.

The deciduous Azaleas are a beautiful group of shrubs that warrant more use in East Texas landscapes. Depending on the species, you can have bloom color from mid March to late September. So, if you're in East Texas and have moist acidic soils and need a shrub, consider one or more of these azaleas and to everyone GOOD GARDENING in 1993.

## NOTES FROM THE HERB GARDEN - by Kurt Whiting

The herb garden has made great strides in the last year. Plants are well-established, weeds are less of a problem, and drainage has been improved. Climbing roses now adorn the lattice screen that lies between the quonset greenhouse and the herb garden. These old climbing rose varieties were a gift from the Antique Rose Emporium. Resistant to black spot in most years, antique roses are dependable long-season bloomers. Two lines of Vetiver, a vigorous perennial clumping grass, vigorously define the steps that lead to the arboretum's creek-side plantings. This lane was seen as a critical visual tool to steer visitors into the bottomland collections and theme gardens. Vetiver reaches 8' in a year's growth and has returned reliably after two winters. The clumps should be cut to about six inches above the ground just before spring growth begins. In the winter the light yellow-brown blades, though dead, are very showy and rustle in even the slightest wind. The plant can be set on fire and burned back but a sharp hedge clipper makes short work of a clump.

The Herb Society of Deep East Texas and a few horticulture students maintain the herb garden. The society's goal is to display in a pleasing fashion a wide diversity of herbs and to sign and interpret that collection. Soon, high quality labels will be placed. The AutoCad maps will be updated and available on-site. The gardens will expand by another 1000 square feet of raised garden beds framed by railroad ties. Mary Lou Hamilton has donated the following to the collection: Cardamom (*Elettaria cardomomum*), Chocolate mint

(*Pelargonium* species), Costmary (*Tanacetum balsamita*), Cuban oregano (*Coleus amboinicus*), a Datura with dark stems (*Datura stramonium*), Gotu kola (*Hydrocotyle asiatica*), Hoja santa (*Piper auritum*), Patchouli (*Pogostemon patchouli*), Royal sage (*Sabia regla*), Society garlic (*Talbaghia violacea*) and Yerba buena (a *Mentha* species). Thank you, Mary Lou.

One of the standouts this past year was the lane of vetiver, *Vetiveria zizanioides*, a subtropical grass from India that appears well adapted to the east Texas climate and soils. Our plants reach a rather robust eight feet and have not yet flowered. This plant forms extremely dense clumps and prevents erosion on steep slopes if well established. The plants lead visitors down the steps at the east end of the herb garden to the entrance gate for the bottomland collections.

#### **THE ANNUAL ARBORETUM GARDEN GALA DAY - May 23, 1992**

The arboretum's fifth annual conference was a bit different in 1992. Instead of an all-day Fredonia Inn event, this year's conference shifted to the Kennedy Auditorium for morning presentations and afternoon events in the arboretum: garden tours, three garden dedications and a sale of uncommon, rare, and unusual plants. The latter was a first for the arboretum.

Pam Puryear, President of the Pioneer Plant Society of Texas, delivered a great talk, in spite of taking a bad tumble down the steps in the Kennedy Auditorium on her way to the podium. In a light-hearted fashion, Pam led the audience through the plants and landscapes and garden philosophies of early Texas settlers. Peter Loos presented his work and thoughts on the silky camellia, a beautiful species hanging on in Texas in only two tiny spots on Little Cow creek. Will Fleming, an avante-garde gardener/landscaper from Houston presented a slide program on his favorite natives for east Texas and Houston gardens. Lucy Perry of Floribunda, Tyler, a cut-flower grower, gave a great presentation on her top ten plants. Kurt Whiting, always a treat at the podium, delivered a relaxed walk-through of the herbs and plans of the herb garden in the arboretum. I delivered a slide program on the plant surprises of the arboretum: plants that are either never or rarely encountered in Texas gardens but deserve more recognition.

#### **SOUTHERN REGION MEETING OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE - February 3 - 7, 1993.**

The SFASU Horticulture club competed against seven university teams and came away with the number one team, number one woody ornamentals, and number one foliage trophies this year. Congratulations go out to four horticulturists that made us all proud: Erin Smith, Dana Hill, Lee Glover and Gregg East.

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# SFA team shows it knows beans about horticulture

Students grab highest scoring team honor in Tulsa contest

By CANDIS ANN SHEEHAN  
*Sentinel Staff*

A local team showed several large universities just who knows about horticulture — Stephen F. Austin.

Four SFA horticulture students competed against six other southern universities — including Texas A&M University — in a horticulture competition and won the highest scoring team honor.

The contest was an effort in conjunction with the Collegiate Branch of the American Society for Horticulture Science.

SFA team members included Dana Hill, Lee Glover, Greg East and Erin Smith.

Dr. David Creech, SFA horticulture professor, said the contest wasn't easy.

Participants had to identify plants in a matter of seconds and rate certain ones based on quality.

The competition included four categories — woody ornamentals, floriculture, fruits and nuts, and vegetables.

Although SFA has done well in past competitions, that doesn't stop Creech from being excited over the students' accomplishment.

"I'm real proud of them," Creech said.

## AGRICULTURE

And he is extremely pleased SFA placed over Texas A&M.

"Historically they have always won it," he said. "They are just accepted as one of the premier schools in the South. They are shocked. I know so."

The SFA team also placed first in the woody ornamentals and the floriculture divisions.

Creech said the team prepared for the competition for about a month, and carried more than 100 plants with them on the trip to study.

"We actually have all the plants here in the arboretum, so that has to be given some of the credit for this," Creech said.

"I just think it was a great opportunity for SFA, as a smaller school, to compete against major universities," said Glover, who is also the SFA Horticulture Club president.

Other schools participating were Texas A&M, Louisiana State

"It was like winning the Super Bowl."

—Lee Glover,  
SFA Horticulture Club  
president

University, Oklahoma State University, Mississippi State University, Clemson University and the University of Missouri.

"It's a great accomplishment," Glover added. "We were great underdogs."

Glover said when the awards were announced during the banquet, it was nice to hear SFA mentioned as a top winner. And people would think: "Stephen F. Austin — who's that?" he said.

"It was like winning the Super Bowl," Glover said.



Pictured are Dana Hill and Erin Smith, in back, and Lee Glover and Greg East. The Stephen F. Austin horticulture team won the highest team award in a recent judging competition held in Tulsa, Okla. (photo by Hardy Meredith)

## ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF BOTANICAL GARDENS AND ARBORETA, COLUMBUS, OHIO - June 13 - 16, 1992

I was fortunate enough to obtain a faculty development grant for a three week study tour to Ohio, Tennessee, Kentucky, Missouri, and Arkansas. The trip's high point was four days at the AABGA annual conference. The annual meeting is an action-packed conference that focuses on symposium speakers and field trips to representative gardens in the area. I was able to visit Dawes arboretum, the Chadwick Arboretum at Ohio State University, and attend Floramerica, a 96 million dollar extravaganza in downtown Columbus that celebrated color and gardening.

### NEGLECTING OUR NATIVE PLANT TREASURES

The great American horticulturist Andrew Jackson Downing wrote this superbly written short piece on "neglected American plants" in 1851. It was reprinted recently in *Native Notes: A Newsletter Devoted to Landscaping with Native Plants* and in the April, 1993 issue of *HortIdeas* 10(4): 47. While written long ago, the theme still strikes a curious note in 1993.

"It is an old and familiar saying that a prophet is not without honor, except in his own country, and as we were making our way this spring through a dense forest in the state of New Jersey, we were tempted to apply this saying to things as well as people. How many grand and stately trees there are in our woodlands, that are never heeded by the arboriculturist in planting his lawns and pleasure-grounds; how many rich and beautiful shrubs, that might embellish our walks and add variety to our shrubberies, that are left to wave on the mountain crag or overhang the steep side of some forest valley; how many rare and curious flowers that bloom unseen amid the depths of silent woods, or along the margin of wild water-courses. Yes, our hot-houses are full to the heaths of New Holland and the Cape, our parterres are gay with the verbenas and fuchsias of South America, our pleasure-grounds are studded with the trees of Europe and Northern Asia, while the rarest spectacle in an American country place is to see three or four native trees, rarer still to find any but foreign shrubs, and rarest of all, to find any of our native wild flowers.

Nothing strikes foreign horticulturists and amateurs so much as this apathy and indifference of Americans to the beautiful sylvan and floral products of their own country. An enthusiastic collector in Belgium first made us keenly sensible of this condition of our countrymen...by telling us that amateurs and nurserymen who annually import from him every new and rare exotic that the richest collections of Europe possess, could scarcely be prevailed upon to make a search for native American plants, far more beautiful, which grow in the woods not ten miles from their own doors. Some of them are wholly ignorant of such plants, except so far as a familiarity with their names in the books may be called an acquaintance. Others knew them, but considered them "wild plants," and therefore, too little deserving of attention to be worth the trouble of collecting, even for curious foreigners. "And so," he continued, "in a country of azaleas, kalmias, rhododendrons, cypripediums, magnolias, and nyssas--you never put them in your gardens, but send over the water every

year for thousands of dollars worth of English larches and Dutch hyacinths. *Voila le gout Republique!*

In truth, we felt that we quite deserved the sweeping sarcasm of our Belgium friend. We had always, indeed, excused ourselves for the well known neglect of the riches of our native Flora, by saying that what we see any day in the woods is not the thing by which to make a garden distinguished--and that since all mankind have a passion for novelty, where, as in a fine foreign tree or shrub, both novelty and beauty are combined, so much the greater is the pleasure experienced. But, indeed, one has only to go to England, where 'American plants' are the fashion (not undeservedly) to learn that he knows very little about the beauty of American plants...Perhaps the finest revelation of this is the clumps and masses of our azaleas and rhododendrons, which embellish the English pleasure-grounds. In some of the great country-seats, whole acres of lawn, kept like velvet, are made the ground-work upon which these masses of the richest foliaged and the gayest flowering shrubs are embroidered. each mass is planted in a round or oval bed of deep, rich, sandy mould, in which it attains a luxuriance and perfection of form and foliage, almost as new to an American as to a Sandwich Islander. The Germans make avenues of our tulip-trees, and in the South of France, one finds more planted magnolias in the gardens than there are, out in the woods, in all the United States. It is thus, by seeing them away from home, where their merits are better appreciated, and more highly developed, that one learns for the first time what our gardens have lost by having none of the "American plants" in them.

## DECIDUOUS CONIFERS FOR TEXAS

Think of conifers and you probably conjure up visions and smells of pines, junipers and cedars. Most certainly, you think of an evergreen tree or shrub with needle-like leaves. Deciduous conifers are different: they lose their leaves after the first few frosts in the fall and put on a new cloak of greenery every spring. There are five deciduous conifers that have a place in many Texas landscapes. They are all members of the family Taxodiaceae and make fine tree candidates for any planting that needs a fine-textured light green foliage during the growing season and a jolt of brown, tan, and gold fall colors at the end of the season. As a screen, deciduous conifers are perfect for providing shade during long, hot Texas summers and allowing through the warming rays of the sun during cold winter spells.

Deciduous conifers are not common in Texas landscapes. There are several reasons the cypresses have failed to make a big presence in the state. First, the fact that deciduous conifers lose their leaves in the winter means





they look their worst during the early spring sales peak. That doesn't help sales. Second, any county extension agent can tell you of having to calm the fears of a homeowner watching their cypress needles shed: "No, they are not dying, they just do that every year." This is an educational problem. Third, many think that these trees from wet places can't perform elsewhere; that's just not true. Adapted members of the Taxodiaceae family actually fare quite well through Texas dry spells once well-established in the landscape.

*Taxodium distichum*, the bald cypress, is a special native found in the swamps and waterways of east and coastal Texas and across the south. The tree is valued because of its feathery foliage, good growth rate, freedom from pests, and tolerance of wet sites. In the fall, the needles usually hang well into the early winter. With proper site selection, the species can fit anywhere in Texas. Several cultivars are adapted into Zone 4 (Monarch of Illinois, and two narrow forms, Prairie Sentinel and Shawnee Brave). For the gardener looking for something a bit unordinary, there is a rarely seen pendulous form, "Pendens", available. One thing for sure, the bald cypress is long-lived. With a great deal of time (hundreds of years) and proper siting, the species can exceed one hundred feet. Knees are most likely to occur in naturally-wet sites and should be considered as a landscape attribute. The trees are best used as specimens in full sun, for massing and naturalizing in suitable areas, or as a street tree in special circumstances.

The pond cypress, *Taxodium ascendens*, is another southern U.S. native with exceptional landscape merit. The tree has a smaller range than the bald cypress with most populations in the warmer regions of the Gulf coastal plain. The tree is less irregular, more vertical and conically shaped than the bald cypress. Many botanists argue that the pond cypress is actually just a form of the bald cypress. At any rate, there is little difference in the landscape value and both make fine specimen trees.

The Montezuma cypress or Mexican swamp cypress, *Taxodium mucronatum*, is a little different. The species is a close relative of the bald cypress, making its home in the waterways of temperate highland Mexico and south Texas. The tree is a fast grower, blessed with an interesting and irregular branching. Little is known about the northernmost range of adaptation of this species in Texas. However, it is encouraging that the species suffered no damage in the SFASU Arboretum when hit by the record-breaking plunge to -1°F during the arctic blast of December, 1989. The Montezuma cypress deserves more extensive testing in Texas with trials in suitable sites in northern regions of the state.

The Dawn Redwood, *Metasequoia glyptostroboides*, is a native of China, thought extinct, but rediscovered in 1945 by Hu and Cheng in eastern Szechwan and western Hupeh provinces. The original trees from seed in the U.S. rest in the woods of Arnold Arboretum and from those trees all U.S. and European stock has evolved. Surprisingly, the species is well adapted to a wide range of climate and soils. At our location, Dawn Redwoods have a tendency to push needle growth a little early in the spring and are often nipped back; so far, it's been a minor problem. Dawn Redwoods are easily propagated from cuttings or seed and are fast growers in moist, fertile soils. The young tree develops a short, stiff branching

habit with interesting, flaking bark. Given enough time, the trees form fascinating buttresses if the lower limbs are not pruned away.

Rare in Texas, the Chinese swamp cypress, *Glyptostrobus lineatus*, is described as a small to medium size tree from southeastern China, Canton province. Thought to be extinct in the wild, the species is often planted along the banks of rice canals and field ditches where it commonly develops respiratory knees. This monotypic genus is closely related to *Taxodium* and differs only subtly in the form of its leaves and fruit. A two-foot tree planted in March, 1987, now exceeds 12 feet in the SFASU Arboretum. Hardwood cuttings taken in January, 1991, rooted 100% with hormone application under mist and plants grew off well in containers. While several references advise that this is a Zone 9 plant, our tree suffered no damage in Nacogdoches during the December 23, 1989, hard freeze. While the northernmost range in Texas is still a question mark, the species is certainly worthy of more testing in the warmer southern regions of Texas.

Key to establishing trees naturally adapted to wetland soils is a good planting site and a wide, shallow planting hole. If you have a choice, plant where the root system can eventually reach wet ground. The edge of streams, waterways and drainage ditches are prime sites. We have found that a five to six-foot wide, shallow planting hole is best. Here's our formula: plant well-developed, one to ten-gallon container-grown plants in the late fall. We do not add amendments to the planting hole. In regions with high pH, high conductivity or severe soil density problems, organic amendments are recommended throughout the entire potential root zone. Break up the root ball vigorously, spread roots laterally, and do your best to get good soil/root contact via a heavy watering and muddying effort at planting. Finally, it's important to bark mulch two to four inches deep and to keep that mulch replenished for one to two years. Keep all weeds away from the plant and apply water during dry spells the first two summers. After two full years in the landscape, the trees should prove to be quite tough.

Texans looking for a choice in deciduous trees might find one of the cypresses just the ticket. For a sure thing, try the bald or pond cypress in a sunny, wet spot. If you've got a streak of experimentation in you, plant a Montezuma cypress. If exotics don't threaten your gardening philosophy too much, you can test your gardening luck and skill with a Dawn Redwood or the very rare Chinese swamp cypress.

## REGIONAL ARBORETUMS FOR TEXAS

Have you ever wondered why there are so few arboretums in Texas? A state with five thousand plant species (40% of those in east Texas) should have dozens of arboretums. After all, small states on the east and west coast are commonly blessed with many more arboretums than the great widely diverse state of Texas. The state has only six well-recognized arboretums and SFASU is still the only arboretum at a Texas university, although substantial progress has been made at Sam Houston State University and others are about to establish diverse garden collections. Much more is needed.

Since the 1930s, Texans have become increasingly more aware of the importance of native plants. This interest has matured into movements towards conservation and preservation of native plants in their natural habitats. Texans have taken a national leadership role in native plant population dynamics research, utilization in water efficient landscape designs, and habitat assessment.

A positive outcome of the interest in Texas native plants has been the establishment of organizations dedicated to native plant protection and utilization. The National Wildflower Research Center (NWRC), the Native Plant Society of Texas (NPSOT) and the Texas Organization for Endangered Species (TOES) have made tremendous strides in bringing native plant issues to public attention. The groups work diligently, in spite of economic and political obstacles, to promote native plant species conservation. With this mission, we firmly feel, comes the responsibility of collection and interpretation of data detailing native plant ecophysiology, propagation, and production of analyzed information for the public. This is a formidable task since Texas contains some 5,500 native species distributed over an area comprised of ten (10) regional habitat types. Each area supports a distinct subset of the species list, with the more adaptive species occupying more than one region. In the Piney Woods region of East Texas some 2,300 species occupy 15 million acres (Campbell and Loughmiller 1988; Nokes 1986; Nixon 1985; and Correll and Johnston 1979). At present there are at least four critical issues concerning native plant species in Texas, all of which we feel are significant to East Texas situations. The issues are species population dynamics, public awareness of native species importance, educational outreach program development, and automated approaches to data gathering, storage, and analysis.

Leading the list is conservation and preservation of native species. On a global level groups such as the International Union for the Conservation of Nature and Natural Resources (ICUN) predict the loss of tens of thousands of species worldwide during the next decade (Enger and Smith 1992). On a national level the Endangered Species Act (1973) which has provided a vehicle for protection of endangered and threatened species is constantly under challenge (Bush 1992). In Texas, research has focused on floristic surveys and determining vulnerable plant species in the landscape. In east Texas, TOES has identified 19 species that are either federally endangered, in danger of extirpation from the state or deserving of watch listing. For example, the three federally endangered plants of east Texas are *Hymenoxys texana* (Texas bitterweed), *Lesquerella pallida* (white bladderpos), and *Spiranthes parksii* (Navasota ladies-tresses). On the TOES state endangered list, *Abronia macrocarpa* (large-fruited sand verbena), *Hibiscus dasycalyx* (Neches River Rose mallow), *Trillium recurvatum* (Prairie trillium). There are seven state threatened species: *Brachyelytrum erectum* (Bearded short-husk), *Cypripedium kentuckensis* (Southern Lady Slipper orchids), *Parnassia asarifolia* (Grass of Parnassus), *Phlox nivalis* var. *texensis* (Texas trailing phlox), *Rhynchospora miliacea* (millet beakrush), *Scirpus divaricatus* (Elliot's bullrush), *Talinum rugospermum* (Flame flower). There are six species that have been placed on TOES "watch" list: *Bartonia texana* (Texas bartonia), *Brazoria pulcherrima* (Centerville Brazos mint), *Leavenworthia texana* (Golden yellow-eye), *Macranthera aurea* (Houston macranthera), and *Polygonatum biflorum* (Great Solomon Seal), and *Trillium*



*pusillum* var. *texanum* (Texas trillium). Without protection or recovery programs, most endangered plants are doomed (Poole and Riskind 1988).

Habitat alteration and destruction are critical factors in reducing the resilience of native species populations. In Texas, as well as across the country, habitat assessment is undergoing critical review. Generally, economic impact concerns have tended to be the fulcrum tipping support towards conservation when the economy is strong and away from plant and habitat protection when the economy is weak. Currently, many decision-makers are giving less sympathy for habitat preservation and more support for land use changes that would seemingly benefit local economic activities. This position will affect native plant populations in Texas.

Secondly, public awareness programs must continue to be enhanced. New approaches, including GIS, should be used to strengthen our understanding of the role and value of native plants. Increased awareness will lead to recruitment of individuals and organizations to the mission of conserving and using native plant species. This helps protect Texas plants and can reduce artificial management demands created by introduced species. For example, native plant garden designs can save large amounts of water compared to many garden palettes currently found in Texas (Ellefson et al. 1992; Wilson 1991; Wasowski 1984).

Thirdly, there is a significant need to expand educational outreach to Texans of all ages; especially young Texans who will be the decision-makers of tomorrow. Educational programs in species propagation, community ecology, and designs for use can be valuable forums for native plant species conservation. The SFASU Arboretum is in a unique position to promote conservation and environmental stewardship concepts. The arboretum can and should support greater native plant research and outreach. The facility is among the first arboretums in the state to innovatively use computer technology in facilities management, plant research, and outreach activities (Crech 1992).

The fourth issue is the application of automated technology in native plant conservation. Automated drawing software packages provide scientists and educators with tools to examine and present concepts of laboratory and field experiments. The software enables easy update, retrieval and display of graphic information. Figure 1 depicts the dynamic power of a Geographic Information Systems approach to data, text, and visual image retrieval available through this relative new mapping technology. Computer databases are a strong tool for botanical science research. Only in the last few years have botanical gardens and arboretums started to automate card files and create visual images of their gardens. Many have initially employed CAD packages, particularly AutoCad®, accessing databases to update information and expand plant research. GIS is the next step.

Wouldn't it be great if we could one day see a string of regional native plant arboretums across this wide state of ours? Fostered and assisted by the Native Plant Society of Texas, NPSOT, these plant sanctuaries would be home to a plant collection that represents the plant diversity of the region. With a goal of gathering a reasonable and

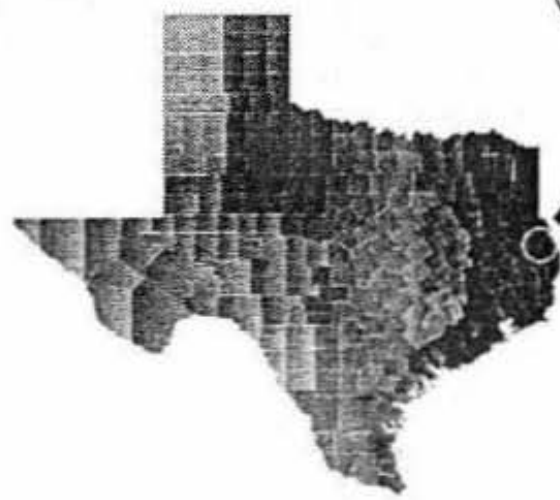
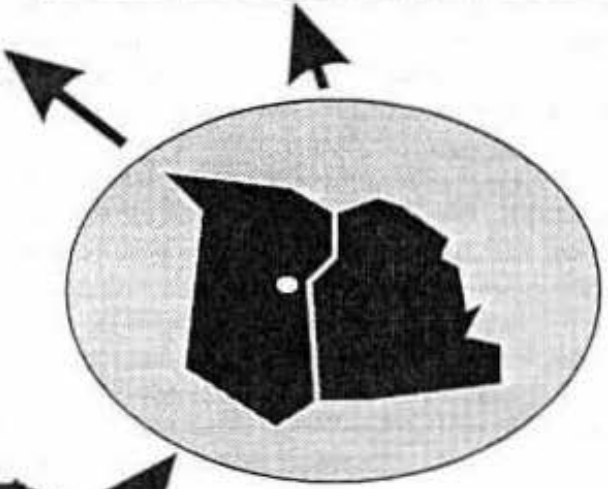
USER CAN SCROLL ROWS & COLUMNS, SORT DATA, ETC.;  
 USER CAN THEN REDISPLAY NEW MAP ATTRIBUTES ON MAP SCREEN

MID-SLOPE SPECIES	NUMBER PLOTS	FREQUENCY	REF. NUMBER	NUMBER PLANTS
Smilax bona-nox	3	15		3
Smilax laurelifolia	1		21	1
Stewartia malacodendron	11		832	39
Styrax grandifolius	2		1,242	3

PLANT COMMUNITY DATABASE

Distance between is measured by nearest Neighbors Values, why similar community (See # 12, Number nearest Texas)

PLANT COMMUNITY ANALYSIS AND GRAPHICS



POINT  
ON  
COMPUTER  
MAP

Fig. 1. The silky camellia in Texas: Graphic representation of CAD/GIS mapping and database, text, graph and visual image retrieval strengths. Coreldraw file with Microsoft Excel linkage, Harvard Graphics, Harvard Geographics, and .tif slide image import. Size: 1.7 mb.

representative range of provenances, the collection would be a documented and verified collection. Set into a garden design, signed and interpreted, the gardens would provide a pleasing educational setting. The arboretums would be of value to botanists, foresters, horticulturists, ecologists and others intent on habitat protection and plant reintroduction projects with the rare, the threatened and the endangered.

The idea is not a new one. Benny Simpson, TAMU Research and Extension Center, Dallas, Texas, has long preached on the need for pure native plant gardens. These would be plantings that collected species from locations within a fifty or hundred mile radius. If I had to lay out the perfect outreach goal for the native plants movement, I can't help but think of regional native plant arboretums. When you think about outreach, think how special it would be to foster a string of outreach native plant arboretums: plant sanctuaries for plants finding their habitats dwindling and ranges constricted.

### THE PLANT/PEOPLE CONNECTION:

Classically, horticulture has always been defined as the science and art of growing fruits, vegetables, flowers, or ornamental plants. However, there's a growing group of horticulturists that want the definition enlarged to include human issues. After all, they proclaim, if we focus solely on a combination of "garden" and "cultivation of soil," we severely limit what horticulture is really all about. Horticulture determines how the world looks around us and how we relate to nature.

New studies prove that plants and gardens affect human behavior, attitudes, feelings, and health. Ulrich and Parsons (1992) feel that plants are beneficial because of **overload** and **arousal**; the modern world damages human psyches with too much visual, psychological and physiological excitement and plants reduce feelings of stress. Another theory is that we respond to plants because of early learning experiences. We like foundation plantings even though we no longer need to hide unattractive foundations and we like broad expanses of lawn even though our urban water resources could be spent more efficiently in other ways. Finally, there's a theory that our response to plants is simply due to evolution; we evolved in environments composed primarily of plants and we respond positively to combinations of plants, water, and stone.

Putting a value on plants in the landscape might not seem significant but it is. After all, ornamental horticulture is now big business and, yet, it isn't really perceived that way. When I tell folks that ornamental horticulture in Texas at the producer level has passed poultry and timber in gross value, they are usually surprised. That doesn't count the huge retail industry, landscape installers and maintainers, and the green indoor trade. If you add it all up, ornamental horticulture is a billion dollar plus industry in Texas and it's growing faster than other sectors of the agricultural community. The average Texan spends over \$250 per year on gardening and drops over fifty dollars per year on cut flowers. Yet, the perception of many that control budgets is that ornamental horticulture is an unwarranted luxury.



Lewis (1988) stated that, "it seems obvious that an industry whose sole survival depends on the purchase of plants should understand the meaning plants may hold and the kinds of needs they satisfy in the people who purchase them." Studies prove the value of plants in reducing stress, improving attitudes, and eliciting positive feelings at work, at home, and in our communities. Yet, city governments, developers, and state institutions often relegate plants to a secondary role. Financially pressed local and state governments often dismiss plants as unjustifiable luxuries.

In Texas, many universities have decided that colorful flower beds on campus cannot justify the fifty to seventy-five cents per student per semester cost. Yet, research has shown that students choose a college because of "how it looks" (Carnegie Research Institute, 1986). The lack of research on plant benefits has tended to reduce spending for plants in other important settings (workplaces, health-care facilities, and outdoor apartment complexes).

When it comes right down to it, the responsibility to promote horticulture must come from horticulture. Nationally, we have seen college enrollments in horticulture drop in half since the late 1970's. No one disputes that there has been a down-sizing of good applied horticultural research and extension in Texas. Yet, the industry continues to grow faster than many other segments of the economy. No doubt about it: it's a marketing problem. We fail to convince state and local governments, school administrators, developers, and young people of the value of plants because we are too busy gardening or studying botanical and cultural factors. Maybe, as horticulturists, we should get more familiar with plant benefit research. If we make the public aware, this would increase the demand for horticultural products and services, the number of jobs, the number of students, and, finally, the funding for traditional horticultural research and education.

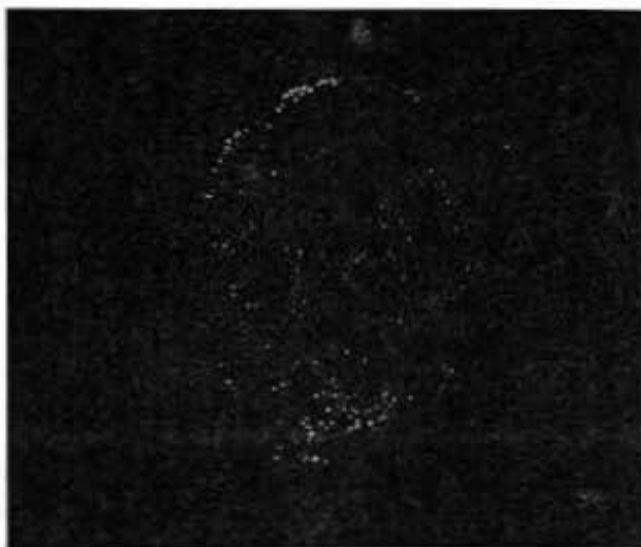
## THE ECOLOGY OF THE TWO KNOWN TEXAS STANDS OF SILKY CAMELLIA, *Stewartia malacodendron* L. - by Peter Loos

The silky camellia, *Stewartia malacodendron*, is a multi-branched, deciduous shrub or small tree to twenty feet (Vines, 1960). The species is a member of the *Theaceae*, or Camellia family. The species is rare in Texas, known from only two isolated sites on the western banks of Little Cow creek in Newton county. The SFASU Arboretum serves as an informal "steward" of these rare plants and is developing a small population of the trees in the arboretum. This paper describes the species, the soil and the vegetation of the two known Pineywoods colonies.

**Species and Site Description:** In bloom, *Stewartia malacodendron* is a striking native ornamental plant. The showy three-inch flowers have five white obovate petals with purple filaments and bluish anthers. The fruit is a globose capsule and typically contains about five smooth seeds. The simple glossy green leaves are two to four inches long and described as shortly petioled, ovate to elliptic or somewhat obovate, with serrulate and ciliate margins; the lower surface is light green and pubescent (Correll and Johnston, 1970). In east Texas and Louisiana, the species prefers well-drained, deep soils of wooded stream banks or

hillsides. There are approximately thirteen known colonies in Louisiana (Price, 1991). In the southeastern U.S., the species is found as an understory plant of rich wooded bluffs, ravine slopes, and creek banks of scattered localities in southwest Georgia, the Florida panhandle, and southern Alabama (Godfrey, 1988). It is known to occur in Arkansas and in the east as far north as Virginia. While always uncommon throughout its range, the species is not considered endangered. However, in Texas, the silky camellia must be considered in danger of expatriation from the state and deserves perpetual stewardship for that reason alone.

There are two known stands of silky camellia in east Texas. The sites lie along the western banks of Little Cow creek in Newton county, approximately 10 miles northwest of the town of Burkeville, Texas. This region of east Texas receives, on the average, about fifty inches of rainfall per year and can be considered firmly planted in Zone 8B of the new USDA hardiness zone map. The region is blessed with rolling, forested hills, bisected frequently by creeks, streams, and moist and dry tributaries. The two silky camellia colonies are of different sizes. The larger stand of several dozen small trees was first reported by Mr.



Osa Hall in 1959. In 1988, Osa discovered the second colony, a small grouping of less than a dozen trees, while he was exploring for a quicker route to the original stand. Both colonies appear vigorous, healthy and facing no immediate threats at this writing. For the purposes of this paper, the larger stand will be referred to as Site #1 and the smaller stand as Site #2. Site #1 lies in a pine-dominated forest that was last disturbed in 1972 when the site was clear cut. Site #2 lies in a mixed forest that was selectively cut in 1988. Both sites can be described as mesic creek bottom (Nixon, 1988) which are typically dominated by Red Maple, (*Acer rubrum* L.); American Hornbeam, (*Carpinus caroliniana* Walt.); Flowering Dogwood, (*Cornus florida* L.); American Beech, (*Fagus grandiflora* Ehrh.); Eastern Hophornbeam, (*Ostrya virginiana* (Mill.) K. Koch.) and White Oak, (*Quercus alba* L.).

**Soil Characteristics:** The Newton county soil survey classifies the area as a Tehran-Letney association, Hilty, and the wet creek bottom as a Melhomes soil. Soil samples (zero to six inches depth) were collected in late May, 1989, from Site #1 and from both sites in 1991. Samples were collected from above, inside, and below the silky camellia colony (dry upland, mesic mid-slope and wet creek bottom). All soil samples were analyzed by the Stephen F. Austin State University Soil Testing Laboratory for pH, textural classification, and macro and micronutrient concentrations (Table 1).

Table 1. Soil pH, macro and micronutrient analysis of the two silky camellia communities, Newton county, Texas.

	pH	P	K	CA	MG	PPM				
						S	FE	MN	ZN	CU
MESIC UPLAND	5.5	5	26	237	48	9	27	5.2	0.59	0.21
MID-SLOPE	5.2	6	30	251	48	11	43	4.6	0.57	0.25
CREEK BOTTOM	4.9	9	52	265	55	14	106	9.5	1.09	0.50

The test results represent the average of 1989 and 1991 soil samplings. The results indicate acid sandy loams with low levels of macronutrients and high levels of iron and manganese. Conductivity values were low in all samples (data not shown). The textural classification of soil samples revealed a sandy loam in all transects (Table 2).

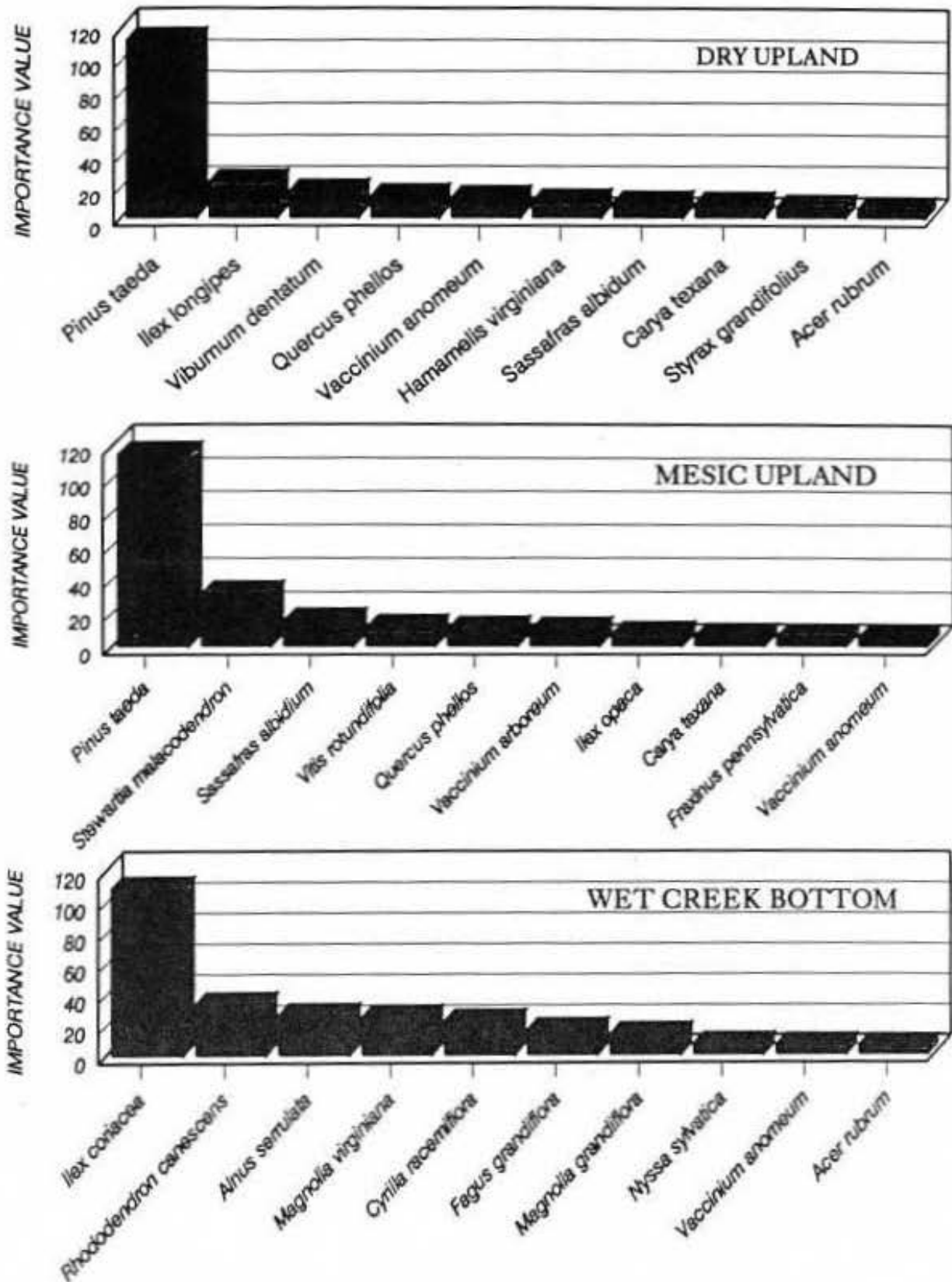
Table 2. Percent clay, silt, and sand of two silky camellia communities, Newton county, Texas.

	% CLAY	% SILT	% SAND
MESIC UPLAND	11.8	8.4	79.8
MESIC MID-SLOPE	13.8	12.4	73.8
WET CREEK BOTTOM	13.4	16.7	69.8

**Vegetative Analysis:** In October, 1991, a vegetative analysis was conducted at Site #1 by running three transect lines 50 meters long, each transect with twenty (5m X 5m) plots (data not shown). The lines ran on the contour and parallel to the slope (northwest to southeast) and were located with the first transect at the top of the slope, the second on the lower portion of the slope through the upper part of the silky camellia community, and the third was located in the creek bottom. The vegetative analysis of these lines included frequency, relative frequency, density, relative density, basal area, relative basal area, and importance value. The plants were measured using centimeter incremented tape and the circumference of each plant recorded (1cm or larger). The procedure for this analysis was provided by Dr. Elray Nixon, Professor, SFASU Biology Department. It must be noted that the vegetative analysis would have benefitted by a greater number of transects and plots per transect. Time, labor and budget constraints had much to do with the size and scope of this study. However, the data does provide a useful understanding of the soil and botanical factors found in the silky camellia habitat.



Figure 1. Dominant species as measured by transect Importance Values, silky camellia community (Site # 1), Newton county, Texas.



Importance value is the sum of the relative frequency, the relative density and the relative basal area. A description of the formulas used to calculate the various parameters can be found in the piece on site analysis in this newsletter. The dominant species (top 10) of the silky camellia community, based on importance values, are listed as follows:

MESIC UPPER SLOPE:

- 1) Loblolly Pine, (*Pinus taeda* L.)
- 2) Georgia Holly, (*Ilex longipes* Chapm.)
- 3) Arrowwood Viburnum, (*Viburnum dentatum* L.)
- 4) Willow Oak, (*Quercus phellos* L.)
- 5) Blueberry, (*Vaccinium anomeum* Ait.)
- 6) Witch Hazel, (*Hamamelis virginiana* L.)
- 7) Sassafras, (*Sassafras albidum* (Nutt.) Nees)
- 8) Black Hickory, (*Carya texana* Buckl.)
- 9) Bigleaf Snowbell, (*Stryax grandifolius* Michx.)
- 10) Red maple (*Acer rubrum*)

MESIC LOWER SLOPE:

- 1) Loblolly Pine, (*Pinus taeda* L.)
- 2) Silky Camellia, (*Stewartia malacodendron* L.)
- 3) Sassafras, (*Sassafras albidum* (Nutt.) Nees.)
- 4) Muscadine Grape, (*Vitis rotundifolia* Michx.)
- 5) Willow Oak, (*Quercus phellos* L.)
- 6) Farkleberry, (*Vaccinium arboreum* Marsh.)
- 7) American Holly, (*Ilex opaca* Ait.)
- 8) Black Hickory, (*Carya texana* Buckl.)
- 9) Green Ash, (*Fraxinus pennsylvatica* Marsh.)
- 10) Blueberry, (*Vaccinium anomeum* Ait.)

WET CREEK BOTTOM:

- 1) Tall Inkberry Holly, (*Ilex coriacea* (Pursh) Chapm.)
- 2) Hoary Azalea, (*Rhododendron canescens* (Michx.) Sweet.)
- 3) Hazel Alder, (*Alnus serrulata* (Ait.) Willd.)
- 4) Sweetbay Magnolia, (*Magnolia virginiana* L.)
- 5) Leatherwood, (*Cyrilla racemiflora* L.)
- 6) American Beech, (*Fagus grandiflora* Ehrh.)
- 7) Southern Magnolia, (*Magnolia grandiflora* L.)
- 8) Swamp Blackgum, (*Nyssa bicolor* (Walt.) Sarg.)
- 9) Blueberry, (*Vaccinium anomeum* Ait.)
- 10) Red Maple, (*Acer rubrum* L.)

The vegetative analysis results in this study were based on Dr. Elray Nixon's habitat founded classification system (Nixon, 1988). At Site #1, the understory contains the largest species diversity with a canopy of almost pure pine along the mesic transect lines. Several scouting trips in the area have not revealed any additional stands of silky camellia. Herbarium specimens were collected in November, 1991, and are now housed in the Stephen F. Austin State University Herbarium.

**Propagation Trials:** The fruit is a capsule and normally contains about five seeds. At Site # 1, capsules yielded six plump, firm seed per capsule. The smaller colony produced capsules with only three healthy seed. A small sample of seed was collected, sown in containers, and placed in the SFASU shadehouse in June, 1989. There has been no emergence to this point in time.

Cuttings were collected in June, 1991, and were placed into four treatments; Dip-N-Grow liquid hormone, Hormodin #2 rooting powder, and no hormone treatment. Six medias were used for the cuttings: sand, pine bark, perlite, and Promix (a commercial potting media consisting of peat, perlite and vermiculite), bark/perlite, and bark/Promix. All cuttings failed to survive after callusing although roots were initiated in perlite, bark, and bark/perlite. While discouraging, others report similar difficulty with post-rooting survival (Nokes, 1986). Tom Dodd, Semmes, Alabama, has found that exposing cuttings to long days after rooting encourages shoot growth to continue unabated during the first winter in a greenhouse; that greatly increases survival (also reported by Dr. J.C. Raulston, North Carolina State University Arboretum). Jack Price, Blanchard, Louisiana, reports that air layering works well if one has the time to wait: 1) spring, scar woody stems lightly and scratch in Hormodin #3 talc, 2) wrap with a ball of moist uncut sphagnum, 3) wrap with a layer of poly and layer of aluminum foil; tie with a twistie, 4) wait a month, uncover, look for significant callus, moisten the sphagnum, recover, 5) when first roots and good callus, girdle stem below the layer, 6) wait for good root development before removing from nurse plant and transplanting. While certainly an elaborate method, Jack claims it works well. It is true that plants in the wild seem to layer naturally.

**Conclusions:** The two small Texas colonies of silky camellia represent the western-most edge of the species range. If for no other reason than for the value of this genetic material, this species ecotype of deep east Texas deserves protection in its native habitat and through more frequent cultivation in appropriate garden settings. Future work should include a thorough scouting of the creek and many of its tributaries, the reintroduction of this specific germplasm into similar east Texas habitats, and cultural studies to aid in propagation and plant growth. With proper stewardship and good horticulture, the silky camellia's destiny in Texas will be a good one.

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**GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNOLOGY USE IN BOTANICAL SCIENCE EDUCATION: APPLICATIONS FOR HORTICULTURE** - Dr. Darrel McDonald, Political Science and Geography, SFASU

Geographic Information Systems (GIS) is a powerful new computer technology that can be applied to the storage, management, and spatial analysis of horticultural and botanical science data. This paper presents an overview of an interdisciplinary project in progress which is integrating computer-assisted design (CAD) drawings, graphic designs, and dBase IV files of the Stephen F. Austin State University (SFASU) Arboretum and horticulture program into a GIS environment. At present, the SFASU Arboretum is the only regional facility developing this technology. In addition, CAD and GIS applications for botanical science research and education are described that involve data manipulation, spatial analysis and student involvement.

Computer automation of map (graphic) and variable (attribute) data is an important area of botanical science research and development. Automated drawing packages such as AutoCad provide scientists and educators with dynamic tools to examine and present concepts of laboratory and field experiments. These packages allow for easy update of spatial changes. Databases are another important tool for the botanical sciences. Recently, Geographic Information Systems (GIS) technology has emerged as the premier approach to data storage, manipulation, and analysis. Graphic and attribute data are stored in "layers" or "features" that are logically and fully integrated. This allows questions to be asked about the graphic features which are answered by the attributes assigned to specific locations. Conversely, distributions and densities of variables can be located on maps through inquiries made to the attribute files. These data can be measured or derived. But the most unique strength of GIS is based in the ability to perform vertical queries of the layers or features. For example, soil layers could be spatially analyzed for relationships to hydrology, built structures, and vegetation features. The analysis generates a new map and attribute association, effectively linking maps and databases into one cohesive unit.

The Horticulture and Geography departments at SFASU are developing an interdisciplinary approach to botanical science instruction. The SFASU Arboretum serves as a core resource to explore the capabilities of landscape management and resource assessment utilizing GIS technology for research and educational missions.

**Background:** The ten-acre SFASU Arboretum is located on the eastern side of a busy university campus, a campus often referred to as "the University among the pines." The arboretum enjoys many positive attributes: high visibility, easy access, numerous theme gardens, rolling terrain, excellent soils, irrigation and a mature native woodland featuring patriarch pines, oaks, river birches and sweetgums as an overstory. Most important, the facility is the first and still the only

arboretum at a university in Texas. The arboretum is blessed by its home on the banks of LaNana Creek, the watercourse that bisects Nacogdoches. The SFASU Arboretum began as a landscape project in 1985 in a landscape plant materials course. As a class design project, students created, planted, and constructed a quarter-acre shrub and color garden on the south side of the Agriculture Building at SFASU. Over the last six years, class projects, enthusiastic students, a few volunteers and a cadre of outside supporters have allowed the arboretum to prosper. The gardens now spill over ten acres and display surprising diversity with many unique plants. The mission of the arboretum is, first, to educate students about the wonderful diversity of plant material available for landscaping and, second, to serve as a regional evaluation garden for all that diversity. Many of the trees and shrubs in the collection have never been tested in the south and come from cooperative exchanges with Texas arboreta and botanical gardens, the National Arboretum in Washington D.C., Arnold Arboretum in Jamaica Plain, North Carolina State University in Raleigh and progressive nurseries.

The mission statement of the arboretum focuses on the "conservation, selection, and use of native plants." However, special theme gardens have been added to attract a wider audience and give the arboretum special character and visitor interest. Outside support groups like the Herb Society, the Daylily Society, and the Daughters of the Republic of Texas have contributed to the character of the garden and have been critical to development of this resource that receives no state funding. The following theme gardens are in place: A Wetland Garden, the Dry Garden, the Perennial Border, a Native Plants Garden, a Woodland Garden, an "Asian Valley", a Daylily Garden, the Herb Garden, and a Shrub and Color Garden. The next garden, now in the design phase, is the Texas Heritage Garden which will display plant materials that were used in Texas cottage gardens in the mid-1800's.

The arboretum serves as a functioning archive for a number of outreach projects in local and nearby communities. One project, now in its third year, involves a native plant landscaping effort at the Shelby county courthouse, a state historical landmark building. The arboretum has set in motion a native woodlands project on the LaNana Creek Trail and at two local secondary schools. Both of these projects will increase public awareness about new technologies and careers emerging in horticultural sciences and geography.

Early in the development of the arboretum it was recognized that computer technology applications would benefit the goals of the horticultural program and mission of the arboretum. The first application to be initiated was mapping the landscape. The second phase of automation involved entry of pertinent information concerning the arboretum infrastructure and plant materials into dBase IV.

The base map of the SFASU Arboretum is derived from a modification of the coordinate locating system described by Grogg (1989). The template AutoCad base map of the SFASU Arboretum, a graduate research project of Mr. Rick Rankin, is complete and includes layers for the 50' X 50' grid, existing overstory trees, text, shrubs, buildings, irrigation system, electrical lines, major garden beds, paths, etc. What remains is the completion of documentation of individual plants on the map. The SFASU Arboretum acquisition policy involves the assignment of an acquisition number. For instance, SFASU 192-86 stands for the 192nd plant collected in 1986. As mentioned, dBase IV software package currently holds the plant inventory. Fields



include genus, species, common name, date of acquisition, how received (cuttings, seed, plants, etc.), provenance, and grid map location. By translating the AutoCad map into an GIS environment (Ultimap is the software being utilized for the project) the database can be accessed instantly for manipulation by GIS applications. Initiating this research and record-keeping foundation while the arboretum is young (less than six years old) greatly enhances the potential of this unique new university resource. Ultimap running on a Apollo workstation platform will provide the SFASU Arboretum with outstanding on-screen data retrieval and analysis power, certain to streamline and allow for flexible report and map generation. No regional arboretum has introduced GIS technology, putting the SFASU Arboretum in a leadership role. GIS technology offers distinct advantages over translational packages (speed, regeneration time, database/map interfacing, report generation, analysis, etc.).

It is important to point out that GIS technology is not a "quick fix" to botanical data manipulation and analysis considerations. The success of a GIS project requires careful planning, considerable time investment in data acquisition and input, and funds to acquire the hardware and software. Presently, GIS technology is being applied to a broad spectrum of endeavors. Thus, it should be seen as an essential tool to incorporate into educational institutions to encourage significant research and provide students with skills that will make them competitive in the employment arena.

**GIS and the Botanical Sciences:** Geographic Information Systems technology has become an integral tool for storage, manipulation, and analysis of diverse data. GIS environments can include pc's, workstations, main frame platforms, or networks of computers. Although pcs might be seen as the best solution for educational settings, it is our opinion that the workstation provides an affordable, yet lasting computing environment to use GIS technology for both educational and research programs. A strength of GIS technology is the ability to handle large volumes of data quickly and efficiently. In building a GIS database several factors must be considered before the project is started. First, the user must decide in detail the types of inquiries that will be necessary to answer research or utilization questions. Second, the user must then identify and classify variables that will be used to answer the queries. These variables become layers or features of the database. Third, the scale of the project area needs to be addressed. This involves not only the geographic concept of scale but also accuracy and precision of data needed to provide useful information after analysis. This step creates the working area or base map in which all spatial and attribute analysis is conducted. To obtain reliable locational information the base map must have geodetic control. World coordinates of latitude and longitude, UTM, or other grid systems such as State Plane Coordinate Systems should be attached to the base map so that any analysis carried out inside the study area is positionally or distributionally correct.

The basic graphic entities in GIS software are points, lines, and polygons. These elements are geocoded into the database which allows for efficient retrieval, updating, or spatial analysis. GIS technology has the capability of working with vector and/or raster images, although the capacity to easily move from one structure to the other is still in the development stage for most GIS software. Spatial and attribute information can be derived or delineated from existing maps, textual records, aerial photography, and other remotely sensed images. The data from maps and images is either manually digitized or scanned into the computer. Data also can be put into the database by key entry.



GIS applications being considered for use at the SFASU Arboretum involve editing and updating plant acquisition data, spatial analysis of infrastructure and theme gardens, i.e. locating irrigation systems to water plants, manipulation of physiological parameters of species and designs for future gardens. A specific example for a GIS application would be to query the database for all plants requiring treatments during a window of time. The query will not only generate a tabular list of these plants, but also will locate the species on a map which can aid the staff in efficient use of resources in providing proper care of the arboretum. Another application might involve generation of a site location map for all members of a genus for examination by a visiting researcher.

The broader application of GIS technology to the Botanical Sciences involves a wide range of themes. Some of the most active areas of research utilizing GIS as a tool include urban landscape ecology (Goodchild et al. 1990), vegetation dynamics, resource management and assessment (Burrough 1986), modelling of ecosystem dynamics (ERSI 1990), landscape design, and environmental impacts on the landscape (Perquet and Marble 1989; Goodchild et al. 1990). Topics within the themes involve investigations of the spatial importance historic garden designs and palettes in urban gardenscapes (McDonald 1990), fire history and vegetation impact on landscape (Veblen et al. 1992), regional resource management (Fugikawa 1992), and biophysical analysis of environments (Bian 1992).

**Conclusions:** Geographic Information Systems (GIS) technology is a tool which is becoming more widely used in the botanical sciences. The SFASU Arboretum has nearly completed automating theme garden maps and species data. The paper describes the benefits of upgrading the AutoCad drawing and associated attribute data into a GIS environment.

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## **UNDERSTANDING LANDSCAPE ECOLOGY UTILIZING A GEOGRAPHIC INFORMATION SYSTEMS(GIS) - Darrel L. McDonald, Assistant Professor of Geography**

Conzen (1990) recently pointed out that there are distinctive landscape traditions emerging in America. Early settlements and coastal regions have long served as conduits for introduction of garden styles and plant materials. The styles of landscape modification reflect influences from cultural contacts over the last two hundred years. Garden styles that have developed in different regions of the country often reflect influences of contacts with cultural groups engaged most frequently in trade with America (Hugill 1986; Jellicoe and Jellicoe 1988).

The most altered of American native landscapes are urbanized areas. In early Texas landscapes, elements of English and French traditions were often used as style models with modifications incorporated by landscape managers to fit environmental constraints of Texas landscapes (Doughty 1983; 1987). Presently, the preservation of historical structures and recreation of past landscapes is an important theme in Texas community development. Attempts to recreate the landscape thought of a previous era is a task of great difficulty (Hyland 1982). The manager of such a project must maintain a historically accurate site, meet visitor needs and employ modern maintenance techniques (McGann 1989). Many community preservation projects have captured the imagination and support of local citizens. For example, the Galveston Historical Foundation directs one of the most aggressive programs in this area. Although historic buildings were the focus of early work, more recently the organization has given more attention to recreating themes of the Victorian period in Galveston.

A core area of garden design and plant material diffusion in the American South was New Orleans. McDonald (1990) has identified Galveston as another significant point of American garden style development. The single most descriptive landscape unit in urban areas is the residential garden (Rapoport 1969; McDonald 1990). Although the amount of general literature devoted to gardening is large, most relies upon personal recollections; significantly less information has been based on quantitative and qualitative assessments of garden design and components (Young 1987; Kimber et al. 1988). Recent Texas garden designs and landscape plant palettes have been greatly influenced by the nursery industry which began in Texas during the late 1800s (McDonald 1990). Nurseries have developed regional specializations and national retailing networks which often dictate what floral elements are available in local retail outlets (Lawrence 1985; Young 1987). As a result, garden designs have included many more exotic than native species. Whether or not this is a positive or negative characteristic is a matter of debate.

There are many reasons why native plants have achieved increased prominence and popularity in Texas landscapes. The hard mid-winter freezes of 1983 and 1989 cost millions of dollars and forced nurseries, landscapers and homeowners to scramble for alternatives. Texas natives, better able to deal with the harsh climate of Texas, cold, hot, wet, or dry, were suddenly more attractive. The campaign for xerophytic landscapes, plantings that save water and dollars, is well known. Water conservation, based on worsening shortages, is a strong factor encouraging the use of adapted, native plants, particularly in the central and western regions of the state. A pesticide-fearful public has also bolstered the natives cause. Consumers are demanding landscape plants that require a minimum of pest control activity. Increased environment and plant conservation awareness has affected the way we want our world to look. The public is being

educated at every turn about the tragic loss of genetic diversity, that ecosystems are being shattered and endangered plants are on the increase. Conservation work in Texas is more visible than ever before. The National Wildflower Research Center, the Texas Nature Conservancy, the Native Plant Society of Texas, the Texas Organization for Endangered Species, the Texas Association of Botanical Gardens and many other organizations find themselves now on center stage. Each group is working hard to make some kind of positive impact on the environment. If landscape philosophy is to evolve to any degree of sophistication beyond the common plant palette, that change must come from benchmark studies.

At SFASU, we hope to link the talents, interests and physical resources of several Departments with the CADD/GIS and innovative graphics software power available on campus. We intend to compile presently unavailable information about the garden styles and plants in urbanized Nacogdoches, Texas, beginning first with the flora of the SFASU campus. This benchmark data will be archived in the files of the SFASU Arboretum. It will then be available for research analysis and future comparative studies, educational and interpretation programs, and as a resource to public agencies and civic groups interested in historic urban planted landscapes in East Texas. This project will be an asset to individuals looking for development strategies to enhance tourism and community development.

There is an increasing amount of activity in the East Texas region toward the restoration, beautification, and reconstruction of period structures and landscapes in cities such as Lufkin, Nacogdoches, and Center. For example, Scott Engels, the City Planner has been working with SFASU in identifying projects that would enhance the visual image of Nacogdoches. One downtown project will encourage restoration of historic buildings and beautification of street store fronts. In addition, Engels (1990) mentioned that residential landscape interpretation and beautification were of interest to the city in reference to increasing tourism. Currently, there is limited compiled information about the urban planted landscapes of Nacogdoches, nor is there any benchmark data available on frequency, distribution and general health of landscape plants commonly occurring in Nacogdoches gardens today.

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