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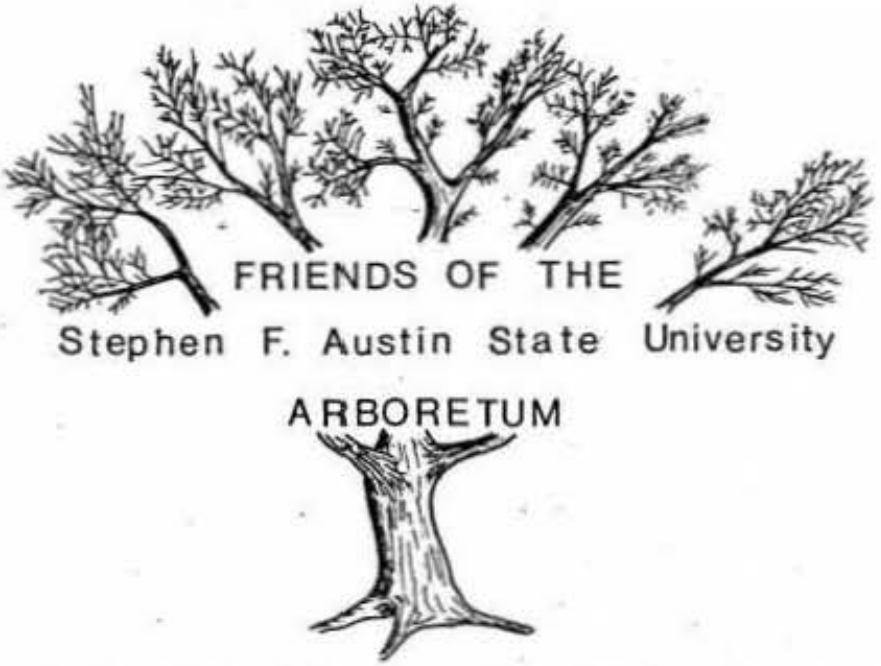
SFA Gardens Newsletter, May 1987

SFA Gardens, Stephen F. Austin State University



Friends of the SFA Arboretum Newsletter No. 4, Dr. David Creech, Department of Agriculture, SFA State University, Nacogdoches, Texas 75962 (409-568-3705), - May, 1987

What more can you say about the 1987 winter and spring weather? Record cold in late March and early April, record heat in mid-April, and a record dry spell by late April have certainly tested normal beliefs about our east Texas weather. Breaking one one hundred year record is interesting but breaking three in less than a month appears a bit too much. The garden has endured and the gardener's spirit is alive and well at the arboretum. Out of a catastrophe can come a new body of knowledge and much of this newsletter will touch on the effects of the 100-year spring freeze. In addition, and best of all, I've included a discussion of our new arboretum expansion plan, recently approved by the administration. A partially wooded expanse just to the east of the current horticultural garden will soon be a wonderful place to visit with friends or stroll alone. Given sufficient time, this new and special garden resource will be on the "list" of places to visit when in our area.

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THE MARCH 31st AND EARLY APRIL, 1987 SPRING FREEZE

Perhaps, if the late March arctic blast had been one day later, the whole disaster would have been just another April Fool's joke. Mother Nature wasn't fooling this time. The first inkling that a problem was in the making came from changes in the jet stream flow during the last week of March. Normally, one might expect a late freeze to come directly out of the north or northwest. This frigid wind, however, blew in from the west and left little undisturbed in its path.

Most fruit growers in Texas appeared on the verge of an excellent crop. After last year's March 21st freeze left many growers without a crop, orchardists were looking forward to recouping some of their losses. Most gardening enthusiasts had set their tomatoes, peppers, eggplants, and other bedding plants in the garden weeks earlier. After an exceedingly mild winter and early spring, most of our landscape plants and our

native woods were generously leafed out. In spite of good soil heat accumulation, there just wasn't enough there to counteract the very hard freezes of late March and early April.

The average date of the last killing freeze at Nacogdoches is March 15th. Here are some interesting figures: If we make it to March 5th, we have a 24% chance of 28 degrees or less, but if we make it to March 20th, we have only a 5% chance of 28 degrees or below. No wonder even the old timers felt we were "home free"! These are forty year figures that I worked through in the early 1970's for an orchard management class. While they provide little solace, they do indicate how rare this late freeze really was.

The March 31st icy finger blew away essentially all of the Texas peach and blueberry crop. Many orchards suffered leaf damage. Early vegetables were flattened. Our beautiful azalea bloom display was darkened and many trees, already in leaf, were set back severely. Some Virginia pine Christmas tree growers reported tip and needle damage. How cold did it get? The Forestry weather station just a couple of hundred yards from the arboretum reported a reading of 21 degrees on the morning of March 31st. Evidently, our arboretum is a true frost "pocket" laying in the Nacogdoches "valley". My orchard thermometers (28 miles east of Nacogdoches) read a frigid 24 degrees at 5:30 a.m. and most of east Texas was below 30 degrees from 12 midnight on. Kirbyville, eighty miles south of Nacogdoches, experienced a low of 25 degrees. Northeast Texas weather stations reported readings in the low 20's. Fruit growers across the south were caught in a no-win situation. It was not as if there wasn't a warning. Many growers attempted to heat orchards but most efforts failed miserably. One large peach grower in Louisiana burned brush and tires all night with a helicopter hired to stir the rising heat back into the orchard. The results were poor. To make matters worse, a cold spell settled in for the entire week with temperatures falling below freezing on the morning of April 2nd and 3rd. To make matters even more discouraging, the freeze had been preceded by a month of considerable heat. This greatly reduced plant hardiness. Many plants, even our natives (who should have known better!), had forced buds and appeared particularly sensitive.

What happened at the arboretum? On March 30, 1987, several volunteers and I hastily threw together a sprinkler system and covered many of the bedding plants with containers. Bob Rogers, Grounds director, covered the thousands of just-planted bedding plants on the campus with polyethylene tents. The zinnias, salvia, and marigolds, grown by the SFA Horticulture club, had been planted into the campus annual beds only the week before. At 10:30 p.m. on the night of March 30th, I made a phone call to Alan Ware, one of my students, to turn the system on. By morning, the entire garden was an icy wonderland. At first, I thought the whole effort was a lost cause (Nothing commands more attention than a really bad mistake! - Pat Hall). At 8:30 a.m., after temperatures had risen above freezing, the sprinkler system was shut off. Many of our young five to eight foot tall trees were bent to the ground, laid low by the ice

load! The Dawn Redwood and Monterrey oak were flattened. Many of the corkscrew willow limbs were broken and strewn beneath the tree. All of the lush Penstemons, Physostegias, Salvias, Aquilegias, Hibiscus and other herbaceous perennials were encased in a ball of ice! Local newspaper reporters and photographers, after hearing of our plight, dashed in to capture the spectacle on film! See attached Daily Sentinel article. Many students and faculty thought that a sprinkler system was "accidentally" left on. After all the dust had settled and the ice melted away, I knew that the effort was successful. Whew!

The Daily Sentinel

Vol. 88—No. 32 NACOGDOCHES, TEXAS 75961 26 pages in two sections

Peach, blueberry crops damaged

County suffers from hard freeze

By CANDACE VELVIN
Sentinel Staff

The Nacogdoches County peach crop was severely damaged and perhaps lost during a hard freeze overnight, the latest spring freeze most county residents can remember.

"My first impression is that we lost the crop," said Dr. David Creech, agriculture professor at Stephen F. Austin State University, who also owns 35 acres of peach trees on a farm near Center. "I'll be able to tell more this afternoon when I look at the developing fruit," he added.

Dr. Creech said most flowering fruit and berry trees suffered severe damage when temperatures reached the low 20s during the night. "I'm particularly concerned about the blueberry industry here," Dr. Creech said. "We may have lost it, too. We've just never had a freeze this late in the year before."

Most of last year's peach crop was lost to a 27-degree freeze on March 21, 1986, Dr. Creech said, and for many area orchard owners, this is a second year of bad luck.

"When Mother Nature decides to show her stuff, she can really do it," he commented.

Some blueberry growers tried to sprinkle-irrigate their crops to protect the plants from the freeze, Dr. Creech said. He said his students were able to use the method to protect the garden near the Agriculture Building on the SFA campus Monday night.

"I had a student go up at midnight, when the temperature reached 32 degrees, and turn on the make-shift sprinkler system we set up," Dr. Creech said. "As long as you keep the water flowing on the plants, you can keep the temperature at 32 degrees. The water will freeze and provide some protection to the plants."

The volume of water flow required makes this method impractical for trying to protect fruit trees, Dr. Creech said. Smudge pots and burning tires are used by the citrus industry to protect trees from a freeze, but that method won't help peach trees either. "The citrus trees already have foliage by that time, which will keep the heat in the trees. The peach trees just don't have any foliage to trap the heat, so it just rises up," Dr. Creech explained.

The freeze killed young, tender garden plants such as tomatoes and peppers, but may actually help pastures, county extension agent Reggie Young said.

"The tomato and pepper plants can be re-planted and our more hardy plants such as cabbage and turnips won't be affected," he said. "Many weeds in the pastures had already started to germinate and the freeze may have killed them back," he explained.

"Most of our summer grasses and lawns haven't started growing yet, and shouldn't be damaged by the freeze," Mr. Young said. "We will probably see some damage to our azaleas and dogwoods. I saw that many people covered their flowering plants, but that may not have helped against such a hard freeze."

R.F. Wilson, official weather reporter for the Douglass area who celebrates his 73th birthday this week, said he could not remember a freeze this late in the spring. "The temperature reached 21 degrees here last night," he said.

21 degrees was the official low recorded by the SFASU Forestry School weather station at 6 a.m. today, Tuesday. By 7 a.m., observation time, the temperature had risen to 26 degrees. The 24-hour high of 50 degrees was recorded at 4 p.m. Monday.

Relative humidity was 100 percent at 7 a.m. today, following a 24-hour low of 24 percent recorded at 4:30 p.m. Monday.

The total day's wind movement was 48.8 miles with an average velocity of 2.03 miles per hour. At observation time this morning, the wind was still. Total evaporation was .11 inch.

ICY WONDERLAND — Stephen F. Austin State University agriculture students sprayed water on plants in the horticulture gardens near the Agriculture Building to protect them from the hard freeze overnight. As the sun rose this morning, Tuesday, the melting ice drips from the plants refracted the sunlig Following the unusual late spring free temperatures are expected to rise into 60s and 70s this afternoon. (Staff photo Hardy Meredith)

Dots and dashes

By Victor B. Fain

OVERHEARD: "One trouble with the world is that so many people who stand up vigorously for their rights fall down miserably on their duties."

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GARAGE SALE: Members of the Heitage Club of Nacogdoches are busy assembling items for their semi-annual benefit garage sale planned for Thursday and Friday, April 2 and 3. The place: the corner of North Mound and Ochiltree (just south of Memorial Hospital), and the hours: from 12 noon to 6 p.m. Thursday, and all day Friday. As usual, all pro-

The principle "behind" sprinkling for frost control is rather simple, but demanding. The key ingredients to its success depend on the system's ability to deliver about .20 inches per hour precipitation rate and that the foliage, blooms, fruit, etc. be "hit" at least one time per minute. A precipitation rate of .16 inches per hour will protect plants to the low 20's while the higher rate of .20 inches per hour can protect into the high teen's. The sprinkler should be turned on just before the temperature reaches freezing and should not be turned off until the wet bulb temperature rises above freezing. That may be as high as 40 degrees air temperature. Many homeowners and growers make the mistake of turning off a sprinkler system too early. Any sprinkler can be checked for its precipitation rate by simply placing three or four cans into the wetted pattern of a sprinkler head and then measuring the depth of water in the can after one hour. Keep in mind that the protection depends on the existence of an ice/water interface. For best protection, sprinkler patterns must overlap appropriately so that no "dry" spots are present. As water changes from the liquid to the solid, it releases 80 kilocalories per liter of water. This is referred to as heat of fusion. This release of heat warms the objects in contact with the water and ice.

As long as water is dripping from
icicles, the temperature of the plant
will remain at thirty-two degrees
fahrenheit.

For those of you who like extrapolating to Gallons per Minute per Acre requirements, a precipitation rate of .20 inches per hour would necessitate a pump and mainline system capable of delivering about 90 gpm/acre. A 10-acre peach orchard, for example, would need 900 gallons per minute via sprinkler to survive our recent icy blast. That's a lot of water and is often beyond the resources of most growers. Homeowners, however, can find this an easy way to protect prized specimens. Again, from all of this, the lesson should be that a landscape foundation should rely heavily on known "dependables" and tender plants interplanted only for their "interest". Should they be lost, the basic landscape remains undisturbed and satisfying. If the freezing period lasts for many hours, the ice load can build to the point that limb damage may demand that the system be turned off prematurely. In general, however, in our area of east Texas, a long and extended period of freezing weather during the critical March period is highly unlikely and sprinkling for frost control appears especially attractive at this time.

Tomatoes, peppers, and eggplants are very sensitive to frost and were the first plantings I inspected. I figured if they survived, most of the plants would make it. They did. Some of the plants in the arboretum were unprotected and suffered heavy damage. Perhaps, most interesting was the across the board burn-back of all the new growth on the crepe myrtle

collection. Even those crepes that received good sprinkler protection were damaged heavily. In spite of the damage, most of our collection was not killed and regenerated new growth. I was very surprised in mid-April by the realization that many of our one year old crepe myrtles were regenerating from only the lower portions of the trunk, that major limbs and shoots had been killed. I spent a number of hours recording plant damage in the shade house and in the arboretum. Plant response to the freeze depended, of course, on the species and its location and whether or not the plant was protected via sprinklers. Several surprises were apparent. There are too many interesting responses to develop into a long narrative but I have chosen a few for illustrative purposes.

I was amazed that none of our six Eucalyptus species suffered any damage. These plants (about 2 feet tall) were wintered in the glass greenhouse in 5 gallon containers and were moved to the shade house around March 1st. Not even the tiny developing leaves were affected! Right next to them, our containerized crepe myrtle variety collection was burned to a crisp. Many of our landscape foundation plants suffered major limb damage and are regenerating only from the lower portions of the main trunk. I have read many times that a shade house, in spite of the fact that it is open to the environment, often affords good freeze protection. There were some tragedies and, wouldn't you know it, they usually involved a plant that might be difficult to replace! In the shade house, we lost all of the new growth on the rare Heptacodium jasminoides, and the plant failed to recover. Our brand new container collection of Rhododendron species and hybrids lost all of its blooms and suffered severe new growth damage. I do, however, expect a full recovery there. The dissected leaf Acer palmatum varieties suffered total leaf burn while the entire leaf varieties appeared only to suffer tip damage. We lost Acer carpinifolium, Stachyrus chinensis, Camptotheca acuminata, and several other plants that I thought would have survived. In the ground cover section of the shade house, the Hosta varieties were flattened but within a few days regained their turgor and now look healthy. Many of our new tree species suffered new shoot damage but are quickly regenerating from basal buds. In the arboretum proper, the survival of the Myrospermum, the Pistache texana, several Quercus species of Mexico origin, the Ilex latifolia, the Asimina triloba, the Acer species grouping, and other temperamental sorts was encouraging. The Milletia reticulata vine planted at the southeastern corner of the deck and arbor suffered new growth damage but recovered nicely. The two red wing plants, Heteroptyerus glabra, had just begun to push its dark red leaves leaves when the freeze hit. Both plants were protected via sprinklers and are performing well. I have still not found a reference to this species and its requirements. We are testing these potential landscape plants for Hines Nursery, Houston, Texas; so far the performance of both is encouraging. The Dawn Redwood, in spite of sprinkler protection, was severely damaged. The 7 foot tall tree spent most of April looking unthrifty but by mid-May new growth has returned the

beauty of this tree. I'm convinced, after close observation of the cambiums of many species, that many of our native trees were damaged, and that the return to healthy growth will be slow. I am amazed that so many of the species that our landscapes commonly have in large numbers were so heavily damaged. The Ligustrum, Pittosporum, Rhododendron groups (particularly the common Southern Indica varieties), Eleagnus, Photinia species suffered severe tip damage and partial defoliations. There are lessons to be gained from this experience that should be carried into current landscape thinking in our area. The full impact of the freeze will take months to express itself. Horticulturists always recommend that homeowners and orchardists wait to see the full extent of the damage before tackling plants with a pruning lopper.

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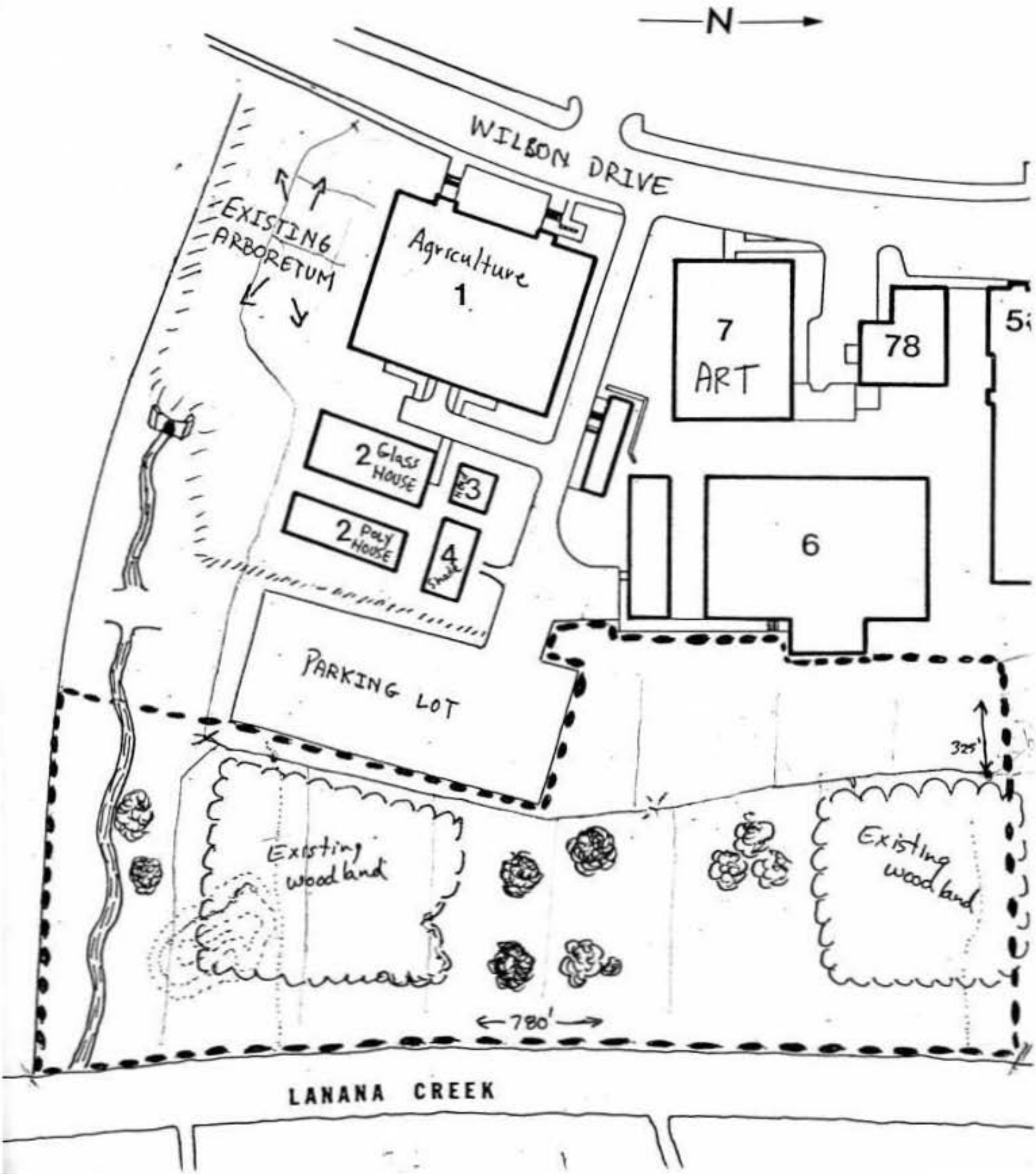
ARBORETUM EXPANSION

A proposal submitted to the administration in March has been approved. This effectively adds a truly remarkable site to our effort and opens up many new avenues for development. Approximately 2.3 acres just to the east of the Agriculture/Art parking lot has been added to the SFASU Arboretum! The fertile soil will soon be home to numerous examples of bottomland species. In the shadehouse we already have the makings of a fine collection destined for the site. Magnolia, Quercus, Fagus, Nyssa, Salix and numerous other tree species will be set into tightly planted "mixed screens" to segregate different garden areas. A map of the area follows.

The following program outlines a plan of work that will attempt to alter tastefully this under-utilized section of university property. The new site has some tremendous attributes that insure our success. For one, it is easily accessed by students and arboretum visitors. The Agriculture/Art parking lot forms the western face of the property. Lanana Creek defines the eastern edge. The drainage ditch that flows from the large concrete culvert (just to the south of the glass greenhouse) marks the southern border. There are two woodland groves in the area and both contain a surprising number of specimen trees. Carl Baum and James Meeker, forestry students, have marked and indexed one of the two groves. It contains pines, oaks, willows, ash, Maclura, tallow, river birch, maple, and muscle trees. The diversity and the number of species doing well is good testimony to the plant growing ability and internal drainage of this soil. The two woodland groves are separated by a one-acre expanse of grass dotted by an occasional large oak or pine specimen. The area could be categorized as very light shade. Both woodland thickets are dense and will need a light cleaning up. The Landscape plant materials course (Agriculture 324) will tackle this area in the Fall of 1987 with the intention of creating an SFA Arboretum woodland glen setting, accented by an understory of plants selected from our current inventory. The project has great promise if class management techniques, student

THE SFA ARBORETUM



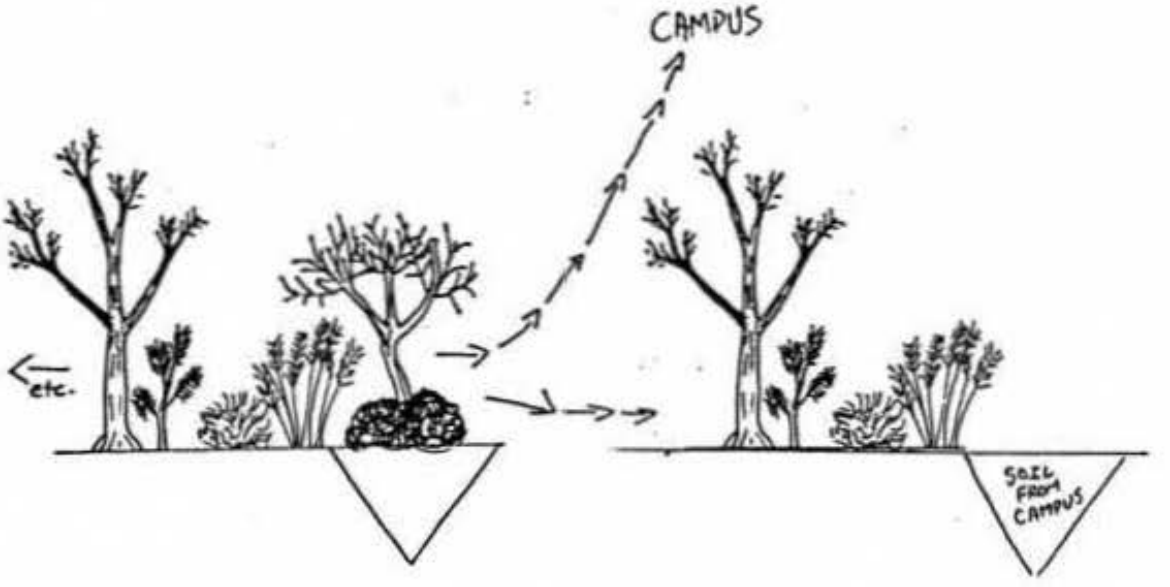
enthusiasm, and outside support can be maintained at the current level.

The southern grove of trees has another interesting attribute. Several years ago, the Ag Pond just to the north of the Agricultural Mechanics shop was deepened by dredging. This soil was dumped into the northeastern corner of the woodland and has "mellowed" into an interesting bottomland knoll. It will serve as a very large and well drained planting resource. While just a bit "heavier" than I like, the knoll will afford good drainage and flood safety for many interesting species. The makings of a curving woodland trail meandering along the knoll's bank would appear to be a natural for our new Rhododendron collection this fall.

The danger of flooding greatly influences the development of the new garden area. That chance (once or twice every five years) will mold our approach to arboretum development. Several aspects are clear. In a site that floods, the approach should be to establish plant "colonies" in a slow and steady fashion. No large beds involving disturbed earth will be utilized for planting the large number of species. Instead, the approach will be to develop "pockets" and "mixed screens" of trees first. We will be setting hundreds of one-to-five-gallon specimens in the fall in the area. No backfill will be utilized. Vigorous container trees and shrubs set in October and November in our area of the south, generally become well anchored quickly and continue to grow roots throughout the winter period. The specimens will be mulched lightly. A key ingredient to insuring tree establishment success is often mulch, particularly if drought stress periods are likely. Mulch reduces irrigation volume needs. An essential factor to successful tree establishment in a flood-prone site lies in the first few months. Of course, a flood immediately after planting can be devastating; container grown plants can "float" out and away! Trees and shrubs that have grown roots into the surrounding soil are soon well anchored and can deal with flooding and even prosper by its occurrence. Once trees are established, shrubs and smaller trees can be set with the goal of creating small colonies. By not planting a large number of container plants at any one time, the risk of losing a great deal is minimized.

The arboretum will be developed a section at a time utilizing a mixed screen approach. The new garden will be developed in phases. Each phase will be separated by a living screen to create separate garden vistas. The mixed screen will absorb most of our horticultural program's output. Greenhouse, nursery, plant propagation, and other horticultural labs can be intelligently utilized to develop a plant product adapted to the site. The acreage can absorb thousands of small plants into screens three feet in width. The mixed screen will be comprised of tree and shrub species, with occasional groupings of herbaceous perennials, annuals, ground covers, and vines. A key ingredient to the success of our "concept" is that the screen, once it is several years old, can be invaded by a tree spade to fill a "hole" on the campus. A section of the screen might

involve planting pecan seedlings every 3 feet, each pecan seedling surrounded by Forsythia, Spiraea, or Azaleas. The number of combinations is, of course, limitless. The soil taken from the hole on the campus proper can be utilized to fill the hole in the screen. A new planting can be made to fill the screen and the process repeated, or the hole can be left unplanted to give "neighbors" in the screen further opportunities for growth. The screen will be maintained at less than 3 feet wide to facilitate good tree spade access and easy utilization. In this manner, a narrow living screen not only separates different garden vistas, it also serves as a low cost resource for the campus replanting effort. The screen development will also simplify the task of mowing; developing individual trees dotted every so often across a long, wide expanse can make mowing tedious. While the screen is growing, and its diversity improved by underplantings, it too contributes its own beauty to the landscape. As the landscape grows, specimen trees and shrubs in the screen "row" can be selected as candidates for permanent residence. If selected, a established colony can be diversified and expanded by interplanting with numerous shrub and perennial candidates growing nearby. While the process sounds confusing, there is much merit in its development. For the University to have its own nursery, to have access to specimens of numerous tree and shrub varieties, and to have two departments working together with a common goal is, indeed, an encouraging development. The screen should serve as a source of nursery trees for five to seven years. I have calculated that 3000 feet of "living screen" can be quickly developed in the next five years. The mixed screen will be utilized as a nursery tree resource, as stage setters to different garden vistas, and will be used in grafting and budding horticultural labs.



The most challenging aspect of the site involves the eastern edge, Lanana Creek. For most of the border there is very little cover. The banks have been cleared of trees and brush, except for an occassional young river birch. The creek flow is normally such that its width is less than ten feet. But once every two to three years, heavy rains cause the creek to leave its banks and flood the bottom land. Herbicides have been used to keep the creek bank "clean" and fertilized ryegrass has reduced erosion somewhat. Bank stability, however, is not good and there are numerous signs that the channel is widening. A strong effort will be made to secure the bank in the next five years. Dr. David Kulhavy, in the School of Forestry, is enthusiastic about this aspect of our project and will be invaluable in sorting through some of the technical problems sure to be encountered in this area. In the creek bank area, the mixed screen approach will be the same with the exception that the line of trees and shrubs will not be robbed. The screen may be thinned later, but soil disturbance will be avoided. Some trees may not anchor, others will. By underplanting successful colonies with low-growing, bank-loving species, the channel can be brought under some sort of control. The key is to gain establishment. The bank-loving species must be set far enough away from the bank edge to achieve good anchorage and underplanting ability. Only when the roots of all species become meshed, does natural erosion reduction occur. The planned creation of a "river walk" must anticipate and expect floods. Design of the garden arenas must take that risk into account.

The western edge of the new area includes a sloped expanse that runs up to the bare walls and foundation of the Art building. This area will be planted to numerous tree and shrub species in the fall. The new arboretum area and its close proximity to the Horticultural facility makes it a "natural" in terms of developing "living classroom" concepts. Even though our effort is young, I am convinced that students learn and enjoy horticulture experiences via hands-on work more than through straight lecture scenarios. The class primarily responsible for the current garden effort is titled Landscape Plant Materials, Agriculture 324. The class has designed the garden layouts, been involved in the various construction projects, seeded all of the annuals and herbaceous perennials in the greenhouse, kept up with labelling, and then set the plants into the landscape beds. This seed-to-garden-display activity nurtures educational motivation. I have met very few students who do not enjoy making a garden "bloom". Besides learning to appreciate the genus species, care, culture, and placement of approximately 180 common east Texas landscape shrubs and plants, students are also exposed to a wide variety of plant materials not so common, many quite rare. This exposure opens up new avenues in future landscape expressions. My harping that "life is more than endless rows of Ligustrum", is only a plea to incorporate diversity, difference, variety, and interest into the landscape. Try a new plant today! Popped here and there into a landscape foundation, a different plant

can provide joy in its time of best display. While not at its best, it can blend back into its inconspicuous nook in the screen's vista.

The arboretum to come will be like that evolving screen. The fact that plants may rotate into and out of the screen landscape will not remove the contributions they make while they are there. I am particularly encouraged that our effort has grown to a point that all of the agricultural students will be able to enjoy its presence and will be involved in its progress. Dr. T.A. Alhashimi has the responsibility of Introductory Horticulture, Turfgrass, and Landscape Design classes at SFA. The new expansion will result in a heavier involvement of those classes than in past phases. A new turfgrass testing "pad" is being established at the southeast corner of the poly greenhouse and Dr. Al is busy making plans for that area. The trees and shrubs in the Phase 1 and 2 area are now well established and are quickly filling their allotted territory. The landscape and introductory horticulture classes will be responsible for the display of this area in the years to come. My plant materials class can move on to create new garden visions. It is a long range plan and one certain to be fraught with problems and obstacles, but, with a little patience and time, our "forest" will grow.

I would like to express my strong feelings of appreciation to the "Friends" group. The group has provided a strong core of support for an effort of this type, encouraged the return of color to the campus, and created a forum for arboretum expansion. The administration's recognition of this development as a special university resource is very encouraging! Keep in mind that, to date, there is only <u>one</u> university campus arboretum in Texas. While our effort may appear small at this time, the first and most important steps have been taken. I am hoping that <u>someday</u> the Arboretum will one day tie into the LaNana Creek jogging trail south of our project and the LaNana Creek nature trail (spearhead by Dr. Bill Gibson's Biology Club) north of the Arboretum. Talk about a special kind of river walk!

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ARBORETUM HAPPENINGS

We have made some sizeable acquisitions to the arboretum collection. Most are growing happily in the container collection in the shade house. Drop by to check on their progress. I have received many queries on just how we plan to "grow out" the many species accumulated. We are using a composted pine bark with no other amendments. We are not adding sand or peat moss. The bark, secured from a local source, has been composted, is gritty and drains well. It makes an excellent potting medium, provided irrigation needs are met. We are fertilizing with slow release 17-6-12 plus micronutrients applied to the surface of the container media. That is then mulched lightly with more pine bark to prevent the fertilizer from "splashing" out during irrigations. The slow-release

product is described as a 3-4 month product and is, of course, less likely to burn sensitive types. Because Nacogdoches city water contains a substantial burden of calcium and magnesium salts, we have never found a need to add limestone. The pine bark container medium generally rises to a pH in the 6's after a month or two of daily irrigations. This approach has been successful with a wide range of plant materials. The root system is inspected frequently. Fungal gnats have occasionally darkened root systems, particularly in the greenhouse, but a light application of insecticides plus Benlate has kept our collection healthy. When the plant root system fills the container, the plant is "chipped" up to a larger container. Therefore, a one-gallon plant is transplanted into a two gallon container. With vigorous growing species, we have found that it saves time to go directly from the one gallon container to a four or five-gallon container.

A trip in early February to Dallas, Texas included a visit with Benny Simpson at the Texas Agricultural Research and Extension Center. Benny has a long-time history in the native plants movement, has encouraged native plant availability through various progressive nurseries, and has added numerous plants to our landscapes. Benny let me walk away with two varieties of Desert Willow, Chilopsis linearis,: "Dark Storm" and "White Storm". These attractive small trees are native to western regions but should find a happy home in our arboretum. I also garnered several small plants of Mahonia swaseyi that make a nice addition to our collection of this attractive genera. I have also seen this plant labelled as Berberis swaseyi, and am not sure where it belongs exactly. I couldn't resist the offer to try four container-grown specimens of Arbutus xalapensis, the Texas or Mexico Madrone, even though its chances of long term survival here are doubtful. This striking tree is described by Krussman as "very beautiful with the colorful contrasts of flower, fruit, leaves and bark." The tree evidently survives well for years but can succumb to mid-winter cold. Although all four plants had pushed new growth, the late freeze did only slight damage and they have quickly recovered. Apparently, the plant has a strong need for well-drained soil and should be placed accordingly. Like the strawberry tree, Arbutus unedo, the Madrone may benefit from an occasional Benlate drench on the root system. Spending just a little time with Benny Simpson is an education. I couldn't help but agree with many of his landscaping philosophies that center around "xeriphytic landscaping trends." The concept of planting species adapted to extended dry periods is often construed as a cactus/yucca vista. While that "desert" landscape is certainly moisture efficient, there are numerous other combinations that provide more color, form, texture, and considerable water efficiency. Benny also encouraged me to search for many of our own east Texas natives that have failed to capture landscape attention. He raised the question of why so many horticuturists and arboretum directors tend to look far and wide for distant species, when some of the best and rarest are in our own back yards. For example, I have located several plant enthusiasts

that know the exact location of the last few remaining stands of Stewartia malacodendron, the silky camellia, in east Texas. This small tree or shrub is very rare, enjoys moist sites with partial shade, reaches 10 to 15 feet in height, and is blessed by a cloak of 8 to 10 cm wide snow-white flowers in June. I am eager to add this "native" to our collection of Stewartia species.

Our Rhododendron collection received a tremendous boost from a visit in early March to the nursery of John Rochester at Franklinton, Louisiana. Located just 30 miles to the north of New Orleans, John has created a breathtaking collection of Rhododendron taxa. Dogwood Hills Azalea Nursery operates primarily as a wholesale operation, but John generously spent a glorious Friday with me. Running up and down the container rows, I had to have this one and that one and, hey, this one over here! After the dust settled (seven hours!), we had accumulated a mountain of varieties that could barely be crunched into my little camper. A real joy was a gift from John and Evelyn of about 40 numbered selections of Kurume azalea, collected by the past Director of the National Arboretum, Dr. John Creech, during his trips to Japan and Korea. These were provided to us as a small flat of rooted cuttings. The entire collection numbered over two hundred taxa and included John's "best-bet" representations of a number of hybrid groups. John Rochester's personal collection exceeds 2000 varieties and I assure you that he knows each and every variety personally! The grounds surrounding the nursery, aesthetically shaded by towering pine trees, is heavily planted to Japanese maples, camellias, magnolias, and, of course, rhododendrons. This essentially "dryland" planting is doing remarkably well, in spite of an occasional varmint problem. His many years of observation at Franklinton and the helpful hints I received that sunny Friday will go a long way to insuring SFA of a superior Rhododendron garden in the near future. Take a look at the plant acquisition list. I have categorized all as Rhododendron and then followed that by the variety name and, frequently, by the hybrid group. After I segregate these a little better (back to the books!), I will tackle a "tighter" taxonomic approach. But for right now, the plants are enjoying their new home, are double labelled, and are notched into a floppy disk somewhere. John selected for our collection a broad representation of various varieties from the different Rhododendron groups. These were all varieties that John felt a had a reasonable chance of good performance in our area. We have representatives of the Glenn Dale, Satsuki, Indicum, Kurume, North Carolina/LSU, Harris, Robin Hill, Kehr, Vuyk, Girard, Linwood, and Mollis hybrids. In addition, several species types were included. In spite of the rushed collecting, labelling and recording, we ended up with only two containers minus a label!

Holly Hills, 1216 Hillsdale Rd., Evansville, Indiana 47711 provided our effort with a collection of 20 Ilex opaca, American Holly, cultivars. I had my eye on these reasonably-priced, rooted plants as an inexpensive source of trees to fill

a portion of the bottomland arboretum. All arrived in excellent shape and are busy forcing new growth. I secured two of each variety. While most are red-fruited females, one is a bright yellow-fruited cultivar from Longwood Gardens, and several varieties were selected to serve as male pollinators. Thank you, Steve, for the generous discount.

Mrs. Jean Barnhart, a generous "Friend" of the arboretum, provided six of her daylily breeding lines: 1) Nacogdoches Ace seedlings 2) Dazzling Beauty seedlings 3) Seedling X seedling 4) Martha Adams seedlings 5) Little Maggie seedlings and 6) Mamie Schultz seedlings. These were planted into the third bed (Bed I) on the arboretum slope that faces the Intramural field. Judging by the names I would suspect that these progenies are the result of open pollinations, that the resulting plants are fairly heterozygous, but I'm not sure and will get the details on these lines from Jean soon. The six groups contained about 30 "fans" each and should make a beautiful display this summer and for summers to come. The collection was sprinkle irrigated during the late freeze and emerged from the ice undisturbed. Many unprotected daylilies in our area were badly damaged. Jean's daylily breeding "creations" have been well received in the past. Several of her variety releases have achieved notoriety in England for their exceptional qualities. Jean's efforts focus on improving "storm resistance" and duration of bloom. Most daylily flowers "last" for only one full day; Jean's breeding efforts are attempting to select types most likely to hold blooms "longer". Jean is very much appreciated in daylily circles and her generousity to our effort is appreciated. I'm excited about Jean's offer to put together a "Stout Medal" collection for the arboretum. This medal is bestowed by the American Hemerocallis Society on one new daylily variety per year. The entire collection would include daylilies selected since the 1940's. As soon as they are assembled, we will provide them with a new home in the arboretum. Labelling and mapping this wonderful collection will be a worthy challenge and will add just one more "special" attribute to our garden. Thank you, Jean.

To add a little variety to the garden, it's hard to beat spring and summer flowering bulbs. The Phase 1 and 2 gardens received a healthy sprinkling of daffodils, gladiolus, and canna varieties. On the fence that separates the Phase 1 and 2 garden areas, the class planted 8 canna varieties. Four were tall-flowering varieties: Wyoming (orange), Yellow King Humbert (yellow), Red King Humbert (red) and Orange Beauty (orange). Four were semi-dwarf varieties: The President (red), Rosemond Cole (orange with yellow petal margins), King City Gold (yellow), and Los Angeles (orange-pink hue). Under Rodney Watson's, Rhonda MacSwain's, and Deniece Bynum's control, this collection was planted behind and between the numerous shrubs that border the fence separating phase 1 and 2. Late last fall, fifty daylilly varieties, three bulbs of each variety, were planted to the front of the railroad tie border of that bed. We will evaluate the varieties in two to three years for their perennial behavior and season of bloom characteristics. The

bulbs were set four to six inches deep just inside the railroad tie border in small colonies. They provided a wonderful display this spring, as many of you who visited in March can attest.

A collection of six gladiolus varieties was planted in early March by Carl May, Shannon Murphy, Tim Kiphart, and Susan Elking. The 600 corms were set into the three rectangular box beds at the east end of Phase 1. The six varieties planted were (from east to west): Snowstorm (white), Oscar (red), Flowersong (yellow), Illusion (orange), Purple Sensation (purple), and Friendship (pink). The three 4' x 25' beds should certainly "shout a joyful noise" this summer and I hope the blooms find their way to many of the dining room tables in our fair city.

The class this spring has been involved with the poly greenhouse bedding plant project, developed numerous varieties of annuals and a few herbaceous perennials, and has set to the landscape about 8000 bedding plants. Some of the surprises deserve mentioning. The snapdragon "florared carpet" variety that graces the box bed in the center of the first phase has been a phenomenal success. The 1200 bedding plants were set in the bed in September, 1986, and provided a wonderful display in late November and through the winter period. We were able to "create" three color explosions by shearing the spent flowers. The first lasted a month in November and December. The second bloom display in March was outstanding. The plants were sheared in early April and managed a decent showing in late May. Not bad! The Cabbage and Kale varieties that formed the curvilinear lines separating groups of snaps was outstanding. The mild winter of 1986-87 (until the last freeze!) increased the beauty of the display. The heat in February and March caused the cabbage and kale to bolt (initiate inflorscences) and the planting was removed and replanted to Salvia in mid-March. Kathy Malone, Wes Collier, and Jayme Reaves tended the box garden this spring. The snapdragons formed a 10" deep carpet and only light weeding was needed. The Salvia endured the early April cold snap and has slowly filled its allotted space. In hindsight, I think it would be more appropriate to have removed the cabbage and kale earlier (mid-February) and replanted with a hardier type (calendulas, for example). There are numerous combinations of many different annuals that succeed in our area in the late spring. Only a few succeed in the dead of winter and early spring. Being able to put annual colors together for season long continuous displays is a never-ending circle of potential groupings.

At the entrance bed, Deniece Bynum, Steve Gehring, Stuart Cureton and I decided to leave the Fall chrysanthemums in place but interplanted heavily with several Dianthus varieties. The entire kidney bean bed was circled by a ring of bright red/white petunia varieties. The purple, lavender, and white garden mums will be kept sheared until August. Then the plant will be allowed to grow flowering shoots, perhaps pinched only once. I'm not sure how a Dianthus/Chrysanthemum interplanting might look, but the combination of two tough herbaceous perennials in this bed is worth exploring. We currently have about 16 varieties of garden mums interplanted into the Phase 1

landscape in pockets of 6 plants of each variety.

Robert Milligan, Mike Armalavage, and Chris Michael were responsible for the difficult herbaceous perennial Bed B. This bed (the bottom half resembles the outline of southern Texas) contains a surprising number of Texas natives with landscape value. We have in place several "varieties" of desert honeysuckle, Anisicanthus spp., that promise good summertime colors. I am looking forward to seeing Lynn Lowrey's "gold" flowered selection in bloom this summer. Bed B is also the home of a Quercus polymorpha (New leaves were a beautiful red this spring!) and a Bauhinia congesta, a rare "orchid" tree from Mexico that may be hardy in our area. It has certainly survived the past mild winter (low in low twenties) and was protected via sprinkler during the late freeze. The blooms in mid-April were small, white, pendulous, and very fragrant. It appears to be very slow growing. Robert, Mike, and Chris decided to interplant the numerous herbaceous perennials and the few woodies with three varieties of Alyssum. A wave of white, purple, and lavender alyssum stretches across most of this "Texas" shaped bed. A shining star in Bed B this spring was Penstemon cobea, a Beardtongue. The large, showy lavender inflorescence is conspicuous and attracts attention more than most Penstemons. Penstemon tenuous, while a larger plant, is not as showy with its smaller blooms. Penstemon australis, with its light lavender blooms and sparse stature was a somewhat inconspicuous beauty. Aquilegia canadensis and Aquilegia longissima have adapted well to this bed, in spite of what one might consider as a poor site. These delicate plants form foot-tall mounds of delicate foliage frequently topped by dangling inflorescences. The plants appreciate part shade and frequent moisture. In spite of what I would consider as excessive sun and drought stresses, these plants have certainly found a comfortable "home" in this area of our garden. I'm convinced that excellent soil drainage and heavy bark mulching have resulted in the obvious good health of this species. The Aquilegia's have adapted well to this bed, as have the Salvia greggii and Salvia farinacea varieties. At the March and April Horticulture Club Plant Sales I disseminated to many of you several herbaceous perennials for your gardens. The liatris needs a well-lit, well-drained spot. The salvias also appreciate full sun and occasional watering. Remember, these plants will die to the ground after the first few frosts in the fall, then regenerate in the spring when heat returns. They respond favorably to a light mulch during the winter.

Another interesting herbaceous perennial for our area is the "Texas Star" Hibiscus, Hibiscus coccineus. We have planted a grouping of three in Bed C. The Texas Star Hibiscus is believed to have invaded small sections in the big thicket years ago and is now thought of as naturalized. It appears to appreciate moist, lightly-shaded woodland thickets. The plant sends a succulent group of shoots to four feet and then produces one to several blooms. Older plants often send up many shoots, the crown growing slowly over the years. The plant responds to generous waterings and is always a conversation

piece. If allowed to go very dry, the plant can die to the ground, but a generous watering can cause new shoots to emerge almost immediately. Let me warn you, though. I received a call from Lufkin in early April requesting information about this plant, that it had been confused by police in Louisiana with marijuana. The lobed palmate leaves are, to me, quite distinct and different but I can see how the mistake might have been made. Any way, I did provide the state agency with information about the plant and a source of container stock for their collection. Evidently, the Louisiana law enforcement agencies have a miniature arboretum on plants that mimic the illegal crop. The plant collection is evidently used as a teaching aid to law enforcement officers charged with possibly having to identify the plant. While someone might confuse the leaves of this plant with marijuana, the blooms are dramatically different. The bright red five to six inch flower of the Texas Star Hibiscus is breath-taking. I would also consider our placement of this plant somewhat poor. Centered just on the north side of the Phase 1 fence, the specimen is forced to endure mid-day sun. In spite of its placement and last summer's drought stresses, the plant has grown vigorously. As a nearby neighbor, I have also included an Anne Robinson hybrid, Hibiscus coccineus X H. militaris. Although I saw several of these plants in bloom at Ecotones Nursery last fall, I have no idea what the bloom may look like on this particular seedling. In the group of seedlings that I observed at Ecotones, it was obvious that a great deal of genetic diversity was expressed. The opportunity to observe up close some of nature's newest marvels is just one aspect that makes working in the arboretum so inspiring.

The camellia collection has been planted to the north face of the Agriculture Building and the Headhouse. The few blooms we were able to observe on these small plants (most donated from Hines Nursery, Houston, Texas) was reassuring enough to realize just how beautiful this area will look in several years. Mark Sanford was responsible for the planting and many wheelbarrel loads of mulch needed for this area. The completion (finally!) of the bridge was delayed because of design changes (lumber warp problems) and time configurations (too busy to get to it). While the entire class worked on this structure, I have decided that Chuck Martindale and Alan Woods must bear the burden of this structure's final "look". I think both students learned what is meant by the word "plumb". The new garden focal piece will be planted to vines and shrubs this Fall.

A new "touch" added to the Phase 1 garden this spring was a donated antique Planet Junior planter. Made in 1919, the steel wheels, bearings, seed box and plates, and the handles were in almost mint shape. Dr. Bill Long, Agricultural Mechanics professor, got a gleam in his eye when he saw this old piece and we owe him a note of thanks for the fine job he did in refurbishing our new garden structure. Welded onto a steel pipe and set in the center of the Phase 1 box garden, the piece adds a beautiful and interesting accent piece to our garden picture.

Enjoy the arboretum this summer. Hopefully, we can do a

better job this summer fighting weeds. Feel free to cut flowers for your table. It always helps subsequent bloom to remove spent flowers. That allows plant energy to channel into new shoots rather than seed maturation. So, when you cut a flower for your home, you are actually creating a better plant display later.

Please take a careful look at the Plant Acquisition List at the end of this newsletter. You will note that this list is in alphabetical order by genus, that each plant has an assigned SFA number. We are nearly current in placing our entire collection on file. Mr. Stuart Cureton, one of my undergraduate students, has been responsible for putting the inventory into a software profiling system that we will use to keep our records. The system involves creating a number of fields. We have chosen the following: Field 1 = SFA acquisition number, Field 2 = Year collected, Field 3 = genus species, Field 4 = Location (shade house, arboretum bed, etc.), Field 5 = classification (Tree, shrub, vine, herbaceous perennial, ground cover, etc.), Field 6 = dead file lists all those plants that have died, Field 7 = comments up to 200 characters. The program can pull out each field or combinations of fields and will be invaluable in developing lists of plants on-hand and plants needed. For instance, it is now possible to extract all the Ilex species and varieties and print them. We can print a list of trees or ground covers. We can list those plants acquired but now lost and in need of replacing. The uses for this system are multitudinous and awesome. The plants listed at the end of the newsletter are only those collected from January 1, 1987 to May 1, 1987. The early inclusion of this data handling base is a key ingredient to the successful development of our arboretum. Mr. Leslie Dale, our computer technical resources consultant, has been invaluable in smoothing out the utilization of this filing system and trained Stuart in its use. In just a few weeks, I will have a brand new IBM clone on my desk, 640K, with 30 Megabyte hard drive disk and high resolution monitor. That will eliminate some of our current "storage" problems on the floppy disks we are currently using. Our inventory has spilled across several disks and is, thus, impossible to alphabetize as a whole. The hard drive with 30 million character storage potential should last us forever! In spite of my normal reaction to microcomputers (fear), I have come to realize and appreciate those functions that the computer can take away from our burden: Record keeping and data sifting.

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MEN'S GARDEN CLUB

Nacogdoches has a Men's Garden Club. This group was formed in March and will meet one time per month at the Agriculture Building to share the joys of gardening. At the first meeting, Mr. Don Freeman and three other Austin Men's Garden Club representatives attended and made our first meeting a success. Mr. Homer McAninch, retired to Nacogdoches, serves as our first President and has jumped in with a high degree of enthusiasm.

Good officers are a key ingredient to any club's success. The group will be exposed to educational programs. At the second meeting, I presented a slide program on the techniques of protecting tender plants from frost and followed with a quick how-to primer on growing tomatoes. At the third meeting in May, Mr. Kurt Whiting presented an interesting program on herb growing. Mr. Whiting owns the Kurt Gardener nursery in Lufkin, Texas and provided the audience with a lot of information on the history, the uses, and the care and culture of herbs. Our next meeting, June 11th, will feature Dwight Hall, a Texas A & M Extension specialist with a timely program on east Texas gardening. All "Friends" are invited to attend these programs. The meetings start at 7 p.m. and will be the second Thursday of each month. We will meet in Room 118 of the Agriculture building. Come a little early and we'll tour the arboretum! The Men's Garden club will be tackling several civic projects. Our new county judge, Mr. Bob Dunn, was enthusiastic about the possibility of a new landscape for the rather barren courthouse lawn. This high traffic area, on the corner of Main street and Highway 59, would be a wonderful high-exposure project. The Ladies Council of Garden Clubs in Nacogdoches has the responsibility of maintaining the city library landscape. The calendulas, marigolds, and petunias that brightened that spot were grown and planted by the SFA Horticulture club. This is an excellent example of community/university cooperation that benefits all of us.

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BOOK REVIEWS

I have purchased the three volume set by Gerd Krussmann, Manual of Cultivated Broad-leaved Trees and Shrubs, published in 1985 and 1986 by Timber Press, Portland, Oregon. This set, originally in German, was translated by Michael Epp and provides us with an easy-to-use extensive reference for arboretum acquisition development. While many of the European cultivars are not available in the United States, they do provide an understanding of just what is "out there" in the gene pool. There are a generous number of black and white photographs that illustrate tree and shrub forms, leaf shape and arrangement, and the nature of the flowers. In addition, there are numerous line drawings that depict stem, leaf, and flower morphology. Krussmann has included three maps indexed to the USDA Hardiness Zone rating system. One map is that of North America, one is of Europe, and the third is of eastern Asia and Japan. Being able to roughly relate hardiness zones in the United States with areas in Europe and Asia is useful when researching species adaptation potentials. This will be an invaluable reference tool for our collecting efforts in the future.

I couldn't resist Krussmann's, Manual of Cultivated Conifers, Timber Press, Portland, Oregon. Published in 1986, this is a wonderful compilation of conifer species and cultivars. It also describes many species that are very rare or

not in cultivation. I was amazed at the number of Abies species (the Firs), that might find a home in Nacogdoches. One of the "Friends" of the SFA Arboretum, Mr. Mark Norman, has donated a generous amount to our effort. He has earmarked the funds for a test of several potential Christmas tree candidates. This has resulted in the accumulation of a fairly wide range of Abies and Picea species. Many of these are in place in the shade house and when they become container established, they will be transplanted into the arboretum for testing. While generally adapted to more northern and colder regimes, several species might appear worth investigating. I am particularly interested in Abies duragensis, guatemalensis, and concolor species and forms, with a special emphasis on provenances that might have similar climactic stresses. The first two species are common to highland regions in Mexico and Guatemala. They receive only moderate chilling, even at their high elevation, because of their proximity to the equator and moderate climates. Abies concolor, on the other hand, is native throughout the Rocky Mountain chain from Canada into New Mexico. There are, perhaps, pockets of this species in New Mexico that might find our area particularly hospitable. Time will tell on this interesting aspect of our arboretum studies. While many of the Abies and Picea species are not at "home" in our mild winter/high summer heat regime, proper placement and initial care and culture of the young plant might make establishment possible. Screening trials in the south have previously relied on "field" studies involving seedling bare-root transplants. Proper siting, planting hole preparation, afternoon shade considerations, moisture stresses and other factors are often not addressed. Our containerized plants should find establishment stresses easier to overcome.

A companion color picture book useful with Krussmann's reference text is a new book by D.M. van Gelderen and J.R.P. van Hoey Smith, Conifers, published by Timber Press, Portland, Oregon. The book is essentially a color picture "guide" of the species types and cultivated forms available with 1180 color plates in all. All of the lovely little mounds associated with Picea, Abies, Chamaecyparis, Thuja, Thujopsis, and other conifers are beautifully displayed for the reader. The book contains a small description of each conifer species, its range, native habitat, and number of forms. This book will be a wonderful resource to be used in our future conifer collection.

* * * *

A FEW QUOTES

> If any idea can survive a bureaucratic review and be implemented, it wasn't worth doing - Mollison's Bureaucracy Hypothesis

The greatest service which can be rendered to any country is to add a useful plant to its culture - Thomas Jefferson

How much the making of a garden, no matter how small, adds to the joy of living, only those who practice the art can know - E.H. Wilson

"my delight to learn that there is another Creech in this business, no matter how remote the relationship . . . I learned that two Creech brothers settled in North Carolina before the Revolutionary War and were very prolific, dispersing the Creech name widely throughout the south . . . from the look of the plants you are testing, my good Japanese friends do quite well in your area. - John Creech, past director of the National Arboretum and plant explorer, personal communication.

* * * *

DUES

Finances are always difficult for any new arboretum. The "Friends" group has generated about $1700 since September, 1985. Two Houston Livestock Show and Rodeo grants totalling $4700 have been a wonderful transfusion for this project. These two sources have acted as the "seed" and our students have managed the "planting". Thank you. If it's been over a year since you joined our group, we would appreciate your $15 renewal. We have set a goal of 200 "Friends". That would allow us to take advantage of bulk mailing rates and would insure the development of this new university and community resource. If you know of someone who might find our project and the newsletter interesting pass them an application blank.

YES, I want to be a "Friend of the Stephen F. Austin State University Arboretum".

NAME:

ADDRESS:

Dues are $15 per year. Mail check to SFA Arboretum Fund, Department of Agriculture, PO Box 13000, SFA State University, Nacogdoches, Texas 75962.

PLANTS ACQUIRED JANUARY 1, 1987 - MAY 1, 1987

SFA	YE	GENUS/SPECIE
107-	87	
212-	87	
245-	87	Abies bornmuellerana
344-	87	Abies bornmuellerana
232-	87	Abies cephalonica
343-	87	Abies cephalonica
252-	87	Abies coahuilensis
370-	87	Abies cocolor
231-	87	Abies concolor
453-	87	Abies durangensis 'Coahuilensis'
258-	87	Abies homolepis
371-	87	Abies homolepis
289-	87	Abies koreana
248-	87	Abies magnifica var. shastensis
350-	87	Abies procera (nobilis)
311-	87	Acer glabrum
351-	87	Acer griseum
276-	87	Acer grosseri
327-	87	Actinidia arguta
316-	87	Amelanchier 'Regent'
1-	87	Arbutus xalapensis (TAMU) (4)
2-	87	Berberis swaseyi (TAMU)
295-	87	Betula lenta
243-	87	Calocedrus decurrens
341-	87	Calocedrus decurrens
226-	87	Campotheca acuminata
325-	87	Camptotheca acuminata
336-	87	Camptotheca acuminata
365-	87	Carpinus caroliniana
366-	87	Castanea millisima
368-	87	Celastrus orbiculatus
285-	87	Celastrus scandens
282-	87	Celtis occidentalis
367-	87	Celtis reticulata
272-	87	Cercis siliquastrum
277-	87	Chaenomeles japonica 'Spitfire'
255-	87	Chamaecyparis lawsoniana
119-	87	Chamaecyparis pisifera 'Monstrosa'
4-	87	Chilopsis linearis 'Dark Storm' (TAMU)
3-	87	Chilopsis linearis 'White Storm' (TAMU)
347-	87	Chimonanthus praecox
353-	87	Chionanthis virginicum
227-	87	Chrysolepis chrysophylla
442-	87	Cladastris lutea
225-	87	Clerodendron trichotomum
218-	87	Cornus alternifolia
234-	87	Cornus baileyi
259-	87	Cornus controversa
264-	87	Cornus kousa chinensis
345-	87	Cornus mas
340-	87	Cotinus coggygria
200-	87	Crataegus opaca (50)
240-	87	Cunninghammia lanceolata
335-	87	Cunninghammia lanceolata
331-	87	Cunninghammia lanceolata 'Glauca'
219-	87	Cupressus duclouxiana (3)
256-	87	Distylium racemosum
361-	87	Enkianthus campanulatus
228-	87	Eucommia ulmoides
326-	87	Eucomnia ulmoides
338-	87	Euonymus alata
271-	87	Euonymus alata 'compacta'
260-	87	Fagus sylvatica
236-	87	Fallugia paradoxa
359-	87	Fontenesia fortunei
242-	87	Fraxinus dipetala
342-	87	Fraxinus latifolia (oregona)
239-	87	Fraxinus ornus
17-	87	Gardenia radicans variegata
133-	87	Gardenia spp. unk.
452-	87	Gingko biloba
224-	87	Glyptostrobus lineatus
323-	87	Gordonia lasianthus
372-	87	Gymnocladus dioceus
302-	87	Gymocladus dioicus
283-	87	Hamamelis japonica
297-	87	Hamamelis mollis
318-	87	Hamamelis vernalis
275-	87	Hydrangea anomala petiolaris
314-	87	Hydrangea arborescens 'Anna Belle'
235-	87	Hydrangea macrophylla 'Glowing Embers'
305-	87	Hydrangea paniculata grandiflora
303-	87	Hydrangea quercifolia
247-	87	Idesia polycarpa
363-	87	Idesia polycarpa
449-	87	Ileopaca (6 unknowns from SFA 418-437/87)
440-	87	Ilex aquifolium 'Angustifolia'
278-	87	Ilex aquifolium 'Cilita major'
317-	87	Ilex aquifolium 'Gold Coast'
438-	87	Ilex aquifolium 'Princess Pat'
439-	87	Ilex aquifolium 'Strybing 59-194-2'
288-	87	Ilex crenata 'Green Dragon'
358-	87	Ilex meservae 'Blue Boy'
324-	87	Ilex meservae 'Blue Girl'
430-	87	Ilex opaca 'Arden'
424-	87	Ilex opaca 'Arlean Leach'
423-	87	Ilex opaca 'Big Mack'
429-	87	Ilex opaca 'Cave Hill #1'
427-	87	Ilex opaca 'Cheerful'
436-	87	Ilex opaca 'Clarissa'
421-	87	Ilex opaca 'Farage'
425-	87	Ilex opaca 'Grace McCutchen'
426-	87	Ilex opaca 'Jersey Knight' (male)
418-	87	Ilex opaca 'Jersey Princess'
431-	87	Ilex opaca 'Klein #1'
433-	87	Ilex opaca 'Longwood Gardens XC' (yellow-berried)
428-	87	Ilex opaca 'Louise'
437-	87	Ilex opaca 'Manic'
432-	87	Ilex opaca 'Maryland Dwarf'
434-	87	Ilex opaca 'Merry Christmas'
420-	87	Ilex opaca 'Miss Helen'
435-	87	Ilex opaca 'Old Heavy Berry'
419-	87	Ilex opaca 'Red Flush'
422-	87	Ilex opaca 'Sleigh Bells'
263-	87	Ilex verticillata 'Winter-Red'
229-	87	Itea japonica
257-	87	Juniperus deppeana glauca
309-	87	Juniperus deppeana glauca
362-	87	Juniperus deppeana glauca
441-	87	Koelreuteria paniculata
310-	87	Larix decidua
261-	87	Larix kaempferi
294-	87	Larix Kaempferi
304-	87	Lithocarpus densiflorus echinoides
299-	87	Lithocarpus edulis
238-	87	Lonicera 'Dropmore Scarlet'
241-	87	Lonicera ciliosa
319-	87	Lonicera henryi
315-	87	Lonicera hispidula
262-	87	Lonicera involucrata
253-	87	Lonicera japonica 'aureo-reticulata'
251-	87	Lonicera nitida
355-	87	Lonicera periclymenum scrotina
301-	87	Lonicera pileata
298-	87	Lonicera syringantha
360-	87	Lonicera x heckrottii
244-	87	Maackia amurensis
279-	87	Maackia amurensis
446-	87	Magnolia acuminata
290-	87	Magnolia stellata 'Royal Star'
448-	87	Magnolia tripetala
312-	87	Magnolia virginiana
313-	87	Mahonia lomarifolia
296-	87	Myrica pensylvanica
201-	87	Nyssa sylvatica (50)
349-	87	Ostrya virginiana
447-	87	Oxydendrum arboreum
281-	87	Parrotia persica
444-	87	Philadelphus coronarius
443-	87	Philadelphus virginalis
445-	87	Philadelphus virginalis SEM DB
199-	87	Picea abies
413-	87	Picea breweriana
408-	87	Picea engelmannii
404-	87	Picea glauca densata
380-	87	Picea mitchensis
198-	87	Picea omorika
378-	87	Picea omorika
410-	87	Picea omorika
401-	87	Picea sitchensis
414-	87	Pinus aristata
417-	87	Pinus attenuata -
385-	87	Pinus balfouriana
384-	87	Pinus bungeana
406-	87	Pinus contorta latifolia

SFA	YE	GENUS/SPECIE
415-	87	Pinus cooperii
411-	87	Pinus durangensis
386-	87	Pinus edulis
395-	87	Pinus engelmannii
409-	87	Pinus greggii
405-	87	Pinus jeffreyi
390-	87	Pinus koraiensis
393-	87	Pinus leucodermis
403-	87	Pinus maximartinezii
397-	87	Pinus monophylla
375-	87	Pinus montezumae
396-	87	Pinus montezumae
377-	87	Pinus monticola
398-	87	Pinus mugo pumilo
412-	87	Pinus muricata
402-	87	Pinus patula
416-	87	Pinus pinea
388-	87	Pinus ponderosa
407-	87	Pinus pseudostrobus
379-	87	Pinus roxburghii
381-	87	Pinus rudis
392-	87	Pinus sabiniana
400-	87	Pinus strobiformis (reflexa)
389-	87	Pinus strokus
391-	87	Pinus torreyana
376-	87	Pinus wallichiana (griffithii)
383-	87	Pinus washoensis
292-	87	Polygonum aubertii
250-	87	Polystichum munitum
287-	87	Populus tremuloides
374-	87	Populus tremuloides
254-	87	Populus trichocarpa
293-	87	Potentilla atrosanquinea
286-	87	Prinsepia sinensis
204-	87	Pseudocydonia sinensis
210-	87	Pseudolarix kaempferi
320-	87	Pseudolarix kaempferi (amabilis)
233-	87	Pseudotsuga menziesii
207-	87	Ptelea trifoliata
206-	87	Pterostyrax hispidus
450-	87	Quercus alba (50)
216-	87	Quercus chrysolepis
208-	87	Quercus coccinea
220-	87	Quercus douglasii
209-	87	Quercus durata
348-	87	Quercus garryana
213-	87	Quercus glauca
321-	87	Quercus ilex
203-	87	Quercus kelloggii
205-	87	Quercus lobata
222-	87	Quercus macrocarpa
223-	87	Quercus myrsinfolia
268-	87	Quercus sadleriana
332-	87	Quercus suber
451-	87	Quercus virginiana (50)
173-	87	Rhododendron 'Adelaide Pope' (NCSU)
31-	87	Rhododendron 'Aikerman's' (9-292)
41-	87	Rhododendron 'Ambrosia x oldhammei 'A03'
155-	87	Rhododendron 'Amoena' (obtusum)
183-	87	Rhododendron 'Amy'
13-	87	Rhododendron 'Anna Kehr' (Kehr)
29-	87	Rhododendron 'Autumn Sun'
23-	87	Rhododendron 'Balsaminaeflorum' (Indicum)
143-	87	Rhododendron 'Baton Rouge'
174-	87	Rhododendron 'Betty Hemingway' (Harris)
60-	87	Rhododendron 'Big Ks Joanna'
22-	87	Rhododendron 'Boldface' (Glenn Dale)
110-	87	Rhododendron 'Bryan Harris' (Harris)
140-	87	Rhododendron 'Carla'
131-	87	Rhododendron 'Caroline Gable' (Gable)
30-	87	Rhododendron 'Carror Rose'
185-	87	Rhododendron 'Casablanca' (Yerkes-Pryor)
122-	87	Rhododendron 'Cattleya' (Kurume)
11-	87	Rhododendron 'Cherie' (Robin Hill)
137-	87	Rhododendron 'Cherry blossom'
166-	87	Rhododendron 'Chinzan' (Satsuki)
156-	87	Rhododendron 'Cochran's Lavender'
168-	87	Rhododendron 'Copperman' (Glenn Dale)
181-	87	Rhododendron 'Corsage' (Gable)
127-	87	Rhododendron 'Daphne Salmon'
197-	87	Rhododendron 'Dark Storm'
27-	87	Rhododendron 'Dayspring' (Glenn Dale)
6-	87	Rhododendron 'Dixie Rose'
161-	87	Rhododendron 'Dusty Pink'
163-	87	Rhododendron 'Easter Parade' (Mossholder-Bristone)
12-	87	Rhododendron 'Eikan' (Satsuki)
58-	87	Rhododendron 'El Frida' (Mobile) (Sawada)
124-	87	Rhododendron 'Elaine' (Carla)
169-	87	Rhododendron 'Eros' (Glenn Dale)
153-	87	Rhododendron 'Fairy Bells' (Dale)
142-	87	Rhododendron 'Fancy Gumpo'
186-	87	Rhododendron 'Fascination'
100-	87	Rhododendron 'Festive' (Glenn Dale)
96-	87	Rhododendron 'Fisher Pink'
180-	87	Rhododendron 'Flame Creeper' (Indicum)
151-	87	Rhododendron 'Frosted Orange'
106-	87	Rhododendron 'Fuji no Koshi'
50-	87	Rhododendron 'Fuji no Koshi' (Satsuki)
147-	87	Rhododendron 'Fuju no ashai'
45-	87	Rhododendron 'Fukurokuzu 0912' (Brookside)
114-	87	Rhododendron 'Georgia Giant'
36-	87	Rhododendron 'Getsuko' (Satsuki)
35-	87	Rhododendron 'Getsutoku' (Satsuki)
66-	87	Rhododendron 'Gillie' (Robin Hill)
46-	87	Rhododendron 'Girard's Chiara' (Girard)
184-	87	Rhododendron 'Girard's Pleasant White' (Girard
9-	87	Rhododendron 'Glacier' (Dale)
117-	87	Rhododendron 'Glamour' (Glenn Dale)
158-	87	Rhododendron 'Glenn Dale Greetings' (Glenn Dal
136-	87	Rhododendron 'Gloria Still'
68-	87	Rhododendron 'Gunsei' (Satsuki)
170-	87	Rhododendron 'Hampton's Beach'
164-	87	Rhododendron 'Harris purple' (Harris)
138-	87	Rhododendron 'Herbert'
20-	87	Rhododendron 'Hershey Orange' (Kurume)
177-	87	Rhododendron 'Hexe' (Sanders)
115-	87	Rhododendron 'Higasa' (Satsuki).
24-	87	Rhododendron 'Hino Mayo' (Kurume)
94-	87	Rhododendron 'Irene Purswell'
152-	87	Rhododendron 'Iveryana'
33-	87	Rhododendron 'Ivory'
101-	87	Rhododendron 'Jane Spaulding' (Carla)
99-	87	Rhododendron 'Janet Rhea' (Linwood)
121-	87	Rhododendron 'Jennifer'
112-	87	Rhododendron 'Jogo'
28-	87	Rhododendron 'Kaigetsu Mayi' (Satsuki)
118-	87	Rhododendron 'Keisetsu' (Satsuki)
27-	87	Rhododendron 'Kikoshi' (Satsuki)
7-	87	Rhododendron 'Kin no zai' (Satsuki)
126-	87	Rhododendron 'Koromo shikibu' (Kurume)
111-	87	Rhododendron 'Lady Edith'
25-	87	Rhododendron 'Lady Louise' (Robin Hill)
59-	87	Rhododendron 'Madame Butterfly' (Deerfield hyb
34-	87	Rhododendron 'Madame Pericat'
48-	87	Rhododendron 'Madame Perrot'
83-	87	Rhododendron 'Madame Perrot'
150-	87	Rhododendron 'Mardi Gras'
125-	87	Rhododendron 'Massasoit' (Alan)
172-	87	Rhododendron 'Matsu no Kekari' (Satsuki)
171-	87	Rhododendron 'Mikoku'
57-	87	Rhododendron 'Mother's Day' (Kurume)
54-	87	Rhododendron 'NA45404 Atsumizakura'
63-	87	Rhododendron 'NA45405 Ayahime'
78-	77	Rhododendron 'NA45406 Aratama'
91-	87	Rhododendron 'NA45408 Imamurasaki'
90-	87	Rhododendron 'NA45410 Itten'
73-	87	Rhododendron 'NA45411 Iwatokagami'
55-	87	Rhododendron 'NA45413 Usuyukari'
108-	87	Rhododendron 'NA45415 Ezonishiki'
87-	87	Rhododendron 'NA45418 Oogocho'
109-	87	Rhododendron 'NA45418 Oogocho' (2)
98-	87	Rhododendron 'NA45419 Kagura'
75-	87	Rhododendron 'NA45420 Karanishiki'
76-	87	Rhododendron 'NA45422 Gunki'
72-	87	Rhododendron 'NA45423 Kunimitsu'
53-	87	Rhododendron 'NA45426 Shizunomai'
105-	87	Rhododendron 'NA45427 Tambeni'
97-	87	Rhododendron 'NA45429 Tagonoura'
85-	87	Rhododendron 'NA45430 Tennyonomai' (Kurume)
67-	87	Rhododendron 'NA45432 Tokonatsu'
70-	87	Rhododendron 'NA45433 Tokoharu'
47-	87	Rhododendron 'NA45435 Harunosato'
79-	87	Rhododendron 'NA45436 Hakuonishiki'
64-	87	Rhododendron 'NA45437 Hinotsukasa'
65-	87	Rhododendron 'NA45438 Fujiasahi'

88- 87 Rhododendron 'NA45439 Fujinosusone'
61- 87 Rhododendron 'NA45440 Fukuhiko'
95- 87 Rhododendron 'NA45443 Mayafujin'
82- 87 Rhododendron 'NA45445 Yoshimigatake'
74- 87 Rhododendron 'NA45446 Yomeinishiki'
77- 87 Rhododendron 'NA45447 Yoro'
52- 87 Rhododendron 'NA45449 Wakaebisu'
141- 87 Rhododendron 'Nellie'
159- 87 Rhododendron 'One of Mayos'
113- 87 Rhododendron 'Orange Cup'
38- 87 Rhododendron 'Orange Macrantha' (Indicum)
19- 87 Rhododendron 'Otome' (Satsuki)
130- 87 Rhododendron 'Parfait'
5- 87 Rhododendron 'Pearl Bradford' (Dale)
51- 87 Rhododendron 'Pennington Hybrid'
132- 87 Rhododendron 'Pericat unidentified'
145- 87 Rhododendron 'Peter Pooker' (Robin Hill)
80- 87 Rhododendron 'Pink Camellia' (Carla)
178- 87 Rhododendron 'Pink Cascade' (Harris)
104- 87 Rhododendron 'Pink Cheer'
128- 87 Rhododendron 'Pink Cloud' (NCSU)
89- 87 Rhododendron 'Pink Gumpo' (Indicum dwarf)
149- 87 Rhododendron 'Pink Ice'
120- 87 Rhododendron 'Pinnochio' (Glenn Dale)
14- 87 Rhododendron 'Polypetalum' (Indicum)
81- 87 Rhododendron 'Posaman'
71- 87 Rhododendron 'Pride of Dorkin'
134- 87 Rhododendron 'Pride of Lawrenceville'
135- 87 Rhododendron 'Prince of Orange'
189- 87 Rhododendron 'Prudence' (Glenn Dale)
123- 87 Rhododendron 'Pryor Red'
194- 87 Rhododendron 'Rainfire' (Harris)
192- 87 Rhododendron 'Red Slippers' (Back Acre)
40- 87 Rhododendron 'Refrain' (Dale)
43- 87 Rhododendron 'RO1'
182- 87 Rhododendron 'RO3'(LSU)
39- 87 Rhododendron 'Rose Greely' (Gable)
102- 87 Rhododendron 'Rosea' (Mobile)
8- 87 Rhododendron 'Rosebud' (Gable)
49- 87 Rhododendron 'Rosie Morn' (Dale)
175- 87 Rhododendron 'Ruth May' (Kurume)
154- 87 Rhododendron 'Salmon Beauty' (Kurume)
188- 87 Rhododendron 'Salmon Solomon'
10- 87 Rhododendron 'Sara Holden' (Robin Hill)
157- 87 Rhododendron 'Scarlet Prince'
167- 87 Rhododendron 'Sherbrook' (Robin Hill)
195- 87 Rhododendron 'Sherwood Cerise' (Sherwood)
191- 87 Rhododendron 'Sherwood Orchid' (Sherwood)
16- 87 Rhododendron 'Shoqua' (Satsuki)
129- 87 Rhododendron 'Showa no homare' (Satsuki)
146- 87 Rhododendron 'Silver Sword'
21- 87 Rhododendron 'Sir Robert' (Robin Hill)
18- 87 Rhododendron 'Southern Charm'
42- 87 Rhododendron 'Sunglow' (NCSU)
190- 87 Rhododendron 'Sweetheart Supreme' (Pericat)
176- 87 Rhododendron 'Temple Red Segi'
69- 87 Rhododendron 'Trouper' (Glenn Dale)
92- 87 Rhododendron 'Vesper'
93- 87 Rhododendron 'Vesper'
32- 87 Rhododendron 'Vittata fortunei' (Simsi species)
56- 87 Rhododendron 'Vuyks Scarlet' (Vuyk)
37- 87 Rhododendron 'Vuyks Scarlet' (Vuyks)
179- 87 Rhododendron 'Wakaebisu' (Satsuki)
103- 87 Rhododendron 'Wakamatsu' (Satsuki)
84- 87 Rhododendron 'Waragusta'
62- 87 Rhododendron 'Waraigishi'
86- 87 Rhododendron 'Waraigishi' (Satsuki)
116- 87 Rhododendron 'Wee Willy'
165- 87 Rhododendron 'Wendy' (Robin Hill)
160- 87 Rhododendron 'White Jade' (Back Acre)
15- 87 Rhododendron 'White Rosebud' (Kehr)
196- 87 Rhododendron 'White Storm'
193- 87 Rhododendron 'William Bull' (Indicum)
144- 87 Rhododendron 'Wolf Pack Red'
162- 87 Rhododendron 'Wood's Red Macrantha'
187- 87 Rhododendron 'Wood's White Gumpo'
148- 87 Rhododendron 'Yaeshojo'
139- 87 Rhododendron oldhamii
44- 87 Rhododnedron 'NA45431 Tsukiminoen'(Kurume)'
214- 87 Sequoia sempervirens (3)
221- 87 Sequoiadendron giganteum
273- 87 Sophora mollis
354- 87 Sorbus alnifolia
300- 87 Sorbus aria
3(?- 87 Sorbus bristoliensis
35.- 87 Sorbus commixta
369- 87 Sorbus latifolia
246- 87 Spiraea densiflora
306- 87 Spiraea douglasii
364- 87 Spiraea japonica 'Coccinea'
217- 87 Spiraea japonica 'Little Princess'
211- 87 Spiraea lucida
269- 87 Spiraea x bumalda 'Shirobana'
337- 87 Stauntonia nexophylla
330- 87 Stranvaesia davidiana undulata
266- 87 Styrax japonicus
215- 87 Styrax obassia
267- 87 Tamarix x pentanora 'Summer Glow'
328- 87 Thuja occidentalis 'Emerald'
322- 87 Thuja occidentalis 'Sunkist'
230- 87 Thuja plicata
329- 87 Thuja plicata
334- 87 Thuja plicata
202- 87 Thujopsos doloborata
352- 87 Tilia platyphylla
333- 87 Torreya californica
387- 87 Tsuga canandensis
382- 87 Tsuga caroliniana
399- 87 Tsuga caroliniana
394- 87 Tsuga heterophyiia
284- 87 Umbellularia californica
265- 87 Viburnum lantana
339- 87 Viburnum lantana
274- 87 Viburnum sargentii 'Susquehanna'
308- 87 Viburnum x pragense
291- 87 Vitex agnus-castus
280- 87 Vitex negundo leterophylla
249- 87 Weigela florida 'Pink Princess'
237- 87 Xanthoceras sorbifolia
270- 87 Zelkova serrata
356- 87 Zelkova serrata