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Xeriscape

Landscape
Water Conservation
In The Southeast


Extension
Cooperative Extension Service
Clemson University

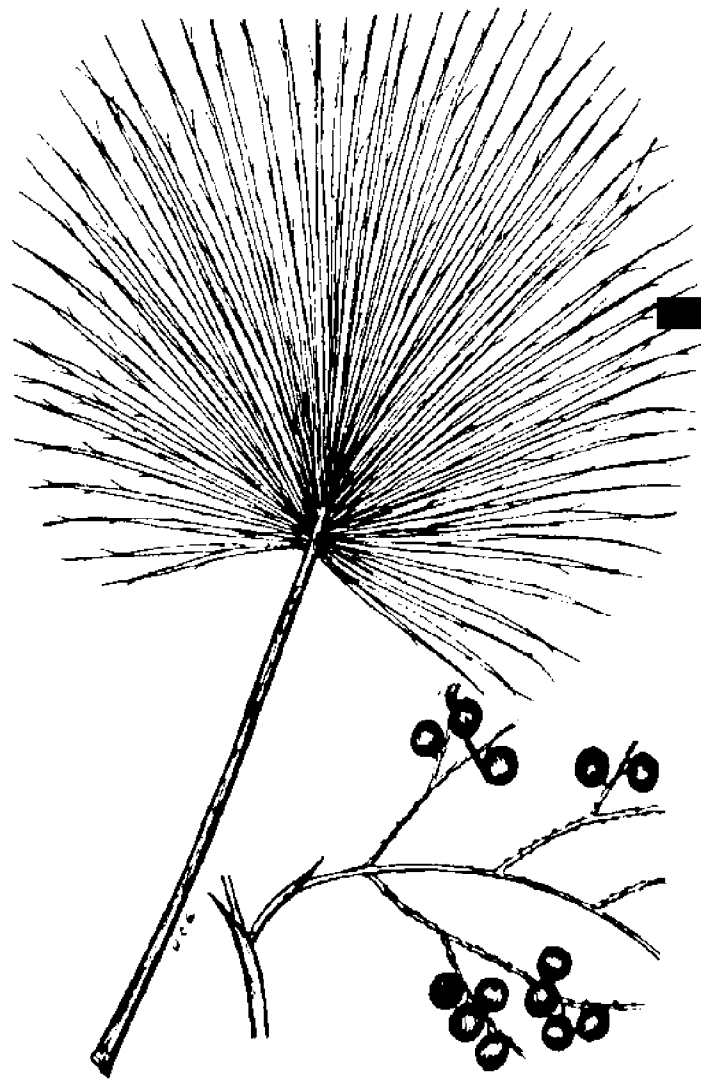


Xeriscape

Landscape Water Conservation In The Southeast

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*"We have not
inherited the
earth from
our parents;
we have
borrowed it
from our
children"*

L. Brown, 1981.

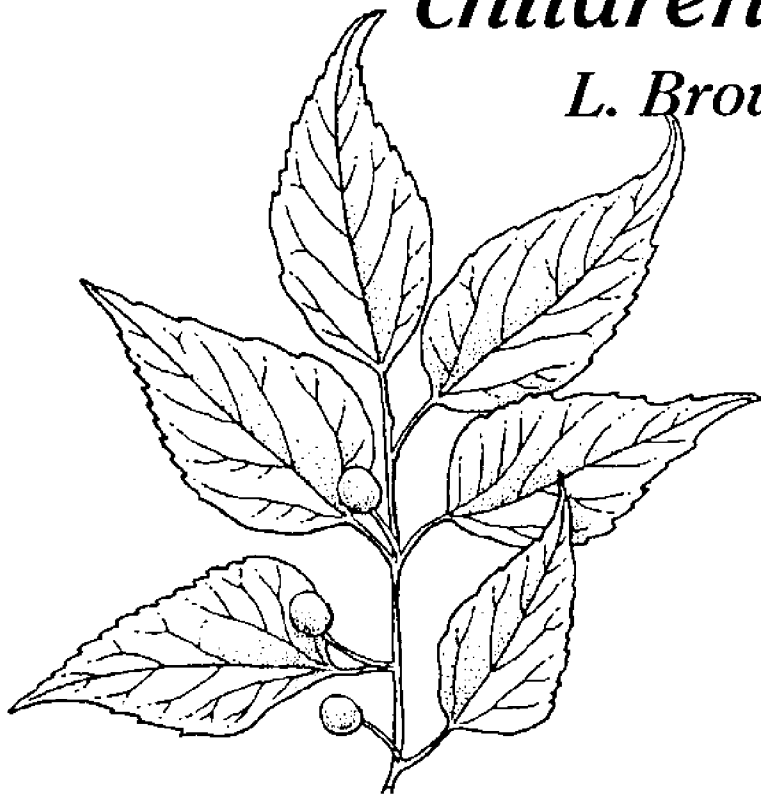


TABLE OF CONTENTS

	Page
Introduction	1
Planning and Design	3
Plant List: Residential Design	7
Appropriate Lawn Areas	9
Soil Preparation	11
Plant Selection	13
Drought-Resistant Plant Materials	16
Effective and Efficient Watering Methods	20
Mulching Trees, Shrubs, and Flower Beds	23
Proper Landscape Maintenance	26
Bibliography	29
Acknowledgements	31

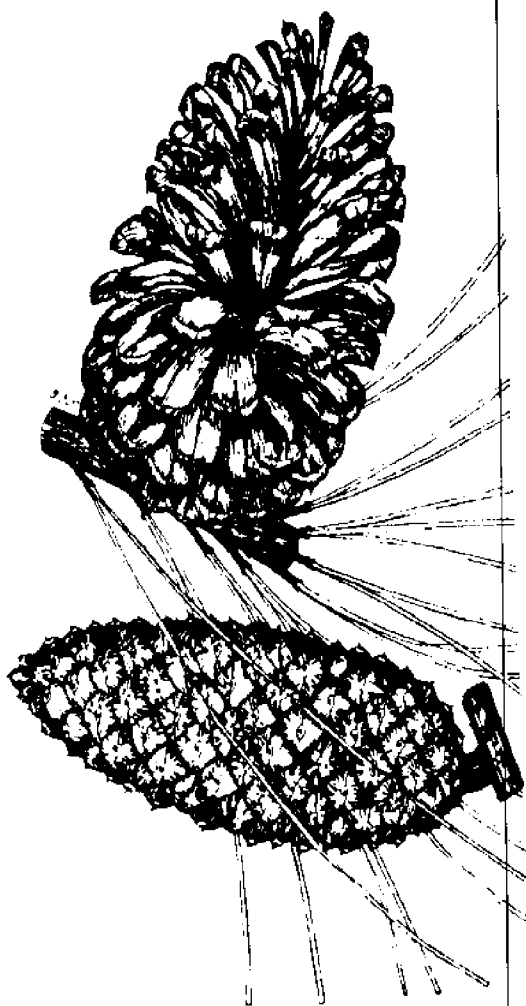


INTRODUCTION

Water is one of the most abundant resources on earth, covering three-fourths of the planet's surface. Ninety-seven percent of earth's water is saltwater in the oceans, and of the three percent freshwater, most is locked up in polar ice sheets. Only a minute percentage of the earth's water is in groundwater, lakes and rivers, and this water supplies most of humanity. Many Southeastern cities rely on surface waters such as reservoir systems which, in turn, rely on adequate rainfall. In the United States approximately 82 billion gallons of ground water are removed daily for a wide variety of uses. Water is a precious resource, which we cannot continue to use as an unlimited resource.

Five of the driest years on record occurred in the 1980s, and many people wondered if the droughts were part of the predicted "greenhouse effect." While it may be impossible to determine if recent droughts are a direct result of greenhouse warming, it is certain that our water supplies can be limited by drought. Droughts in recent years have spotlighted our dependence on previously plentiful water supplies in the Southeast. Water rationing and outright bans on watering landscapes have imposed severe limitations on the landscape/nursery industry as well as on home gardeners. Scientists predict that if global warming does occur as a result of air pollution, periods of drought could become more frequent and severe. Many municipal water authorities will be forced to restrict water use further if future shortages occur. Preparing for drought now is a sensible alternative to suffering the consequences later.

A finite amount of water is available to consumers. It is estimated that the average middle-class person uses 80 gallons of water everyday. According to a study conducted by the Strom Thurmond Institute at Clemson University, 566 million gallons of water a day are currently used for residential purposes in South Carolina with a projected increase to 743 million gallons per day being required by the year 2005. Combined with sharply increasing demand, water resources are becoming more precious even in areas never before affected by shortages. Short-sighted and unwise use of water resources in the past has resulted in an all-time high in water dependency today. If Americans are to enjoy the luxury of inexpensive water in the future, we must begin employing water efficiency practices now. Fortunately, specific steps can be taken to relieve pressures on water supplies around homes and in businesses without detriment to quality of life. Because the largest single use of municipal water may be the landscape, it is an excellent place to begin reducing water demand.



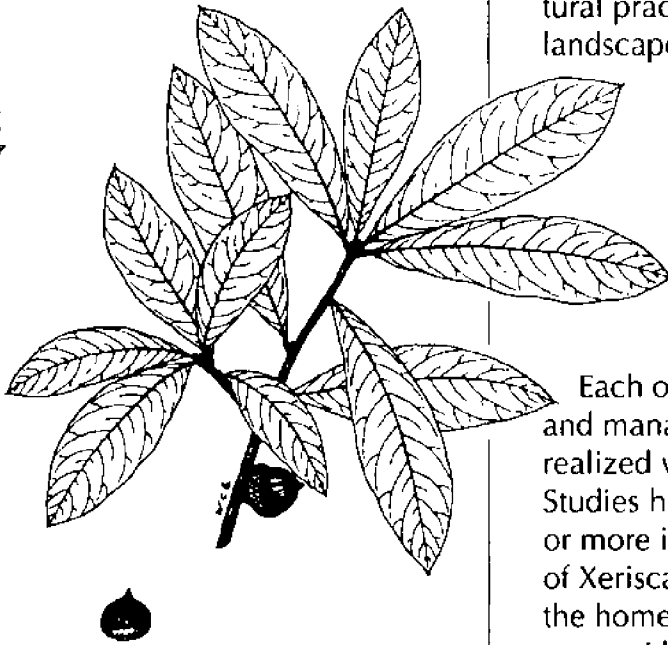
Professionals and homeowners can take an aggressive and positive attitude toward water conservation in landscape design and management. When basic horticultural principles are employed with an emphasis on water efficiency, landscapes use much less water and are drought tolerant.

Combining water conservation techniques with landscaping is a concept known as Xeriscape or "dry landscape". Xeriscape is a term coined in a Denver, Colorado, program designed to promote water conservation in the landscape. While the idea began in the western United States where landscapes can be truly dry, the same water-saving principles apply to the Southeast. Xeriscaping combines sound horticultural practices to conserve water while maintaining a beautiful landscape. The seven basic Xeriscape principles are:

- 1) careful planning and design,
- 2) appropriate lawn areas,
- 3) thorough soil preparation,
- 4) appropriate use of plant materials,
- 5) effective and efficient watering methods,
- 6) use of mulch on trees, shrubs, and flower beds, and
- 7) proper landscape maintenance.

Each of these principles should be used when designing and managing a landscape. The greatest water efficiency is realized when all seven principles are used in combination. Studies have shown water-use reductions of 30 to 60 percent or more in landscapes that employ the seven basic principles of Xeriscape. This translates directly into money savings for the homeowner or business. Combining lower maintenance costs with greater survivability of landscape plants in times of water shortage, a Xeriscape is economically attractive. However, Xeriscaping should not be done for economics alone because each of us has a social responsibility to conserve water as stewards of our environment.

Xeriscapes need not be dry-looking cactus and rock gardens. Xeriscapes are landscapes that employ existing principles of landscape design, construction, and maintenance to create water-efficient landscapes. Xeriscapes that employ basic techniques create state-of-the-art landscapes that save money and are beautiful. By employing the basic principles of Xeriscapes, one can enjoy lush, green Southern landscapes and conserve water, too.

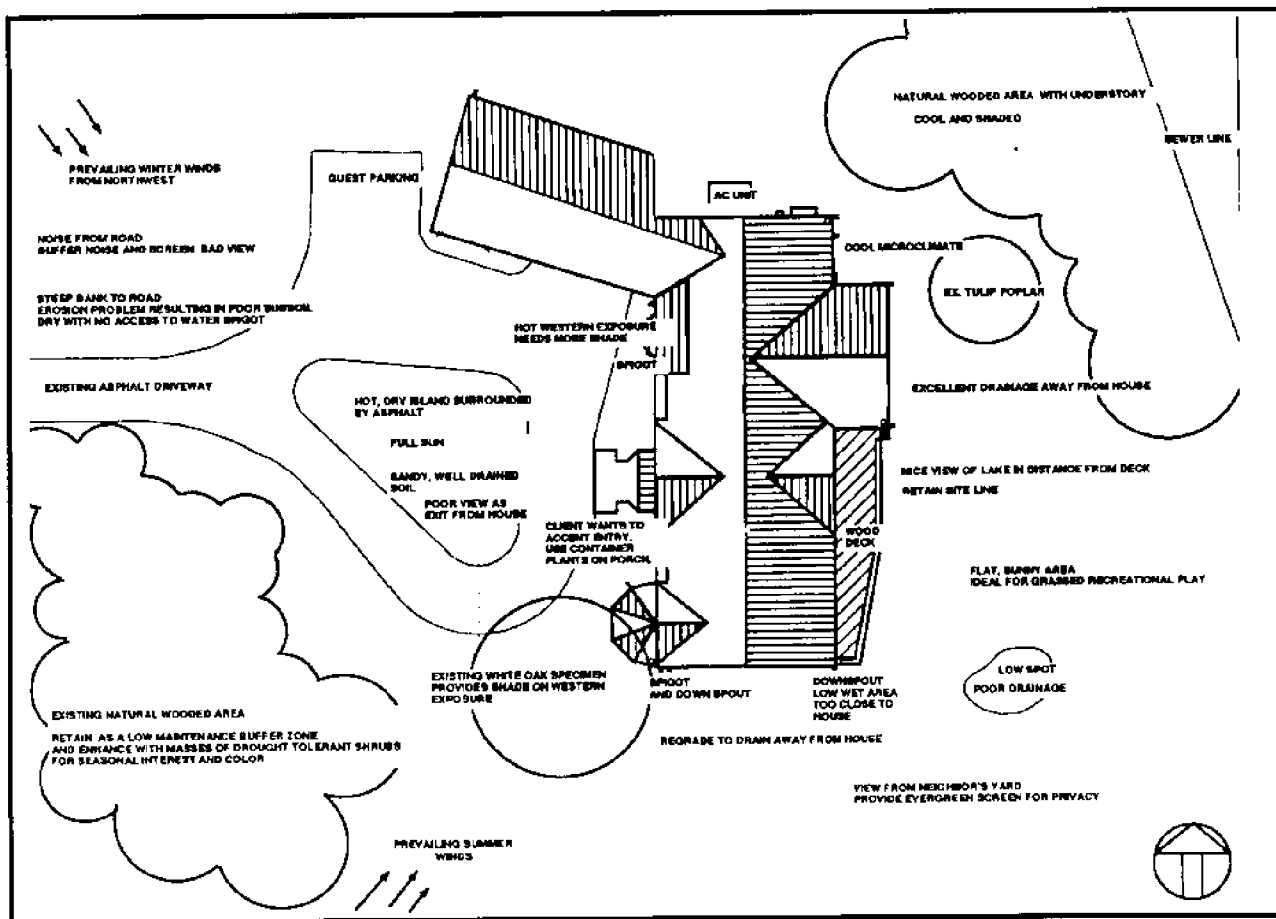


PLANNING AND DESIGN

When designing a new landscape or renovating an existing one, planning the landscape on paper is the best place to begin. The first step in planning a water-efficient landscape is the process of site analysis. While walking through the site with a piece of paper and pencil, the designer makes a sketch of the layout of the existing building and driveway, including any decks, patios or walkways. Existing trees, shrubs, and flower beds are located on the design. Careful notes are made on sun and wind exposure, topography, and drainage. Relationships among all site features are considered. Modifications that require grading, paving or construction should be planned at this stage. When modifying an existing landscape, the designer must outline the most important or desirable features. Existing shade trees should be left wherever possible, because shady landscapes are cooler and need less water than sunny areas. Decisions should be made about what size lawn area is needed, if any. Lawns are often the single largest user of water in the landscape, so reductions in lawn areas should be made where possible. Switching to a more drought-tolerant lawn species can also reduce watering needs.

The first step in planning a water-efficient landscape is a site inventory and analysis. A drawing of the layout of the existing building, driveway, walks, and vegetation is completed. Notes on sun and wind exposure, soils, topography, drainage, views, and other climatological and aesthetic features are noted, and relationships among all site features are considered.

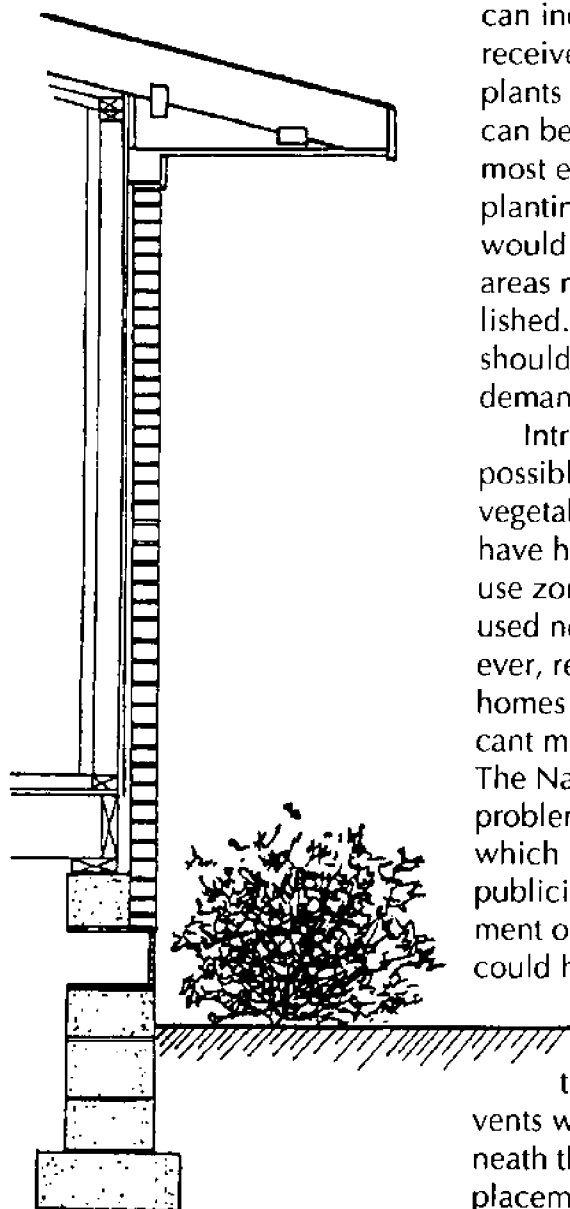
The site's microclimates should be outlined on the plan. Microclimates are areas within the design that have environ-



Plants placed too close to the house can block foundation vents. Restricting air flow under the building may create home moisture problems which cost U.S. homeowners over \$1 billion per year.



4

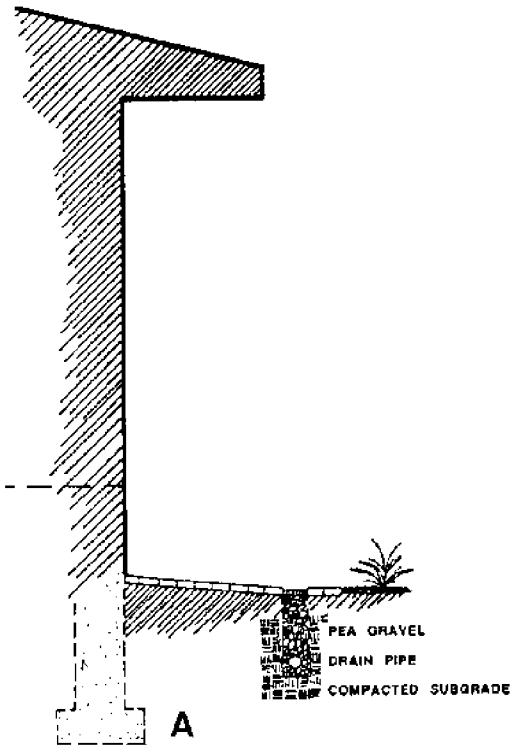


mental conditions that differ from adjacent areas, such as the cool, shady north side of a building. Other microclimates would include the hottest places in full sun on the south side of a building. Areas that receive more water, such as rainfall runoff from the roof or low spots that collect water, should also be noted. Coastal residents must also consider the effects of ocean salt spray as it greatly affects plant selection in the landscape.

Microclimates influence plant selection. For example, a large shade tree on the south side of the house will lower temperatures and reduce water demands on an otherwise hot and sunny area. Cooler, shady areas on the north side of buildings are a good environment for shade-loving plants. Some plants thrive in the cool morning sun of an eastern exposure, but wilt in the hot afternoon sun of a west-facing exposure.

To achieve the greatest water efficiency, the landscape plan can incorporate "hydrozones"—areas within a design that receive either low, moderate or high amounts of water. All plants within a zone have the same water requirements and can be watered as a group. Plants grouped in this way make most efficient use of irrigation water. For example, certain planting areas may be designated low-water-use zones and would contain plants with low-water requirements. These areas receive little or no extra water after plants are established. Placing high-water-use plants in low-water-use zones should be avoided because watering plants with different demands is inefficient.

Introducing a few limited high-water-use zones makes it possible to use specimen plants as an accent or focal point. A vegetable garden or flower border could contain plants that have high water needs and would be considered a high-water-use zone. High-water-use zones have also frequently been used near entryways and close to buildings in the past. However, recent research indicates that a high percentage of homes and commercial buildings in the Southeast have significant moisture problems and damage related to landscaping. The National Forest Service estimated that home moisture problems cost U.S. homeowners over \$1 billion per year which is similar to what is spent annually to control the most publicized, structurally damaging insect pest, termites. Placement of low-water-use zones adjacent to building foundations could help alleviate the extensive mildew problems and moisture damage that many Southeastern homes presently face. In addition, the placement of dense shrubs near the building foundation frequently blocks foundation vents which were installed to allow good air circulation beneath the floor of the structure. Thus, plant varieties and placement should be planned to provide free air flow through vents and around foundations and siding of a house. For more



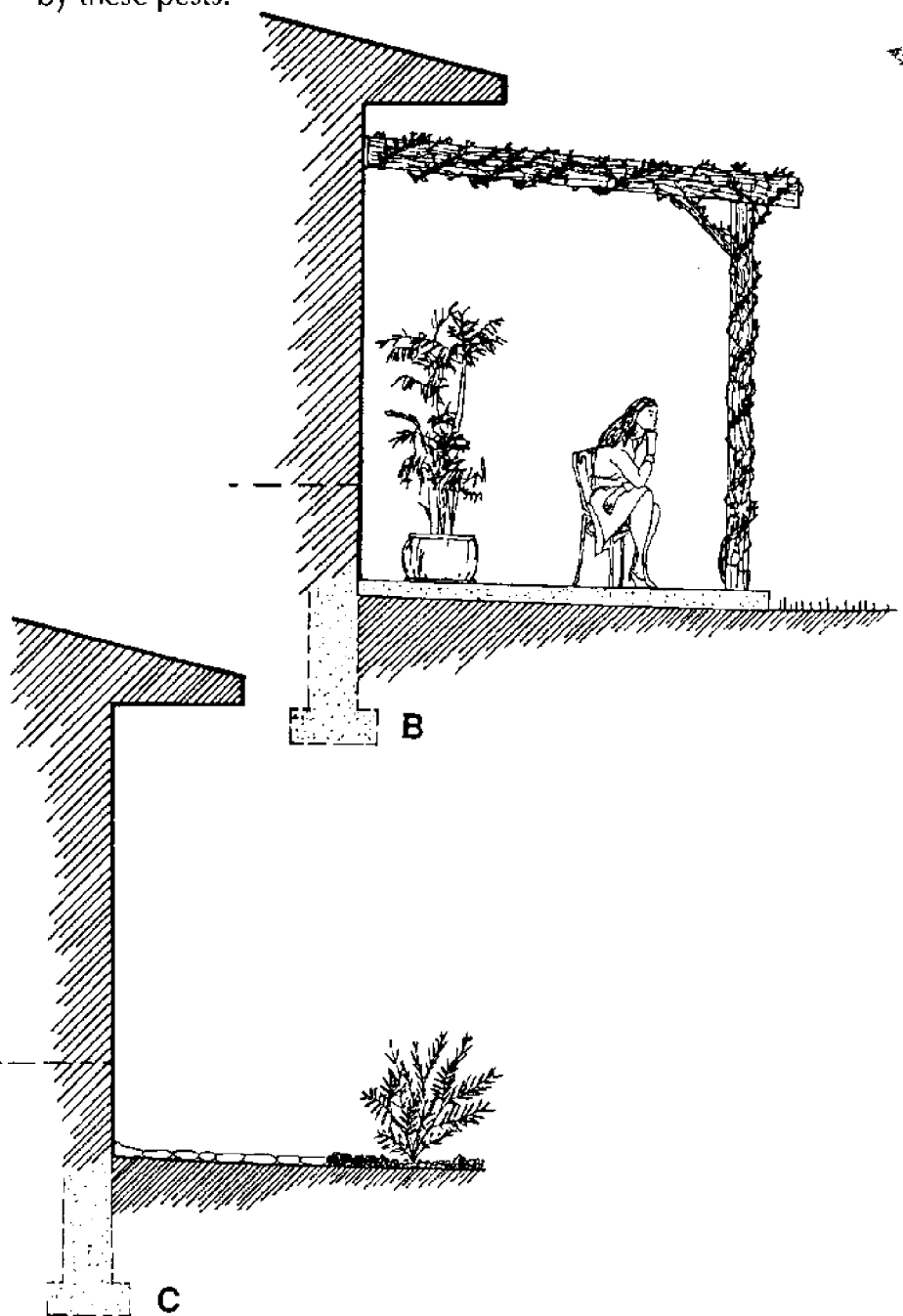
People with home moisture or insect problems may want to consider alternatives to foundation plants around buildings.

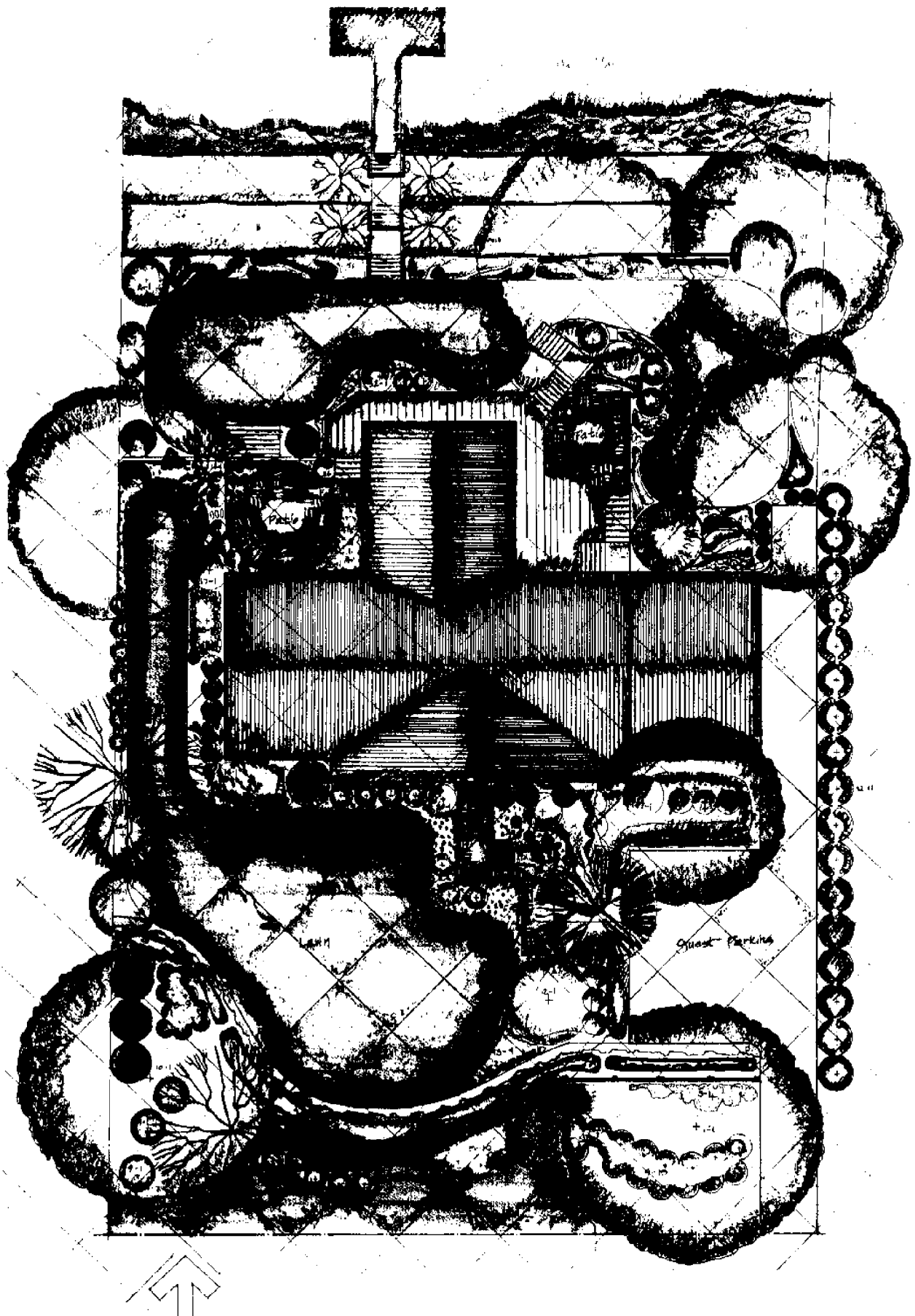
Solutions could include:

- A. installing a subsurface drainage system to move water away from the foundation.
- B. placing hard surface areas such as patios adjacent to the foundation. Container plants and vines on an arbor can "soften" the structure.
- C. moving plants away from the foundation and out from under the roof overhang to eliminate the need for irrigating close to the building.

information review the five Clemson University Cooperative Extension Service video tapes in the series "Managing Moisture — The Housing Menace". They show how to prevent, identify, and correct home moisture problems. Further help for professional or amateur landscapers is found in the Clemson University Extension slide-tape set "Landscape Management to Prevent Home Moisture Damage" and the companion leaflet "Landscape Moisture Checklist: Preventing Home Moisture Damage".

Excessive moisture applied to landscape plants near the building's foundation may also promote the development of insect pests. Research has shown that termites, carpenter ants, and roaches thrive in moist locations. Reducing moisture around a building's foundation lessens the chance of invasion by these pests.





6

This plan view of a residential Xeriscape illustrates design with mulch, lawn, shrub, and groundcover areas to promote efficient water use. Patios and decks provide space for outdoor entertainment and require no irrigation.

PLANT LIST: RESIDENTIAL DESIGN

KEY	BOTANICAL NAME	COMMON NAME
1	<i>Quercus laurifolia</i>	Laurel Oak
2	<i>Cortaderia selloana</i>	Pampas Grass
3	<i>Loropetalum chinense</i>	Loropetalum
4	<i>Prunus laurocerasus</i> 'Otto Luyken'	Otto Luyken Laurel
5	<i>Raphiolepis indica</i>	India Hawthorne
6	<i>Jasminum floridum</i>	Florida Jasmine
7	<i>Prunus serrulata</i>	'Sekiyama' Japanese Cherry
8	<i>Cercis canadensis</i>	Redbud
9	<i>Buddleia davidii</i>	Butterfly Bush
10	<i>Liriodendron tulipifera</i>	Tulip-Tree
11	<i>Osmanthus heterophyllus</i>	Holly Osmanthus
12	<i>Osmanthus fragrans</i>	Fragrant Tea Olive
13	<i>Phlox subulata</i>	Thrift
14	<i>Ilex vomitoria</i> 'Nana'	Dwarf Yaupon
15	<i>Betula nigra</i>	Riverbirch
16	<i>Koelreuteria paniculata</i>	Golden Raintree
17	<i>Osmanthus fortunei</i>	Fortune's Osmanthus
18	<i>Ligustrum lucidum</i>	Waxleaf Ligustrum (tree form)
19	<i>Callicarpa dichotoma</i>	Purple Beautyberry
20	<i>Ilex pernyi</i>	Perny Holly
21	<i>Corylus avellana</i> 'Contorta'	European Contorted Filbert
22	<i>Nandina domestic</i> 'Harbour Dwarf'	Dwarf Nandina
23	<i>Vinca minor</i>	Periwinkle
24	<i>Ilex cornuta</i> 'Carissa'	Carissa Holly
25	<i>Prunus laurocerasus</i>	English Laurel
26	*Relocated <i>Podocarpus</i>	Existing Podocarpus
27	*Relocated Hollies	Existing Hollies
28	<i>Rosa banksiae</i> 'Lutea'	Banks Rose
29	<i>Abelia grandiflora</i> 'Sherwood'	Glossy Abelia
30	<i>Fatsia japonica</i>	Japanese Fatsia
31	<i>Ophiopogon japonicus</i>	Mondo Grass
32	<i>Ilex glabra</i>	Inkberry Holly
33	<i>Gelsemium sempervirens</i>	Carolina Jessamine
34	<i>Abelia x grandiflora</i>	Glossy Abelia
35	<i>Cedrus deodara</i>	Deodar Cedar
36	<i>Myrica cerifera</i> (tree form)	Wax Myrtle (tree form)
37	<i>Juniperus chinensis</i> sargentii	Sargent Juniper
38	<i>Hypericum calycinum</i>	Aaronsbeard
39	<i>Ulmus parvifolia</i>	Chinese Elm
40	<i>Catharanthus roseus</i>	Madagascar Periwinkle
41	<i>Verbena canadensis</i>	Clump Verbena
42	<i>Lantana camara</i>	Common Lantana
43	<i>Artemisia schmidtiana</i>	Wormwood 'Silver Mound'
44	<i>Hemerocallis</i> 'Stella d'Oro'	Daylily
45	<i>Pennisetum setaceum</i>	Fountain Grass
46	<i>Helleborus orientalis</i>	Lenten Rose
47	<i>Caladium x hortulanum</i>	Caladium 'Pink Beauty'
48	<i>Epimedium grandiflorum</i>	Barrenwort
49	<i>Aster x frikartii</i>	Hardy Aster
50	<i>Salvia x superba</i>	'May Night' Salvia
51	<i>Rosa hybrida</i>	Climbing Rose





Shade is an important feature in a water-efficient landscape. A California study found that surface temperatures cooled an average of 36 degrees in the five minutes following the arrival of the shadow line from overhead foliage. Lower temperatures mean less water loss by plants. However, plants placed directly under a shady tree face tree root competition which may decrease the availability of water. "Dry shade" is a problem that must be considered when planting within a tree's root zone. Shade is not created only by trees, but also by hardscape features such as walls, fences, arbors, and trellises.

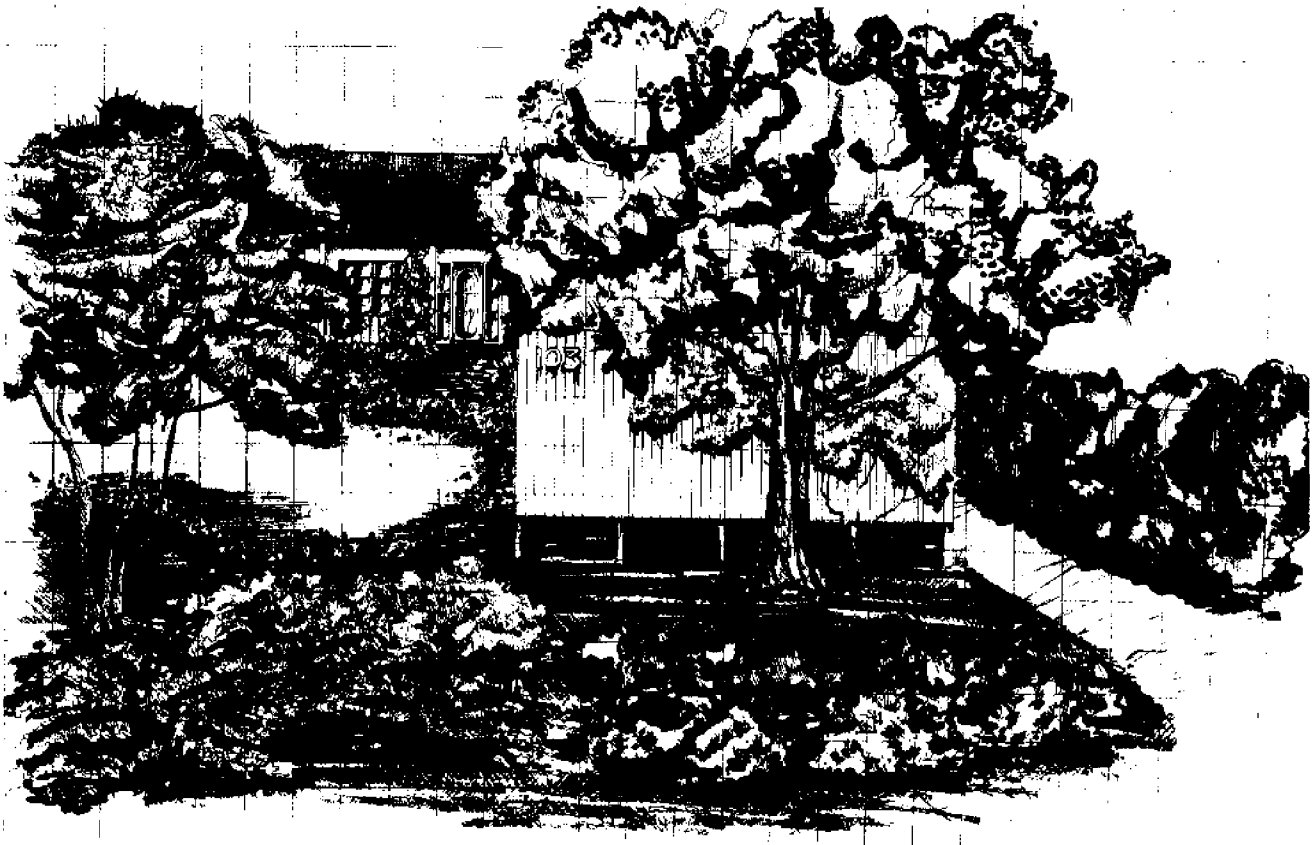
Root depth is an important consideration. Red maple (*Acer rubrum*) is an example of a shallow-rooted tree that competes with other plants for water and can cause cracking of driveways, sidewalks and patios as well. Deep-rooted trees such as willow oak (*Quercus phellos*) will accommodate understory plantings and cause less damage by roots.

Lawn areas are often the single largest user of water in the landscape, but are an important feature in landscape design. When planning a landscape, be sure to consider how much lawn area is appropriate or needed. Shape lawn areas to make irrigation and maintenance efficient. Highly irregular lawn areas are more difficult to mow or irrigate efficiently. A small, irrigated area of grass can provide much of the aesthetic beauty associated with a larger lawn and can conserve a significant volume of water.

Decks and patios help tie the house into the landscape, provide outdoor living space and reduce water consumption. These design features, together with groundcovers and shrub beds, create spaces that compliment limited turf areas. Deciduous trees placed near decks and patios provide shade in summer and allow the sun to warm them in the winter. Flowering and fragrant plants and plants that attract wildlife placed nearby enhance the outdoor experience.

APPROPRIATE LAWN AREAS

The concept of appropriate lawn areas is a key principle when designing Xeriscapes. Irrigated turf areas should be limited to the highest impact locations in the landscape. Lawn areas usually receive more water and require more maintenance than any other area in the landscape. Grasses should be carefully selected depending on location, use and desired maintenance programs. In-depth information on establishing lawns is available in the Clemson University Extension Publication "Warm-Season Lawn Grasses of South Carolina" (Circular 547).



Well-designed Xeriscapes can retain the lush, green and colorful look long associated with Southern landscapes.

In this residential design, large mulched areas and shrub masses complement a limited lawn, providing aesthetic impact while conserving water and reducing maintenance.

Common bermuda grass has recently been found to be among the best grass choices for very low irrigation regimes. This grass is an excellent choice for many Xeriscape designs. Several other warm-season grasses become dormant and may wilt or become brown during severe water shortages if they are not irrigated, but they will often "green-up" as soon as rains return. These nonirrigated turf areas provide useful control of erosion and provide play areas without wasting valuable water.

Table 1. Drought Tolerance of Grasses.

Common Name	Drought Tolerance	Sun/Shade
Centipede grass	Fair	Sun/Shade
Bermuda grass	Good	Sun
St. Augustine grass	Poor	Sun/Shade
Zoysia grass	Good	Sun/Shade
Tall Fescue	Poor	Sun/Shade
Red Fescue	Fair	Shade

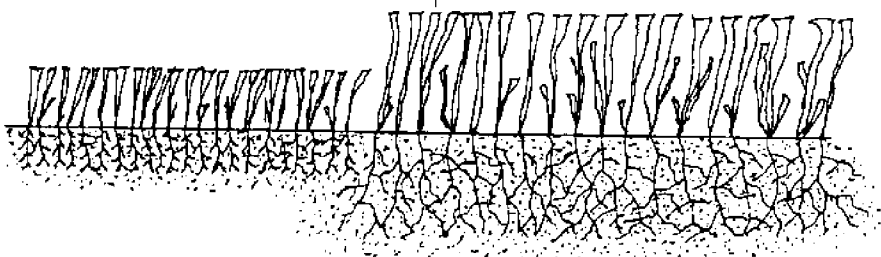


Mowing the lawn at the proper height will help improve the drought tolerance of turfgrass. Maintaining cool-season turfgrass such as tall fescue at three to three and one-half inches will encourage a deeper root system which can access ground water more readily. Recommended mowing heights for the more drought-tolerant bermuda grass and centipede grass are one inch and one and one-half inches, respectively.

It is difficult to determine exactly when a lawn area needs irrigation. One technique that helps determine needs for irrigation is the "footprint" method. Walk across a lawn (not covered with dew) and examine the area behind you to see if any footprints were left behind. Footprints often appear when the grass plants have low moisture in the leaves. When the grass blades are pressed by the foot, low water levels in the tissues prevent them from springing back. If the footprints remain for an extended time, the lawn area should be thoroughly irrigated.

Mowing the lawn at the proper height will help improve the drought tolerance of turfgrass. Maintain cool-season turfgrass such as tall fescue at three to three and one-half inches while the warm-season grasses such as bermuda grass and centipede grass should be maintained at a mowing height of one inch and one and one-half inches, respectively. If grass is mowed frequently enough, the lawn clippings should be left on the lawn to mulch the turf and reduce fertility requirements. The

beauty and quality of a lawn cannot be replaced, but the traditional size, design, and maintenance programs must be changed to meet water restrictions and drought conditions.



SOIL PREPARATION

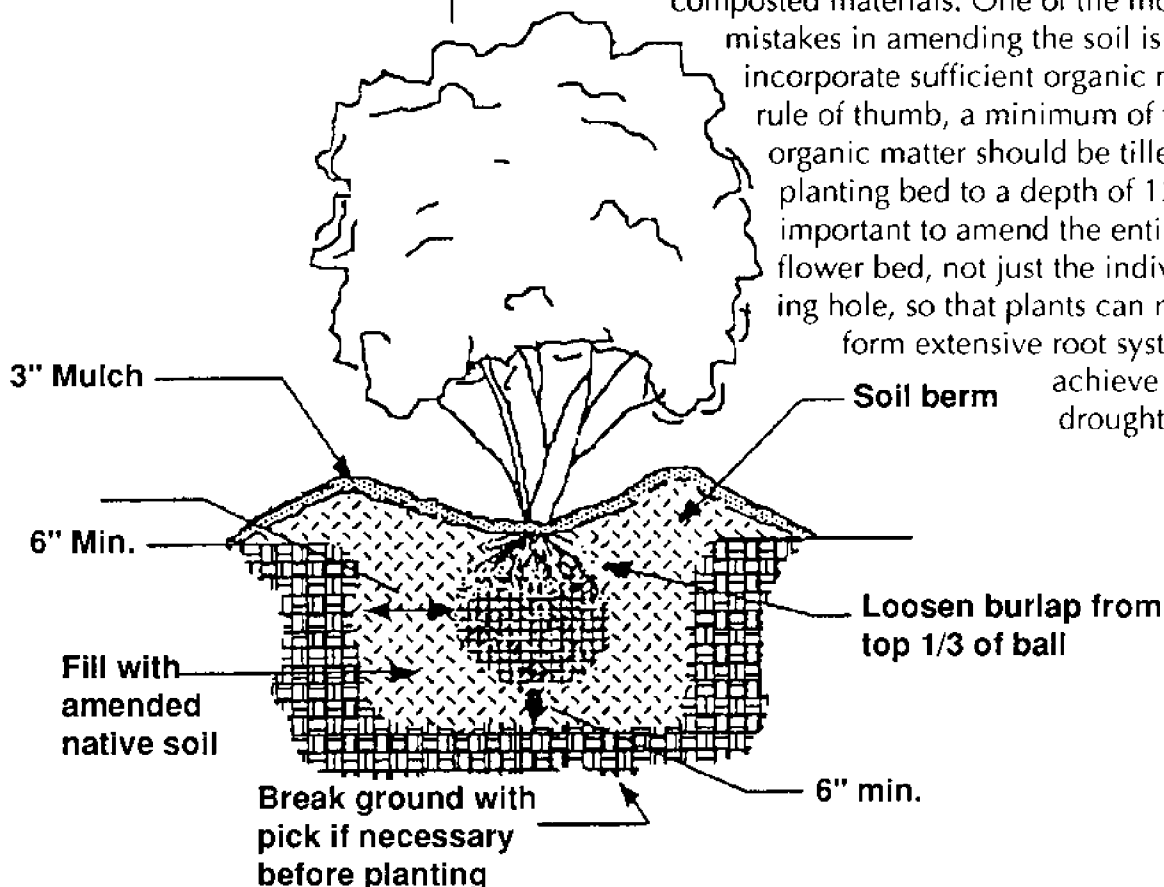
A basic life-support system of the landscape, soil is the medium for root growth and a reservoir for water and nutrients. Properly conditioned soil is of vital importance to the health of landscapes. Creating a good soil environment from the start will bring great dividends in the future.

A good soil is porous and will drain freely, yet retains water and nutrients in a form available to plants. Soils that are hard and compacted do not allow water and air to penetrate to the root zone, and irrigation water is often wasted as runoff. Sandy soils dry out quickly, and water and nutrients usually drain away before plants can use them. However, it is important to note that not all soils need amending. Many soils in the Southeast are already suitable for plant installation. When unsure about the soils in a landscape, call your county extension agent or bring in a soil sample for a complete analysis and recommendations for improvement.

Addition of organic matter to the soil is the single most important method of improving soil structure. Organic matter increases water and nutrient-holding capacity, aeration, and drainage. Plants establish more rapidly when planted in well-prepared soils. They are healthier and more vigorous, and they have greater disease and drought resistance.

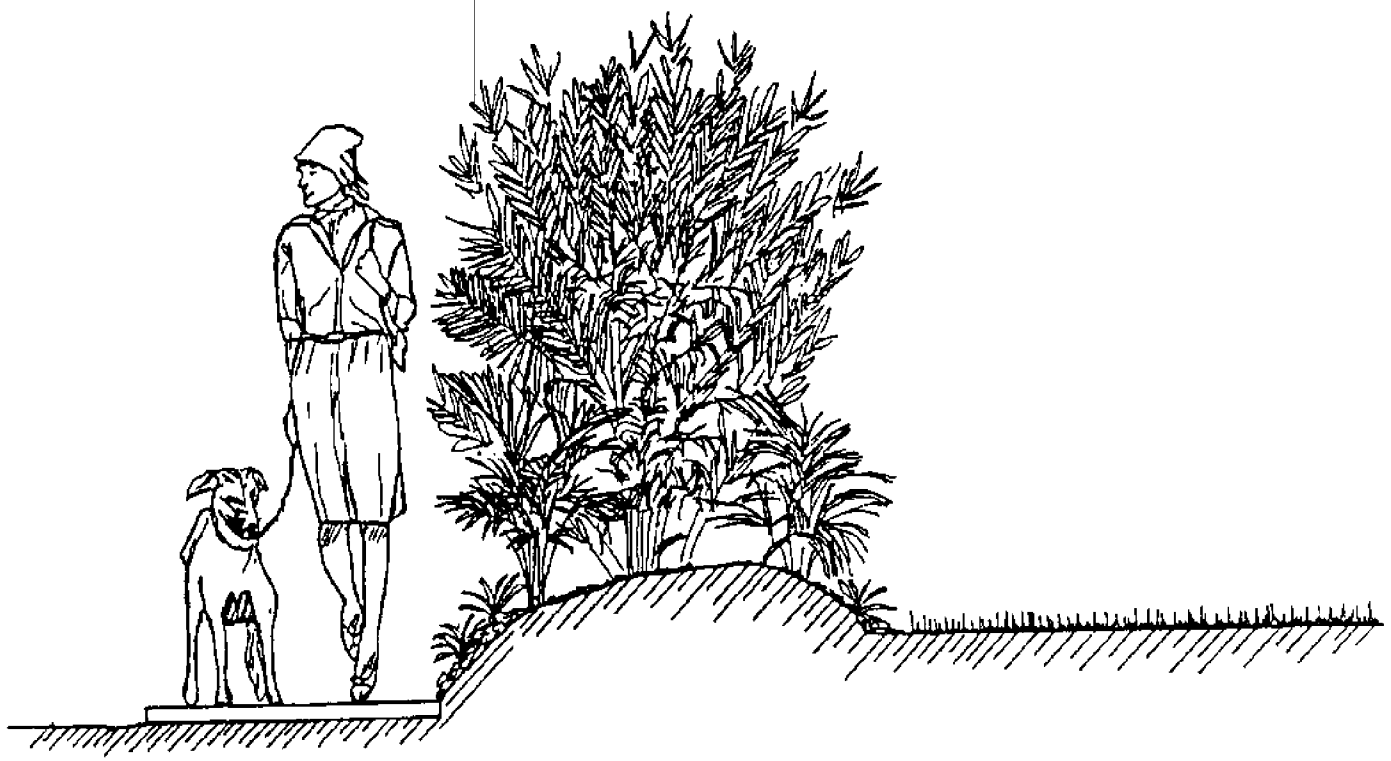
Types of organic matter for soil amendment include sphagnum peat moss, pine bark, decomposed wood chips, and composted materials. One of the most common

mistakes in amending the soil is failure to incorporate sufficient organic matter. As a rule of thumb, a minimum of four inches of organic matter should be tilled into the planting bed to a depth of 12". It is important to amend the entire shrub or flower bed, not just the individual planting hole, so that plants can more easily form extensive root systems and achieve greater drought tolerance.



Trees and lawn areas, in general, do not receive as extensive amendment as shrub and flower beds; however, lawns establish more rapidly and grow stronger root systems when some attention is given to improving the soil. The type of tree to be planted dictates the level of soil improvement; for example, many flowering trees, such as dogwood, prefer a "richer" soil than pine trees, which can usually grow well with no soil improvement. Know the cultural preferences of the trees you are planting before investing in extensive soil improvement. Possibly the most beneficial treatment for trees is loosening compacted soils before planting, mulching heavily, and watering until established.

Much of the Southeast receives nonuniform rainfall, and excessive moisture may be a problem in poorly drained areas during winter and spring. Drainage may be improved by changing the slope of the site, adding subsurface drainage, or planting at a higher grade.



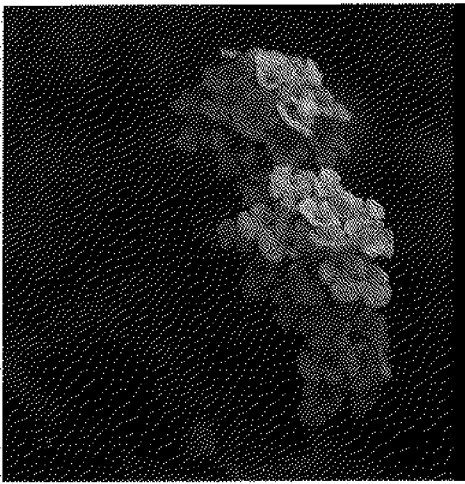
Mounding or berming of soil will improve survival of plants susceptible to drainage problems.

PLANT SELECTION

Lush, green landscapes and seasonal color provided by a variety of plants are a hallmark of the Southeast. Xeriscapes can achieve this beauty while reducing water consumption. Xeriscaping does not require that landscapes become cactus gardens. However, careful planning and plant selection are important to insure the investment and longevity of landscape plants in a Xeriscape.

Any plant is a candidate for use in a Xeriscape; the key to success is how the plant is used. In general, the greatest success is achieved when plants are placed in an environment most similar to the plant's native habitat. However, many plants are adaptable and will perform equally well in different situations. River birch (*Betula nigra*) and bald cypress (*Taxodium distichum*) are examples of trees native to low, wet areas that grow perfectly well on high ground. Determining a plant's adaptability often requires research into its cultural requirements, which must be compatible with the plant's placement in the landscape plan.

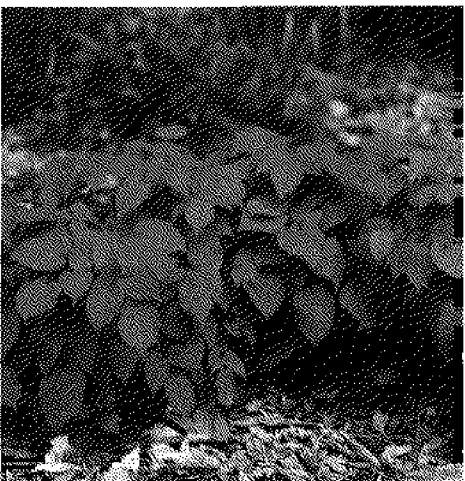
Plant selection for coastal residents is more challenging because they must often consider the influence of ocean breezes which may be laden with salt spray if they are located near the beach. Both salt spray and wind cause the foliage of many plant species to dry out, often resulting in severe damage or death. In addition, soils very near the beach are sandy with little water and nutrient holding capacity, while soils slightly inland may be heavy, poorly drained, "gumbo-type" soils. Another problem for coastal residents is the quality of the irrigation water available. Because of the intrusion of seawater into underground aquifers, the concentration of salts in the drinking-water supply is increasing. These salts may injure landscape plants in a manner similar to the harm caused by ocean spray. The Southeast is fortunate to have a large



Common Lantana
Lantana camara



Crape Myrtle
Lagerstroemia indica



Epimedium or Barrenwort
Epimedium grandiflorum

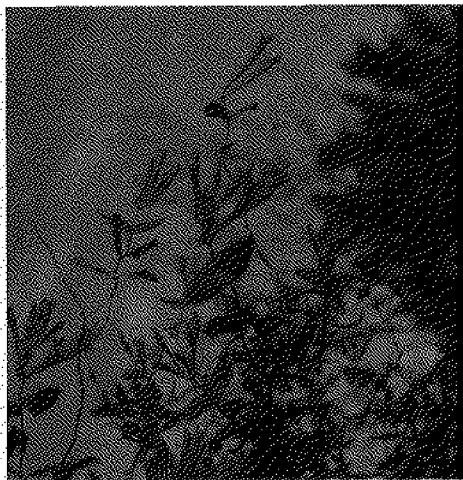


Liatris or Spike Gayfeather
Liatris spicata 'Kobold'





Yellow Jessamine
Geisemium sempervirens



Trumpet Honeysuckle
Lonicera sempervirens



Hosta or Plantain-Lily
Hosta sp.

number of native plant species that are naturally well-adapted to our climate. Many of our most popular landscape plants are from similar temperate climates around the world and perform very well in the Southeast. Together these sources provide a large palate of plant materials from which to design a landscape. The key to water efficiency is using these plants properly in the design, placing the plants where they will perform their best without excess water.

Native plants are well adapted for use in Xeriscapes; however, this does not mean they are all drought tolerant. Many of our Southeastern native plants are extremely hardy and are useful in a wide range of conditions, but it is important to consider that the landscape into which they are being introduced may not resemble their native landscape. For example, building construction almost always destroys the natural soil structure, often leaving compacted red clay or sandy subsoil for the landscaper or homeowner to contend with. This is where the Xeriscape principle of soil amendment can help restore these soils to a more hospitable environment for plant roots.

A plant's candidacy for a Xeriscape hinges on its placement in the landscape. Selecting and grouping plants that have similar water needs is desirable. For example, azaleas and rhododendrons should be grouped together in a cool area of the landscape because water requirements are the same for these plants and irrigation becomes most effective.

When selecting plants for a landscape, a designer must consider a number of site conditions such as sun exposure, wind, soil conditions, and drainage patterns. It is important to know the sun/shade patterns of the landscape, for some plants are tolerant of morning sun but not of the intensely hot afternoon sun, while other plants require both to flower prolifically. Soil type, structure, and pH are factors that will determine the success of a particular plant. While soil factors can be modified for a given planting, the dominant soil conditions



Nellie R. Stevens Holly
Ilex x 'Nellie R. Stevens'



An existing natural woodland enhanced by annuals and perennials



Rudbeckia in perennial border

will ultimately be the most important when choosing plants. As mentioned earlier, coastal landscapes must consider the proximity of sea breezes and the rapid changes in soil types. The USDA Soil Conservation Service Bulletin "Plants for Coastal Dunes" addresses the establishment, protection, planting, and maintenance of our fragile coastal dunes.

Plants requiring areas that are wetter than the site being designed should be used in an area that will naturally receive more water, such as a low spot, near a spigot, or where runoff from the roof or paved areas will provide extra water. Likewise, plants that are adapted to areas that are drier than your site should be located in the design where they will benefit from good drainage, such as slopes, tops of berms, or nonirrigated areas.

It is important to bear in mind, however, that a plant tolerant of dry conditions may be stronger and faster-growing when it receives extra moisture. Just because a plant is drought tolerant does not mean it has to be used in a dry spot in the landscape. Drainage is often important, and careful attention should be given to placement of species requiring good drainage.

By combining proper plant selection with the other basic principles of Xeriscape such as improving the soil, mulching, and appropriate maintenance, water efficiency is maximized. If each plant's basic cultural requirements are met in the design, a landscape can be healthy, green, and water efficient, too.

The plant list that follows should not be considered a complete listing of all drought-resistant plant materials. It should be used as a guide to selecting new plants and/or retaining existing plants as the landscape is being planned. Improved cultivars of the species listed are often drought tolerant, but it is beyond the scope of this publication to list all cultivars of landscape plants. There are some species not listed (such as azaleas and camellias) which may survive drought periods once they are established, but they are generally considered to require irrigation to supplement rainfall. There are many plant choices for a Xeriscape; you may even wish to include a hydrozone incorporating high-water-use plants, which are not on this list. The plant list includes some species which may not be hardy in your area or which may not be available in the local garden centers. Some plants on the list are shade-loving while others require full sun. Always work with your local nursery for suggestions when selecting plants from the list.

It is very important to note that most plants on the list are drought tolerant only after they become established in the landscape. It is critical, therefore, that irrigation be provided when necessary for the first and, perhaps, second growing season.



DROUGHT-RESISTANT PLANT MATERIALS

LARGE TREES

Acer buergeranum
Acer negundo
Alnus glutinosa
Betula nigra
Carya illinoensis
Catalpa bignonioides
Cedrus deodara
Celtis laevigata
Celtis occidentalis
X Cupressocyparis leylandii *
Fraxinus americana
Fraxinus pennsylvanica
Ginkgo biloba
Gymnocladus dioicus
Ilex opaca
Juniperus virginiana *
Koelreuteria bipinnata *
Koelreuteria paniculata *
Liquidambar styraciflua *
Magnolia grandiflora *
Pinus sp. *
Pistacia chinensis
Populus sp.
Pyrus calleryana 'Bradford' *
Quercus sp. *
Sabal palmetto *
Sapindus drummondii
Sapium sebiferum
Sophora japonica
Taxodium distichum
Trachycarpus fortunei *
Ulmus alata
Ulmus carpinifolia
Ulmus parvifolia
Zelkova serrata

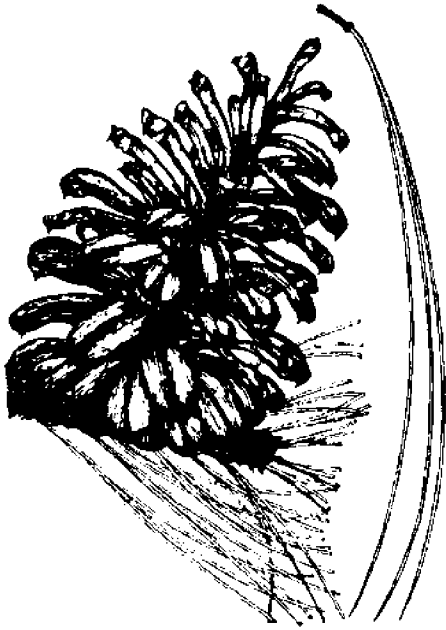
Trident Maple
 Boxelder
 Black Alder
 River Birch
 Pecan
 Southern Catalpa
 Deodar Cedar
 Sugar Hackberry
 Hackberry
 Leyland Cypress
 White Ash
 Green Ash
 Ginkgo
 Kentucky Coffeetree
 American Holly
 Eastern Redcedar
 Chinese Flame Tree
 Golden Raintree
 Sweetgum
 Southern Magnolia
 Pines
 Chinese Pistache
 Poplars
 Bradford Pear
 Oaks
 Cabbage Palm
 Western Soapberry
 Chinese Tallow
 Japanese Pagodatree
 Bald Cypress
 Windmill Palm
 Winged Elm
 Smoothleaf Elm
 Chinese Elm
 Japanese Zelkova

SMALL TREES

Albizia julibrissin
Amelanchier arborea
Cercis canadensis
Cornus florida
Cotinus coggygria
Eriobotrya japonica
Hamamelis virginiana
Hibiscus syriacus *
Ilex cassine *
Ilex x attenuata 'Foster #2' *
Ilex x attenuata 'Savannah' *
Ilex x attenuata 'Hume' *
Ilex x attenuata 'East Palatka' *
Lagerstroemia indica *
Malus sp.
Osmanthus fragrans *
Ostrya virginiana
Oxydendron arboreum
Prunus caroliniana *
Rhus copallina
Rhus typhina

Mimosa
 Serviceberry
 Redbud
 Flowering Dogwood
 Smoketree
 Loquat
 Witchhazel
 Rose of Sharon
 Dahoon Holly
 Foster Holly
 Savannah Holly
 Hume Holly
 East Palatka Holly
 Crape Myrtle
 Crabapples
 Tea Olive
 Hophornbeam
 Sourwood
 Cherry Laurel
 Flameleaf Sumac
 Staghorn Sumac

* Plants which have been found to do well in plantings very near the coast.



SHRUBS (6-12')

Buddleia davidii	Butterfly Bush
Callicarpa americana	Beauty-Berry
Chimonanthus praecox	Wintersweet
Elaeagnus angustifolia*	Russian Olive
Elaeagnus pungens*	Thorny Elaeagnus
Exochorda racemosa	Pearl Bush
Fatsia japonica*	Fatsia
Ilex cornuta*	Burford Holly
Ilex decidua*	Possumhaw Holly
Ilex vomitoria*	Yaupon Holly
Juniperus chinensis cultivars*	Chinese Junipers
Kolkwitzia amabilis	Beauty Bush
Ligustrum japonicum*	Japanese Privet
Ligustrum x vicaryi*	Golden Privet
Loropetalum chinense	Loropetalum
Myrica cerifera*	Waxmyrtle
Osmanthus x fortunei*	Fortune's Osmanthus
Osmanthus heterophyllus*	Holly Osmanthus
Photinia glabra*	Photinia
Pittosporum tobira*	Japanese Pittosporum
Podocarpus macrophyllus*	Podocarpus
Punica granatum*	Pomegranate
Pyracantha coccinea*	Scarlet Firethorn
Pyracantha koidzumii *	Formosa Firethorn
Rhus glabra	Smooth Sumac
Sabal minor*	Dwarf Palmetto
Spiraea x vanhouttei*	Vanhoutte Spirea
Viburnum plicatum tomentosum	Doublefile Viburnum
Vitex agnus-castus*	Chaste Tree
Yucca aloifolia*	Spanish Bayonet
Yucca gloriosa*	Spanish Dagger

Many of the shrubs in the 6-12' category are also pruned to grow as small trees.

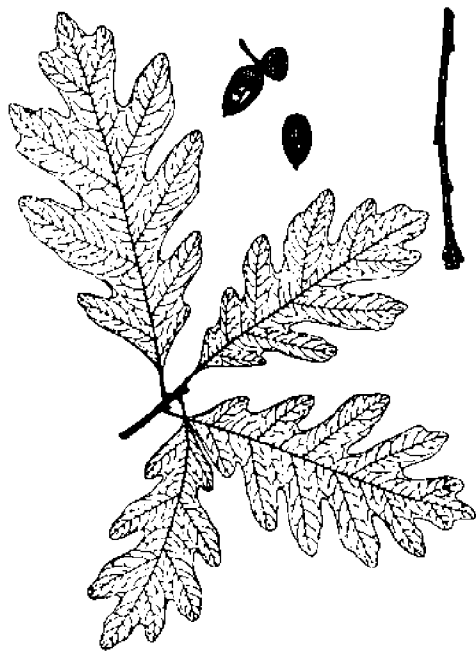
SHRUBS (4-6')

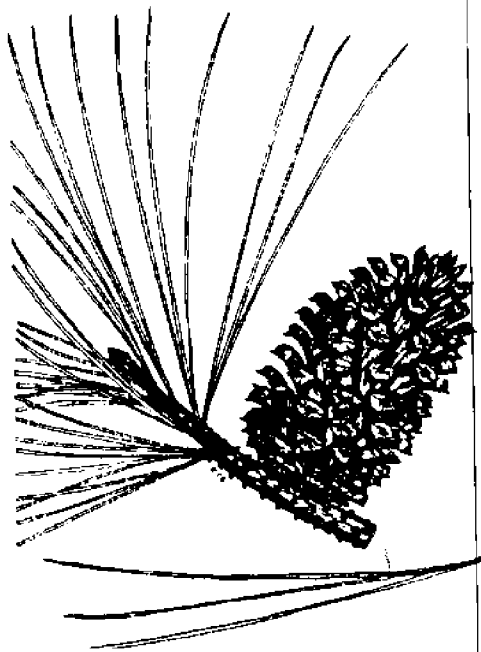
Aucuba japonica*	Aucuba
Berberis species*	Barberries
Buxus microphylla*	Japanese Boxwood
Chaenomeles speciosa*	Flowering Quince
Chamaecyparis obtusa 'Nana Gracilis'*	Dwarf Hinoki Cypress
Cytisus scoparius*	Scotch Broom
Forsythia x intermedia*	Border Forsythia
Gardenia jasminoides *	Gardenia
Hamamelis vernalis	Witch Hazel
Juniperus chinensis cultivars*	Chinese Junipers
Lantana camara*	Common Lantana
Leucophyllum frutescens*	Texas Sage
Ligustrum sinense 'Variegatum' *	Chinese Privet
Nandina domestica*	Nandina
Raphiolepis indica*	Indian Hawthorn
Raphiolepis umbellata*	Yeddo Hawthorn
Rhus aromatica	Fragrant Sumac
Rosa sp.	Rugosa Rose, Carolina Rose
	Cherokee Rose, Japanese Rose
Spiraea thunbergii *	Thunberg Spirea

SHRUBS (1-4')

Abelia x grandiflora*	Abelia
Berberis verruculosa*	Warty Barberry
Callicarpa dichotoma	Purple Beautyberry
Ilex cornuta 'Rotunda'*	Chinese Holly

* Plants which have been found to do well in plantings very near the coast.





Ilex cornuta 'Carissa'*
 Ilex vomitoria 'Nana'*
 Jasminum nudiflorum
 Juniperus chinensis cultivars*
 Juniperus conferta*
 Pittosporum tobira 'Wheeler's Dwarf'*
 Sabal etonia*
 Salvia greggi
 Yucca filamentosa*

Carissa Holly
 Dwarf Yaupon
 Winter Jasmine
 Chinese Junipers
 Shore Juniper
 Dwarf Pittosporum
 Scrub Palmetto
 Sage
 Adams Needle Yucca

GROUND COVERS

Euonymus fortunei
 Juniperus conferta cultivars*
 Juniperus horizontalis cultivars*
 Juniperus procumbens cultivars*
 Liriope muscari *
 Liriope spicata*
 Ophiopogon japonicus*
 Sarcococca hookerana humilis
 Vinca minor

Wintercreeper Euonymus
 Shore Junipers
 Creeping Junipers
 Jaggarden Juniper
 Liriope
 Lilyturf Liriope
 Mondo Grass
 Himalayan Sarcococca
 Periwinkle

VINE-LIKE PLANTS

Akebia quinata
 Campsis radicans*
 Clematis paniculata
 Cocculus laurifolius*
 X Fatshedera lizei*
 Ficus pumila*
 Gelsemium sempervirens*
 Parthenocissus quinquefolia*
 Parthenocissus tricuspidata
 Rosa banksiae
 Trachelospermum asiaticum*
 Wisteria floribunda
 Wisteria sinensis
 Lonicera sempervirens

Fiveleaf Akebia
 Trumpet vine
 Sweet Autumn Clematis
 Snail Seed
 Tree Ivy
 Creeping Fig
 Carolina Jessamine
 Virginia Creeper
 Boston Ivy
 Lady Bank's Rose
 Yellow Star Jasmine
 Japanese Wisteria
 Chinese Wisteria
 Trumpet Honeysuckle

HERBACEOUS PLANTS (Annuals and Perennials)

Achillea millefolium*
 Ageratum species
 Anthemis species
 Artemisia species
 Asclepias tuberosa
 Aspidistra elatior *
 Aster x Frikartii *
 Baptista species
 Calendula species*
 Caryopteris x clandonensis
 Catharanthus roseus*
 Chrysanthemum species*
 Coreopsis species*
 Echinacea angustifolia*
 Echinops species
 Epimedium species
 Eschscholzia californica*
 Eustoma grandiflora*
 Gaillardia species*
 Gaura lindheimeri
 Gazania species*

Yarrow
 Flossflowers
 Dog Fennels
 Wormwoods
 Butterfly Weed
 Cast Iron Plant
 Frikarti Aster
 False Indigos
 Calendula
 Blue Mist Caryopteris
 Madagascar Periwinkle
 Mums
 Coreopsis
 Purple Coneflower
 Globe Thistles
 Epimedium
 California Poppy
 Lisianthus
 Blanket Flower
 Gaura
 Gazanias

* Plants which have been found to do well in plantings very near the coast.



Hemerocallis cultivars*	Daylily
Hosta cultivars	Hostas
Iberis sempervirens	Candytuft
Lantana camara*	Common Lantana
Lantana montevidensis *	Trailing Lantana
Lathyrus species	Sweet Peas
Lavandula species*	Lavenders
Liatris spicata*	Spike Gayfeather
Limonium species	Sea Lavenders
Linum species	Flaxes
Lychnis species	Campions
Melampodium paludosum*	Melampodium
Oenothera species	Sundrops
Phlox species*	Phlox
Portulaca grandiflora*	Rose Moss
Rosmarinus officinalis*	Rosemary
Rudbeckia x Goldstrum*	Goldstrum Rudbeckia
Salvia species*	Sages
Santolina chamaecyparissus*	Lavender Cotton
Santolina virens*	Green Santolina
Sedum x 'Autumn Joy'*	Autumn Joy Sedum
Solidago altissima	Goldenrod
Tagetes species*	Marigolds
Thymus species	Thymes
Verbena canadensis*	Clump Verbena
Verbena tenuisecta*	Moss Verbena
Veronica species	Speedwells
Zinnia species	Zinnias

TURFGRASSES

Cynodon dactylon*	Bermuda Grass
Eremochloa ophriuroides*	Centipede Grass
Zoysia japonica*	Zoysia Grass

GRASS-LIKE ORNAMENTALS

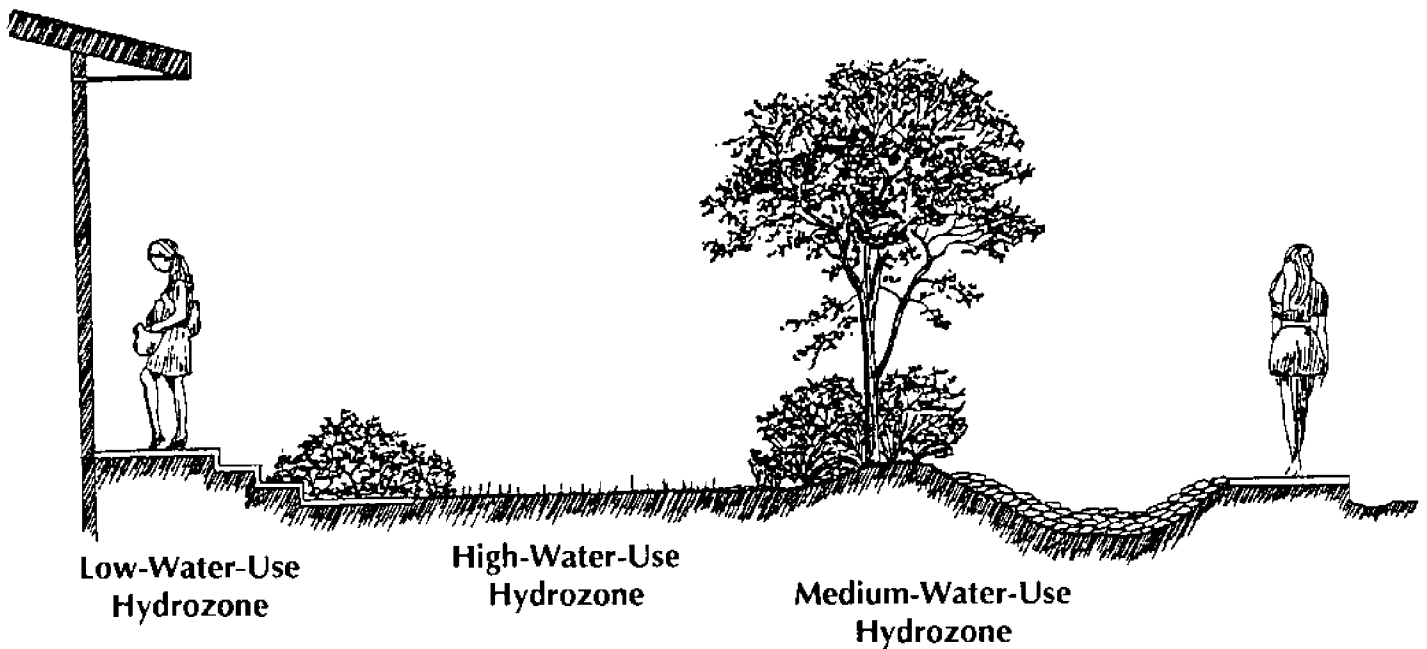
Arundo donax*	Giant Reed
Cortaderia selloana*	Pampas Grass
Eragrostis curvula	Weeping Lovegrass
Miscanthus sinensis	Japanese Silvergrass, Eulalia
Miscanthus gracillimus	Maiden Grass
Miscanthus sinensis variegatus	Silvergrass
Miscanthus sinensis zebrinus	Zebra Grass
Panicum amarum*	Bitter Panicum
Pennisetum alopecuroides	Fountain Grass
Uniola paniculata*	Sea Oats

* Plants which have been found to do well in plantings very near the coast.



EFFECTIVE AND EFFICIENT WATERING METHODS

The use of efficient irrigation systems is a technique inherent to Xeriscape planning. Irrigation systems should provide appropriate amounts of water at critical times. The irrigation system must be designed to correlate directly to the planting zones, known as "hydrozones." The planting zones are created by grouping together plants of similar water requirements. Turf areas need to be irrigated by a separate system or by using timers to control the amount of water the turf receives versus the requirements for ornamental shrubs, perennials, and annual beds. Irrigation systems are available in various forms: the traditional pop-up sprinklers and overhead sprinklers and the more water-efficient subsurface, drip and soaker-hose systems. For more information on irrigation systems obtain a copy of Clemson University's Extension Service Circular 580 "Irrigating Your Lawn and Garden".



Hydrozones are planting zones created by grouping plants with similar water requirements into low, medium, or high-water-use areas. Irrigation systems can be designed to meet the requirements of each separate zone.

The proper selection and placement of irrigation systems can allow the landscape designer the use of water-loving plant material while taking into consideration drought conditions. Soil texture will influence the selection of both the kind and the placement of an irrigation system. In addition to environmental factors, economic factors must be considered with irrigation practices.

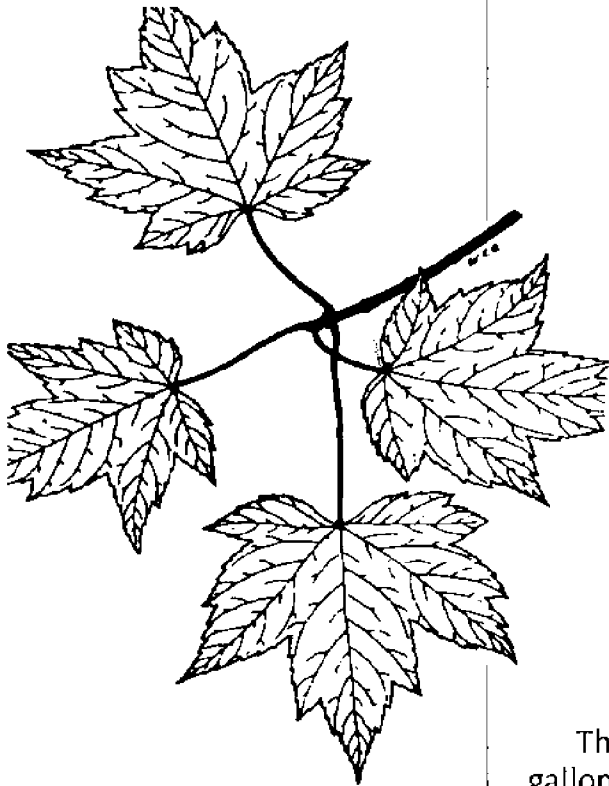
Drip and microsprinkler irrigation systems have many advantages.

1. They are precise.
2. They keep the foliage dry.
3. They are simple to install.
4. They can be used almost anywhere.
5. They reduce the number of replacement plants necessary by insuring better plant survival.
6. They reduce erosion and water loss due to evaporation.
7. They reduce splash-transmitted, soil-borne diseases associated with traditional sprinkler irrigation.
8. They reduce or prevent mildew and decay because water does not hit house siding.
9. They reduce weed populations.
10. The landscape can be enjoyed at any time because there is no water spray to inhibit activities.
11. They efficiently supply water slowly so that puddling is not a problem.
12. Because water is placed directly at the root zone, the plant's water requirements are met by using much less water than conventional methods.

The amount of water that drip systems use is measured in gallons of water per hour, whereas the amount of water used by a sprinkler system is measured in gallons per minute. While drip irrigation is not suitable for lawns or ground cover plantings, it is very effective in shrub and tree areas. Drip irrigation, when used properly, encourages deep rooting and reduces runoff and evaporation. Many existing sprinkler systems can be retrofitted to serve as drip and microsprinkler systems.

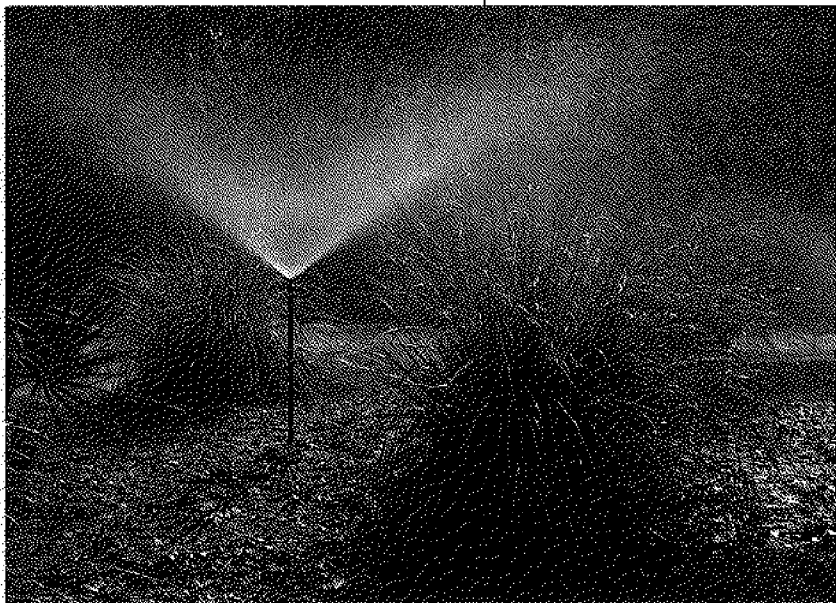
A soaker hose is also an economical choice for an irrigation system. The hose is small and easy for the homeowner to handle. Installation is relatively simple and the hose works well in small shrub or flower beds. Local garden centers or nurseries can answer questions about designing the irrigation system and can supply the necessary parts for installation.

Although they have had only recent widespread use, subsurface systems are now demonstrating their effectiveness in both economics and conservation. Evidence suggests that they create as much as a 60 percent savings in water use, and because the water is placed directly at the root zone, wet/dry cycles are reduced, resulting in deeper root growth.





Traditional high pressure overhead irrigation systems often result in a fine mist with a high evaporation rate and poor water use efficiency. Less visible drip irrigation systems provide a more water-efficient alternative where irrigation is desired.



Drip systems, soaker hoses, and subsurface systems have a low profile in the landscape, so vandalism is almost eliminated. These systems use much less water than conventional irrigation systems and create lush, green Xeriscape landscapes and gardens.

Sprinkler irrigation for appropriate turf areas can be designed efficiently. State-of-the art sprinklers offer spray patterns that can effectively cover geometric or curvilinear areas without waste. It is imperative that sprinkler heads be adjusted so that large droplets are sprayed, because if a mist is created, 50 percent of the water may evaporate before it ever reaches the plant. Early morning watering reduces evaporation, and the system works more efficiently because morning winds are usually calmer. Rainfall sensors can be used to prevent time clocks from irrigating after an adequate rain. Irrigation timers should be adjusted weekly as determined by rainfall, season, and plant growth stage. Watering deeply and infrequently encourages deep rooting of plants which promotes greater drought tolerance.

The irrigation system must be properly installed and maintained so that there are no leaky heads and inefficient spray patterns. The system should be carefully monitored to meet the minimum water needs of the plants in the landscape. If water is observed to puddle or runoff excessively, split the watering cycle into two time periods to allow the soil time to absorb the water or change the sprinkler heads to a lower application rate. While a well-designed irrigation system can play a major role in water conservation, a poorly designed system can waste enormous amounts of water and money. The irrigation system must be matched to suit the site and the plants to be grown. So-

phisticated controllers allow great flexibility in automatically scheduling irrigation systems. One of the best ways to monitor irrigation needs is to observe the plants carefully in the landscape. Turfgrass will often develop a bluish caste with leaves curling and a rigidity loss when it is drought stressed. Ideally, the turf should be irrigated just before it reaches this point.

Property owners choosing to implement an irrigation system must realize that the cost of installing an efficient system will save tremendously in the long run. These cost savings will be obvious from the reduced water usage, the reduction of replacement plants, and the lowered maintenance cost.

MULCHING TREES, SHRUBS, AND FLOWER BEDS

As much as 75 percent of the rainfall landing on bare ground is lost due to evaporation and runoff. This loss can be enormously reduced when the proper mulch is utilized. Mulch helps to insure plant survival and is an important component of Xeriscapes. The two basic types of mulches are organic and inorganic. Some examples of organic mulches are pine straw, pine bark mini-nuggets, pine bark mulch, shredded hardwood bark, wood chip mulch, composted leaves, and grass clippings. Inorganic mulches include pebbles, gravel, black plastic, and landscape fabrics. While many materials can be used for mulches, price, availability, and aesthetic appeal often dictate choice. In a research study conducted by Clemson University forestry professor Don Ham, properly mulched trees grew faster than unmulched trees. He also found almost 25 percent higher soil moisture and about seven degrees cooler soil temperatures around mulched compared to unmulched trees.

Properly mulched street trees (on either side of photo) grew much faster than unmulched trees (the two trees in the center of photo) in a study done by forestry Professor Don Ham in Aiken, S.C.



The best mulches are usually fine-textured and nonmatting organic materials. An organic mulch should decompose

slowly, be free of weed seed, and should not be easily washed away by rainfall. Mulches that decompose quickly, such as grass clippings, are less desirable. Gravel mulches reflect heat to the plant's canopy, thereby increasing water loss from the leaves. Organic mulches have many benefits in the landscape. They:

1. increase water-holding capacity of the soil,
2. reduce the amount of water lost by runoff,
3. moderate extreme soil temperature fluctuations,
4. reduce weed competition,
5. reduce the incidence of soil-related diseases,
6. prevent soil erosion,
7. reduce soil compaction, improve soil structure, and add nutrients and humus to the soil,
8. create an aesthetically pleasing design feature,
9. prevent mechanical damage to trees and shrubs

caused by mowers and weedeaters, and
10. prevent splash-back and staining of house foundation and siding.

Woody landscape plants need an application of three to five inches of a good mulch. This should be applied under the plant and at least out to the drip line, because the root system can extend two to three times the spread of the plant. Mulch should be pulled away from the trunk of the plant to keep the plant's bark dry. Trees have a very large spread, and mulching to the drip line will give good protection during a severe drought. When using mulch near the house, it is important to be sure that the mulch is at least six inches below untreated wood siding and at least eight inches below any untreated wood structural members such as sills, joists, plates, etc.

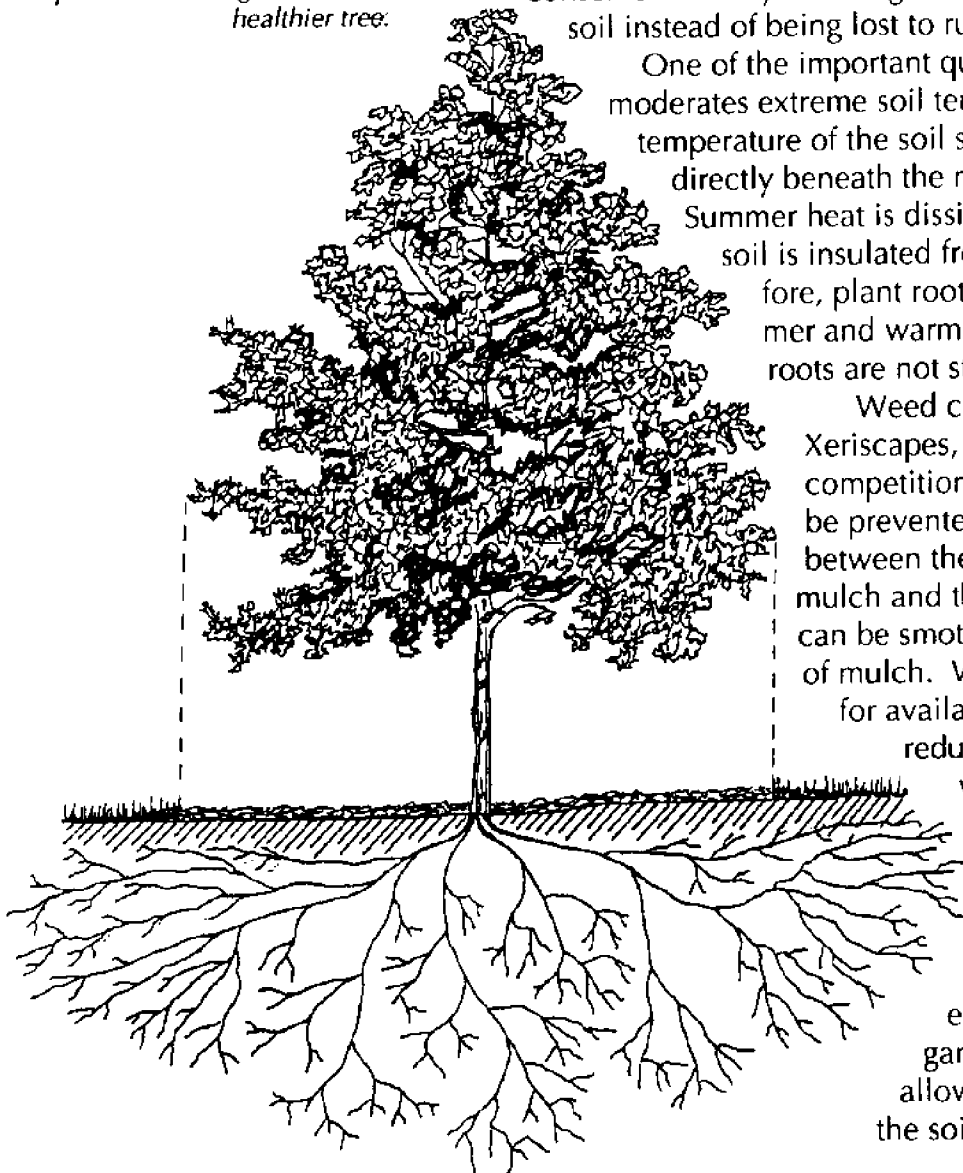
Mulching increases the water-holding capacity of the soil. Soil moisture can be increased 5 to 25 percent or more above that of a nonmulched area. The amount of water lost by runoff can be reduced significantly. Fine-textured mulches conserve water by allowing water to percolate down into the soil instead of being lost to runoff.

One of the important qualities of mulching is that it moderates extreme soil temperature fluctuations. The temperature of the soil surface and that of the soil directly beneath the mulch are partially controlled. Summer heat is dissipated by the mulch and the soil is insulated from the winter cold. Therefore, plant roots are kept cooler in the summer and warmer in the winter. When plant roots are not stressed, they use less water.

Weed control is an integral part of Xeriscapes, and mulching reduces weed competition. Weed-seed germination can be prevented by the mulch barrier created between the seeds that fall on top of the mulch and the soil. Also, existing weeds can be smothered by proper applications of mulch. Weeds compete with the plants for available water and nutrients. By reducing the weed population, water requirements and fertilizer applications can be significantly reduced.

By using landscape fabrics under organic mulches, weed competition can be reduced even more than by using organic mulch alone. Also, fabrics allow air and water to penetrate to the soil below. However, using

Root systems of trees often extend beyond the canopy of the tree. A three to five inch layer of mulch may be applied under the plant out to the drip line. This protects the plant during a drought by reducing evaporation of moisture from the soil surface, by reducing soil temperature fluctuations, and by controlling weeds which compete for available water and nutrients. It also promotes faster growth and a healthier tree.



black plastic as a mulch can cause several problems. Black plastic restricts water and air flow to plant roots, and the water that penetrates the plastic cannot evaporate, which increases the likelihood of disease problems. Heat buildup is also a consideration.

The incidence of splash-transmitted soil-related diseases is reduced by mulching. A mulch barrier between the soil and plant helps prevent splashing of soil onto plants and keeps plants clean, reducing the spread of diseases.

When mulches have been established a few weeks, they can aid in preventing surface-soil erosion. Mulches create a mat that reduces splash erosion and helps hold the soil in place. On steep slopes, pine straw holds better than shredded barks and helps prevent erosion.

Organic mulches serve as food for beneficial soil organisms and improve soil aggregation if they are tilled in later on. Soil compaction is reduced because good soil aggregation increases aeration. These mulches also add nutrients like potassium to the soil. Over a period of time humus is added to the soil through the continued use of organic mulches. Humus increases the nutrient-holding capacity of the soil.

Mulches are an aesthetically pleasing design feature. Organic mulches create clean lines between planting beds and lawn areas giving a nice definition to space. In times of extreme drought or until landscaping is done or is affordable

by the owner of a new house, beds that would normally be planted can be appealing without plants when an attractive mulch is used. Mulches are critical in a successful Xeriscape and cannot be overemphasized.

Mulch can be used as a design element to create line and rhythm in a plan. The dark brown color and rough texture of the mulch contrasts with the light green, fine textured grass giving visual relief in addition to water and maintenance savings.



PROPER LANDSCAPE MAINTENANCE

The principles of Xeriscape design are not new. It is the use of these principles to create the total landscape package for our changing environment that is new to the industry and to the homeowner. Xeriscape designs that implement all seven principles have been shown to reduce maintenance by as much as 50 percent. There are nine main reasons for reduced maintenance. Xeriscape designs:

1. reduce water loss and soil erosion through careful planning, design, and implementation,
2. reduce mowing by limiting lawn areas and utilizing proper fertilization techniques,
3. reduce fertilization through soil preparation,
4. reduce pruning of trees and shrubs through proper plant selection and through restricted applications of water and fertilizer,
5. reduce replacement plants through proper watering methods and soil preparation,
6. reduce weeds through proper mulching,
7. reduce disease and pest problems by creating less stress on plants through the methods listed above,
8. reduce irrigation through proper maintenance and selection of plants with healthier root systems, and
9. reduce costly damage to house/structures and foundations through proper selection, placement, and minimum watering near the house.

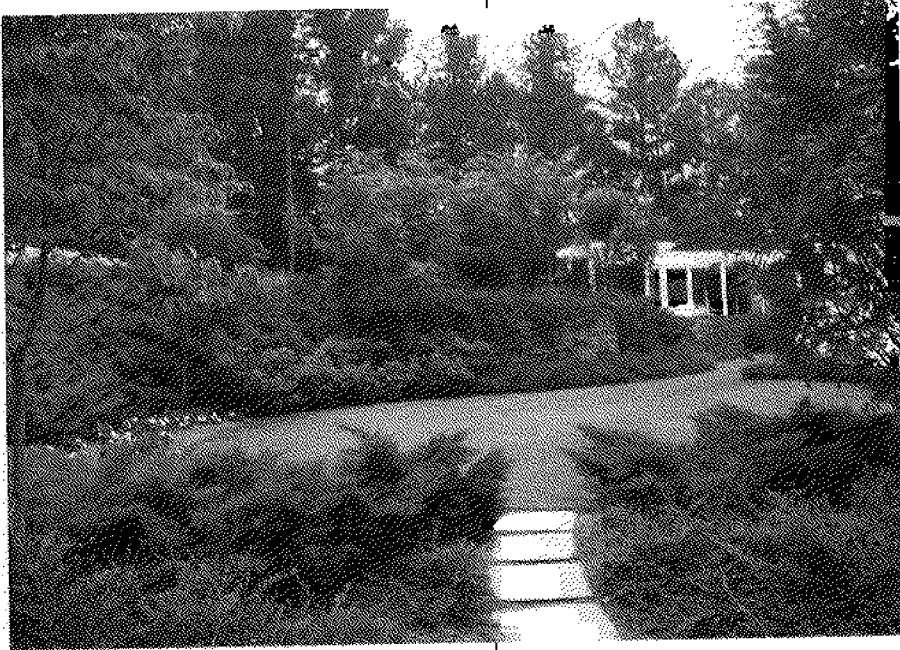
Water is conserved and less erosion occurs with careful planning and implementation of a Xeriscape design and irrigation system. Since plants are grouped in their respective hydrozones, they do not receive unnecessary water. Soil erosion can be partially prevented by implementing one of the watering systems discussed in the irrigation section. These systems do not create runoff and thereby help eliminate erosion. Spot checks of irrigation systems can help insure that water is being conserved. Considering the contours of the property when designing the hydrozones also helps prevent erosion and water waste.

The reduction of lawn areas to minimal size cuts down on the amount of mowing required. Proper fertilization can help reduce mowing by preventing unnecessary growth.

Proper timing of fertilizer applications reduces mowing and irrigation needs. Specific requirements for fertilizing grasses vary tremendously, depending on the variety of grass (see Clemson University Extension Circular 547 "Warm-Season Grasses for South Carolina"). Thorough soil preparation before planting should take care of fertilizer requirements necessary for the establishment of trees, shrubs, and lawn areas. Most landscape plants are overfertilized, creating excessive growth which requires more water.



Careful massing of xeriphytic plants in a backyard setting creates a sense of privacy around a lawn area intended for recreation.



Pruning of trees and shrubs can be reduced by the correct choice of plant material and by reducing the amount of excessive growth encouraged by overfertilizing and overwatering. Selecting plants that have the desired natural form and appropriate height and spread enables homeowners to enjoy a low-maintenance mature landscape.

Fewer plants will have to be replaced when deep-watering techniques are used instead of the overused "too frequent, too shallow" method. Deep saturation of the soil less frequently is

much preferred because it creates deep, extensive root systems. Also, much-needed fertilizers are not leached from the soil before they become available to the plant. Allowing the soil to dry out between watering intervals encourages roots to penetrate deeper into the soil. This Xeriscape technique helps plantings withstand times of extreme drought because root systems are deep within the soil and close to available moisture rather than at the dry surface. Annual mulching with organic matter can also help reduce maintenance by inhibiting weeds, by preventing soil com-

paction, by keeping the soil temperatures more moderate year round and, most importantly, by slowing evaporation. This gives the plants reserves of water in times of drought.

Xeriscape maintenance practices make disease and pest problems less prevalent because they reduce stress on plants. The plants have been hardened-off by using good irrigation techniques. Correct amounts and timing of fertilizers, especially nitrogen, keep the plants healthier and less succulent. Soil temperature extremes and weed competition are partially eliminated due to mulching. All of these maintenance practices keep plants from being stressed, reducing pest and disease problems.

Water requirements can be lowered because root systems of plants are healthier (more fibrous and deeper) when proper care and a good maintenance schedule are followed. By being aware of plant signs that indicate the need of water, a gardener can irrigate more efficiently, conserve water, and produce healthier plants.

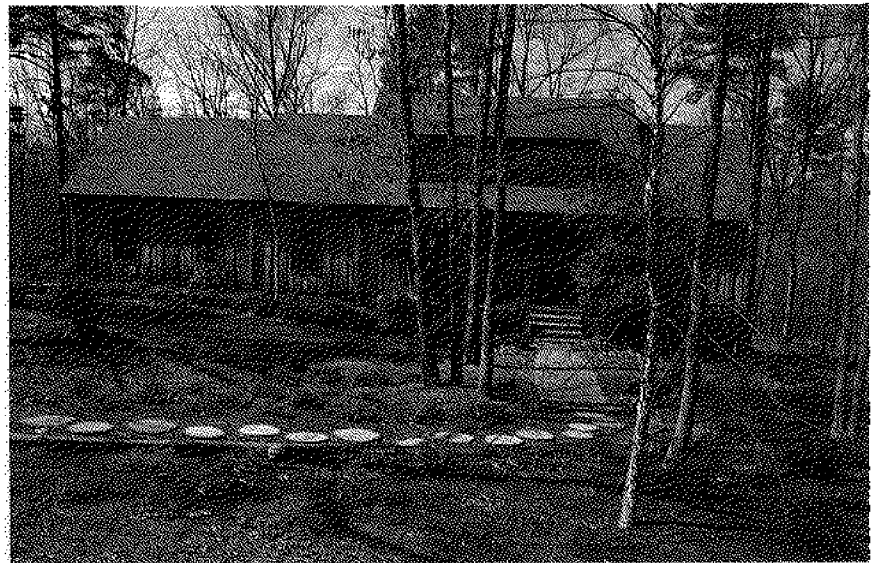
Teamwork is the key to the long-term success of the Xeriscape. Teamwork among homeowners, landscape design-



ers, landscape contractors, and maintenance crews is crucial to maximize efficiency of the seven Xeriscape principles. A successful Xeriscape allows homeowners more leisure time to enjoy the lush, green environment that they have created as part of the team. In addition, all involved can experience the satisfaction of having contributed to the quality of life for others by conserving a limited, precious, and threatened natural resource: water.



This high-density residential development has effectively utilized Xeriscape principles to create a water efficient yet beautiful landscape.

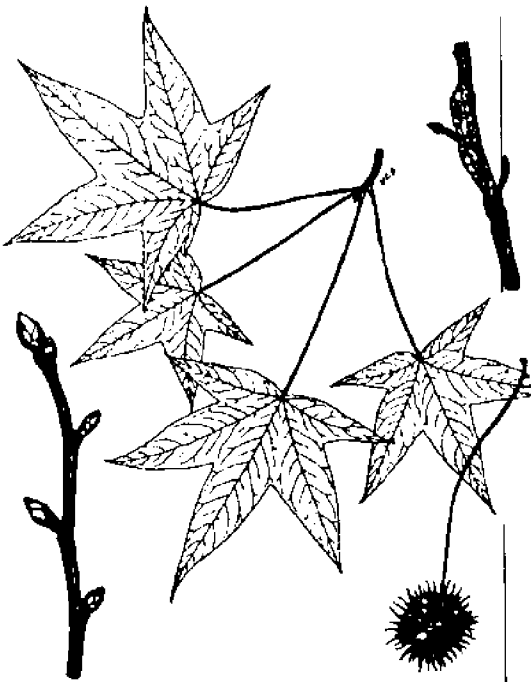


Saving native trees and preserving woodland areas is an excellent way to combine Xeriscape and low-maintenance concepts into an attractive naturalistic design.

A slide set on Xeriscaping is available from the Clemson University Cooperative Extension Service.

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Video Tapes

- Efficient Water Management in the Landscape*. San Luis Video, San Luis Obispo, CA
- Xeriscape: Appropriate Landscaping to Conserve Water*. San Luis Video, San Luis Obispo, CA

Slide Sets

- Xeriscaping: Landscape Water Conservation in the Southeast*. Clemson University Cooperative Extension Service.

Local Climate Data and Information

Daily, monthly, seasonal, and annual weather and climate information is available from the Southeast Regional Climate Center. You can write, call, or fax your request to:

Southeast Regional Climate Center
1201 Main Street, Suite 1100
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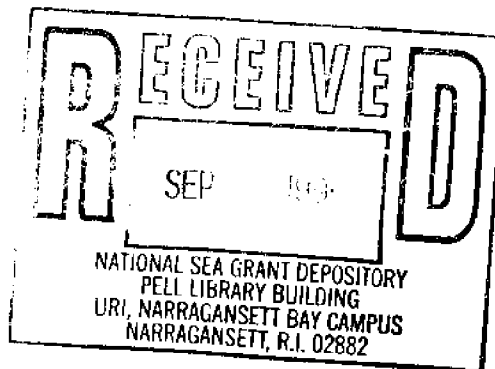
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