



# The Shoreline

August, 2010

Volume 1, Issue 2

## Apiculture at Virginia Tech

The first beekeeping course at Virginia Tech (Virginia Polytechnic Institute at the time) was taught during the 1920-21 school year by Professor William J. Schoene. The course was listed in the Biology Department and was taught until the early 1940's. Entomology courses were not taught during the war years, but were resumed afterward. John Amos was hired in 1949 as an extension fruit specialist. Mr. Amos was also a beekeeper and provided extension programs in beekeeping, as well as fruit pest management. He also taught a beekeeping course. Entomology became a separate department in 1959 and during the next decade John Amos continued to offer beekeeping programs in extension and teaching. Mr. Amos retired in 1970 and the beekeeping course was removed from the catalog in 1972. In 1979 Dr. Richard Fell was hired as an apiculture specialist. He reinitiated the beekeeping program, and today apiculture at Virginia Tech involves an active program in teaching, extension and research.

**Teaching:** Two beekeeping courses are taught at Virginia Tech, an Introduction to Bees and Beekeeping, and a Bees and Beekeeping Laboratory. Both courses are taught in spring semester. Students may also independent studies courses involving honey bee research.



**Extension:** The extension program is designed to provide educational information and programs to Virginia beekeepers, as well as to industry groups in the mid-Atlantic region. Programs are offered on a statewide basis and involve a variety of local programs, workshops and short-courses. Educational programs and workshops include topics such as introductory beekeeping, seasonal management, queen rearing, and hive IPM.

**Research:** The apiculture research program at Virginia Tech is directed toward biological and behavioral studies of honey bees, pollination biology, and colony management. The past several years this program has focused on several major areas, including the effects of miticides on the reproductive physiology of honey bees, the potential for miticide residues in honey, a survey on pathogenic bacteria in honey, the spatial distribution of varroa mites within colonies, and the incidence of Nosema in the state.

## Improper Mowing of Lawns Can Impact Water Quality

### Inside this issue:

Urban Forestry Issues 2  
Plight of Beekeeping

Master Beekeeping Program 3

Wildlife in a Home Pond Garden 4

Creating a water-wise landscape 7

Cutting turf and impacting water quality sound like completely unrelated topics. However, the improper handling of clippings is a very important way in which nutrients are inadvertently introduced into our water sources. When you make those first few passes with the mower along the street, do you think to throw the clippings back into the lawn, or, as many seem to do, into the street? Or worse still, have you ever seen folks take their leaf blowers and blow piles of clippings into the street in order to clear their sidewalks, driveways, or lawns?



## Urban Forestry Issues

### Introduction

The U.S. population has grown increasingly urban each decade, from 28 percent in 1910 to 80 percent in 2000 (U.S. Census Bureau, 2002). In the Chesapeake watershed alone, residential development is predicted to consume 800,000 acres between 2003 and 2030, nearly 90 percent of it replacing farmland (Boesch and Greer, 2003). As urban communities grow larger and faster than ever before, natural resource management in these areas becomes crucial for achieving sustainable development and maintaining and enhancing the quality of life and the environment.

### Tree-Care Issues in the Urban/Community Forest

Many tree-care issues affect the use, management, and protection of the urban and community forest. These include loss of tree cover, proper care of trees to increase longevity and decrease hazards, alleviation and prevention of soil compaction, providing for better wildlife habitat, the effect of air pollution on tree health, and public mandates for storm-water retention and flood prevention.

The loss of tree cover is becoming a critical issue in many areas. In a natural or commercial forest situation, the canopy will approach 100 percent cover as trees attempt to capture all available sunlight. In a residential area, the canopy cover will typically range from 30 percent to 60 percent. Highly developed areas often have less than 10 percent canopy cover. One way to calculate the loss of forest cover in a community is to compare aerial photographs taken over time. Soil surveys are one source of these photographs. If you have two photographs at the same scale, lay a dot grid over each photo and count the percentage of dots that fall on forest cover.

Planting the right tree in the right place is essential to the proper

care of trees. Trees can only provide benefits if they are healthy and live for a long time. Trees should not be planted where they cannot live or will interfere with power lines or buildings. They should not be planted where they cannot survive cold winters or hot summers because they will die and have to be removed. These are examples of trees costing



Photo by Brian Kane, Assistant Professor, University of Massachusetts, Amherst

money, not saving money. [Table 1](#) provides a list of common urban and community trees suitable for hardiness zones 6 and 7 (all of Virginia). The table is meant as a starting point for ideas. Consult websites for additional information, such as pictures of tree form (Peterson and Seiler, 2003) and government nurseries for hard-to-find native tree seedlings (Department of Forestry, 2004).

Pruning is sometimes required for the proper care of trees. In young trees, you prune primarily to promote good tree structure. Older trees may require periodic pruning to clean out dead and dying branches or for other clearly defined reasons. However, a good rule of thumb is never to remove a branch from a tree unless you have a clearly defined reason for doing so. When you prune, properly placed, clean cuts will help the tree recover quickly. A common mistake is to remove a tree limb by cutting it flush with the tree trunk. Take care to cut the branch at its natural removal point, the branch collar. Remove any size tree limb with three cuts to avoid bark stripping from the tree after the final cut (Bedker et al., 1995). Perhaps the worst mistake you can make is to top a tree. This is the practice of severely cutting back

*(Continued on page 6)*

---

## Plight of Beekeeping

The Virginia Department of Agriculture and Consumer Services recently completed a report on "Study of the Plight of Virginia's Beekeepers". In response to the recommendations in the report the General Assembly appropriated \$250,000 for developing integrated pest management programs, queen production, Africanized honey bee response, and pollination promotion in the Commonwealth of Virginia. The programs will be overseen by the Virginia Cooperative Extension Service. The VSBA appreciates the efforts of Senator Harry Blevins (Virginia Beach), Senator John Chichester (Fredericksburg), and their staff for their support and diligence in successfully moving the funding bill through the Senate and House of Delegates. VSBA is also thankful to the many beekeepers that sent letters, made phone calls, and emailed their representatives in the General Assembly in support of the programs. Your efforts were instrumental in obtaining appropriation of these funds.



## Master Beekeeping Program – Sweet as Honey

By Ashley Estes

As the interest in local foods grows, so does interest in beekeeping. Richard Fell, professor of entomology, is helping to develop a group of well-educated, well-trained people who can serve as resources for beekeepers. The Master Beekeeper Program at Virginia Tech provides field experience and guidance to volunteers who will assist beekeepers across the state.

Anyone interested in beekeeping in Virginia may participate in the three-tiered training program by contacting their local Virginia Cooperative Extension office. Participants first become Qualified Level Beekeepers, then Certified Level Beekeepers, and finally, Master Level Beekeepers.

“It’s a certification program designed to do a couple of things. First, provide an education for beekeepers. Next, lessen public concerns about people keeping bees. Also, we want to develop well-trained beekeepers who can mentor other beekeepers,” explains Fell, who is also an Extension bee specialist. “But we really want to give our beekeepers a sense of satisfaction.”

Prior to advancing to the next level, beekeepers must pass written and practical exams and demonstrate an advanced knowledge of beekeeping practice. Currently, Fell oversees about 60 people in the course’s first module. According to Fell, the program could take years to complete due to the extensive experience and the ability to manage a minimum of 15 hives that are required for the master level. Beekeepers managing 15 hives can produce up to 1,200 pounds of honey per year.

Since 2007, there has been a mysterious decline in honeybee colonies across the United States, which has sparked a renewed interest in the practice of beekeeping. Apiarists are blaming the honeybee disappearance on a number of factors, one of which is called colony collapse disorder. Other causes credited for colony disappearance are parasitic mites, newly introduced bee diseases, poor environmental conditions, the use of pesticides, and poor management practices.

“We look at bee colonies and analyze them to find what problems are associated with their death,” explains Fell. “We cannot point to a specific cause, and feel that it could be a number of possible stress factors that are causing the bees to disappear.”

Fell notes that despite a recent surge in colony loss, honeybees are known to be quite resilient and to pollinate nearly one-third of the produce humans consume every day, such as apples, almonds, watermelons, cucumbers, and cantaloupes.

In addition to providing personal assistance to inquiries about honeybees, beekeepers in Fell’s program interact with local Extension offices to distribute information on managing honeybee hives and controlling social insects. Also, annual beekeeping short courses are held around the state on a variety of topics, including management, disease control, and queen rearing.



## It's Hot and Dry - Don't Set Virginia on Fire

Extreme Temperatures, Lack of Rain Concern Virginia Forestry Officials - [Governor McDonnell Warns Virginians of Increased Fire Danger](#)

Many areas of the state prohibit open burning >> take me to [the list of local burn restrictions](#).

If you must burn, practice safety by following these points:

- Before burning - call your local fire department or sheriff's office to confirm whether or not you can burn.
- Stay with any fire at all times.
- Have a fully-charged hose, a rake, wet towels and a bucket

of water with you when burning.

- Avoid driving or parking your vehicle in dry or tall grass. This material can come into contact with your hot exhaust system and create a fire.
- Properly maintain all farm and other outdoor equipment.

Even a small spark can start a devastating fire. Pay attention when welding; using farm equipment; towing trailers or vehicles or doing any activity that can cause sparks.



## *Urban Water-Quality Management: Wildlife in the Home Pond Garden*

Small home pond gardens support aquatic plants and also attract a variety of wildlife. Turtles, frogs, birds, snakes, lizards, and raccoons as well as many other animals may use these ponds. Most wildlife needs water to survive and will seek out ponds for drinking, bathing, habitat, and in some cases, reproduction.

Wildlife in and around the home pond garden can make the area interesting. However, an overabundance of wildlife can become a burden on the pond ecosystem. In some cases, controls may be necessary to reduce the adverse impact of wildlife.

### *Fish*

Fish are a wonderful addition to the home pond garden. They eat mosquito larvae, water beetles, and other insect pests. Fish, especially colorful koi and goldfish, are extremely vulnerable to predators and need places to hide. If the pond is located where fish could escape into natural bodies of water, then the fish placed in the home pond should only be native to the area to avoid the introduction of exotic or invasive species.

Fish can cause problems in the home pond garden. In addition to providing natural insect control, fish will eat the eggs and larvae of frogs, snails, and other amphibians. Under the right conditions fish will breed readily and may overwhelm the pond ecosystem promoting algal blooms and declining water quality. A high fish population may also stimulate greater plant damage in the home pond by uprooting the plants or eating the foliage.

### *Birds*

Some bird species can cause problems in the home pond garden. Kingfishers, herons, and egrets eat fish and amphibians from the pond, which is why providing adequate hiding places is important. Ducks, geese, and other birds can also foul the water and adjacent landscape areas.

During the breeding seasons, geese and other waterfowl may become aggressive and threaten or attack people and pets. Discourage birds from resting or nesting in an area by not feeding them and blocking access to the pond. This can be done by raising the height of the plants along the shoreline and making the shoreline of the pond steeper. Loud noises and random or motion-sensitive high-pressure water sprays can also discourage birds from becoming permanent visitors. Nets and fencing will also deter birds from the home pond garden.

Other birds, especially songbirds, frequently visit home pond gardens. They eat insects and small frogs, drink, and bathe at the pond. Birds near the home pond garden may also attract predators such as snakes, raccoons, and cats.

If the design of the pond does not allow easy access to the water for drinking or bathing, birds may fall into the water and drown. Be cautious when using netting as birds can become tangled. To avoid both of these problems create a separate area such as a birdbath to supply drinking and bathing water.

Whenever birds are present at a site, predatory birds such as hawks and falcons may also be attracted to the site.

### *Insects and Other Invertebrates*

Mosquitoes lay their eggs in warm, still water. An adult female needs a blood meal to complete her life cycle and lay eggs. Often that blood meal comes from a human or other mammal. Fish, tadpoles, and dragonflies (both the adults and the young called naiads) in the home pond feed on mosquito larvae. Adding an aerating fountain will reduce the mosquito population by keeping the water moving. Biological treatments (various forms of the bacteria *Bacillus thuringiensis* or Bt) to prevent the mosquito larvae from developing into adults are available, but should only be used according to the label directions so as to not harm fish and other wildlife in the home pond.

Dragonfly and Damselfly naiads are aquatic predators that feed on insects, tadpoles, and even small fish. Larger fish feed on naiads. Bullfrogs and insect-feeding birds also eat the adult forms of these insects.

Insect pests of pond plants may become problematic when aquatic plants are added to the home pond garden. Insect Pests of Water Garden Plants, Virginia Cooperative Extension publication 426-040, describes these pests, the damage they cause, and control methods. Other insect pest populations, such as diving beetles and water bugs, frequently are controlled by predators such as larger fish and frogs.

Snails primarily feed on algae. There are some species that devour pond plants. Japanese black and trapdoor snails are less likely to feed on pond plants.

Crayfish can be problematic because they are scavengers and will eat pond plants. Discourage them by reducing hiding sites such as soft, damp soil, and rock piles.

### *Pets*

House cats may upturn pots or catch fish, frogs, and birds from the home pond. Keeping them indoors is the easiest solution. Motion-sensitive sprinklers or speakers, and repellent

*(Continued on page 5)*

*(Continued from page 4)*

sprays will deter them from the pond. Weighting containers with gravel or stones can help anchor them. Adding netting over the pond will prevent cats from accessing the pond.

Dogs may dig, swim, splash and upturn pots or catch fish, frogs, or birds at or in the home pond. They can also puncture the liner with their toenails. Keeping them indoors and monitoring their behavior around the pond when outdoors are the easiest solutions. Other options include motion-sensitive sprinklers or speakers, repellent sprays, or adding fencing (structural or electric) around the pond to prevent access. These methods also work for potbellied pigs and other domestic pets.

### *Wild Mammals*

Deer will eat water lily leaves and buds as well as many other pond and garden plants. In addition, their hooves can easily puncture pond liners. Fencing (structural and/or electric), repellent sprays (hot pepper wax, soap, predator urines, human hair, etc.), motion-sensitive lights, sprinklers, and audio speakers may keep deer from the pond.

Opossums will eat small animals, insects, carrion, birds, eggs, and plants from the pond. They may be vectors of transmittable diseases, including: rabies (rarely), tuberculosis, herpes, tularemia, salmonella, and leptospirosis, and/or disperse parasites such as fleas, ticks, mites, and lice. To deter opossums, eliminate tree cavities and brush piles. Close off areas under decks and houses, and lock up or securely close trashcans, compost bins, and sheds. Fencing, repellent sprays, motion sensors, and dog or human activity may also deter them.

Raccoons are attracted to pond gardens and eat small animals, wild birds, fruits, carrion, poultry, eggs, nuts, mollusks, insects, grubs, vegetables, and fish. They can become aggressive and are the primary vector species for rabies in Virginia. Remove or close off tree hollows, drain pipes, brush piles, and abandoned burrows. Lock up compost piles, sheds, basement/crawl spaces, garages, pet foods, and trash. Suspend netting over ponds, limb up trees and/or put 5-foot-high metal sheeting around tree bases, and increase human activity to deter raccoons. Fencing and repellents do not work and auditory/visual stimuli have limited effectiveness. Trapping may be an alternative, but check with local game wardens first. Skunks may come to ponds to eat small animals, insects, fruits, eggs, grubs, and vegetation.

Skunks are undesirable because of their very smelly defensive spray, plus they may carry rabies as well as other diseases. Grub control and blood meal may help to keep skunks from visiting the pond and flowerbeds. Remove or close up fallen tree hollows, abandoned burrows, and crawl spaces. Call animal control or a professional exterminator to trap them.

### *Reptiles and Amphibians*

Lizards/skinks are harmless and help eat insects around ponds.

Eliminating debris and limbing up shrubs/trees will deter their presence.

Snakes eat fish, tadpoles, worms, slugs, frogs, crayfish, toads, rats, voles, moles, birds, and other snakes. They also frighten people and some are poisonous. Eliminate shady areas, firewood piles, tall grass, and brush and rock piles and block holes to discourage snakes from the home pond. Repellents are not effective.

Turtles eat fish, birds, and vegetation. Snapping turtles can injure humans, ducks, or pets and puncture liners. To reduce their visitation, keep the pond small and site it in an area without loose soils or mulch where turtles may easily lay eggs.

Salamanders lay eggs in moist areas and occasionally in ponds. The carnivorous young will eat insects and small fish. Eliminate logs and rocks that adults tend to hide under and keep ponds steeply sloped and open to discourage their presence.

Frogs and toads as tadpoles are good scavengers and food for fish and dragonfly larvae. Adult frogs control mosquitoes and other insects. Bullfrogs eat fish, small rodents, and birds. Frogs can be noisy at times. To keep the population under control, make ponds shallow and open so that predators can have easy access to them.

Similar to frogs, toads lay their eggs in ponds and spend part of their life cycle as tadpoles. Toads do not cause warts, but can make dogs ill if they eat or mouth toads. To reduce the toad population, eliminate shady areas adjacent to the pond.

### *Conclusion*

Whether wild or domestic, big or small, creatures will be attracted to home ponds. All living things need food, shelter, water, and space to live. Removing one or more of these elements will help deter unwanted organisms.

In general, to deter undesirable wildlife:

- Increase the lawn/open area and keep the grass mowed short.
- Decrease plant diversity – monoculture.
- Eliminate brush, leaf, and debris piles.
- Eliminate open water.
- Build the pond with steep sides.
- Do not provide feeders or other food sources.
- Increase human and dog activity.

For quick reference on the pest, possible impacts to the home pond garden, and pest control options refer to [Table 1](#).

*Lynnette Swanson, Extension Agent, City of Norfolk; Mike Andruczyk, Extension Agent, City of Chesapeake; Laurie Fox, Horticulture Associate, Hampton Roads AREC; Susan French, Extension Agent, Virginia Beach.*

(Continued from page 2)

branches and the main stem so that only stubs remain. Topping destroys a tree's natural beauty and makes it dangerous by allow-



Photo by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida

ing decay fungi to invade the branches and make them hollow. Although strong limb growth may occur after topping, these branches are only weakly attached to

the outer layers of wood and are likely to fail in storms.

Mulch rings should be three to four inches deep, and as wide as possible around the tree. Remember not to put mulch right up against the trunk.

Many people forget to protect the roots of trees in an urban area. In a natural forest situation, the forest floor is usually left undisturbed in the area beneath a tree. This often is not the case in the urban/community setting, where tree roots are restricted by pavement and building foundations. In 2003, Hurricane Isabel up-rooted many trees because their root systems had been compromised by sidewalks, curbs, and streets. A good management practice is to mulch the area beneath and extending about three feet beyond the canopy (see the pictures below).

Soil compaction is a problem in every community. It occurs when vehicles, particularly those involved with construction and maintenance, drive across moist soil, but it can even occur where there is heavy foot traffic. Natural, undisturbed soils have many pore spaces that are important reservoirs of gasses, such as oxygen, and moisture that roots need to live. Pore spaces also serve as passageways for water to percolate through the soil profile. When compaction occurs, these pore spaces collapse. Existing roots find it difficult to obtain oxygen, nutrients, and moisture, and the resultant dense soil is difficult for new roots to penetrate. Consequently the tree makes very slow growth and can die back from the branch tips. These trees can die during drought because of their limited root systems. On older trees, severe soil compaction can precipitate decline and eventually lead to tree death.

Urban and community forests have great potential for providing wildlife habitat. An important decision is whether to retain or remove dead and hollow trees, which are used by cavity-nesting birds, squirrels, and other animals. Unlike natural forests, the retention of dead and hollow trees in urban/community areas must be balanced against the safety hazards posed to humans from falling branches or trees that blow over in storms. There are many urban and community areas where this hazard is low, and dead and hollow trees may be retained. Another wildlife habitat issue is the need to provide food and cover. Evergreens provide

valuable winter cover. Nut- and berry-producing trees are particularly valuable food trees. (Martin et al. 1951).

Native tree species are often preferred over non-native's where you are planting trees to achieve greater canopy cover. It is important to remember, however, that the tree must be an appropriate choice for the location. For example, if air pollution is common in the area, it is better to plant a nonnative tree that tolerates pollution than a native tree that does not. Never plant an exotic species that is known to be invasive. An invasive plant list for Virginia is available from the Department of Conservation and Recreation. (DCR, 2003).

Flooding and storm-water retention are growing issues in urban areas. Tree canopies intercept rainfall, reducing and postponing the amount and time that water is received into a stream or river. Tree roots help to create pore spaces that provide reservoirs for still more water, and provide pathways for rainwater to be absorbed into the soil profile. Loss of tree-canopy cover and soil compaction are two conditions that contribute to flooding in urban and community areas.

The effect of air pollution on tree health is very difficult to quantify. Like many environmental conditions, it is almost impossible to directly link tree death to air pollution. Usually environmental conditions contribute to overall poor health, and may contribute to tree death in the face of other disturbances, such as insect or disease attack or drought.

Table 1. Common trees suitable for planting in Virginia (hardiness zones 6 and 7) by size class (Peterson and Seiler, 2003). For hard-to-get species consult on-line sources for local tree nurseries.

### *Less than 30 feet tall*

- Acer buergeranum - trident maple\*
- Acer griseum - paperbark maple\*
- Acer palmatum - Japanese maple\*
- Amelanchier arborea - downy serviceberry
- Asimina triloba - pawpaw
- Carpinus caroliniana - hornbeam
- Cercis canadensis - eastern redbud
- Chionanthus virginicus - fringetree
- Cornus florida - flowering dogwood
- Cornus kousa - kousa dogwood\*
- Hamamelis virginiana - witch-hazel
- Ilex x attenuata - Foster's holly\*
- Koelreuteria paniculata - goldenrain tree\*
- Magnolia stellata - star magnolia\*
- Magnolia x soulangiana - saucer magnolia\*
- Magnolia virginiana - sweetbay magnolia
- Malus spp. - crabapple\* (disease resistant varieties only)
- Pinus thunbergiana - Japanese black pine\*
- Prunus americana - American plum
- Prunus cerasifera - purple leaf plum\*
- Prunus serrulata - Kwanzan cherry\*

(Continued on page 7)

# Creating a Water-Wise Landscape

## *What is Water-Wise Landscaping?*

Water-wise landscape design and management focus on working with nature and natural forces (such as rainfall) to create an aesthetically pleasing, livable landscape, while using less water from the local supply.

Minimizing the need for watering in your landscape requires careful observation, planning, and common sense. Several principles for water-wise landscaping include choosing the best design and plants, preparing soils, and watering properly for efficient water use.

Water-wise landscaping is also known as xeriscaping, a word trademarked by the National Xeriscape Council. The word is a combination of the prefix xero- or xer- meaning dry or dryness and the suffix -scape meaning scene or view.

## *Plan Your Landscape*

The first step in any successful landscape is a good plan. Observe

*(Continued on page 8)*

*(Continued from page 6)*

Prunus subhirtella "pendula" - Weeping higan cherry\*  
Prunus x yedoensis - Yoshino cherry\*  
Salix discolor - pussy willow

## *Between 30 and 50 feet tall*

Acer negundo - boxelder  
Betula nigra - river birch  
Castanea mollissima - Chinese chestnut\*  
Diospyros virginiana - persimmon  
Ilex opaca - American holly  
Juniperus virginiana - eastern red cedar  
Maclura pomifera - osage-orange\*  
Morus rubra - red mulberry  
Nyssa sylvatica - blackgum  
Ostrya virginiana - hophornbeam  
Oxydendrum arboreum - sourwood  
Picea pungens - blue spruce\*  
Pinus virginiana - Virginia pine  
Pyrus calleryana - callery pear\*  
Quercus acutissima - sawtooth oak\*  
Salix babylonica - weeping willow\*  
Salix nigra - black willow  
Sassafras albidum - sassafras  
Thuja occidentalis - northern white-cedar  
Tilia cordata - littleleaf linden\*  
Ulmus parvifolia - Chinese elm\*  
x Cupressocyparis leylandii - Leyland cypress\*  
Zelkova serrata - Japanese zelkova\*

## *Over 50 feet tall*

Acer rubrum - red maple  
Acer saccharinum - silver maple  
Acer saccharum - sugar maple

Carya glabra - pignut hickory  
Carya illinoensis - pecan  
Catalpa speciosa - northern catalpa  
Celtis occidentalis - hackberry  
Fagus grandifolia - American beech  
Fraxinus americana - white ash  
Fraxinus pennsylvanica - green ash  
Ginkgo biloba - ginkgo\*  
Gleditsia triacanthos - honeylocust  
Juglans nigra - walnut  
Liquidambar styraciflua - sweetgum  
Liriodendron tulipifera - yellow-poplar  
Magnolia grandiflora - southern magnolia  
Picea abies - Norway spruce\*  
Pinus echinata - shortleaf pine  
Pinus strobus - eastern white pine  
Pinus taeda - loblolly pine  
Platanus occidentalis - American sycamore  
Platanus Xacerifolia - London plane tree\*  
Populus deltoides - cottonwood  
Prunus serotina - black cherry  
Quercus alba - white oak  
Quercus bicolor - swamp white oak  
Quercus coccinea - scarlet oak  
Quercus nigra - water oak  
Quercus palustris - pin oak  
Quercus phellos - willow oak  
Quercus prinus - chestnut oak  
Quercus rubra - northern red oak  
Quercus velutina - black oak  
Robinia pseudoacacia - black locust  
Taxodium distichum - baldcypress  
Tilia americana - American basswood  
Ulmus americana - American elm (disease resistant varieties only)  
\* not native to Virginia

*Jeff Kirwan, Extension Forestry Specialist, Virginia Tech and Brian Kane, Assistant Professor, University of Massachusetts, Amherst*

the site and take notes on the current use of different areas or their desired use. Indicate high-use areas, desirable views, environmental concerns (such as wind direction, slopes, dense shade), and traffic flow through the yard. Sketch the property, including any permanent structures, trees, and shrubs that you plan to leave, grass areas, driveways, and sidewalks.

Based on your notes, develop a plan that meets your needs for use, appearance, and budget. Consider maintenance and water requirements in making your decisions. For example, maintaining a high-quality lawn area for entertaining will require frequent fertilizing and mowing, as well as high water use. A more maintenance-free choice for get-togethers is a deck or patio, but don't overdo the use of wood or concrete on your land. Leave plenty of vegetative surface for rain to reach the soil and soak in; otherwise, runoff and erosion problems are created. Whatever plan you develop, the cost can be distributed over a period of time if you implement your design over several years.

### *Prepare Soil Adequately*



Good soil is the basis for healthy plants and optimum use of water. The key to good soil is the addition of organic matter, such as compost. Sandy soil will

hold water and nutrients better if organic matter is incorporated. Clay will absorb water faster, reducing runoff and erosion, if it is loosened with organic matter. Incorporate approximately 2 to 3 inches of compost, shredded leaves, or other fine organic material into the soil annually.

In locations with established trees and shrubs, it is difficult to incorporate organic matter, but applying and maintaining a 2- to 3-inch layer of an organic mulch (coarse leaves, shredded bark, pine needles, or wood chips) will gradually improve the soil as the humic acid formed by the decomposing material leaches into the ground.

### *Select Plants Wisely*

Decide on the trees, shrubs, and ground covers for your water-wise landscape based on their natural ability to grow well in your area. Select plants that do well with little or no addition of water. Consider native plants as well as introduced species for residential landscapes. Your local Extension agent and nursery personnel can help you identify suitable plants for your location. Limit plants with high water demands to small areas that can be watered efficiently. Grouping plants by water requirements is one way to guard against overwatering some plants and under-watering others.

In general, ground covers require less water than turfgrass, so replacing some of your lawn with a ground cover will conserve water. If you have large deciduous trees in your yard and want to reduce work and water, go natural - allow leaves to accumulate as they would in nature. Plant a few understory shrubs (such as azaleas and rhododendrons), a few understory trees (such as dogwood), and quit raking!

### *Mulch Your Gardens*

Use mulch to conserve soil moisture. Organic mulches help retain moisture so there is less need to water. They also recycle plant materials that might otherwise end up in the landfill. In addition, mulches control annual weeds that compete with desired plants for water. Organic mulches improve soil structure as they decompose and moderate the soil temperature, two factors that also help plants use water efficiently.

### *Use Optimum Cultural Practices*

Proper mowing and fertilizing of the lawn help conserve moisture. Mowing at the proper height (do not remove more than one third of the grass at any one mowing) allows the grass to develop deeper roots that are more efficient in using soil moisture, and reduces annual weeds. Fertilizing at the proper time (your Extension agent or local nursery experts can help you determine this) encourages healthier turf that needs less watering.



Leaving shrubs in their natural forms reduces stress to the plants and, therefore, lessens their need for water.

Keeping weeds, insects, and diseases under control reduces the competition and stress to plants that increase their water demands.

These principles minimize the water demands in your landscape, help you save money and time, and reduce your impact on the local water supply.

### *Use Turfgrass Appropriately*

Limit the amount of turfgrass you use in the landscape to areas in which grass provides a functional benefit (i.e., a play area for

*(Continued on page 9)*

(Continued from page 8)

children) that exceeds the benefit of other ground covers or surfacing materials. Select turfgrass suitable to your climate and site.

Design the grass area to make watering easier. Long narrow areas and small, odd shapes are hard to water efficiently. Avoid turf in the strip between the sidewalk and the road; most irrigation water will land on the paved surfaces and run off.

### *Use the Best Watering Method*

While soils vary greatly in their ability to hold water, your garden and lawn should receive enough water to wet the soil to the bottom of the root zone each time you water - generally 1 inch per week. Determine this by digging a hole 5 to 6 inches deep in the watered area the day after watering so the water has a chance to seep in. Adjust weekly watering to your soil needs.

**Avoid watering by hand** - it often wastes water as there is excess runoff, and water does not penetrate beyond the top 1 inch of soil. This irrigation practice harms plants by forcing root growth too close to the surface. If you must water by hand, place a 5-gallon bucket with a few holes in the bottom next to the plant and fill it with water; when it is drained, move it to the next plant and refill.

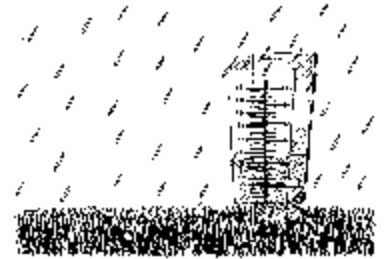
**Properly used sprinkler systems** can deliver a large quantity of water in a short time. They have the disadvantage, however, of excessive evaporation, both during watering and from the plant and soil surface. Early morning watering minimizes water loss. However, sprinkler systems that deliver the water from overhead are the most effective means of watering turfgrass. Be sure to position sprinklers to shower areas of vegetation, not driveways, streets, or patios. Water until the soil is moist 6 inches deep, usually 1 inch per week applied at one time.



**Trickle or drip irrigation systems and ooze hoses** are very efficient, slowly applying water to vegetable and ornamental gardens. Soil moisture can be maintained at a level most suitable to plant uptake. If properly installed and maintained, little water is lost to evaporation or runoff and water use can be reduced by up to 50 percent. For many situations, the expense of installing a good trickle irrigation system will be compensated by reduced water usage, less replacement of plant materials, and less work. On any irrigation system, replace leaky parts promptly.

### *Measure the Quantity of Water*

To measure the amount of water - whether from a sprinkler or rain - use a rain gauge or a tin can set in the lawn or garden areas to be measured. The soil has received an inch of water when the water in the container is an inch deep.



For more information on selection, planting, cultural practices, and environmental quality, contact your local Virginia Cooperative Extension Office. If you want to learn more about horticulture through training and volunteer work, ask your Extension agent about becoming an Extension Master Gardener. For monthly gardening information, subscribe to The Virginia Gardener Newsletter by sending your name and address and a check for \$5.00 made out to "Treasurer, Va. Tech" to The Virginia Gardener, Department of Horticulture, Virginia Tech, Blacksburg, VA 24061-0349. Horticultural information is also now available on the Internet by connecting with Virginia Cooperative Extension's server at <http://www.ext.vt.edu>.

The original development of this series was funded by ESUSDA Smith Lever 3(d) National Water Quality Initiative Funds and the Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

Revised by Joyce Latimer, Extension Specialist, Virginia Tech

Reviewed by Alex Niemiera, Extension Specialist, Horticulture