Functions of Trees

Aesthetics. Trees are creatures of beauty and grandeur. They offer beauty in each season with their form, bark, foliage, flowers, fruit, and sometimes fragrance. In addition to their seasonal variations, they change in size and character over time. Some trees will become quite large and are magnificent just for their size, irrespective of their species.

Shade and Wind Break. The shade of trees, placed on the south side of a house, can significantly cool a house in the summer with estimates of 30 percent lower air-conditioning bills compared to an unshaded house. In the summer, the temperature under a tree can be 9°F lower than an adjacent area and up to 25°F lower than air above nearby blacktop. We intuitively know the value of tree shade when we search for the shade of a tree in the desert-like expanse of an asphalt parking lot. Evergreen trees (broad leaved or conifers) placed on the northwest side of a house to act as a windbreak can save up to 20 percent on winter heating costs.

Architectural Elements. Trees serve as the structure of a landscape and form the walls and ceilings that create outdoor spaces. They can be used to frame a view, serve as a focal point, form boundaries, act as a privacy screen, or create outdoor rooms. A particularly elegant example of an architectural space created by trees is that formed by a double row (allée) of vase-shaped trees (e.g., American elm, American yellowwood). The meeting of the arching branches between the rows creates a space like that beneath a cathedral ceiling.

Noise Abatement and Pollution Reduction. Trees reduce noise levels, trap particulates, and absorb carbon dioxide and gaseous pollutants. One hundred trees can remove five tons of carbon dioxide and 1,000 pounds of particulates and gaseous pollutants in a year.

Erosion Prevention and Runoff Reduction. Tree canopies reduce the impact of raindrops on the soil and the network of tree roots helps keep soil in place.

Property Value. Research has shown that an attractive landscape can increase the value of a home by 5 percent to 11 percent (Behe et al., 2005).

Wildlife Habitat. Trees serve as a shelter, nesting site, food, perch, and residence for many birds, mammals, and insects.

Social and Emotional Value. Trees serve as a link to nature, give a sense of well-being, and are often the site of social events such as picnics. Of course, children are tantalized by the sight of a good climbing tree and a rope swing.

Tree Placement and Maintenance

In view of all the benefits of trees extolled in the previous section, improperly placed trees may cause harm to you and your home. Thus, the location of trees in a landscape is a very important consideration. Also, trees inevitably generate maintenance tasks.
You must first determine the mature height and spread of the tree you wish to plant to make sure that the tree you choose will fit its designated location. In addition to using the plant tag as an information source, consult gardening books and garden center personnel for plant sizes in your area. Unless you plan to regularly control the tree’s height and spread, the distance of a tree from the house should be somewhat greater than the mature spread and height of the tree. This avoids your house being hit in the event the tree falls toward your house. The same recommendation can be made for the area in which you park your car. In addition to the falling hazard, trees that are too close to a house may result in 1) branches hitting roof, gutters, and utility lines and boxes; 2) moisture problems; 3) roots impacting foundations; 4) leaves clogging gutters; and 5) branch, leaf, and fruit/seed litter on entryways and paths. From an economic standpoint, remediation of these problems is costly. Pruning trees that are close to a house is relatively expensive due to the extra time involved in safely removing limbs. Additionally, trees that require drastic pruning to keep them in bounds are often stressed due to excessive limb removal.

One must consider the environmental aspects of your site. For example, is your site mostly sunny or mostly shady? Is the soil in the site generally moist, average, or dry? Do you have good topsoil or poorly drained clay? Is the soil acid or alkaline (determined by a soil test)? Is the site particularly windy? What plant hardiness zone are you in? Once you have answered these questions, you can select a tree species that is suited to your site and accomplishes the desired functions.

If your landscape is in need of many trees, avoid using only one or two species. Too few tree species is akin to putting all your eggs in one basket. If there is a pest problem or any other potential deleterious factor, then the chance for a significant portion of the tree population being affected is great.

All trees drop leaves, fruit/seeds, and branches. Some trees are especially messy; the southern magnolia (Magnolia grandiflora) drops large leafy leaves throughout the year, and sweet gum (Liquidambar styraciflua) drops hundreds of spiky seed globes over an extended period of time.

All trees require pruning. This is especially important when trees are young to develop a proper scaffold branch structure. Most homeowners can prune a tree when it is young. However, when a tree grows to dimensions that require a ladder or climbing, you should hire a certified arborist to do the work. In advance of buying a tree, find out if it is prone to limb breakage that is inherent to the species or from wind and ice damage.

Some trees have characteristic pest problems that require pesticide treatment. Examples of trees that require such treatment are Canadian hemlock’s (Tsuga canadensis) problem with wooly adelgid, and thornless common honey locust’s (Gleditsia triacanthos var. inermis) problem with webworm. In the case of thornless honey locust, there are cultivars that are less prone to webworm. Thus, in advance of buying a tree, find out if your selected tree species has any significant pest problems.

**Container-grown vs. B&B**

Most trees offered by garden centers will be come in two forms 1) container-grown or 2) ball and burlap (B&B). Which form should you choose? This decision depends on a few important considerations.

**Availability.** Your garden center(s) may only sell one of these two forms. B&B plants are becoming less available at garden centers due to weight and transportation issues. B&B plants have a significant portion of their roots cut off during the harvesting procedure. Thus, B&B transplants will resume their characteristic growth rate in about three years. In contrast, container-grown plants have their root system intact and transplants will grow at their characteristic growth rate soon after transplanting, provided they have ample irrigation. The choice between B&B and container-grown plants will also depend on your capacity to irrigate the tree (see Irrigation).

**Plant Size and Weight.** There are a wide variety of plant sizes for sale, ranging from a seedling to a large tree. Of course, as the plant size increases so does the degree of difficulty in transporting and transplanting. As mentioned, B&B plants are less available these days at garden centers since the average customer cannot handle a medium-sized tree. For example, a B&B tree with a one-half-inch caliper (diameter at 6 inches above ground level) will have a 12-inch diameter ball and weigh about 50 pounds. A 2-inch caliper tree with a 24-inch diameter ball will weigh about 300 pounds. The average customer would have to pay the garden center or a landscape contracting company to transport and plant such a tree. In contrast, a container-grown 2-inch caliper tree would be about one-fourth of that weight.
**Irrigation.** The choice of plant (container-grown or B&B) will dictate on how often you should irrigate a plant. Container-grown plants have a one- to two-day water supply in the potting soil. B&B plants will have about a one-week water supply because of the much greater water-holding capacity of a mineral soil compared to a potting soil. Thus, container-grown plants will have to be irrigated a few times a week in the heat of the summer. Irrigation frequency will depend on the type of plant and site aspects (e.g., sunny, windy, shady). A fast-growing plant that has a lot of leaves will lose water more quickly than a slow-growing plant in a shady location. Thus, if you cannot irrigate frequently, you are better off buying a B&B tree. You can avoid frequent summer irrigation if you plant in the fall and take advantage of the root growth that occurs in the fall and the following spring. If you plant an evergreen tree (e.g., hollies, conifers), then you will have to irrigate in the relatively warm and dry periods of the fall and winter.

**Growth Rate.** Providing you supply ample water and nutrients, a transplanted container-grown plant will grow at a rate typical of its species, whereas a B&B plant will not. This is because a container-grown plant has its entire root system intact and a B&B plant had the majority of its roots cut off when it was dug. A B&B plant will take about three years to recover from the radical root severance and regain a growth rate typical of that species.

For very heavy clay or compacted soils, the root ball may be one third above the soil surface.

**Time of Year.** A container-grown plant may be transplanted at most times of the year, except when the ground is frozen. Irrigation issues come into play at certain times of the year (see Irrigation above). B&B plants are typically harvested in the early spring and fall when mostly dormant. They can be held for a period of time before planting but one must ensure that they are adequately irrigated during the holding period.

**Planting**

Since wet soils can reduce plant growth and survival, you should plant in a well-drained soil. To test for soil drainage, dig the hole for your new plant and fill it with water. If the water doesn't drain in 24 hours, plant elsewhere.

In advance of digging, consult with Miss Utility at www.missutilityofvirginia.com/ or 800/552-7001 to have utility lines located. In digging the planting hole, the width of the hole should be about twice the diameter of the plant's root-ball. The depth of the hole should be equal to the height of the root-ball so that once planted, the top of the roots should be level with the surface of the ground. Remove all tags, wires, or ropes from the stems or trunk. These can girdle and kill the plant as it grows.

For container-grown plants, ease the pot off the root-ball and save it for recycling. Tease out or cut any large circling roots, then place the root-ball in the hole. For B&B trees, place the plant in the hole before removing the burlap covering. Then, slide the burlap down off the top of the root-ball and tuck it in the sides of the hole. Do not attempt to pull the burlap from under the plant – this could damage the root-ball. If a B&B root-ball is enclosed in a wire basket, the basket can be left in place. Cut off the first horizontal round of wire so that the wire does not interfere with mowing, raking or cultivation.

When replacing the soil in the hole, do not add organic matter. Instead, if the original soil, or backfill, contains too much rock or construction debris, replace it with local topsoil. When the hole is about three-fourths refilled, straighten and level the tree, and water to settle soil and remove large air pockets. Then fill the hole with backfill to its original level. Use excess soil to build a berm, or ring, 6 to 10 inches from the outside edge of the hole and irrigate.

**Watering**

Watering during dry periods of the first growing season is crucial, especially with container-grown plants. Regardless of the season when you plant, make sure
that the root-ball does not dry out. This is especially important for plants that are transplanted in the spring. Such plants may not have established roots into the surrounding soil by summer. The potting soil of most container-grown plants have a one- to two-day available water supply; thus, watering two to three times a week in the summer can be expected during periods of no rainfall. B&B plants will only require weekly irrigation since the mineral soil around the roots has a high water-holding capacity. Always check the soil moisture before watering to avoid overwatering, as this can kill the plant. A rule of thumb for irrigating plants is to apply one inch of water per week to the root zone.

Apply about three inches of mulch on the surface of the root-ball. This will reduce the evaporation rate in the root-ball and therefore reduce the frequency of irrigation.

Staking
Most trees do not need staking. Trees that are top heavy (tree canopy acts as a sail in windy conditions) or on a windy exposed site should be staked to anchor their root-balls so roots growing from the root-ball into adjacent soil are not injured when the root-ball moves in response to wind. To stake a tree, drive two or three stakes into firm soil equidistantly around the tree. Connect the stakes to the trunk with flexible straps designed for this use (make sure straps do not injure the bark). Allow for some movement in the tree since tree sway encourages the development of a strong trunk. Remove the stakes after one growing season.

Mulching
Place mulch (pine needles, straw, bark chips, or slightly decomposed or shredded leaves) 2 or 3 inches deep around the plant. Mulch will prevent water loss, reduce weed growth, and keep lawn mowers and string trimmers from getting too close to the plant. Avoid overly deep mulch or piling the mulch up against the stems or trunk; this promotes shallow roots, disease, and pest injury. Since the root zone of a plant increases with time, the mulched area should be increased with time. Roots that grow into turf areas will be fine but will have to compete with grass roots for water and nutrients.

Fertilizing
Most nursery-grown plants, especially container-grown plants, have been well fertilized in production. Many plants may have controlled-release fertilizer (small prills) in the potting soil when you purchase the plant. Thus, they may not need fertilizer at planting unless the soil you are planting into is nutrient deficient. You may determine the nutrient status of your soil by conducting a soil test. Soil test results will indicate what type and amount of fertilizer to apply in the event of a nutrient deficiency. You must remember that fertilizers are salts that may be damaging to plants during dry periods. Using a controlled-release (slow-release) fertilizer instead of a soluble fertilizer reduces the chance of fertilizer damage to roots and is a more efficient fertilization method. In many cases, your soil will provide ample nutrients to trees. In the event your soil is deficient or you wish to increase the growth rate of your plant, apply fertilizer at the recommended rate.

Summary
The key aspects in planning a tree planting are determining 1) the function of the tree, 2) the site conditions, 3) that the tree is suited to site conditions and space, and 4) if you are better served by a container-grown or
a B&B plant. After the tree is planted according to the prescribed steps, you must irrigate as needed and mulch the root zone area. Staking and fertilizing are only necessary in some cases.

Slow-growing species, B&B plants, or trees planted in the fall may have a small amount of root growth from the root-ball into the existing soil. In these cases, trees may require supplemental irrigation in the year following transplanting.

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 a 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 (0349), Virginia Tech, Blacksburg, VA 24061. Horticultural information is available on the Virginia Cooperative Extension website at www.ext.vt.edu.

Literature Cited

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