HANDLING PLANTS IN LANDSCAPE CONTAINERS[1]

by David J. Williams

The growing of trees and shrubs in large landscape containers is increasing in popularity. This is due in part to the lack of suitable planting sites in urban areas and an increased awareness of the environmental importance of plants. As this trend increases, it is essential that it be accompanied by a corresponding increase in the knowledge of how to handle containerized landscape plants.

Soil water content must be properly managed in order to grow and maintain healthy vigorous plants in containers. The soil in containers is characterized by typically small volume and shallow depth. The small volume represents a limited soil water and nutrient reservoir. At the same time, the shallowness often results in soil conditions that are too wet and poorly aerated for plant growth. To manage soil water content, it is essential to understand the relationships between plants, soil, containers and water. Container design, media and plant selection, irrigation and fertilization are factors which can be manipulated to control soil water content in containers.

Container Design

Figure 1 illustrates the relationship between soil depth and water content in containers. The figure depicts what happens when 3 containers, A, B and C, are filled with an identical growing medium and irrigated until container capacity is reached. (Container capacity is the amount of water the growing medium in a container can hold after draining off excess gravitational water.) The test medium contains approximately 50% solid material (black area) and 50% pore space (light area). Upon irrigation, the pore space will contain water, air or a combination of both. A percentage of the pores in the upper portion of container A will drain and be filled with air. A perched water table forms at the point where all of the pores are filled with water. The location of the perched water table depends on the soil depth and porosity. As soil depth decreases as in container B, the pore volume filled with water is a greater proportion of the total pore volume resulting in a wetter condition. As soil depth is decreased further, container C, the entire pore volume is saturated with water. Since shallowness results in wet poorly aerated conditions, it is recommended that as tall a container as possible be used.

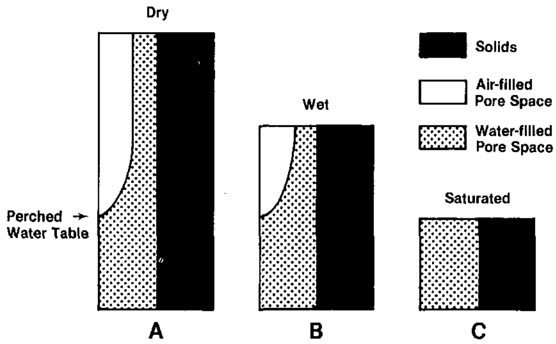

Figure 1. The effect of container and soil depth on soil water content.

Drainage is the single most important factor to be considered in container design. Drainage holes should be provided in the bottom (figure 2) or around the base of containers. Four-inch perforated tiles are sometimes placed along the bottom of the growing medium and run to the medium surface (figure 3). After a heavy rain or irrigation a vacuum pump can be connected to the tile opening at the surface to draw off excess water. When not in use the tile should be capped to prevent clogging.

Large containers and planters found in roof gardens are usually closed vaults (figure 4). Containers of this type require a drain tile connected to the building storm drainage system be placed in their bottoms. Large planters may require the in-

[1] Presented at the annual meeting of the International Society of Arboriculture in Philadelphia, Pennsylvania in August 1977.

stallation of more than one tile.

A figerglass soil separator is often placed between the growing medium and the drainage area at the bottom of the container. This is primarily used to prevent the medium from washing out of the container. The stratified conditions that result from this practice tend to accentuate the problem of a perched water table.

An expansion joint or insulation is another factor to consider in container design. The growing medium in the container will expand and contract with freezing and thawing. A ½" styrofoam lining can be used to help prevent cracking of the container. The styrofoam also acts as an insulator and prevents rapid changes in root zone temperatures which can cause root damage.

Medium Selection

When straight field soil is used as the growing medium in containers there is not sufficient soil depth to allow for drainage through capillary activity. In order to improve drainage, it is necessary to amend the soil. Coarse textured inorganic amendments are recommended to increase pore size and thus improve drainage. Amendments recommended for this purpose include coarse sand, calcine clay, perlite and pumice. Usually organic amendments are also recommended for the completed mixture. They include sphagnum peat moss, leaf mold, bark and well-rotted manure. In most situations, a mixture of 1 part topsoil, 1 part organic matter and 1 part coarse inorganic material will result in a good growing medium.

Fertilization and Irrigation

Container soils are subject to excessive leaching and therefore require that a regular fertilization program be followed.

Mix 5 lbs. of superphosphate (0-20-0) per cubic yard of growing medium at the time of planting. This will provide an adequate amount of phosphorus for 2-3 years. Annually apply a complete fertilizer such as 10-6-4 or 12-12-12. Topdress either of these fertilizers at a rate of .5 lbs.

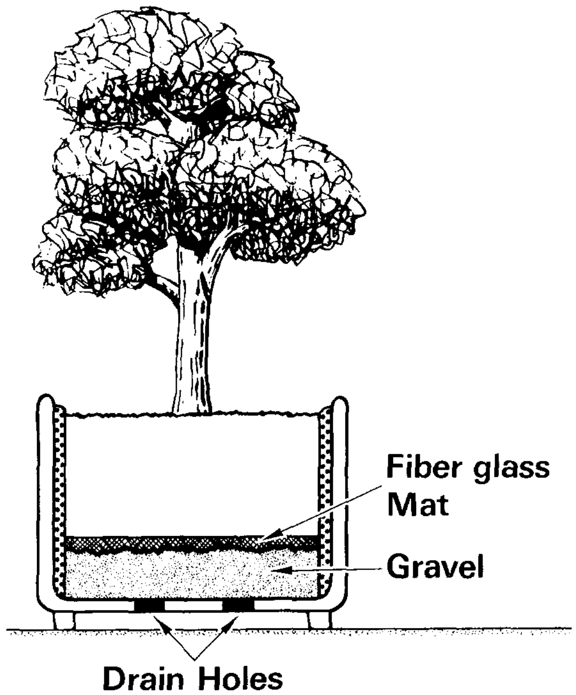

Figure 2. Detail of a container that is raised above surface grade.

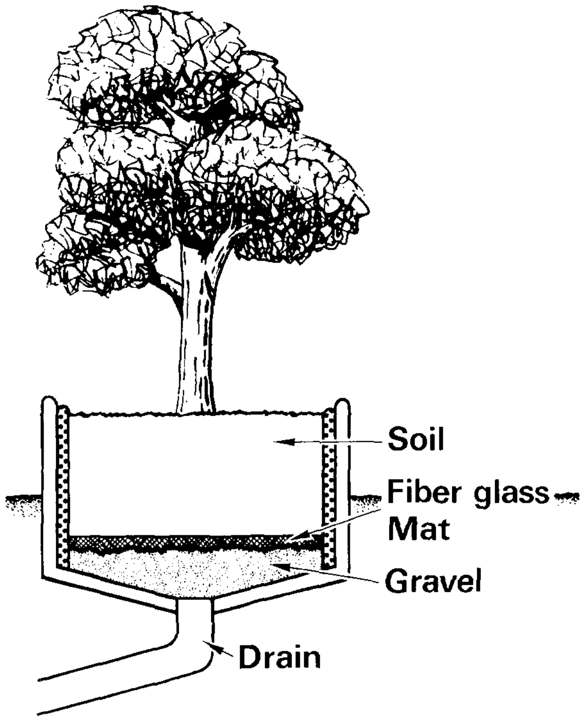

Figure 3. Detail for closed vault containers.

of fertilizer per 10 sq. ft. of container soil surface. Liquid fertilizer can be used but will require more frequent applications due to the ease with which these materials are leached out of the container growing medium.

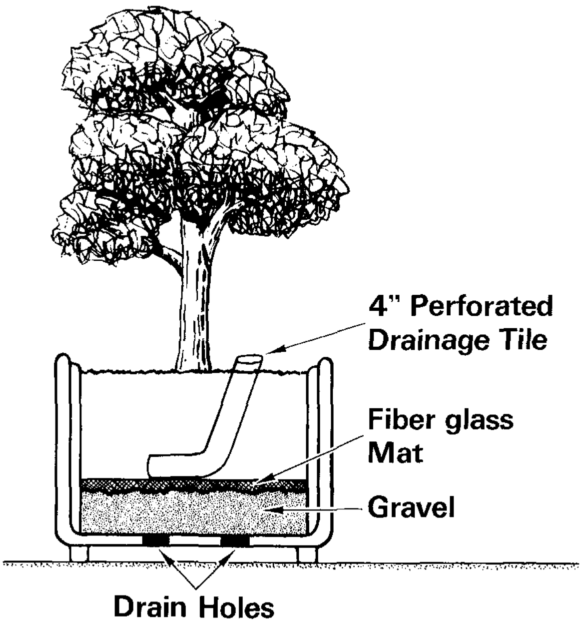

Figure 4. Detail for containers provided with a vacuum drainage system.

Containers should be located near an available water source. The capability to irrigate the plants growing in the containers is a necessity. If a water source is not close by, the containers should be accessible to tank trucks so that water can be carried to them. The ideal situation is to have an irrigation system built into the container.

The frequency of irrigation will depend upon weather conditions, plant material, growing medium and container design.

Plant Selection

The best way to determine what plants will survive and grow in a containerized environment is to observe plants that are growing in containers. For approximately 15 years plantings of canoe birch, tea crabapple, Washington hawthorn, scotch pine, white pine, staghorn sumac and witch hazel have survived and prospered in raised containers at the Krannert Center for the Performing Arts on the University of Illinois campus.

A quick look at a nursery catalog will show that arborvitae, euonymus, forsythia, juniper, mugo pine, potentilla and pyracantha are just a few of many plants which nurserymen are successfully growing in containers. The availability of a given species as a container-grown plant can serve as a guideline for determining if that plant can survive in a containerized landscape situation.

In summary, it should be noted that the culture of landscape plants in containers is much more complicated and exacting than that of landscape plants in ground beds. The soil in a ground bed acts as a tremendous buffer against environmental extremes. This buffering capacity is greatly reduced in containerized conditions.

Department of Horticulture,
University of Illinois,
Urbana, Illinois

ABSTRACT

Anonymous. 1977. **How to control tree diseases and pests: honeylocusts.** Grounds Maintenance 12(9): 32-34, 36, 40-41.

Symptom descriptions and control measures are described for the following insects and pests: bagworm, cottony maple scale, mimosa webworm, honeylocust mite, plant bug, and leafhopper, and the following diseases: witch's-broom, canker and dieback of twigs, branches and trunks, leaf spots, tar spot, shot hole, anthracnose, and Armillaria or Clitacybe root rot.