centimeters would have drained from this depth of the container medium after irrigation. Water held in pores inside a particle may be held at greater tensions or not be in contact with water in or between adjacent particles and not directly affected by the gravitational pull exerted by the continuum of water from the base of the container or from the top of the saturated medium.

Therefore, the height of a container will affect the air space in the growth medium at container capacity. The concentration of water at a given height of the medium from the bottom of the container is not influenced by the container height, only the medium particle size. Therefore, increasing the height of the container increases the volume of medium with the larger pore spaces filled with air. You can demonstrate this concept to yourself or others using a sponge.

Obtain a large rectangular sponge (about 1.5 inches thick, 5 inches wide and 12 inches tall). Cut the sponge into 2 pieces, approximately one-third and two-thirds size portions. This sponge represents a container medium with a combination of large and small pore spaces. Just as in a container medium, a portion of pore space in the sponge will be filled with water after irrigation and drainage. Remember that the proportion of large and small pore spaces in these two sponges is the same; they were once one sponge. Saturate the sponges in water then stand them upright on a raised stand of some sort over a pan. Water will drain from the sponges. This is the force of gravity pulling water from the large pore spaces. The concentration of water at a given height in two sponges is the same, even though one sponge is taller than the other. After a few minutes, squeeze the water from the 2 sponges and measure the amount of water obtained from each. Try to squeeze the sponges with the same pressure. The volume of water squeezed from the two sponges will be surprisingly close. This illustrates the importance of consideration of container height when formulating a container medium. If approximately the same amount of water was obtained from each sponge, that means a greater volume of the pores in the taller sponge was filled with air after drainage.

Some have suggested the placement of gravel in the bottom of containers improves drainage. In fact, the gravel decreases the total volume of medium with favorable aeration. The pores at the interface of the container medium and gravel must be saturated before water will move down into the gravel. This means that a layer of medium with near maximum water content is positioned above the gravel rather than on the container bottom. Therefore, the effective height of this container is reduced by the depth of the gravel in the bottom.

Root distribution in container media can be influenced by the particle size distribution. A medium with high water-holding capacity and low aeration may result in a concentration of roots in the top portion of the container, especially if the medium in the bottom portion of the container remains saturated for extended periods. Roots growing in poorly aerated media are weaker, less succulent and more susceptible to micronutrient deficiencies and root rot pathogens such as *Pythium* and *Phytophthora* than roots growing in well-aerated media.

Rapid temperature fluctuations and extreme temperatures are common in container media. The high container surface area to volume ratio provides little buffering of environmental fluctuations. Root-zone temperatures on a bright, sunny day often exceed the air temperature by 15°C (27°F) because of direct solar radiation on container sidewalls. Winter night temperatures may be lower than air temperatures because of rapid heat loss from this large surface area. These facts are particularly evident in smaller containers. The amount of water present in a container medium will influence how rapidly the temperature of the medium changes. Water buffers or reduces the rate of medium temperature change, although the extent of this buffering is not clearly understood in nursery containers.

The particle size distribution and thus the water-holding capacity and air space can change over time in the container. As the particle size is decreased through biological degradation, the medium volume decreases, the air space decreases and the weight of solids per unit of volume of the remaining medium increases. This degradation may or may not be accompanied with a proportionate increase in water-holding capacity. Smaller particles may wash to the bottom regions of containers over time. This has been reported especially with the use of large amounts of sand in otherwise porous media. Fine sand tends to accumulate in the bottom thus clogging the larger pore spaces, decreasing aeration in the bottom portion of the container and water-holding capacity in the upper zones in the container medium.

Container medium volume generally decreases and general physical properties change over time due to compaction, shrinkage, erosion and root penetration. Decreases in the volume of medium in a container result in decreased drainable pore space