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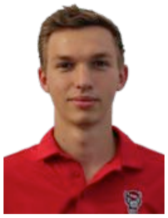

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Volume 13 Number 24 May 2024

Do Taller Pots Hold More Water?

How does the pot height affect the water holding capacity of a pot?

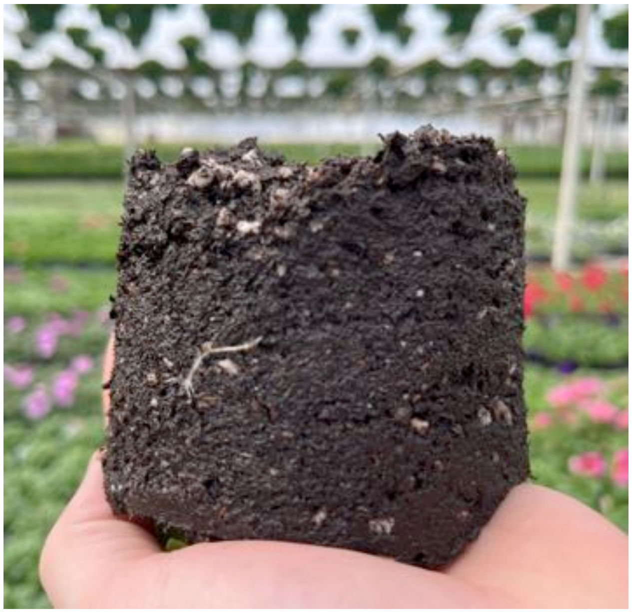

Figure 1. Root rot occurrences can often be increased when the substrate is continually wet leading to poor root growth and or existing roots dying. (Photo: Patrick Veazie)

There is a fine balance between water retention for plant uptake between irrigations and maintaining optimal air space of 25-50% to promote root respiration in a container. There are a number of factors that can influence these parameters. The components of a substrate are the most commonly attributed factor when considering water holding capacity. Often there is a large focus on particle size, aggregate incorporation rate, and substrate composition. In general peat and coconut coir have a greater water holding capacity when compared to wood fiber, however, the particle size of each component must also be considered. Additionally, aggregates such as perlite, bark, and wood chips, can be incorporated to increase drainage within a substrate. Smaller particle sizes will allow the substrate to hold onto more water when compared to larger particle size substrates due to the smaller pores between the particles. However, when utilizing a substrate that consists of a wide variety of components growers must consider how all parts of a substrate blend interact with the various aggregates and particle sizes of each component. While substrate composition and particle size distribution are important factors in water retention and drainage container height is also an important factor to consider.

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Factors such as container capacity and air space within the substrate vary depending on container height and volume (Fonteno, 1988). However, total porosity may remain the same across containers of various sizes as long as the bulk density stays the same. When the container height increases the air space will increase which can result in a lower container capacity (the amount of water a substrate can hold after gravitational drainage). Taller containers also help avoid a post-irrigation perched water table that is common with shorter containers. When using a shorter container with a substrate composed of fine particle sizes, insufficient airspace may be observed, potentially resulting in increased occurrence of root rot (Fig. 1) or plant desiccation (Fig. 2) (Owen and Altland, 2008).

Recently when visiting a grower, we observed marigolds grown in a 4” pot but that was considerably (5.0” tall) taller than a traditional 4” pot (3.75” tall) (Fig. 3). While this taller pot does have greater volume resulting in more substrate being required compared to a shorter pot of the same diameter, the available airspace is much greater. Based on the pairing of container geometry and substrate utilized

Figure 2. when the root zone is continually saturated the and gas exchange with the roots is limited desiccation can occur where the plant appears to be wilting however the pot is saturated. This is a result of root death due to the anaerobic environment. (Photo: Patrick Veazie)

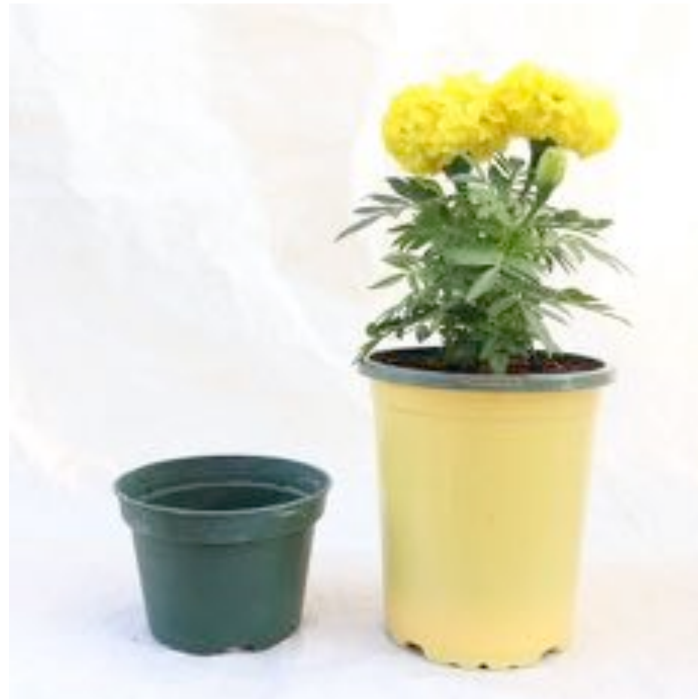

Figure 3. Pot height comparison between observed taller 4” pot and traditional 4” geranium pot. (Photo: Patrick Veazie)

growers must modify their growing practices to accommodate for the difference in air space available and where the roots are within the pot. It is important to ensure that water is available where the roots are but not to overwater the substrate. For growers using taller containers ensuring that water is available near the plug at the time of transplant is crucial for promoting initial root growth. However in contrast, growers using shorter pots must also modify watering to prevent perched water tables and avoid water constantly filling the available airspace within the pot which could result in root rot or plant desiccation. Taller pots will also exhibit more severe surface drying compared to shorter pots and will often not need water even if the top of the pot appears dry commonly resulting in overwatering (Fig. 4). This is a result of the lower water content at the top of the pot post-irrigation due to the increased drainage.

Growers should ensure that they are lifting the pot to determine the water needs instead of only looking at the top of the container.

Container geometry influences gravitational drainage and growers should be aware of pairing the correct substrate, container geometry, and watering practices to maintain optimal air and water conditions within the container to promote plant growth.

References

Fonteno, W.C. 1988. An approach to modeling air and water status of horticultural substrates. In Symposium on Substrates in Horticulture other than Soils in situ 238, pp. 67-74.

Owen, J.S., and Altland, J.E. 2008. Container height and douglas fir bark texture affect substrate physical properties. HortScience, 43(2), pp. 505-508.

Figure 4. Surface drying observed when the top 0.5" of a substrate appears very dry however, the rest of the profile is well irrigated. (Photo: Patrick Veazie)

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