

# A quick and easy way to measure container weights for irrigation scheduling

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The following is an expanded discussion on this article from the New Nursery Literature section: #14 - Dumroese RK, Montville ME, Pinto JR. 2015. Using container weights to determine irrigation needs: a simple method. Native Plants Journal 16(1): 67-71.

The practice of weighing containers to determine their water content is one of the oldest cultural practices in forest nurseries. In a survey of container nurseries for the Seedling Nutrition and Irrigation chapter of the Container Tree Nursery Manual (Landis and others 1989), using container weight was the most common technique to determine when to irrigate. The basic concept behind this technique is simple: because water is considerably heavier than other container components, the moisture content of a tray or block of containers can be monitored by weight. A container is heaviest when it has just been irrigated but loses water weight over time through evaporation and transpiration. When the container weight reaches some predetermined level (Figure 1), it is time to irrigate.

To minimize variation, it is important to reweigh the same container, which is typically marked with a pin flag stake or is painted a bright color. Forest and native plant nurseries use a wide variety of techniques to weigh their containers:

1. In small greenhouses, workers can simply carry containers to a stationary balance on a centrally located bench.
2. In larger facilities, a weight scale can be placed on a cart and rolled to various locations.
3. The latest innovation from the PRT nursery in Hubbard, OR is to use an inexpensive, portable, handheld, digital balance to weigh containers. Four 22.5 in long (57 cm) wire hangers that are manufactured for hanging floral baskets are crimped at the end to form a hook. Each wire is stuck through the air vents in the container and twisted to provide support. Then, it is easy to weigh the container with a handheld weighing scale (Figure 2).

The hanging basket wires can be purchased from nursery supply companies at a cost from US\$ 0.40 to 2.40 each. The balance used at PRT Oregon is the Chestnut Tools Portable Electronic Scale that can weigh to the nearest one-hundredth unit and sells for about US\$ 13 (Lee Valley Tools Ltd; <http://www.leevalley.com>). This particular unit can be set to either English or metric units, permits conversion between units, and is 99% accurate for loads from 2.2 to 88.9 lbs (1 to 40 kg).

Because the critical (often called target) weight will vary during the growing season, nurseries will need to develop a set of “wet weights” from the Establishment Phase to storage for each container and species combination (Table 1). It may be that with enough data and experience, species with similar water use can be combined into larger, easier-to-manage species groups. Also it is important to know that weight loss

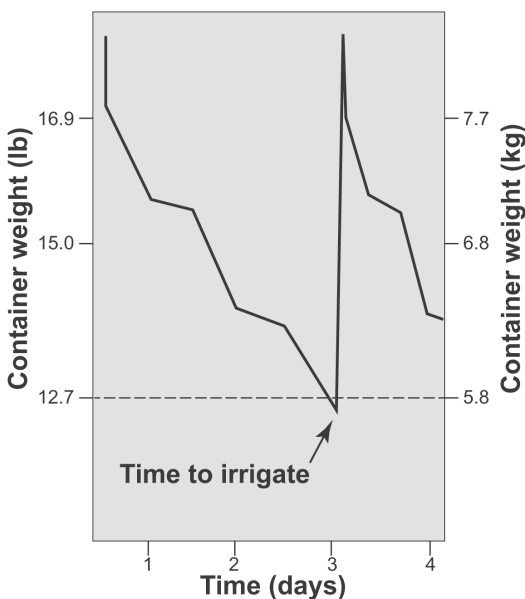


Figure 1 - Container weight is heaviest immediately after irrigation and decreases due to evaporation from the surface of the growing medium and transpiration by the plants. When a predetermined critical weight is reached, 12.7 pounds or 75% of the wet weight in this example, it is time to turn on the irrigation (Landis and others 1989).



Figure 2 - A Styroblock® container fitted with basket hangers has its weight measured with an inexpensive, portable, hand-held, digital balance (Dumroese and others 2015).

can be measured two ways, so when comparing target weights it is essential to know which method is used. In general, nurseries develop target weights based on the change of weight of the entire container without adjusting for the weight of the non-water portion (that is, the container, the dry weight of the medium, topdressing). This method, referred to as the “Manager Technique” or “Grower Method,” is fast, simple, and easy. Sometimes target weights are adjusted, however, to only measure the

weight of the water; this is most common in science literature when the researchers want to quantify the amount of water used. The biggest difference in these methods, given the same target weight, is that the “Manager Technique” results in a dryer growing medium.

## References

Dumroese RK, Montville ME, Pinto JR. 2015. Using container weights to determine irrigation needs: a simple method. *Native Plants Journal* 16(1): 67–71.

Landis TD, Tinus RW, McDonald SE, Barnett JP. 1989. Volume 4: Seedling nutrition and irrigation. *The Container Tree Nursery Manual*. Washington (DC): USDA Forest Service. Agriculture Handbook 674. 119 p.

Table 1 - A container weight scale developed for conifer seedlings in the Pacific Northwest (Landis and others 1989)

Growth phase	Irrigation weight (% of wet weight)
Germination	90%
Rapid growth	80%
Hardening	65 to 70%
Packing and storage	80 to 85%