

FNGA Endowed Research Fund Report

Tensiometers for controlling irrigation and minimizing nutrient loss from ornamental crops
(continuation of 1999 project and funded in 2003)

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Abstract: Daily irrigation activated by time clock resulted in live oak trees with larger caliper that when irrigation was activated by tensiometer placed in native soil beneath The Smart Pot[®] with porous bottom. However, the amounts of water applied per unit of caliper increase for the time clock activation was about 3.5 fold that when irrigation was activated by tensiometer. Daily irrigation activated by time clock or irrigation activated by tensiometer placed in native soil beneath florida cool ring[™] containers resulted in similar live oak caliper increase but a 4 fold increase in amount of water applied per unit of caliper increase for the time clock activation compared to activation by tensiometer. Additional research should be conducted to evaluate plant growth response when tensiometers are placed in the container substrate rather than in the native soil beneath containers that have porous bottoms or open bottoms resting on porous non-woven fabric that allows for roots to traverse.

Objective: The objective of this study was to evaluate response of live oaks grown with predetermined irrigation schedule activated by time clock or soil moisture as determined by tensiometer.

Methods and Results: Live oak trees (*Quercus virginiana*, container size #3) were planted May 5, 2003 with a commercially prepared 6 pine bark: 4 Florida peat: 1 sand

substrate (by volume) in soft-sided porous fabric containers called The Smart Pot[®] (Root Control, Inc., Oklahoma City, Oklahoma) or florida cool ring[™] (Florida Cool Ring Company, Lakeland Florida). A total of 38 trees were planted in The Smart Pot[®] and 41 trees in florida cool ring[™]. Each soft-sided porous container was 24 inches in diameter and ≈16 inches high with the bottom of The Smart Pot[®] made from 10-ounce/square yard non-woven polypropylene. The florida cool ring[™] was placed on non-woven needle punch polypropylene fabric provided by manufacturer. The substrate was amended with dolomitic limestone (pH 5.5 – 6.0). Florikan[®] Blend 15-4-9 controlled-release fertilizer (Florikan, Sarasota, Florida) was applied during potting by distributing 1 pound of fertilizer around the roots of the transplant as the porous container was filled with substrate. Trees were placed 5 feet apart in a guy-wire supported row at Sun City Tree Farm, Ruskin, Florida and were watered with Chapin spray stakes type P [(0.6 quarts/minute≈12 psi) Chapin Watermatics, Inc., Watertown, New York]. Harrell's 17-8-8 (≈0.5 pound/container, Harrell's, Inc., Lakeland, Florida) was surface-applied on July 15, 2003. One half of the trees in each container production system were watered from March 19, 2004 till September 20, 2004 with irrigation events controlled by timer or irrigation events controlled by tensiometer. Irrigation events controlled by timer were daily at 10, 2 and 6 pm for 4 minutes each (2.4 quarts). Irrigation events controlled by tensiometer would occur as above but only if the native soil moisture (Myakka fine sand) level 4 inches below the center of a representative container was depleted to 5-cbar tension. Water meters were located on each of the four irrigation treatment pipes (2 container types and 2 irrigation schedules). Tree calipers were measured six inches above

the container substrate for six trees in each treatment on May 19 and September 20, 2004 and water meter readings recorded.

Conclusion: Live oak trees grown with the irrigation activated daily by a time clock exhibited similar increase in caliper when grown with florida cool ring™ containers or The Smart Pot® (Table 1). Increase in caliper was also similar for trees grown with florida cool ring™ when irrigation was activated daily by time clock or activated by tensiometer. Trees grown with The Smart Pot® exhibited more caliper increase when the irrigation system was activated daily by the time clock than when activated by tensiometer; however, the gallons of water applied per unit of caliper increase was about 3.5 fold that when the irrigation system was activated by a tensiometer (Table 2.). A 4 fold increase in the gallons of water applied per unit of caliper increase was observed for the florida cool ring™ containers when irrigation was activated by time clock compared to tensiometer (Table 2.). In this study, it is likely the container substrate was drier than desirable for optimal growth when the irrigation was activated by tensiometer regardless of container type. Thus, additional research should be conducted to evaluate plant growth response when tensiometers are placed in the container substrate rather than in the native soil beneath containers that have porous bottoms or open bottoms resting on porous non-woven fabric that allows for roots to traverse.

Trade names are mentioned with the understanding that neither endorsement is intended nor is discrimination implied for similar products not mentioned. This information has not been peer reviewed nor incorporated in IFAS recommendations.

Table 1. Caliper of live oaks planted May 5, 2003 with a common nursery substrate in either florida cool ring™ containers or The Smart Pot® each ≈ 30 gallons. Irrigation initiation was controlled by time clock or tensiometer in native soil under container.

	May 04	Sept. 04	Increase	Std. Deviation
Florida cool ring™				
	millimeters			
<i>Time clock</i>	26.0	52.2	26.2	3.9
<i>Tensiometer</i>	24.4	45.5	21.1	1.8
The Smart Pot®				
	millimeters			
<i>Time clock</i>	27.5	54.2	26.7	5.1
<i>Tensiometer</i>	24.6	39.9	15.3	3.5

Table 2. Water applied to live oaks planted May 5, 2003 with a common nursery substrate in either florida cool ring™ containers or The Smart Pot® each ≈ 30 gallons. Irrigation initiation was controlled by time clock or tensiometer in native soil under container.

	Gallons applied May 04 – Sept. 04	Gallons/caliper increase (mm)	Std. Deviation
Florida cool ring™			
<i>Time clock</i>	3769	146.6	22.2
<i>Tensiometer</i>	765	36.5	3.2
The Smart Pot®			
<i>Time clock</i>	3499	136.8	37.1
<i>Tensiometer</i>	570	39.6	13.0