

Project Title: Water Conservation Practices for Michigan Container Nurseries

Project #MDAHF – 2006-09

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Accomplishments During Reporting Period

The primary objective of this experiment was to quantify the daily water use (DWU) of container-grown woody ornamentals so that irrigation can be applied according to plant demand. This will allow growers to minimize over-watering and group plants with similar DWUs together to conserve water and minimize runoff.

The experiment was conducted from June through October 2006 and 2007 with 10 different taxa of landscape shrubs each year (Table 1). DWU was determined by measuring the difference in volumetric moisture content a half hour after irrigation and prior to irrigation the following day. Irrigation treatments were 1) a control of 0.75 inches per day, 2) irrigation applied to replace 100% DWU daily (100DWU), 3) a two day cycle with 100% DWU one day and 75% DWU the following day (100-75), and 4) a three day cycle of 100%-75%-75% DWU (100-75-75). Growth index and leachate pH and EC were measured at regular intervals. End of season leaf area and internode length were also measured.

In addition a data logger was installed to measure volumetric moisture content and substrate temperature of one *S. fritschiana* 'Wilma' per irrigation block (12 total, 3 per treatment) every 60 seconds throughout the summer to provide a more complete picture of substrate water depletion. Net radiation, relative humidity, and air temperature were also recorded over the nursery production area.

An irrigation and runoff collection experiment using the same irrigation treatments as 2006 was conducted using four taxa from 2006: *Deutzia gracilis* 'Duncan', *Kerria japonica* 'Albiflora', *Thuja plicata* 'Atrovirens', and *Viburnum dentatum* 'Ralph Senior'. This allowed a second growing season of water use and growth data under the same treatments to be recorded. The effect of irrigation treatment on runoff quantity was evaluated by collecting runoff 8 times and analyzing for nitrate-N and phosphate-P content. Growth index, ph, and electrical conductivity data were also collected.

Table 1. 2006 Taxa	Abr.	2007 Taxa	Abr.
<i>Callicarpa dichotoma</i> 'Early Amethyst'	CD	<i>Caryopteris</i> × <i>clandonensis</i> 'Dark Knight'	CC
<i>Cornus sericea</i> 'Farrow'	CS	<i>Cotinus coggygria</i> 'Young Lady'	CYL
<i>Deutzia gracilis</i> 'Duncan'	DG	<i>Forsythia</i> × <i>intermedia</i> 'New Hampshire Gold'	FI
<i>Kerria japonica</i> 'Albiflora'	KJ	<i>Hydrangea arborescens</i> 'Dardom'	HA
<i>Symphoricarpos</i> × <i>doorenbosii</i> 'Kordes'	SD	<i>Hydrangea paniculata</i> 'Unique'	HP
<i>Syringa</i> × <i>hyacinthiflora</i> 'Asessippi'	SH	<i>Rosa</i> 'Winnipeg Parks'	RWP
<i>Syringa</i> × <i>prestoniae</i> 'Donald Wyman'	SP	<i>Spiraea fritschiana</i> 'Wilma'	SF
<i>Thuja plicata</i> 'Atrovirens'	TP	<i>Thuja occidentalis</i> 'Techny'	TO
<i>Viburnum dentatum</i> 'Ralph Senior'	VD	<i>Viburnum</i> × <i>burkwoodii</i> 'Chenaultii'	VB
<i>Viburnum opulus</i> 'Roseum'	VO	<i>Weigela florida</i> 'Alexandra'	WF

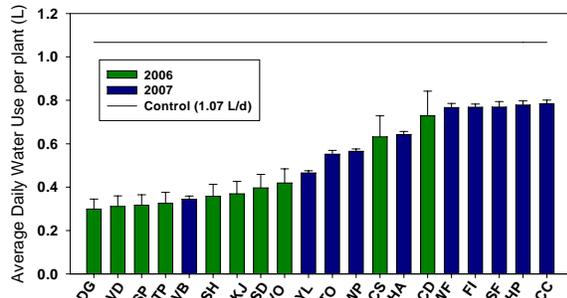


Figure 1. Average Daily Water Use for 20 container-grown woody ornamentals from mid-June through mid-October of 2006 and 2007. Error bars represent standard errors of the means.



Control 100DWU 100-75 100-75-75
Treatment means with same letter are not different ($p = 0.05$).

Average water applied per day based on DWU was less than the control treatment for all taxa (Figure 1) and for the 4 taxa in the runoff study (data not shown). Irrigating according to DWU increased or did not affect final plant size of all taxa compared to the control. Final growth index of *K. japonica* 'Albiflora' from the runoff study is shown in figure 2.

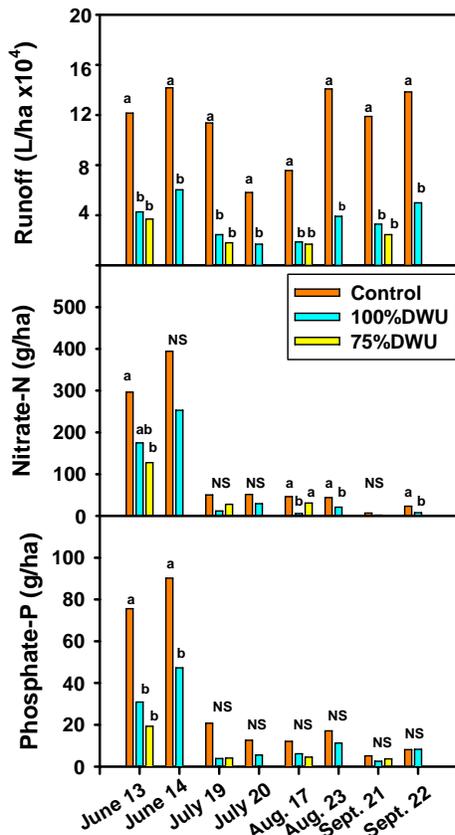


Figure 3. Treatment means with same letter are not different ($p = 0.05$). NS = not different.

In the runoff experiment irrigation volumes at 100% and 75% DWU reduced: runoff by 66% and 79%; nitrate-N by 38% and 59%; and phosphate-P by 46% and 75%, respectively, compared to the control, and results for individual dates are presented in figure 3 to the left. Irrigation applications based on DWU reduced irrigation volume, runoff, and nutrient losses, without harmful soluble salt accumulation while increasing or not affecting final plant size.

Planned Activities for Next Reporting Period

Data analysis for 2006 and 2007 data is close to completion. An additional 5 taxa are under treatment currently. This is the final season of this 3 year project. Data from all three years is anticipated to be analyzed and published in peer review journals by the end of the funding cycle in 2009.

Other Funding/Contributions: Project GREEN FY06&FY07 \$57000; Spring Meadow Nursery 2006-2008 \$6200; Renewed Earth 2006-2008 \$2400; Harrell's Inc. 2006-2008 \$1000.

Publications/Outreach: Nine presentations have been made to industry groups related to this project in 2006-8 and three posters were presented at the American Society for Horticultural Science during 2007 and 2008 conferences. Two national trade journal articles (NM Pro 24(7):29-32, 24(6):42-45) have resulted from this research. Data will be analyzed and prepared for publication in refereed journals from August through December 2008.