Impact of Drought on Salinity Tolerance of Landscape Woody Plants Irrigated With Reclaimed Water

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Objectives

With the rapid increase in urban population, the diminishing potable water supply is less likely to meet future needs. Since urban landscape water use increases dramatically during summer months in Texas and the Southwest, use of municipal effluents (reclaimed water) for landscape irrigation will conserve potable water. Reclaimed water has been traditionally used for irrigating agronomic crops and golf courses. Foliage injury has been reported on salt-sensitive trees and shrubs that were planted on golf courses with reclaimed water irrigation. The objective of this project was to characterize the salt tolerance of selected landscape plants in order to expand the reclaimed water use to landscapes and minimize salt damage.

Method

The following trees and shrubs were used for this project: Black cherry (*Prunus serotina*), Green ash (*Fraxinus pennsylvanica*), Lacebark elm (*Ulmus parvifolia*), Russian olive (*Elaeagnus angustifolia*), Sand cherry (*Prunus besseyi*), Sand plum (*Prunus angustifolia*), and Desert willow (*Chilopsis linearis*). Bare root seedlings were purchased in January and planted in 3-gallon containers filled with commercial substrate (sunshine mix no. 4). Plants were placed in the field. Saline irrigation at 0.8 (tap water), 2, or 4 dS/m electrical conductivity (EC) was initiated in early July and terminated in middle October when leaves started to change color. There were two irrigation regimens: plants were re-irrigated when substrate moisture depleted to approximately 65 percent and 55 percent its container capacity, respectively. Salinity tolerance was evaluated by comparing the caliper growth in three months and visual quality of the plants (photos were taken at various times).

Results

Based on caliper growth and visual quality, lacebark elm was most salt tolerant among the tested species: it did not have any foliage injury due to salt and its caliper increased by 30 to 44 percent in three months. Russian olive had leaf injury and defoliation in some plants when irrigated at 4 dS/m and caliper of most plants increased by 20 to 30 percent. Similar results to Russian olive were observed on Desert willow. Sand plum, sand cherry, and black cherry had severe defoliation in elevated salinity treatments and did not grow significantly. Green ash plants also had leaf injury but was better than the above three species. Drought did interact with salinity on green ash and black cherry growth. Since the salinity and drought treatments were not long enough to reach conclusion, experiment will be continued from next spring.

Figure 1. Photos on the left side: one month after the initiation of saline solution irrigation; on the right side: 3 months after the saline solution irrigation. Plant species from top to the bottom: Green ash, lacebark elm, desert willow, Russian olive, Black cherry, and Sand cherry.

Anticipated Impact on Water Conservation

It is estimated that 40 to 60 percent total household water consumption is for landscape irrigation in the Southwest during summer months. If landscapes can be irrigated with reclaimed water, this amount of potable water can be conserved.