Current Tree and Shrub Research at the Bridger Plant Materials Center

Two studies were recently established at the NRCS Plant Materials Center (PMC) at Bridger, Montana, pertaining to tree and shrub survival and establishment in the northern Great Plains and Intermountain west. The most recent project is a salinity tolerance study installed at the PMC in May 2006 in cooperation with the North Dakota PMC, Plant Materials Specialist, and State Forester. The goal of the study is provide better "real world" recommendations for establishing woody plants on saline impacted sites. The study consists of 30 plants each of 18 different species planted across a salinity gradient. The test species include silver buffaloberry *Shepherdia argentea*, chokecherry *Prunus virginiana*, Colorado spruce *Picea pungens*, blueleaf honeysuckle *Lonicera korolkowii*, silverberry *Elaeagnus commutata,* golden currant *Ribes aureum*, seaberry *Hippophae rhamnoides*, Russian olive *Elaeagnus angustifolia*, Siberian peashrub *Caragana arborescens*, Siberian elm *Ulmus pumila*, ponderosa pine *Pinus ponderosa*, western snowberry *Symphoricarpos occidentalis*, green ash *Fraxinus pennsylvanica*, American plum *Prunus americana*, western sandcherry *Prunus besseyi*, skunkbush sumac *Rhus trilobata,* Nanking cherry *Prunus tomentosa*, and plains cottonwood *Populus deltoides*. The goal is to correlate plant survival, height growth, and vigor rating to salinity level, and possibly to soil moisture level. In preliminary results, some traditional "saline-tolerant" species are not faring well.

The second study, installed in the spring of 2005, involves using PVC pipe to deliver sub-surface supplemental water to trees and shrubs. The Bridger study includes four species; green ash *Fraxinus pennsylvanica*, bur oak *Quercus macrocarpa*, ponderosa pine *Pinus ponderosa*, and Rocky Mountain juniper *Juniperus scopulorum*. These species were selected because they represent a broad mix of root system habits and rates of growth. One study was installed under fallow conditions while the other was planted under a predominantly 'Critana' thickspike wheatgrass cover. Tubes were installed within approximately 10 inches of the seedlings, and initially consisted of 4-inch diameter, 36-inch long PVC pipe with 2-inch horizontal slits spaced two inches apart along the length of the tube. A softball size sphere of moistened bentonite clay was dropped into each tube to prevent excessive basal draining. The top of each tube is capped and holds 1.9 gallons of water. Fifty percent of the trees are watered with tubes, the other half are hand watered on the soil surface. The design was amended in the spring of 2006 with 30-inch extensions atop each irrigation tube in order to increase tube storage capacity to approximately 3 gallons. Preliminary results show dramatic differences in growth between fallow and vegetated sites but little statistical difference between tube and surface application of water on either site. Study results will be reported after the 2007 data is collected.

The potential benefits of and applications for irrigation tubes is several fold. Deep, sub-surface watering may encourage deep rooting that may increase woody plant survival and growth, especially during periods of drought stress. It is possible that deep watering may result in reduced soil surface evaporative losses, as hydraulic conductivity is reduced when moisture content of the surface strata dry out. In addition, irrigation tubes may facilitate faster and more efficient supplemental watering, allowing landowners to drive up, apply water quickly, and then move on to the next tree without having to wait for infiltration. This would be particularly beneficial on heavy-textured soils. Although refinement of this technique may be necessary, this study should answer some fundamental questions regarding the potential application of the technique in the real world.

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