

Drought Stress on Two Tamarisk Populations (Wyoming and Montana) in Containment: Effects on *Diorhabda carinulata* Survival and Adult Size

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Abstract

Several *Diorhabda* spp. beetles (Chrysomelidae) have been released and established as biological control agents of salt-cedar plants or tamarisk (*Tamarix* spp.) in the western US, and the defoliation over several years begins to kill tamarisk plants. Although *Diorhabda carinulata* Tracy and Robbins 2009 has established in northern Wyoming (Lovell), limited or no established has resulted at multiple locations in Montana (including a 250K beetle release near Ft. Peck MT Reservoir). Cage studies were conducted in 2007-2008 to examine how drought stress to Tamarisk plants influenced beetle size and survival. Limited survival of *D. carinulata* in field cages made it difficult to examine the influence of tamarisk drought stress treatments on beetles. However, in 2010 the tamarisk-*Diorhabda* related lawsuit forced the drought experiment to be moved into containment since Colorado *Diorhabda* (interstate transport) was provided, and plant population source (Lovell WY vs. Ft. Peck MT) was added as a factor. The survivorship of CO *Diorhabda* (20 first-instar larvae placed onto each plant with 16 replicates of four water treatments with two plant populations) were lower in well watered plants. Although the study in containment makes it more difficult to compare to field conditions and lacked predation pressure, it was a useful environment to isolate water and plant population treatment effects in this experiment, since upwards of 100% adult beetle survival occurred on some treatment plants. Our results will be combined with predation surveys and experiments to try to answer a simple question: why has *D. carinulata* failed to establish strongly in MT, given successful establishment on tamarisk in northern WY? We will continue to seek to explore other biological control agents for tamarisk in Montana, due to a lack of strong *D. carinulata* establishment to date.