

COMPETITION AND SUCCESSION IN TAMARISK STANDS: TOWARDS BIOLOGICAL CONTROL USING NATIVE PLANTS

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Tamarisk species (*Tamarix ramosissima* Ledeb., *T. chinensis* Lour., *T. gallica* L. and hybrids), have invaded riparian areas throughout western North America to the detriment of native plants and animals. Tamarisk is a relatively recent addition to North American plant communities, thus competitive and successional processes are still developing. Box elder (*Acer negundo* L. var. *interius* (Britt.) Sarg.) is a potential native competitor found in mid elevation canyons throughout western North America. The following questions were addressed: (1) Does tamarisk facilitate box elder establishment? (2) Is box elder or tamarisk the superior competitor? (3) What are the successional trajectories in mixed box elder and tamarisk stands? (4) Can mature tamarisks be killed by limiting available light (PAR) to levels that commonly occur under box elder canopies? (5) How much shade is needed to diminish the growth of or kill tamarisk? (6) Is there a shade threshold below which box elders, but not tamarisk, can grow?

Facilitation was studied by analyzing the survival of box elder seedlings planted in intact or cleared tamarisk stands. Competition was studied through neighborhood analysis and successional trends were analyzed through dendrochronology in mixed stands. The shade tolerance of mature tamarisks was analyzed by building light exclosures around mature tamarisks. Comparative shade tolerances were analyzed using shade cloth of varying interception levels in a greenhouse experiment in Fort Collins,

CO. Field studies and experiments were conducted in canyons of Dinosaur National Monument (DNM), Colorado.

Tamarisk facilitated box elder seedling survival. Box elder was the superior competitor; the presence of canopy box elders within one and two meters was significantly related to tamarisk but not box elder mortality. The presence of canopy tamarisk trees was not related to box elder or tamarisk mortality. Tamarisk establishment predated or was concurrent with box elder establishment on newly formed surfaces. Tamarisk initially dominated the canopy, but box elder eventually overtopped and killed the tamarisk. The shade generated by box elder canopies was capable of killing mature tamarisks in DNM. Box elder had superior shade tolerance to tamarisk, and maintained positive growth and survived under higher shade than tamarisk. The manipulation of competitive and successional processes through the promotion of box elder and other native tree establishment is suggested as a means of bottom up tamarisk control to complement traditional control techniques.