Riparian vegetation competition, tamarisk exclusion

by Morgan A. King

INTRODUCTION

Tamarisk (*Tamarix ramosissima*) is a major threat to the biodiversity of riparian vegetation along the Grand Canyon. Tamarisk is a superior competitor against native vegetation in many ways. Characteristics of tamarisk and its tendency to form monotypic stands make it hard for native vegetation to compete against. Tamarisk are the dominant woody/shrub species along the Colorado River and will continue to spread unless preventative action is taken. There are eradication programs in the Grand Canyon National Park to try to limit further spread.

Figure 1. Tamarisk along the banks of Colorado River (E. Booth personal photograph).

TAMARISK – ECOLOGY OF A SUPERIOR COMPETITOR

Tamarisk dominates the Grand Canyon riparian system because native species no longer have floods to scour floods which allow germination and establishment on open surfaces (Shafroth et al. 2001). The new high water zone is much lower than the old high water zone since Glen Canyon Dam has begun stabilizing water flows. This has allowed tamarisk to extend its range down to the main stem of the Colorado River. Tamarisk are facultative phreatophytes, meaning they require ground water but can utilize surface water in times of stress (Warren and Turner 1975). Native vegetation, such as willows, are obligate phreatophytes meaning they require a constant ground water supply. This allows tamarisk to be more tolerant of more stressful conditions.

Tamarisk disrupts normal systems. It is able to change native plant succession by disrupting nutrient and fire cycles. Tamarisk has a higher evapotranspiration rate (Mitsch and Gosselink 2000), which decreases water available for other plants (Nagler et al. 2003). Tamarisk also increases soil salinity by dropping its salty leaves to decompose at the base of the plant (Nagler et al. 2003). High salt concentrations in the soil can prevent germination of native species. Compared to native plant species, tamarisk has earlier onset of maturity, longer seed dispersal period, and higher overall output. Seedlings of tamarisk are able to germinate in presence or absence of light, saline or non-saline conditions, and they have a resistance to fire (Sher et al. 2001). All of these characteristics favor a tamarisk monoculture.

ERADICATION EFFORTS

Within the boundaries of Grand Canyon National Park, eradication efforts on tributaries and below the old high water zone have been underway since 2001. A combination of mechanical and chemical methods has been utilized to try to decrease the overbearing presence of tamarisk. Mechanical methods are hand pulling/shoveling removal of roots. There are several different chemical methods; 1) herbicide injection and 2) mechanical removal of above ground portions of the plant followed by herbicide treatment to the stump. Both are effective, but expensive and require strenuous labor. Although pulse flooding is not meant to eradicate mature tamarisk, they are timed to miss tamarisk seed dispersal. Any effort helps in the fight against a tamarisk monoculture in the riparian zone of the Colorado River.

CONCLUSIONS

Although tamarisk is established and is a superior competitor against native vegetation, there are efforts to try to limit further spread. More effort and research on tamarisk will help understand what is needed to curb the growth of this invasive species.

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