USGS science for a changing world
USGS Western Ecological Research Center
Publication Brief

Long-Term Survival of Outplants in a Burned Arid Shrubland

Post-fire recovery of arid shrublands is typically slow, and planting greenhouse-raised seedlings may be a means of jump-starting this process. In a study published in *Arid Land Research and Management*, USGS scientists followed the post-planting survival of two contrasting shrub species in the Mojave Desert to investigate the most important determinants of successful establishment.

In fall 2007 and 2009, researchers planted 5,880 **blackbrush** and **Nevada jointfir** seedlings across five field sites and implemented soil amendments and supplemental watering to increase moisture in the root zone, applied pre- and post-emergent herbicides to decrease competition from non-native Brome grasses, and deployed two types of protective structures to avert herbivores. The researchers regularly assessed the plants, evaluating survival over 3.5 years.

Counter to expectations, researchers found that soil amendments and monthly supplemental watering over the first year did not influence long-term survival of either blackbrush or jointfir.

Survival of **jointfir** outplanted in 2007 was 61% after 43 months, and site largely influenced survival, while herbicide containing imazapic applied more than one year after outplanting reduced survival. Reduced survival of jointfir outplanted in 2009 coincided with delayed seasonal precipitation that intensified foliar damage by small mammals.

In contrast, **blackbrush** survival was 4% after 43 months, and was influenced by site, type of herbivore protection, and greenhouse of origin, during the 2007 outplanting. Blackbrush outplanted in 2009 with 2 L organic mulch mixed into the native soil profile had reduced short-term (10-month) survival compared with plants with 1 L organic mulch, with a commercial irrigation supplement, or with no soil amendment.

This Brief Refers To:

Scoles-Sciulla, SJ, LA DeFalco, TC Esque. 2015. **Contrasting long-term survival of two outplanted Mojave Desert perennials for post-fire revegetation.** *Arid Land Research and Management* 29:110-124. doi: 10.1080/15324982.2014.901994
http://www.werc.usgs.gov/ProductDetails.aspx?ID=5064

Different aspects of pre- and post-planting conditions impact native seedling survival, depending on plant species. Lesley DeFalco/USGS.

MANAGEMENT IMPLICATIONS

- Shrub species with rapid growth rates and broad environmental tolerances, such as jointfir, make ideal candidates for outplanting, provided that seedlings are protected from herbivores.
- Re-introduction of species with slow growth rates and narrow environmental tolerances, such as blackbrush, requires careful consideration to optimize pre- and post-planting conditions.
- The lack of effectiveness of soil amendments and supplemental watering may be explained by the relatively small volume of soil under the influence of treatments, compared to the adjacent volume of untreated soil drawing away soil moisture. In arid systems, a wider treatment area surrounding outplants may be required to increase survival.

RESEARCH CONTACT

Sara Scoles-Sciulla and Lesley DeFalco
Las Vegas Field Station
sscoles@usgs.gov
ldefalco@usgs.gov
www.werc.usgs.gov/defalco