



Management Implications

Post-fire planting can overcome dispersal limitations, yet warmer and drier post-fire conditions can still reduce survival.

Gambel oak reduces temperatures and aridity which increases successful establishment of conifer species, especially those from higher elevations.

Shrub fields following high-severity wildfire in Northern New Mexico can be leveraged to increase successful conifer establishment

Dense shrubs enhance conifer establishment

Climate change and fire-exclusion have increased the flammability of western United States forests, leading to forest cover loss when wildfires occur under severe weather conditions. Increasingly large high-severity burn patches limit natural regeneration because of dispersal distance, increasing the chance of conversion to non-forest. Post-fire planting can overcome dispersal limitations, yet warmer and drier post-fire conditions can still reduce survival.

We examined how two shrub species with different structures affect below-shrub microclimate and survival rates of planted tree seedlings (*Pinus ponderosa*, *P. edulis*, *P. strobiformis*, *Pseudotsuga menziesii*) following a high-severity fire in northern New Mexico. We expected that Gambel oak (*Quercus gambelii*), with its denser canopy, would buffer below-shrub climate causing higher survival rates of planted seedlings more than the lower canopy density New Mexico locust (*Robinia neomexicana*). Seedlings planted under Gambel oak had survival rates 10% to 35% greater than those planted under New Mexico locust. Higher light availability beneath New Mexico locust corresponded to higher temperatures, lower humidity, and higher vapor pressure deficit, impacting the mortality of planted tree seedlings.

As the area conducive to tree establishment following fire continues to decrease, post-fire planting will likely be necessary to avoid permanent transitions to non-forest from previously forested areas. Our work highlights how shrubs with dense canopies can alter planted seedling survival. These results indicate that post-fire planting success in the southwest can be increased by waiting for post-fire shrub establishment and leveraging shrubs to buffer microclimate.

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