

# Seed bank composition within two sagebrush communities: a comparison of drought, microsite, and aboveground community effects

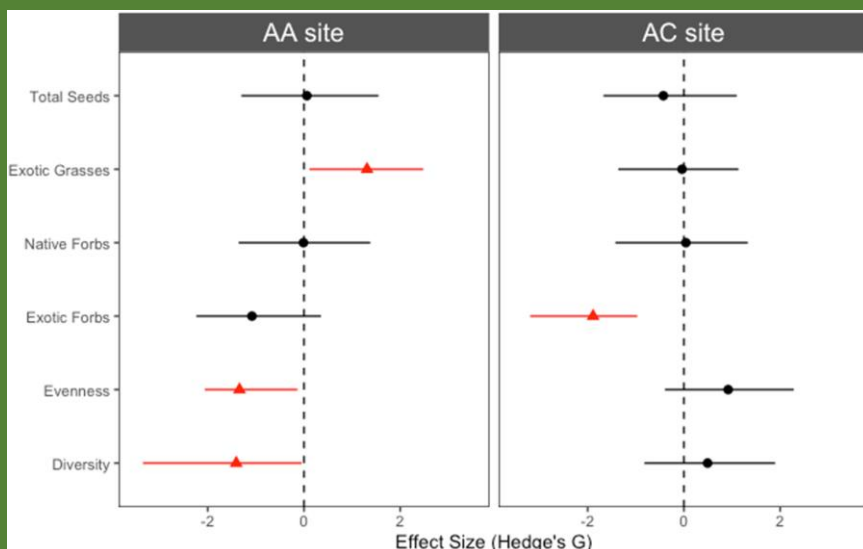
Soil seed banks are critical biodiversity repositories for many rangeland plant communities. Understanding how environmental factors alter seed bank composition provides valuable information on ecological processes and is useful for creating land management strategies. Using the seedling emergence method, we characterized the seed bank of two adjacent sagebrush plant communities that vary in dominant sagebrush species, structure, and function. Specifically, within a low sagebrush (*Artemisia arbuscula*) dominated community and silver sagebrush (*Artemisia cana*) dominated community, we assessed the influence of three environmental factors on each seed bank: experimentally imposed drought, shrub microsites (compared to interspaces), and aboveground vegetation. Within the low sagebrush community, drought decreased seed species diversity, seed species evenness, and exotic forb seed density, and increased exotic grass seed density. Total seed density, native forb seed density, and seed species diversity were greater in shrub microsites compared to interspaces. Within the silver sagebrush community, drought only decreased exotic forb seed density and there were no microsite effects. Both sagebrush communities' seed banks were dissimilar in species composition compared to the corresponding aboveground community (<27%), and both seed banks were comprised of over 50% exotic annual grass seeds. Our study suggests that seed banks of low sagebrush dominated plant communities may experience more drought induced impacts than adjacent sagebrush communities. Additionally, native annual forb seeds may remain resilient during drought, but drought could concurrently promote an increase in propagule pressure of the invasive annual grass *Ventenata dubia*. Finally, our study highlights the role of shrub canopies as beneficial microsites for seeds within low sagebrush dominated plant communities.



## Management implications

- Invasive grass seeds (*ventenata*) increase during drought within low sagebrush communities, which could lead to high severity fires and loss of sagebrush
- Native annual forb seeds remain viable during drought, maintaining future diversity and forage within sagebrush communities
- Sagebrush canopies provide beneficial microsites for preserving seeds and seed species diversity

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Seed bank responses to drought (Effect size  $\pm$  95% confidence interval; AA site – *A. arbuscula* community; AC site – *A. cana* community) of seed density (total seeds, exotic annual grasses, native forbs, exotic forbs), seed bank species evenness, and diversity. Triangles denote effect sizes with confidence intervals that do not overlap with zero, while circles denote effect sizes with confidence intervals that overlap zero. Confidence intervals that do not overlap 0 indicate a significant positive or negative effect. Originally published in [Journal of Arid Environments 2022; 202:104752](https://doi.org/10.1002/ajce.12452)



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