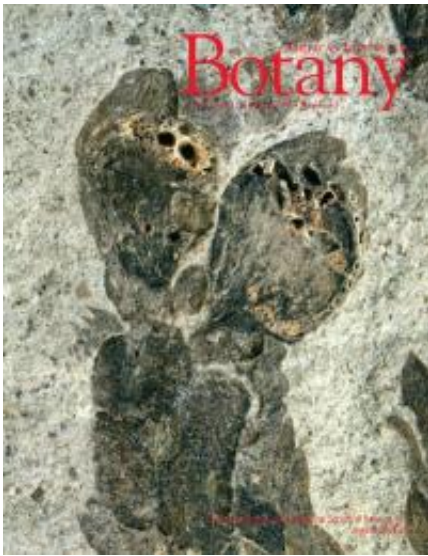


Big sagebrush may need to count on its soil seed bank for survival

March 27 2012



The article by Wijayratne and Pyke is featured in the March 2012 issue of the *American Journal of Botany*. Credit: Cover image credit: Peter Wilf

Big sagebrush (*Artemisia tridentata*) is a key foundational species in an ecosystem that is threatened by invasion of cheatgrass and the subsequent increase in fire frequency. Critical to the conservation, reestablishment, and restoration of the sagebrush steppe ecosystem (which comprises 63 million hectares of the Great Basin of North America) is understanding the dynamics of *A. tridentata* seeds—how long do they remain viable and are they able to persist in the seed bank for any length of time?

Previously it was thought that *A. tridentata* [seeds](#) did not persist in the seed bank, severely curtailing this species' ability to regenerate post-fire. Upekala Wijayratne and David Pyke (USGS and Oregon State University, Corvallis, OR) experimentally investigated whether *A. tridentata* seeds were able to form a short-term seed bank, a critical strategy that would enable this species to persist despite environmental conditions that have been altered by the invasive [cheatgrass](#). They published their findings in a recent issue of the *American Journal of Botany*.

"Understanding seed bank dynamics of sagebrush, an ecologically and economically significant species, is important for its sustainable management," said Wijayratne.

"Many seed viability studies are conducted in greenhouse settings or within a very small field site," she added. "What makes this study valuable is that it was replicated at several different study sites throughout the [Great Basin](#)."

By sowing seeds of two different subspecies of *A. tridentata* at the soil's surface, under the leaf litter, and buried 3 cm below the soil at six different study sites across Oregon, Idaho, Utah, and Nevada, the authors determined that, contrary to previous assumptions, seeds were able to survive in the soil beyond a single growing season and as much as up to 2 years post-dispersal.

Interestingly, the authors found that very few seeds that were on the surface or under the leaf litter survived intact within the first year—they either decomposed or germinated right away. In contrast, 30%²% of the seeds that were buried 3 cm below the soil surface remained viable up to and possibly beyond 24 months post-dispersal.

"Our study showed that burying sagebrush seeds in a few centimeters of

soil allowed a proportion of seeds to remain alive for multiple years, whereas seeds on the soil surface or under plant litter died within 6 months," notes Wijayratne.

Previous research had indicated that *A. tridentata* seeds did not persist in the soil beyond the first season; however, when the authors looked at naturally dispersed seeds they did find some seeds in the soil seed bank, providing newly found hope that this species may be able to survive the frequent fires.

"Our results have the greatest implication for sagebrush restoration," comments Wijayratne. "Getting sagebrush plants established from seed is very difficult because environmental conditions have to be just right. If we can create a soil seed bank during restoration efforts, then we may see a payoff for those efforts in [sagebrush](#) establishment for multiple years rather than potential failure."

"Identifying restoration practices that best promote seeds into entering the [seed bank](#) is the next step," she concludes.

Indeed, restoration efforts that involve aerial seeding may not be as effective as ones in which soil disturbance or mulch aid in moving seeds below the litter surface. Once under the [soil](#), *A. tridentata* seeds may remain viable for a few years and may also escape incineration due to fires.

More information: Wijayratne, Upekala C. and David A. Pyke. 2012. Burial increases seed longevity of two *Artemisia tridentata* (Asteraceae) subspecies. *American Journal of Botany* 99(4): 438-447. [DOI: 10.3732/ajb.1000477](#)

Provided by American Journal of Botany

Citation: Big sagebrush may need to count on its soil seed bank for survival (2012, March 27)
retrieved 26 April 2024 from <https://phys.org/news/2012-03-big-sagebrush-soil-seed-bank.html>

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