

Science You Can Use *in 5 minutes*

Undercover Invasion: New research reveals how smooth brome overtakes native prairies

Smooth brome (*Bromus inermis*) is a Eurasian prairie grass whose roots in America can be traced to 1884, when the California Agricultural Experimental Station began studying its potential as forage for the country's burgeoning cattle industry. Germinating earlier in the spring with protein-rich foliage and blades wider than native grasses, smooth brome was described in a 1915 Canadian Department of Agriculture circular as “a promising grass, possessing the necessary qualifications to the prairie climate.”

Unforeseen consequences

Actively promoted as livestock forage and erosion control after highway construction and other soil disturbances, smooth brome's utility masked a gradual and almost imperceptible shift in the ecosystems where it was introduced. First came a decrease in beetle and other insect species diversity, including pollinators. This cascaded into a decline of bird species diversity as food selection dwindled.

Native ungulates and livestock preferred the sweeter native

grasses, putting extra forage stress on those species and further exacerbating smooth brome's impact—and dominance. Within a century, smooth brome had overtaken 30–60 percent of plant coverage within the northeastern Great Plains grasslands. It is now expanding into northwestern portions of the Great Plains, where western wheatgrass (*Pascopyrum smithii*) is the dominant native grass.

Scientific cage match

Jacqueline Ott is a Research Ecologist for Forest Service Research and Development. Based in Rapid City, South Dakota, Ott has spent the last decade studying the transformation of native grasslands and the mechanisms behind it.

“Smooth brome has a lot of competitive advantages (to native grasses),” Ott said, “but as we better understand what those advantages are, land managers can develop strategies to counter them.”

In growth chamber studies pitting smooth brome against native western wheatgrass under manipulated conditions, the researchers discovered:



Smooth brome (with the copper-colored seedhead) encroaches into a field of native flowers and grasses on the Fort Pierre National Grassland in South Dakota. Forest Service photo by Dan Svingen.

- Smooth brome generates twice as many buds (potential future stems) as western wheatgrass.
- Under inconsistent (drought-like) precipitation, smooth brome bud production and plant vigor was less than that of western wheatgrass.
- When the two species directly encountered one another, smooth brome increased the number, length, and direction of its rhizomes (essentially “accelerating” its spread), whereas western wheatgrass reduced its expansion, growing in a more condensed, compacted footprint.

“This helps explain why a single treatment isn’t enough to knock back smooth brome,” Ott said. “Or why under dry conditions, it might not look like there’s a problem, but once the rains come, smooth brome seems to explode out of nowhere.”

“This also shows us that smooth brome will become a problem in our more arid western grasslands if left unaddressed,” she continued. “It is just a matter of time.”

Fine-tuning the ‘recipe’

Dan Svingen is a district ranger for the Nebraska National Forests and Grasslands, which oversees the 116,000-acre Fort Pierre National Grassland in central South Dakota. In the last 30 years, the grassland has gone from 5 percent smooth brome canopy cover to as much as 60 percent coverage, by some estimates.

Svingen is working with ranchers and university researchers to test how repeated applications of livestock grazing and prescribed fire might help suppress smooth brome.

“We’re trying to figure out the best land management recipe,” Svingen said. “Ott and her colleagues are providing us insights on how best to fine tune our treatments. The more we

Management Implications

- Smooth brome accelerates its spread when encountering native grasses, so it’s better to tackle smooth brome encroachment when it first appears.
- Smooth brome is more sensitive to drought conditions than native species, so eradication during times of low precipitation could be an effective management strategy.
- Because of the large number of buds produced by smooth brome, multiple treatments might be necessary to eradicate it and its growth pattern.

understand the mechanisms of smooth brome and native grass competition, the better we’ll be able to accomplish our goal.”

Featured Scientists

[Jacqueline Ott](#) is a Research Ecologist with Forest Service Research and Development in Rapid City, South Dakota.

[Paul Meznerich](#) is the author of this Science You Can Use.

Further Reading

Bam, Surendra; Ott, Jacqueline P.; Butler, Jack L.; [et al.]. 2026. [Competition affects clonal traits in rhizomatous grasses to favor an invasive species over a native species](#). Journal of Plant Ecology.

Bam, Surendra; Ott, Jacqueline P.; Butler, Jack L.; [et al.]. 2023. [Belowground growth strategies of native and invasive rhizomatous perennial grasses in response to precipitation variability, clipping, and competition](#). Folia Geobot. 58: 245-257.

Bam, Surendra; Ott, Jacqueline P.; Butler, Jack L.; [et al.]. 2021. [Belowground mechanism reveals climate change impacts on invasive clonal plant establishment](#). Scientific Reports. 12: 2860.

Ott, Jacqueline P.; Butler, Jack L.; Rong, Yuping; [et al.]. 2017. [Greater bud outgrowth of Bromus inermis than Pascopyrum smithii under multiple environmental conditions](#). Journal of Plant Ecology. 10(3): 518–527.



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