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Native species interactions with red brome: Suggestions for burn-area revegetation

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Native Species Interactions with Red Brome: Suggestions for Burn-Area Revegetation



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“One of our focal areas of research is to identify native species for use in revegetation projects that reduce the establishment of exotic annual grasses, or at least do not strongly facilitate exotic species establishment.”

Article in press: native vegetation not strongly facilitating red brome establishment –

By Scott Abella

In deserts, native perennial plants often actually facilitate the establishment of exotic annual grasses. One of our focal areas of research is to identify native species for use in revegetation projects that reduce the establishment of exotic annual grasses, or at least do not strongly facilitate exotic species establishment. An initial research effort involving a competition experiment of red brome with native species and a correlational field study of brome distribution among native perennial plants is in press with the journal *Invasive Plant Science and Management*.

Interactions

The interactions between native and exotic species occur on a continuum from facilitative to competitive. A growing thrust in invasive species science is differentiating where particular native species occur along this continuum, with practical implications for identifying species

that might reduce the invasibility of ecosystems. We used a greenhouse experiment to develop a competitive hierarchy of 27 native species with red brome (*Bromus rubens*), an invasive annual grass in southwestern USA arid lands, and a field study to assess *in situ* responses of brome to native perennial species in the Mojave Desert. Native species most competitive with brome in the competition experiment included the annuals pincushion (*Chaenactis stevioides*) and bristly fiddleneck (*Amsinckia tessellata*) and the perennials eastern Mojave buckwheat (*Eriogonum fasciculatum*), sweetbush (*Bebbia juncea*), and brittlebush (*Encelia farinosa*) that reduced brome biomass to 49 to 70% of its grown-alone amount. There was no clear difference in competitive abilities with brome between annual and perennial natives, and competitiveness was not strongly correlated ($r = 0.15$) with the biomass of native species. In the field, sweetbush and brittlebush supported among the least cover of brome, suggesting congruence of the strong early competitive abilities of these species with *in situ* patterns of brome distribution. At the other extreme, brome attained its highest average cover

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Red brome

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(19%) below littleleaf ratany (*Krameria erecta*), significantly greater than all but three of the 16 species evaluated. Cover of brome was only weakly related ($r = 0.19$) to area of the perennial canopy, suggesting that factors other than the sizes of perennial plants were linked to differences in brome cover among species.

Results suggest that (i) interactions with brome differ substantially among native species, (ii) these interactions are not as closely linked to biomass production as in more temperate regions, and (iii)

there is potential for identifying native species that can reduce invasion of desert ecosystems.

Interpretive Summary

Identifying native species, for use in revegetation and plant community augmentation projects, capable of reducing the fitness of invasive species is a major thrust in invasive species science and management. We sought to identify native species competitive with *Bromus rubens*, an exotic annual grass increasing fuel loads and facilitating fires devastating to resources in southwestern USA arid lands. In a greenhouse experiment screening the competitive abilities of 27 native species, we found that the native annuals *Chaenactis*

stevioides and *Amsinckia tessellata* and the perennials *Eriogonum fasciculatum*, *Bebbia juncea*, and *Encelia farinosa* mostly strongly competed with *Bromus*. In a companion field assessment of *Bromus* below different native perennial plants in the eastern Mojave Desert, *Bromus* cover varied more than 9-fold among 16 species. Species such as *Thamnosma montana*, *B. juncea*, *E. farinosa*, and *E. fasciculatum* showed promise in their ability to support low levels of *Bromus* cover, whereas *Krameria erecta* seems to facilitate *Bromus*. There is potential to develop lists of species for practitioners to recommend or avoid using in desert revegetation projects based on species' interactions with *Bromus*.

Species	This study: competition	This study: field	Brooks (2009): field
<i>Ambrosia dumosa</i>	Medium	Medium	Good
<i>Bebbia juncea</i>	Good	Good	Good
<i>Coleogyne ramosissima</i>	--	Medium	Medium
<i>Eriogonum fasciculatum</i>	Good	Medium	Medium
<i>Hymenoclea salsola</i>	Medium	Poor	Medium
<i>Krameria erecta</i>	--	Poor	Medium
<i>Larrea tridentata</i>	Medium	Poor	Medium
<i>Psoralea fremontii</i>	--	Medium	Poor
<i>Salazaria mexicana</i>	Good	Good	Poor
<i>Thamnosma montana</i>	--	Good	Poor

Summary of the performance of native perennial species with *Bromus rubens* in this study compared with Brooks (2009), Mojave Desert, southwestern USA. Species were ranked as poor, medium, or good in their ability for reducing *Bromus* biomass (greenhouse competition experiment) and for supporting low amounts of *Bromus* in the field (i.e. a 'good' rating indicates that *Bromus* is sparse below a species' canopy).

Abella, S.R., D.J. Craig, L.P. Chiquoine, K.A. Prengaman, S.M. Schmid, and T.M. Embrey. 2011. Relationships of native desert plants with red brome (*Bromus rubens*): toward identifying invasion-reducing species. *Invasive Plant Science and Management* (in press).