

North Dakota - Drought Strategies of Invasive Kentucky Bluegrass vs. Native Western Wheatgrass

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Widespread replacement of native plant species by invasive and introduced species, such as Kentucky bluegrass and smooth brome grass, has been a major concern in the northern Great Plains. Many factors, such as suppression of wild fires and long rests, could be contributing to the increasing dominance of invasive species. Biological strategies in resource use and reproduction of native vs. invasive species may also be contributing to this widespread change in prairie plant communities.

In 2009, a greenhouse experiment was conducted to see how the belowground biomass in Kentucky bluegrass (invasive) and western wheatgrass (native) responds to drought. These grasses were grown from early-June to late-September in 12 barrels filled with commercial garden soil and a factorial design of two species, two treatments (control vs. drought), and three replicates.

Initial density of plants in each barrel was controlled at 7-9 plants/ft². 'Control' plant barrels were watered fully twice per week, and 'droughted' plant barrels were watered fully once every three weeks. Upon harvest, plants were separated into shoots, roots, crowns, and rhizomes, which were oven-dried and weighed.

Compared with western wheatgrass, Kentucky bluegrass had a larger percentage of biomass invested in roots (15% vs. 11%) and rhizomes (4.6% vs. 2.5%). The two species had similar percentages invested in crown biomass (avg. 3.7%).

In both species, investment in roots increased under drought. Also under drought, there was evidence of increased investment in crowns and decreased investment in rhizomes, though not statistically significant. Differences in investment to crown and rhizome biomass in response to drought were primarily with Kentucky bluegrass, not western wheatgrass.

Although the statistical power of this greenhouse study does not allow definitive conclusions, a hypothesis can be proposed. Western wheatgrass appears to respond to drought by adjusting investment to vegetative organs, while Kentucky bluegrass adjusts investment priorities in both vegetative (roots) and storage and reproductive organs (crowns and rhizomes). Further study is needed.