



Perennial Grass Suppression of Cheatgrass: Comparisons Among Two Natives and One Exotic

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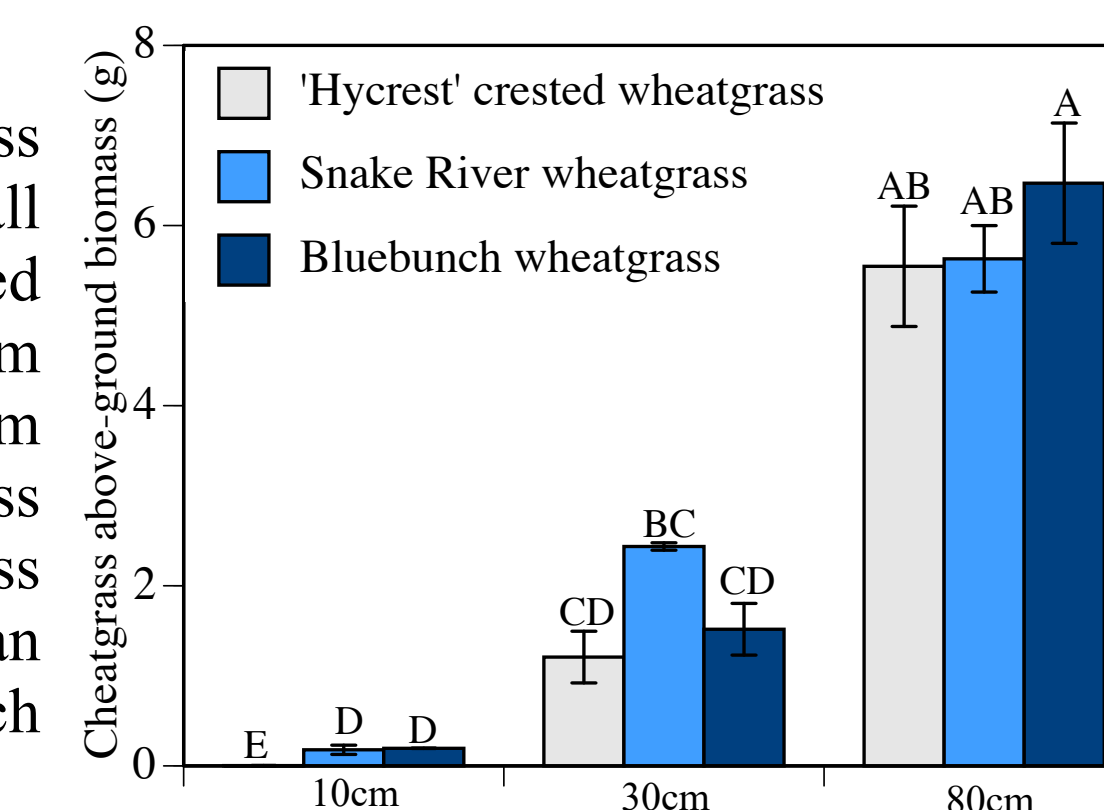
Introduction: Healthy established perennial grasses can suppress the growth of cheatgrass. The above photo was taken in the Dogskin range northeast of Reno, NV. The background has been invaded by cheatgrass; whereas, healthy bluebunch wheatgrass in the foreground has so far suppressed establishment of cheatgrass. The purpose of this research study was to compare the suppressive abilities of established 'Hycrest' crested wheatgrass (non-native) to Snake River wheatgrass and bluebunch wheatgrass (natives). Our working null hypothesis was that all established perennial grasses suppress cheatgrass equally, no matter the distance cheatgrass was sown from the established perennial plants.

All perennial grasses suppressed cheatgrass.

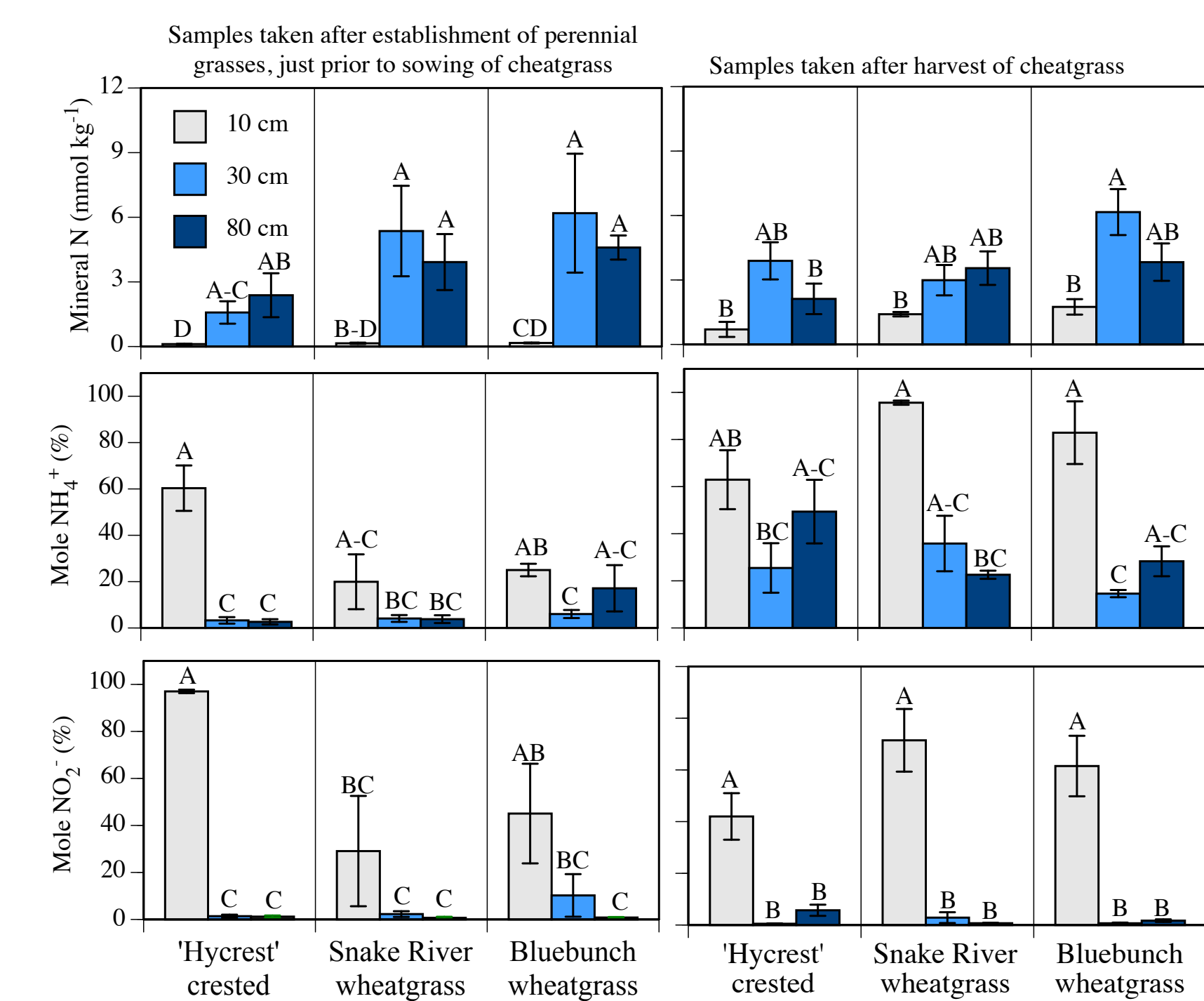
Suppression involved:

- 1) Decreased mineral N availability
- 2) Alteration of facets of N mineralization
- 3) Occupation of soil space by perennial roots.

Cheatgrass Growth: Relative to cheatgrass grown at 80 cm from perennial grasses, all perennial grasses significantly suppressed cheatgrass above-ground growth at 10 cm (average of 97 % suppression) and at 30 cm (average of 68% suppression). For cheatgrass sown at 10 cm, 'Hycrest' crested wheatgrass suppressed cheatgrass to a greater extent than did Snake River wheatgrass or bluebunch wheatgrass.



Effect on Soil Nitrogen: We measured aspects of the soil N cycle before and after cheatgrass was harvested. Before sowing of cheatgrass, all perennial grasses significantly reduced mineral N availability at 10 cm. Cheatgrass growth itself did not lower mineral N - it actually increased availability at 10 cm. Before sowing of cheatgrass, 'Hycrest' crested wheatgrass significantly increased the molar proportion of NH_4^+ in mineral N at 10 cm; after harvest of cheatgrass, all perennial grass greatly increased its molar proportion at 10 cm. A surprising result is that all perennial grasses, both before and after harvest of cheatgrass, fostered a large increase in the molar proportion of NO_2^- in the $\text{NO}_2^- + \text{NO}_3^-$ pool at 10 cm.

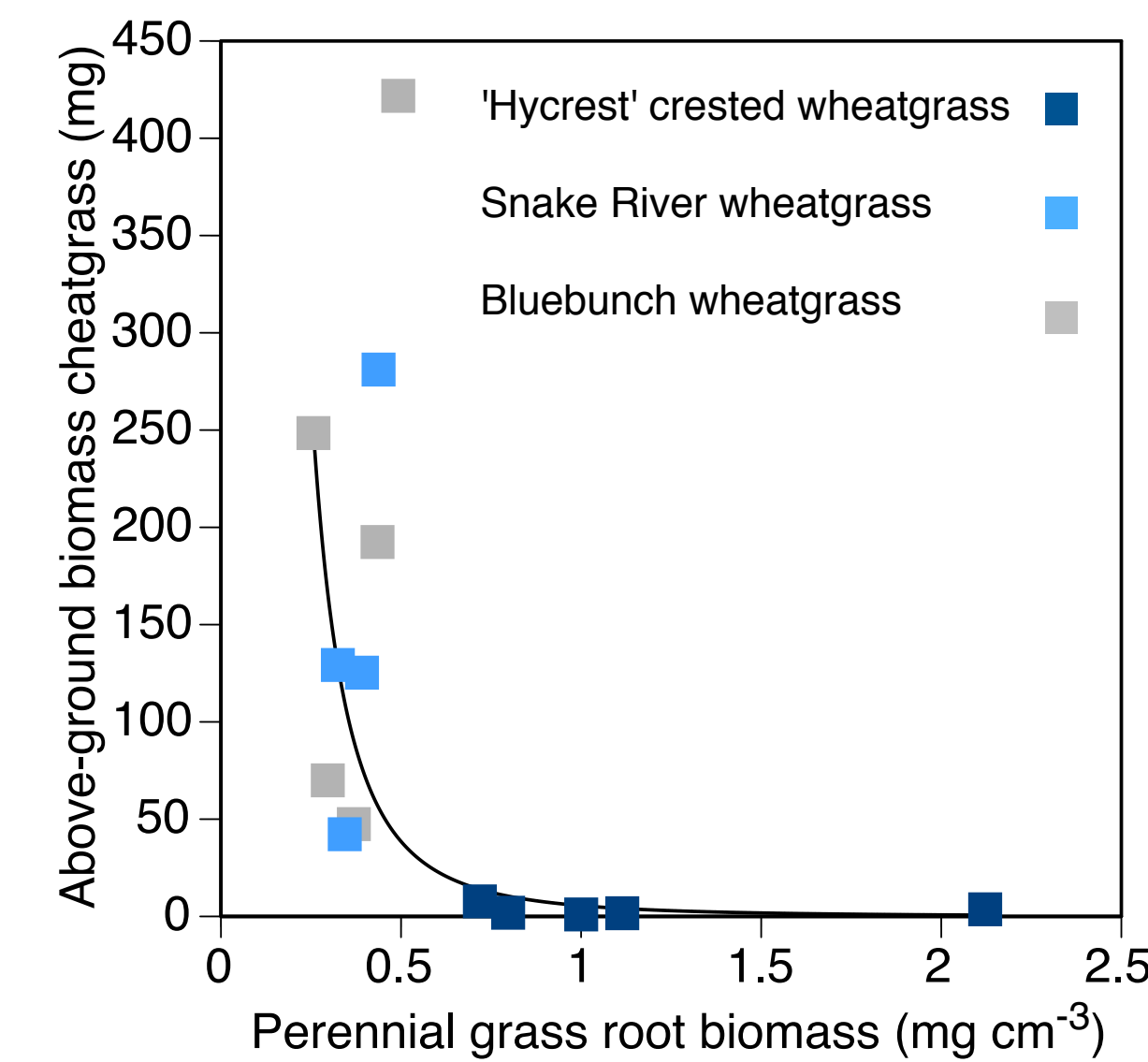


Experimental: Soil was a Torripsammettic Haploxeroll, developed in granite residuum. Tubs, 106 cm long by 40 cm wide by 36 cm deep and were filled to constant volume of 0.15 m³. Perennial grasses, 5 reps of 'Hycrest' crested wheatgrass, Snake River wheatgrass, or bluebunch wheatgrass, were sown at 15 cm from one side and allowed to establish for 96 days. Seeds of cheatgrass were sown in each tub at a distance of 10, 30, and 80 cm from the established perennial grasses. Water was not limiting to plant growth. Cheatgrass was grown for 60 days and above-ground mass was dried, weighed, and analyzed for C and N. Before and after harvest of cheatgrass, soil samples were analyzed for mineral N and soil-solution phase NO_2^- and NO_3^- .

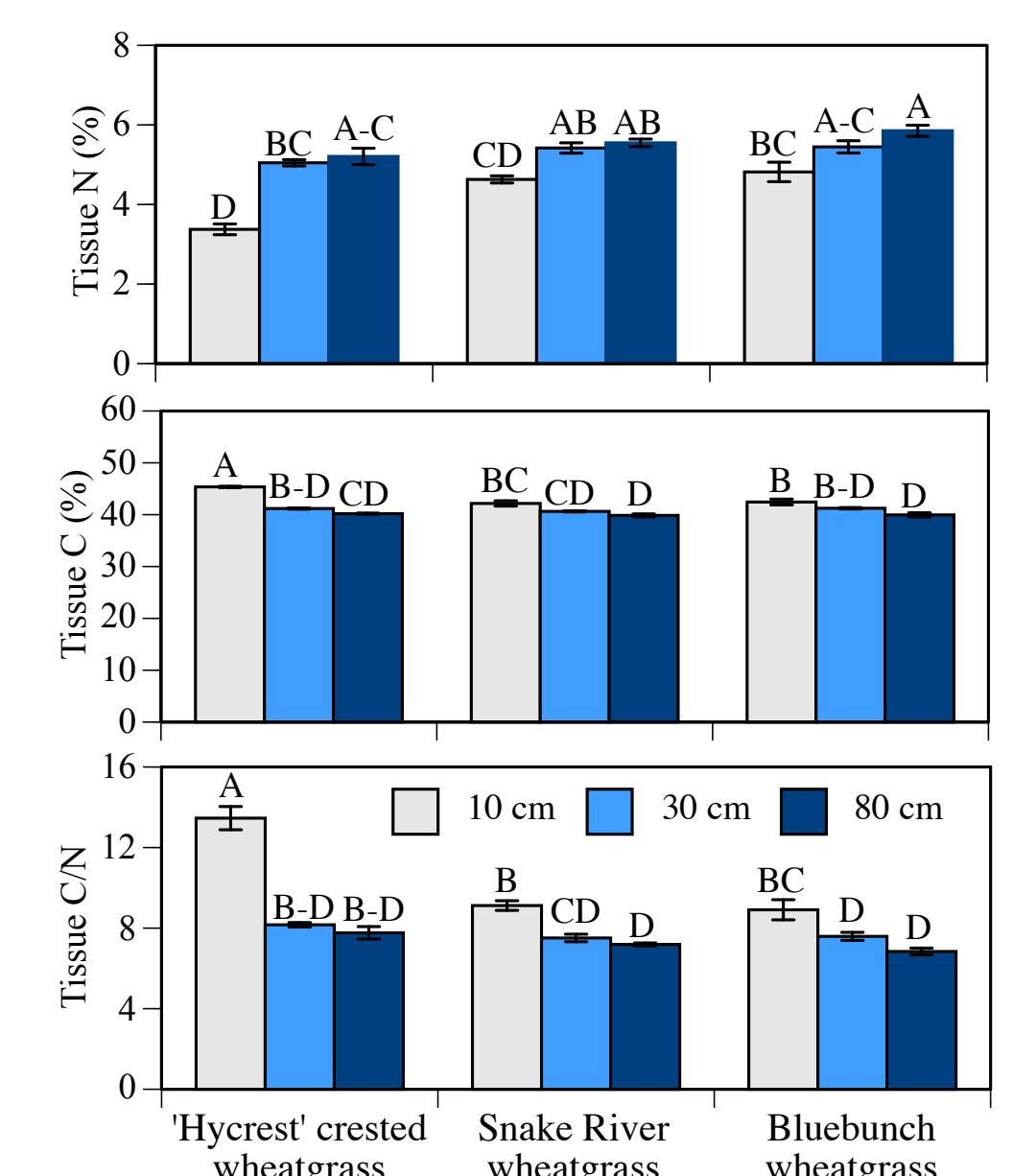


a = established perennial grass; b = highly suppressed cheatgrass at 10 cm; c = cheatgrass at 30 cm; d = least suppressed cheatgrass at 80 cm.

Root Density and Cheatgrass Growth: For cheatgrass sown at 10 cm, a strong asymptotic relationship was evident between perennial grass root density and above-ground cheatgrass biomass. Perennial grass root biomass of roughly greater than 0.5 mg cm⁻³ ('Hycrest' crested wheatgrass) resulted in complete suppression and eventual death of sown cheatgrass.



Cheatgrass Tissue N and C: Cheatgrass plants sown at 10 cm from perennial grasses had lesser N concentration, greater C concentration and greater C/N ratios than cheatgrass sown at 30 or 80 cm from perennial grasses.



Western bluebird hovering over cheatgrass looking for ants to eat.