

Modifying seeding date for successful establishment of bluebunch wheatgrass

Revegetation using native perennial grasses are often unsuccessful due to environmental factors like seasonal drought or competition between seedlings of weedy species and seedlings of native perennial grasses. Revegetation of weed-infested rangeland typically involves applying herbicide to control weeds in the summer or fall; herbicide application is followed by seeding of native species in the fall of the same year. Seeded native perennial grasses remain dormant throughout winter and emerge the following spring. The objective of this project was to examine whether fall or spring seeding results in the best establishment of the native perennial grass bluebunch wheatgrass (*Pseudoroegneria spicata*), and how late seeding could occur in the spring and still result in acceptable bluebunch wheatgrass establishment.



Fall	11/8/15
S1	4/1/16
S2	4/7/16
S3	4/13/16
S4	4/21/16
S5	4/29/16
S6	5/5/16
S7	5/12/16

Our study was conducted at two sites near Bozeman, MT. Both sites were fallow crop fields at MSU’s Post and Fort Ellis Research Farms. Eight seeding treatments of bluebunch wheatgrass included one fall and seven spring dates (table, left). Seeds were hand-seeded at 667 seeds/m² (19 pounds/A) into 1 x 1 m plots. Hand-pulling was used to control weeds.

About 15,000 seedlings emerged over 12 weeks during spring 2016. Across all seeding dates, emergence ranged from 2 – 30%, with an average of 12%. Across both sites, seedling survival from June to September 2016 was relatively high (50 – 75%). There were no differences in survival among seeding dates at Post Farm and minimal differences at Fort Ellis.

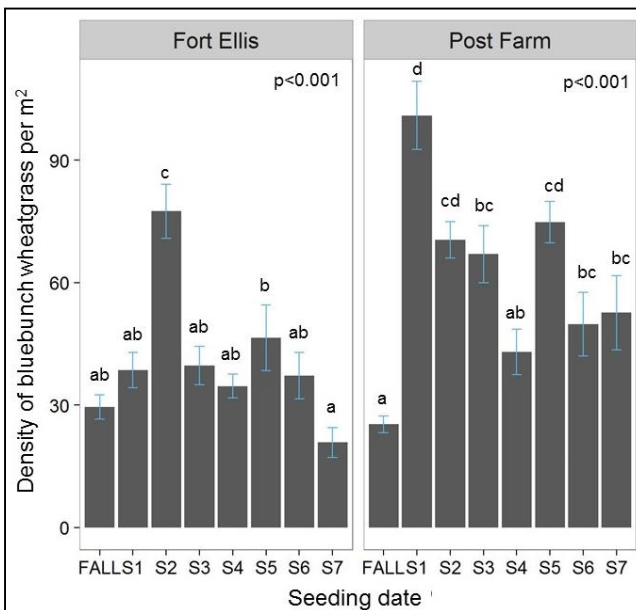


Figure 1: Bluebunch wheatgrass density (plants/m²), September 2016. Differences between seeding groups within a site are indicated by letters and p-values.

We found that fall-seeded plants were bigger (taller, more reproductive stems, and more tillers or stems) than spring-seeded plants at Post Farm. At Fort Ellis, fall-seeded plants and S1 plants were the biggest. Early spring-seeded plants were more numerous (higher density) than fall-seeded or late spring-seeded plants (Figure 1). Specifically, S2 had the highest density at Fort Ellis with 80 plants/m². At Post Farm, S1, S2 and S5 had the highest average density of 95, 77, and 80 plants/m², respectively. Overall, we found that fall-seeded plants were larger in size but less numerous than spring-seeded plants.

Fall or early spring seeding resulted in good establishment of bluebunch wheatgrass. Our results are limited to bluebunch wheatgrass, though, and other native grasses may differ in optimal timing of seeding. In addition, establishment of native perennial grasses may be more challenging in more natural settings, compared to our fallow fields, where seedlings have to

compete with weedy species. In spite of these limitations, our study shows that land managers can continue to implement fall seeding or delay seeding to early spring for effective grass establishment during revegetation. We expanded this study by seeding cheatgrass and spotted knapweed into our plots to see how bluebunch wheatgrass seeding date influenced weed invasion. Stay tuned for results in a future Monthly Weed Post!

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Test your knowledge of modifying seeding date

EGMENCREE

_____ variable ranging from 2-30%, measured during spring

RDGTUOH

_____ environmental condition that can spell doom for revegetation

IAEESGOPTAINAURPDREC
OS

_____ -
_____ scientific name of focal native perennial grass (so you can spell it, but can you pronounce it?)

IVSAULR

_____ this variable was surprisingly high at 50-75%

GIBREG

_____ fall-seeded plants were _____ than spring-seeded plants

NUUSOMER

_____ spring-seeded plants were more _____ than fall-seeded plants

WOLLAF

_____ type of field where study was conducted

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
http://msuinvasiveplants.org/extension/monthly_weed_post.html

