The Influence of Plant Functional Group Removal on Succession in Wyoming Big Sagebrush Communities

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Predicting plant community recovery following disturbance is a major hurdle facing rangeland managers. The objective of our study was to identify the rate of short-term (<10 years) floristic changes following removal of plant functional groups in Wyoming big sagebrush communities. We used a randomized block design with 5 blocks. Response data were collected in 1999-2005. Treatments imposed on 6x6 m plots were 1) complete removal of all plant functional groups, 2) perennial grass removal, 3) shrub removal and 4) unaltered. Removal was accomplished by hand application of glyphosate herbicide to the functional group targeted for elimination. We found that post-disturbance functional group composition was strongly biased toward initial functional group dominance of the post-disturbance environment. On shrub removal plots, we estimated that shrub recovery (to unaltered levels) would take 30 years. On perennial grass removal plots perennial grass recovery would take 19 years. When all functional groups were removed, cover of annual forbs and grasses, and shrubs (cover) recovered within 8 years, but perennial grass recovery took 30 years. Perennial forbs were unaffected ($p > 0.05$) by treatment. Our results can be used as baseline data to guide and prioritize restoration activities in Wyoming big sagebrush communities. The fact that natural recovery of some components occurred within a relatively short post-disturbance time interval (i.e. <10 years) suggests that practitioners can prioritize restoration or rehabilitation efforts based on post-disturbance composition.

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