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The effects of root enhancement seed technologies and timing of seeding on Wyoming big sagebrush establishment
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Sagebrush (*Artemesia tridentata ssp. wyomingensis)* is an integral component of the sagebrush steppe landscape across the West as it provides habitat and forage to many iconic species. Establishing sagebrush is essential to successful reclamation in the sagebrush steppe. However, this can be difficult to do by seed as sagebrush tends to establish episodically during infrequent years with high spring precipitation. We have been developing a possible approach to increase sagebrush restoration success in the form of "root enhancement" seed technologies. These are targeted treatments for sagebrush seed designed to enhance root growth – and therefore drought tolerance – early in the first growing season. We have conducted iterative lab trials looking at the effects of these technologies on root and shoot length and dry biomass and have identified a few promising technologies that increased root length and root biomass. We then tested these at reclamations of varying ages in central Wyoming. Our field results have been mixed. No seed technology that we have tested has significantly increased survival overall, but we have demonstrated that some seed technologies increase mid-season survival, indicating some benefit to the seedlings. We have consistently found that regardless of seed technology, reclamation age plays an important role in sagebrush establishment. Fresh reclamations have the lowest emergence and highest survival rates, while older reclamations have higher emergence and lower survival rates. One year old reclamations have an ideal balance of emergence and survival and seeding at that time could be an alternative strategy to improve success. Our research suggests that these seed technologies and appropriate timing of seeding could be a viable pathway to improving sagebrush restoration success and are worthy of continued research.
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