

Cheatgrass seed banks 30 years after the Hallelujah Junction wildfire

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INTRODUCTION

The Hallelujah Junction wildfire occurred on the Nevada-California border in July 1973. The fire burned in degraded big sagebrush (*Artemisia tridentata*)/bunchgrass communities with a significant understory of cheatgrass (*Bromus tectorum*). The shrubs had been damaged by an out-break of the sagebrush defoliator moth (*Aroga websteri*). Ignited by a dry lightning storm, the fire burned for about 1 week and covered about 16,000 hectares. On sites where the slope and rock cover permitted the use of rangelands drills, a mixture of crested and pubescent wheatgrass (*Gramineae, Poaceae Agropyron intermedium* var. *trichophorum* (Link) Halac.), sainfoin (*Onobrychis viciifolia*), alfalfa (*Medicago sativa*) and fourwing saltbush (*Atriplex canescens*) were seeded in the spring of 1975. The seeding was considered successful on most of the sites. It was so successful the available forage production exceeded demand for 25 years. There are islands in the predominant soil type where seeding was not conducted because of problems with turning the multiple drill hitches used in the seeding operation. Twenty-nine years after the wildfire and seeding, we used a bioassay technique to determine the number of germinate-able cheatgrass seeds per unit area of seedbed.



METHODS

Samples were taken from sites that were originally seeded and maintain a dominance of perennial grasses and sites of the same ecological potential that were not seeded and are currently dominated by cheatgrass.



Literature cited

Evens, R. A. 1961. Effects of different densities of downy brome (*Bromus tectorum* L.) on the growth and survival of crested wheatgrass (*Agropyron desertorum*) in the greenhouse. Weeds 9:216-223.

RESULTS

There is a striking difference in the seedbank between the area seeded 30 years ago and the unseeded site in the same general location. From the control bioassay (no enhancement) the not seeded area had cheatgrass (*Bromus tectorum* L.) seedlings emerge per square foot of surface seedbed. Enrichment of the germination substrate with gibberellin and potassium nitrate increased the cheatgrass seedling emergence to per square foot. This increase of seedling emergence indicates many of the cheatgrass seeds in the seedbank were initially dormant.

TREATMENT	SEEDLINGS PER SQAURE FOOT
Control	230 c
Gibberellin	430 a
Potassium Nitrate	320 b
Gibberellin & Potassium Nitrate	160 d

COLLECTION SITE	SEEDLINGS PER SQAURE FOOT
Upland not Seeded	540 a
Upland Seeded	10 c
Lowland not Seeded	320 b
Lowland Seeded	60 c

CONCLUSION

More germinate-able seeds were found in the seedbed of unseeded sites compared to sites seeded 30 years prior. Yet the seeded sites still maintain an undesirable seedbed with many germinate-able seeds with the potential to establish after any disturbance such as another fire. This demonstrates the importance of weed control after a fire disturbance even when the fire occurs within a previously seeded site that maintained an established seeded community. To put this in perspective, 4 cheatgrass seedlings per square foot (40 / m²) can severely inhibit the establishment of seedlings of perennial shrubs and grasses on rangelands in the Great Basin (Evens 1961).

In comparison to cheatgrass the seedling emergence of forbs (herbaceous broadleaf species) was very low. There were also no perennial grass seedlings emerging from the non-seeded bioassay. It has been 30 years since the burned site and there is no apparent recruitment of native perennial grasses. The apparent near total lack of seedbank of perennial grasses illustrates how hard it is for these burned areas to recover from disturbance. The seedbed did have seedling emergence of crested wheatgrass (*Agropyron desertorum* [Fisher] Schultes) when the germination substrate was enriched with gibberellin. The number of seedlings emerging was small, but the site has the ecological potential only to support about one established perennial grass plant per square foot.

It is not remarkable that the restoration seeding that was done 30 years ago still has such a profound influence on the seedbank of the Hallelujah Junction wildfire area. Such evidence of long term influence from restoration activities is sometimes rare though. Even though the presence of perennial grasses has greatly suppressed the size of the cheatgrass seedbank, weed control would still be necessary to permit the establishment of seedling of perennials if the existing stand of perennials was destroyed.