THE EFFECT OF MICRO-NUTRIENTSEED TREATMENT ON PERENNIAL GRASS EMERGENCE AND ESTABLISHMENT

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ABSTRACT

Restoration of disturbed sites to mitigate environmental degradation is consuming an increasingly amount of natural resource managers time. In semi-arid and arid environments, restoration seedings are often very difficult to establish. Managers who have become frustrated with seeding failures using conventional methodologies are experimenting with non-conventional, often propriety seed treatments in an attempt to enhance seedling establishment. Managers sometimes report excellent seedling establishment using these propriety products, but the lack of experimental designs using replications, data collection, and the use of control treatments makes it impossible to assign cause and effect with any level of statistical precision. We evaluated the micro-nutrient seed treatment GERM-N-8® on seedling emergence and establishment of 8 native and 1 introduced perennial grass at two separate locations in northwestern Nevada. Seedling emergence and growth was followed for 2 years after seeding. A randomized block design with 3 replications yielded that initial emergence of grass seedlings was significantly (P ≤ 0.05) higher with the micro-nutrient treatment at one location. There were no significant differences in seedling establishment or persistence at either site.

INTRODUCTION

Resource managers have become increasingly frustrated with restoration seeding failures in semi-arid and arid environments. In response to this frustration, some resource managers have attempted restoration seedings using non-conventional methodologies such as propriety seed treatments. The exact nature of these propriety treatments is often confidential, but they generally consists of either nutrient or micro-nutrient enrichment or inoculation with unspecified micro-organisms. One of the more popular propriety seed treatments used in Nevada is GERM-N-8®. The product is a suspension of nutrients (nitrogen 2%, phosphorus 14%, and potassium 3%) applied to dry seed at a rate of 182 g per 45 kg of grass seed. Resource managers often report excellent success using these propriety treatments, but lack of experimental design makes it impossible to assign cause and effect.

METHODS

Dry seed of 8 native and 1introduced perennial grass (Table 1) were treated with the propriety seed treatment GERM-N-8® at rate of 182 g per 45 kg of each seed species. Treated and untreated seed was seeded by hand in October 2001 at a rate of 12 seeds per 1' row, or 120 seeds per row in a 10' plot and replicated 3 times at 2 separate locations in northwestern Nevada. The first location is located at Beddell Flat, 30 miles north of Reno, Nevada at an elevation of 5,080' and received an average of 8.5" of precipitation over the 2 years of this study as indicated by a rain gauge at the study site. The site is dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) with a Thurber's needlegrass (*Achnatherum thurberianum*) understory. The second site is also located about 30 miles north of Reno at a higher elevation, 5,840', and is referred to as Granite Peak. The site received an average of 10.6" of precipitation over the 2 year study as measured by a rain gauge at the study site. The habitat is dominated by mountain big sagebrush (*Artemisia tridentata vaseyana*), with an understory of Thurber's needlegrass, Idaho fescue (*Festuca idahoensis*), squirreltail (*Elymus elymoides*), and bluegrass (*Poa secunda*). Treatments were read monthly from October 2001 through August 2003 as initial sprouting, mortality, and persistent establishment were recorded.

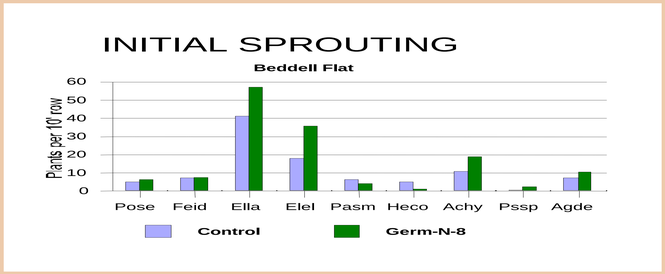

Figure 1a. Initial sprouting of perennial grass seedlings at the Beddel Flat study site.

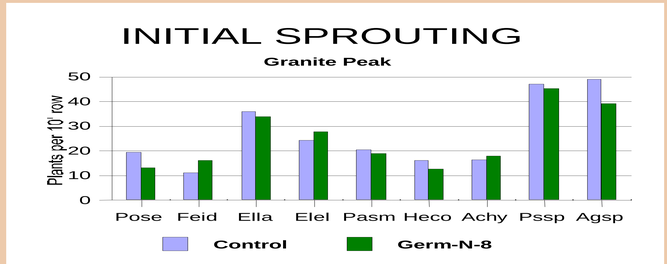

Figure 1b. Initial sprouting of perennial grass seedlings at the Granite Peak study site.

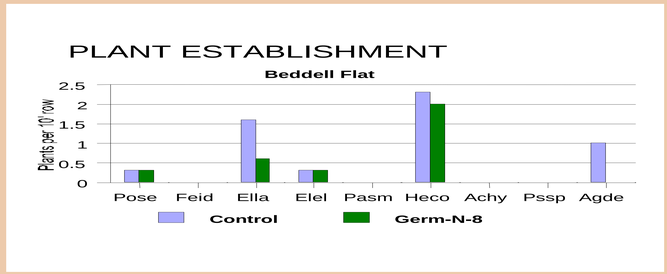

Figure 2a. Recorded perennial grass establishment at the Beddell Flat study site.

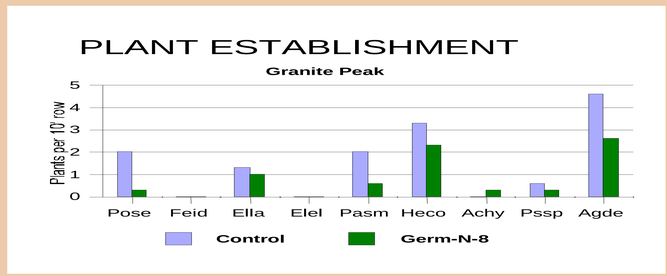

Figure 2b. Recorded perennial grass establishment at the Granite Peak study site.

RESULTS and DISCUSSION

The initial sprouting of squirreltail (Elel), needle-and-threadgrass (Heco), and bluebunch wheatgrass (Pssp) perennial seedlings were significantly (P ≤ 0.05) greater when treated with GERM-N-8® at the Beddell Flat study site (**Fig 1a, 1b**). This did not hold true at the Granite Peak site or for the other species tested at either site. The application of treating these perennial grass seeds with GERM-N-8® did not significantly (P ≈ 0.05) enhance seedling establishment. In fact, thickspike wheatgrass (Ella) at the Beddell Flat site, and crested wheatgrass (Agde) at the Granite Peak site had significantly (P ≤ 0.05) more establishment than their treated counter parts (**Fig. 2a, 2b**).

Nitrate nitrogen is the ingredient most likely to enhance grass seed germination. The application rate of 3 mg of 0.3% nitrate nitrogen in this propriety product is far below the rate of enrichment that has been shown to enhance grass seed germination in the laboratory. Resource managers may very well be visually experiencing increased success using some of these propriety products as favorable climate conditions, site potentials, and other factors can play an important role in any seeding success or failure, but without proper experimental design and analysis it is impossible to assign any statistical significance. We are currently experimenting with important browse species used in restoration efforts, among those is 'Immigrant' Forage Kochia (*Kochia prostrata)* which has been reported to benefit from the application of GERM-N-8®.

Table 1. Common name, scientific name, and abbreviation of perennial grass seedlings.

Common Name	Scientific Name	(Abbr)
Big Bluegrass	*Poa secunda*	(Pose)
Idaho Fescue	*Festuca idahoensis*	(Feid)
Thickspike Wheatgrass	*Elymus lanceolatus*	(Ella)
Squirreltail	*Elymus elymoides*	(Elel)
Western Wheatgrass	*Pascopyrom smithii*	(Pasm)
Needle-and-Threadgrass	*Hesperostipa comata*	(Heco)
Indian Ricegrass	*Achnatherum hymeniodes*	(Achy)
Bluebunch Wheatgrass	*Psuedoroegneria spicata*	(Pssp)
Crested Wheatgrass	*Agropyron desertorum*	(Agde)