Concept Changes Regarding the Use of Interseeding Practices to Correct Problems in Grassland Ecosystems

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Grass plants, grazing mammals, and grassland ecosystem processes have evolved together. During the long period of coevolution, grass plants developed mechanisms that provide resistance to grazing. A complex system of symbiotic rhizosphere organisms that has numerous trophic levels and is critical for ecosystem functions and for energy and nutrient flow through the ecosystem developed in conjunction with the evolution of plants. Defoliation by herbivores that is properly timed with grass phenological growth stages beneficially manipulates grass growth and development and rhizosphere organism activity (Manske 1999). Grassland ecosystems with a high biomass of active rhizosphere organisms produce greater quantities of herbage biomass than ecosystems with low rhizosphere organism biomass. Stimulating the defoliation resistance mechanisms and rhizosphere organism activity with biologically effective grazing management increases herbage biomass production on grassland ecosystems an average of 30% to 45% greater than the herbage biomass production on grasslands managed with traditional practices (Manske 2003).

Traditional grazing management practices designed for the primary purpose of providing forage for livestock do not beneficially stimulate the defoliation resistance mechanisms of grass plants. After long-term use of traditional management practices, herbage production on native grassland ecosystems decreases substantially below potential. This reduction in herbage biomass is a major detriment to the beef production industry.

The low herbage production observed on grasslands managed with traditional practices has long been assumed to be the result of problems inherent within the grassland ecosystem, and it was commonly believed that if alfalfa could be seeded into these degraded grasslands, their herbage production would be greatly increased. Efforts to achieve this increase in herbage biomass were confounded because interseeding productive plant material into grasslands is considerably more problematic than seeding into cropland.

Investigations into the development of techniques and mechanical processes for interseeding plant material within existing plant communities and into the development of strategies to manage interseeded grassland pastures were perceived to be justified because of the potential magnitude of the benefits that would result from improving herbage production on grassland ecosystems. A combination of techniques and mechanical processes that result in the best potential for successful establishment of alfalfa plants interseeded into native grassland ecosystems was developed during the interseeding research program at the Dickinson Research Extension Center.

Interseeding alfalfa into native range pastures, however, does not solve the problem of low herbage production on grasslands. Low herbage production is not the problem itself but a symptom of the problem: antagonistic grazing management practices lead to low activity of the symbiotic rhizosphere organisms. The reduced rhizosphere activity causes decreased nutrient flow in the ecosystem, and this restriction of nutrients leads to the decrease in herbage biomass production.

Research results designed to treat a symptom of a problem do not correct the problem. The problem of low herbage production on grassland ecosystems can be corrected with the implementation of biologically effective grazing management that coordinates defoliation with grass phenological growth stages (Manske et al. 2003) to stimulate the defoliation resistance mechanisms (McNaughton 1979, 1983; Briske and Richards 1994, 1995) and the activity of the symbiotic rhizosphere organisms (Coleman et al. 1983, Manske 1994). Biologically effective grazing management corrects the biological and ecological problems caused by antagonistic management of grassland ecosystems and thereby eliminates the need for interseeding alfalfa into native grassland pastures.

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