DISTRIBUTION, DENSITY, AND VIABILITY OF THE SOIL SEEDBANK OF A FERAL POPULATION OF ALFALFA (*MEDICAGO SATIVA SUBSP. FALCATA*) IN MIXED-GRASS PRAIRIE

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ABSTRACT

Distribution, density, and viability of a soil seed bank can provide insight into various aspects of ecology and population dynamics, in particular, the potential for a species to disperse, establish, and persist in a plant community. Our objectives were to determine spatial distribution pattern and viability of the seed bank of a feral alfalfa population, and to examine the relationship between the density of the alfalfa seed bank and plant communities in the native mixed-grass prairie. The study was conducted on the Grand River National Grassland in SD during 2004 through 2006. Two sites where alfalfa distribution has been concentrated were sampled. Two permanent transects were established on each site along environmental gradients. Distinctive plant communities were identified along each transect and between two transects areas along the environmental gradients in each site. In each community, ten 0.25 m$^2$ quadrats were randomly located and cover by species was recorded. Within each quadrat, three soil seed bank samples were extracted using a bulb planter (5 cm dia. X 7.5 cm depth). Alfalfa seeds were removed from soil and counted. Germination and viability were determined by AOSA testing procedures. Spatial distribution of alfalfa seed bank was associated with plant communities, which varied with topographic position, soil texture, and soil moisture gradients. Alfalfa seed density was strongly correlated with alfalfa cover. The highest alfalfa seed density was more than 39,000 seeds m$^{-2}$, which is about 790 kg ha$^{-1}$. Greater than 99% of alfalfa seeds collected from the soil seed bank were viable.