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Is Altering Grazing Selectivity of Invasive Forage Species With Patch Burning More Effective Than Herbicide Treatments?

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Abstract

Invasion of rangeland by exotic forage species threatens ecosystem structure and function and can cause catastrophic economic losses. Herbicide treatments often are the focus of management efforts to control invasions. Management with the fire-grazing interaction (or patch burning) might suppress an invasive forage species that has grazing persistence mechanisms developed apart from the fire-grazing interaction. We studied tallgrass prairies invaded by sericea lespedeza (*Lespedeza cuneata* [Dum.-Cours.] G. Don) to compare rate of invasion between traditional management and management with patch burning, to evaluate the effect of burn season on sericea lespedeza invasion within pastures managed with patch burning, and to correlate canopy cover of sericea lespedeza to canopy cover of other functional groups with and without herbicides. Sericea lespedeza canopy cover increased from 1999 to 2005 in both traditional- and patch-burn pastures, but sericea lespedeza increased from 5% to 16% canopy cover in traditionally managed pastures compared to 3% to 5% in the patch-burn pastures. Rate of increase in canopy cover of sericea lespedeza was less in patches burned in summer ($0.41\% \cdot \text{year}^{-1}$) than in patches burned in spring ($0.58\% \cdot \text{year}^{-1}$) within patch-burn pastures. Most plant functional groups, including forbs, were weak-negatively correlated with canopy cover of sericea lespedeza. Although herbicide application reduced mass of sericea lespedeza, other components of the vegetation changed little. Herbicide treatments temporarily reduced sericea lespedeza but did not predictably increase other plant functional groups. Patch burning reduced the rate of invasion by sericea lespedeza by maintaining young, palatable sericea plants in the burn patch, and could play a vital role in an integrated weed management strategy on rangelands.

Resumen

La invasión de los pastizales por especies forrajeras exóticas amenaza la estructura y función de los ecosistemas, y pueden causar pérdidas económicas catastróficas. Los tratamientos con herbicidas a menudo son el enfoque de las acciones de manejo para controlar las invasiones. El manejo con la interacción apacentamiento/fuego (o quema de parches) pudiera suprimir una especie forrajera invasora con mecanismos de resistencia al apacentamiento desarrollados aparte de la interacción apacentamiento/fuego. Estudiamos praderas de zacates altos invadidas por “Sericea lespedeza” (*Lespedeza cuneata* [Dum.-Cours.] G. Don) para comparar la tasa de invasión entre el manejo tradicional y el manejo con quema de parches, para evaluar el efecto de la época de quema en la invasión de “Sericea lespedeza” dentro de praderas manejadas con quema de parches, y correlacionar la cobertura de copa de “Sericea lespedeza” con la cobertura de copa de otros grupos funcionales con y sin herbicidas. De 1999 al 2005, la cobertura de copa de “Sericea lespedeza” se incrementó tanto en los potreros con manejo tradicional como en los de quema de parches, pero la “Sericea lespedeza” aumentó su cobertura de copa de 5% a 16% en los potreros manejados tradicionalmente y de 3% a 5% en los que recibieron quema de parches. Dentro de las praderas con quema de parches, la tasa de incremento de la cobertura de copa de “Sericea lespedeza” fue menor en los parches quemados en verano ($0.41\% \cdot \text{año}^{-1}$) que en los quemados en primavera ($0.58\% \cdot \text{año}^{-1}$). La mayoría de los grupos funcionales, incluyendo las hierbas, estuvieron débilmente correlacionados negativamente con la cobertura de copa de la “Sericea lespedeza.” Aunque la aplicación de herbicida redujo la biomasa de “Sericea lespedeza,” los otros componentes de la vegetación cambiaron poco. Los tratamientos de herbicida redujeron temporalmente la “Sericea lespedeza,” pero no incrementarían, en forma predecible, los otros grupos funcionales de plantas. La quema de parches redujo la tasa de invasión de “Sericea lespedeza” al mantener dentro de los parches quemados plantas de jóvenes y apetecibles de “Sericea lespedeza,” y pudiera jugar un papel vital en una estrategia de manejo integrado de maleza en los pastizales.

Key Words: Chinese bush clover, disturbance ecology, fire ecology, grazing management, heterogeneity, herbivory, invasion, macro-ecology, sericea lespedeza

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INTRODUCTION

Invasive plant species alter native plant communities, and their rate of invasion depends upon the structure of native communities they invade (Woods 1993; Morgan 1998; Symstad 2000; Brandon et al. 2004). In addition, the total

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