

Management of Invasive Species: *Sericea Lespedeza* Insights from an Optimization Model

J. Tanner Lampe

*College of Engineering
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Abstract: Native grasslands in the Great Plains are threatened by the spread of *Sericea* (*Lespedeza cuneata*). *Sericea* is a non-native legume originating from Asia. *Sericea* infestations negatively impact the forage value and hay production from grasslands resulting in substantial economic losses to landowners. Furthermore, this invasion threatens the integrity of native and restored prairies as it chokes out native flora and alters the habitat. Although herbicides are available, effective control can be expensive because of the scale of the problem and the necessity of iterated application to combat the plant's long-lived, extensive seedbank. Herein proposed is an optimization model to find economically efficient strategies to control the invasion of *Sericea*. Using empirical data, the model accounts for population growth rates, carrying capacity, seed dispersal, treatment costs, and economic loss due to invasion. The model is then utilized to minimize the discounted sum of damages, prevention/restoration, and control costs over time subject to two constraints: the spread of invasive species over space and time and the cost of resources to control and prevent *Sericea*. Results from model reflecting the outcome of different management scenarios are presented to give insight to economically efficient strategies for controlling *Sericea* in the Great Plains.

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