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Research Note

Growth Regulator Herbicides Prevent Invasive Annual Grass Seed Production Under Field Conditions

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Abstract

Growth regulator herbicides, such as 2,4-D, dicamba, picloram, and aminopyralid, are commonly used to control broadleaf weeds in rangelands, noncroplands, and cereal crops. If applied to cereals at late growth stages, while the grasses are developing reproductive parts, the herbicides often reduce cereal seed production. We are researching methods for using this injury response to control invasive annual grasses in rangelands by depleting their short-lived seed banks. In a previous greenhouse study, we found picloram and dicamba reduced seed production of the invasive annual grass Japanese brome (*Bromus japonicus* Thunb.) by nearly 100%. However, this promising greenhouse finding needs to be corroborated in the field before growth regulators can be confidently recommended for invasive annual grass control. This research note describes a study conducted in eastern Montana suggesting growth regulators may provide excellent control of invasive annual grasses. Specifically, we found typical use rates of aminopyralid and picloram reduced Japanese brome seed production by more than 95% (based on sample means) when applied at three different plant growth stages. This promising result contributes to the accumulating body of evidence suggesting growth regulators may control invasive annual grasses.

Resumen

Los herbicidas reguladores del crecimiento tales como el 2-4D, dicamba, picloram y aminipyralid se utilizan comúnmente para controlar las malezas de hoja ancha en pastizales, en cultivos de cereales así como en no cultivos. Si se utilizan en cereales en las etapas finales de crecimiento, cuando los pastos están desarrollando las partes reproductivas, estos herbicidas reducen a menudo la producción de semilla de los cereales. Estamos investigando métodos para utilizar esta respuesta de lesión para controlar pastos invasivos anuales en pastizales por medio de la disminución del banco de semillas de corta duración. En estudios previos de invernadero encontramos que el picloram y dicamba disminuyen las producción de semilla del pasto anual invasivo el bromo Japonés (*Bromus japonicus* Thunb.) casi en un 100%. Sin embargo estos estudios en el invernadero que son muy prometedores necesitan corroborarse en situaciones de campo antes de que los reguladores del crecimiento puedan recomendarse con la finalidad de controlar los pastos anuales. Esta investigación describe un estudio realizado en la parte oriental de Montana que propone el uso de los reguladores de crecimiento para control efectivamente los pastos anuales invasivos. Específicamente, encontramos que niveles típicos de aminopyralid y picloram disminuyen la producción de semilla del bromo Japonés en más de 95% (basándose en el promedio de las muestras) cuando se aplicó en tres estados diferentes de crecimiento. Estos resultados son prometedores y sugieren que los reguladores de crecimiento pueden controlar las gramíneas anuales invasivas.

Key Words: Aminopyralid, *Bromus japonicus* Thunb., Japanese brome, picloram, seedbank, seed development, weed control, weeds

INTRODUCTION

Exotic annual grasses such as cheatgrass (*Bromus tectorum* L.), medusahead (Taeniatherum caput-medusae L.), and Japanese brome (*Bromus japonicus* Thunb.) are negatively impacting millions of hectares of rangeland in the western United States (Sheley and Petroff 1999; DiTomaso 2000; Sperry et al. 2006; Davies and Svejcar 2008). The most widely used classes of herbicides for controlling annual grasses are amino acid synthesis inhibitors (e.g., glyphosate, imazapic) and photosynthetic inhibitors (e.g., tebuthiuron). These herbicides are expensive to apply to large areas, but they can temporarily suppress invasive annual grasses (Whitson and Koch 1998; Shinn and Thill 2002), and desirable rangeland species often increase during periods when invasive annual grass populations are suppressed (Haferkamp and Heitschmidt 1999; Ogle et al. 2003). However, these herbicides often kill desirable forbs and shrubs in addition to sometimes injuring (e.g., stunt, discolor) and killing the desirable perennial grasses that grow with invasive annual grasses (Lym and Kirby 1991; Shinn and Thill 2004).

We are researching methods for using a different class of herbicides (growth regulators) to control invasive annual grasses. Like currently used herbicides, growth regulators often kill desirable forbs and shrubs or cause them to have reduced

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