Response of African Rue and Associated Vegetation to Herbicides
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INTRODUCTION
African rue (Peganum harmala) is an invasive perennial weed that is spreading in New Mexico (Figure 1). African rue typically occurs where soil has been transported or disturbed, such as roadsides, pipelines and railroads, adjacent to livestock travel routes and watering facilities, and abandoned cultivated fields. It is a Class B weed in New Mexico, and the recommended strategy for management is to control existing populations and prevent spread to new areas. Established populations are persistent and tend to dominate on invaded sites (Figure 2), and the plant is toxic to cattle and sheep. However, this plant is difficult to control. Herbicides provide the greatest control, although the efficacy of herbicides can be influenced by the kind of herbicide, season of application, and plant water stress.

RESULTS

Herbicide Effects on African Rue
• Relative to non-sprayed controls, African rue plants treated with imazapyr and hexazinone were at least 30 to 40% more necrotic at both sites through Fall 2007 (Figure 3).
• Plants treated with metsulfuron were more necrotic than control plants through Fall 2004 at WSMR, and through Fall 2006 at Lazy E (Figure 3).
• Significant interactions of herbicide and application date were detected at both sites (data not shown): Hexazinone was most effective at both sites when applied in June, although the effects of application date for hexazinone were no longer detectable by Fall 2007 at WSMR. Imazapyr was consistently more effective when applied in October at Lazy E and June at WSMR. Metsulfuron treatments at Lazy E were most successful when applied in October, but effects of application date were not observed at WSMR. Target African rue plants treated with hexazinone and imazapyr were significantly smaller than control plants at both sites through Fall 2007. Metsulfuron reduced the size of target plants at Lazy E only (data not shown).

Moisture status of the soil at the time of herbicide application had no effect on plant response to herbicides (data not shown).

Density of African Rue Seedlings
• Hexazinone reduced the density of African rue seedlings through Fall 2007 at WSMR compared to all other treatments (Figure 4).
• Imazapyr and metsulfuron reduced the density of African rue seedlings at WSMR only in Fall 2004.
• Few African rue seedlings and no herbicide effects were observed at Lazy E.

Herbicide Effects on Associated Vegetation
• Grasses were more prevalent at WSMR than at Lazy E throughout the project (Figure 5).
• Hexazinone reduced grass density at WSMR by 64% to 74% compared to non-treated controls, and imazapyr reduced grass density by 33 to 36% at that site (Figure 5).
• Metsulfuron did not reduce grass density compared to non-sprayed controls.
• Grass response varied with herbicide, but was not affected by application date at either site (data not shown).

Forbs were more prevalent at Lazy E than at WSMR throughout the project (Figure 6).
• Hexazinone reduced forb density at both sites through Spring 2007 (Figure 6).
• Forb density was not affected by imazapyr or metsulfuron at either site.

ACKNOWLEDGEMENTS
Authors would like to thank David Anderson, Greg Bettman, Irene Calderon, Carol Lange, Dr. Johnny Manuthavan, John Moony, Matthew Pinch, Emily Pollak, and Amber Voth for assistance. This work was funded by USDA/ARS agreement 2003-34410-13096, the USDA/CSREES Special Grant on Rangeland Ecosystems, and the New Mexico Agricultural Experiment Station, New Mexico State University, Las Cruces, NM.