NEWS from the CENTER FOR INVASIVE PLANT MANAGEMENT

Full story from the February 2009 issue

Research Findings: Leafy Spurge

The following journal articles are highlighted as useful resources for land managers who want to expand their knowledge of current research and applications to invasive plant management. Abstracts of published papers typically can be viewed online for free, but full articles often require a paid subscription.

This month, we focus on leafy spurge. Brief descriptions of research findings for the following papers are provided.

A bioeconomic model of cattle stocking on rangeland threatened by invasive plants and nitrogen deposition. David Finnoff, Aaron Strong and John Tschirhart. *American Journal of Agricultural Economics.* 2008. 90:1074. View Paper

It is commonly accepted that non-native plant species often invade areas that are disturbed or degraded. Because uninvaded rangelands and the growth of desirable grasses provides the livelihood for ranchers, most of them work hard to assure cattle are stocked at a rate that does not degrade the land and lead to invasion. Finnoff et al. however, point out that increased nitrogen deposition may also threaten the productivity of rangelands and lead to invasion of nonnative species even without overgrazing. The authors argue that changes in plant successional thresholds are due to interplay between nitrogen deposition and stocking rates, and that overstocking can create ecosystem niches for invaders.

Integrating Flea Beetles (*Aphthona* spp.) with Herbicide and Grasses for Leafy Spurge (*Euphorbia esula*) Management. Ankush Joshi. *Weed Technology.* 2008. 22:523. View Abstract

The utility of integrated management for leafy spurge control was demonstrated in a 5-year study in North Dakota grasslands. In this study, plots infested with leafy spurge (*Euphorbia esula*) were treated with fall application of imazapic herbicide (105 g ai/ha or 0.094 lb ai/ac), seeding of native grasses, biological control (*Aphthona* beetles), or combinations of these. Leafy spurge reestablished after a single application of imazapic, but was maintained at a mean density of <11 stems per meter squared when the *Aphthona* beetles established or the plot was interseeded with native grasses. The density of *Aphthona* beetles declined with the declining spurge population, but the remaining beetles, in combination with native grass competition, continued to suppress leafy spurge. The author suggested that herbicide application can thin leafy spurge populations enough to allow native

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grasses to establish, and biological control with *Aphthona* beetles provides a competitive advantage for the grasses, leading to long-term spurge control.

Leafy Spurge Suppression by Flea Beetles in the Little Missouri Drainage Basin, USA. Luke W. Samuel, Donald R. Kirby, Jack E. Norland, and Gerald L. Anderson. *Rangeland Ecology and Management*. 2008. 61:437-443. View Abstract

Since 1999, *Aphthona* spp. flea beetles have been collected and redistributed throughout the Little Missouri River basin to control leafy spurge (*Euphorbia esula*). A study was initiated in 2002 to study the effects of the beetles on leafy spurge populations on 292 sites. Results indicated that leafy spurge stem density was reduced on 91% of the sites, and on two-thirds of these sites, stem density was reduced from >100 stems per meter squared to <25 stems per meter squared. Results further indicated that the *Aphthona* beetles had widespread effects on some sites, suppressing leafy spurge over areas as large as 30,000 square meters. The authors stated that the ultimate effect of the *Aphthona* beetles was plant communities that are characterized by an increased occurrence of native perennial grasses in xeric sites and more invasive exotic grasses such as Kentucky bluegrass in mesic areas. In conclusion, the authors suggested that "1) flea beetles are a viable option for leafy spurge suppression, and the continued release of beetles will hasten the process; 2) most sites will have some leafy spurge suppression from introduction of flea beetles; and 3) because the plant communities after leafy spurge suppression are characteristic of undisturbed plant communities, grazing to stimulate graminoid tillering or fall prescribed burning following flea beetle egg laying may be management options applied to hasten restoration of native plant communities."

Soil modification by invasive plants: effects on native and invasive species of mixed-grass prairies. Nicholas R. Jordan, Diane L. Larson, and Sheri C. Huerd. 2008. *Biological Invasions*.10:177-190. View Abstract

It has been suggested that positive feedbacks between invasive plants and soil can contribute significantly to further plant invasions. To test this hypothesis, research was conducted on the invasive species leafy spurge (*Euphorbia esula*), smooth brome (*Bromus inermis*), and crested wheatgrass (*Agropyron cristatum*). Each species was grown separately in pots in a greenhouse through three growth cycles, and then seeds of various species were planted in the pot's soil. Smooth brome and crested wheatgrass exhibited self-facilitation (i.e., seedlings grew better in soil where the species had previously been grown) and they also had facilitative effects on the growth of other invasive species while suppressing two of three native forbs but not native grasses. The effect of leafy spurge conditioned soil was antagonistic to all other species. The results indicate that these invasive species may facilitate further invasion and also impede restoration of native communities even after successful removal of the invasive species. However, results also show that certain forbs (e.g., blue flax, *Linum lewisii*) and native grasses are less affected by invasive species conditioned soil, and thus are good candidates to use for revegetation projects.

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