Bi-annual Summary of Weed Research in and around Montana

Mechanisms driving nonnative plant-mediated changes in small mammal populations and communities (Dan Bachen and Andrea Litt, MSU)**.** The introduction of nonnative plants, such as cheatgrass (*Bromus tectorum* L.), may alter the structure of vegetation and resources for native animals. Our study seeks to quantify how invasion by cheatgrass changes the physical vegetation structure of native sagebrush steppe in southwest Montana and identify the mechanisms by which these changes cause declines of small mammal populations, a pattern that has been seen in other areas invaded by cheatgrass. We will isolate and manipulate density of vegetation, amount of litter, and amount of shrub cover, and quantify the effect on small mammal abundance and diversity. This information, along with other experiments that investigate whether cheatgrass impedes foraging and movement of small mammals, will be used to identify specific mechanisms of small mammal population decline. Contact: Dr. Andrea Litt, andrea.litt@montana.edu

Wild Oat Herbicide Resistance (Bill Dyer, MSU). The Dyer laboratory is studying a line of wild oats (*Avena fatua*) that is resistant to at least four different families of unrelated herbicides that are used for selective control in small grains. Preliminary evidence supports the idea that resistance is based on enhanced herbicide metabolism, which represents the worst case scenario for farmers since these biotypes may already be resistant to herbicides not yet on the market. We hope to understand how this type of resistance evolved and its physiological mechanisms. Results will contribute to successful resistance prevention and management strategies for all agricultural producers. Contact: Dr. Bill Dyer, wdyer@montana.edu

Russian olive removal and revegetation (Erin Espeland, Mark Peterson, Jennifer Muscha, Kevin Delaney: USDA-ARS; Robert Kilian, NRCS). After removing Russian olive trees, does revegetation prevent secondary invasions of other weeds? In large floodplain plots at Ft. Keogh, Miles City, we removed Russian olive trees in April 2011 using a tree shear and applied 1:3 triclopyr to basal bark oil within 15 minutes of the cut. The stump resprout rate was 0.4%. Revegetation plots will be installed spring of 2012 to measure their effect on preventing secondary weed invasion or re-invasion of the site by Russian olive trees. Contact: Dr. Erin Espeland, Erin.Espeland@ARS.USDA.GOV

Impacts of saltcedar on ecosystems in Montana (Dr. Erik Lehnhoff, MSU). The objectives of this research were to evaluate the impacts of saltcedar and its treatment via herbicide on soil chemistry, mycorrhizae (beneficial plant-fungi interactions) and plant communities in Montana. We investigated sites on the Bighorn and Yellowstone Rivers and at Fort Peck Reservation. At Fort Peck, soil salinity was twice as high at saltcedar occupied sites compared to unoccupied ones; at the Bighorn River occupied sites, nitrate, phosphorus and potassium were 2.2, 4, and 1.9 times higher, respectively. The presence of beneficial mycorrhizal fungi was slightly reduced at saltcedar occupied sites. We did not find any effects of saltcedar on the structure, richness or diversity of plant communities. Sites treated with herbicide had greatly reduced plant cover compared to untreated sites. Our results indicate that saltcedar impacts to soil and soil fungi exist in Montana, but are not large. However, saltcedar is a relatively new invader to Montana compared to the Southwest where it is problematic, and it may still be in a lag phase in this northern region. Monitoring of saltcedar populations for spread and impacts is recommended. Contact: Dr. Erik Lehnhoff, erik.lehnhoff@montana.edu

Sulfur cinquefoil life history in northwest Montana (Peter Lesica, Consultant). We followed the fate of sulfur cinquefoil populations from 1998 to 2005 in moist and dry grasslands. Sulfur cinquefoil was long-lived and a prolific seed producer. Projections based on our results indicate that dry grasslands dominated by needle-and-thread grass are capable of supporting much larger populations of sulfur cinquefoil than moist sites dominated by rough fescue. Our results suggest that biological control agents that negatively affect adult survival will be

effective at controlling established sulfur cinquefoil populations, and sulfur cinquefoil has more potential to become dominant in xeric grasslands.

Vegetation surveys to quantify weed threats (Dear Pearson and Yvette Ortega, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT). We are conducting vegetation surveys in grasslands and along roadsides over a large area of west-central Montana from Niarada to Helena to Sula on state, federal, and private lands. We identify and quantify cover for all species in $1m^2$ plots in the hopes of developing an empirical measure of the relative invasiveness of each weed in these systems. Work so far confirms the threats posed by some recognized noxious weeds such as spotted knapweed and St. John's wort, but also indicates the aggressiveness of several species not currently listed as noxious or generally appreciated as strongly invasive. Current samples are relatively small at 440 plots, but we hope to continue this work to develop better data bases if we can obtain future funding. Contact: Dr. Dean Pearson, dpearson@fs.fed.us

Toadflax research (Sharlene Sing USDA Forest Service; David Weaver, Bob Peterson, Eli Hubbard: MSU; Sarah Ward, Colorado State University,). Our group is conducting research on toadflax biocontrol with two highly host specific biotypes of the toadflax stem mining weevil (*Mecinus*). Hubbard's work will address managing for three weed targets: Dalmatian toadflax, yellow toadflax and fertile, aggressively invasive hybrids of Dalmatian and yellow toadflax. Marie Turner, a PhD student at Colorado State University, has been extensively studying the relative invasiveness and fitness of these three toadflax genotypes. George Beck, Sarah Ward and Sharlene Sing, with BLM and FS cooperators will begin assessing potential strategies for integrated hybrid toadflax management using biological and chemical control measures this year. Rosemarie De Clerck-Floate (Agriculture and Agri-Food Canada, Lethbridge, Alberta) and Sharlene Sing, along with collaborators André Gassmann (CABI-Europe Switzerland) and Ivo Toševski (CABI-Europe Serbia) have just completed and submitted a petition to release a new biocontrol agent for yellow toadflax, *Rhinusa pilosa*, a stem galling weevil. Graduate student Emily Barnewall completed an extensive study of the biology, host specificity and impact of this agent last year. Pending APHIS PPQ's review of the petition, limited initial releases of the weevil may occur in the next field season. Contact: Dr. Sharlene Sing, ssing@fs.fed.us

Common tansy control in natural areas (Celestine Duncan, consultant; Jerry Marks, MSU Extension, Mary Halstvedt, Dow AgroSciences). The objective of the research was to evaluate various herbicides for controlling common tansy. Neither Milestone (aminopyralid) alone at 5 or 7 fl oz/ac nor ForeFront R&P (aminopyralid + 2,4-D) at 2.6 pints/ac provided acceptable common tansy control the year of treatment or one year following treatment. Chaparral (aminopyralid + metsulfuron) at rates of 1.5 oz product per acre or higher, Cimarron (metsulfuron) at 0.5 oz product/ac, and Cimarron + Telar (chlorsulfuron) at 0.25 + 0.25 oz product/ac provided excellent common tansy control one year following treatment. On sites having a complex of several weeds such as common tansy and spotted knapweed, Chaparral provides superior control of both weed species compared to either Cimarron or Milestone alone. Contact: Celestine Duncan, weeds1@wildblue.net

Look for more research updates in December 2012. Due to the length of this Weed Post, we must forego the monthly crossword puzzle, but stay tuned for next month: it shall return!

MONTANA STATE UNIVERSITY EXTENSION

Pulling Together Against Noxious Weeds