A Brief Peek at Some Weed Research in and around Montana

Using semiochemicals to manipulate the spatial distribution of weed biocontrol agents (Alex Gaffke, David Weaver, Montana State University; Sharlene Sing USDA Forest Service, Bozeman). Many insects have been introduced as classical biological control agents for weeds. One in particular, a defoliating insect, has been introduced as a biological control agent for a riparian weed. Retaining this species on release sites has been problematic and population growth has been slow in many areas. The use of semiochemicals, such as aggregation pheromones or attractive host plant compounds, could solve these problems. The effectiveness of semiochemicals for increasing this agent aggregation was investigated in field trials. The results of field experimentation indicate weeds treated with semiochemicals attracted and retained higher densities of the defoliating species. Treated weeds not only had higher densities of adults, but also had higher densities of larvae, and showed more damage than control weeds. Application of semiochemicals was also able to focus low density populations of the agent to individual weeds and cause extensive damage. These preliminary results indicate that semiochemicals could be useful in detecting, retaining, and directing populations of biological control agents. *Contact: Alex Gaffke, alexander.gaffke@msu.montana.edu*

Long-term weed monitoring using citizen scientists (Peter Lesica, Missoula). Missoula Parks and Recreation Department and the Montana Native Plant Society established permanent macroplots in three cushion plant communities on exposed sites at the mouth of Hellgate Canyon in June of 2007. We measured the frequency of four noxious weed species (spotted knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), Dalmatian toadflax (*Linaria dalmatica*), and sulfur cinquefoil (*Potentilla recta*)) and seven native species in odd-numbered years through 2013. Eight of ten weed occurrences declined significantly, and the other two remained stable, while only two of the ten native occurrences declined. Cause(s) of the decline of the weeds cannot be ascertained from a descriptive study. However, the declined is believed to be due to the extremely hot and dry summer of 2007. Although the weeds are well adapted to the average Missoula climate on typical grassland soils, they may not be as well adapted as the native species to extreme environments or weather events. *Contact: Peter Lesica, lesica.peter@gmail.com*

Multiple Herbicide Resistant Wild Oat (Erin Burns, Bill Dyer, Fabian Menalled, Erik Lehnhoff, Montana State University, Bozeman). We are currently evaluating the molecular, physiological, and ecological factors that confer multiple herbicide resistance (MHR) in two wild oat (*Avena fatua*) populations from Montana. The wild out populations used in this research are resistant to five different herbicide families that are used to control wild oat in small grains. The first objective of this research is to study how MHR wild oat responds to environmental and biological stressors. This experiment is currently being conducted at the Arthur H. Post Research Farm near Bozeman, MT. Treatments include combinations of two spring wheat seeding rates, four nitrogen fertilizer rates, and three wild oat populations (one herbicide susceptible (HS), two MHR). Spring emergence, survival post herbicide treatment, and seed production of wild oat populations were evaluated. Preliminary results indicate that high wheat seeding rate in combination with high nitrogen fertilizer rate reduced MHR wild oat seed production. The second objective of this study is to examine if MHR wild oat metabolizes herbicides differently than HS wild oat. Plants will be treated with the recommended field dose of an herbicide from one of the five herbicide families the population is resistant to and harvested 0, 24, and 48 hours after herbicide treatment. Leaf tissue from harvested plants will be sent to the Mass Spectrometry, Proteomics and Metabolomics Facility at Montana State University for metabolite detection. Initial results from plants treated with Assert® indicate MHR plants convert Assert® to the herbicidal active form once absorbed by the plant at a lower rate than HS plants. *Contact: Erin Burns, erin.burns2@msu.montana.edu*

Russian olive removal and revegetation (Erin Espeland, Mark Petersen, Jennifer Muscha, USDA-ARS; Joseph Scianna and Robert Kilian, NRCS). In large floodplain plots, we removed Russian olive trees in April 2011 and got excellent control using a tree shear and 1:3 triclopyr to basal bark oil. Revegetation was conducted in spring 2012. Due to drought, tree and shrub transplant survivorship was poor and there was little emergence of seeded species. Flooding in spring 2011 led to natural cottonwood establishment and an unusual diversity of exotic species in the plots. At this point, revegetated and unrevegetated plots in the removal area are not greatly different in their understory plant community, although the understory in removal plots is much more productive and diverse than the understory in reference plots where Russian olive was not removed. There were no differences between plots where Russian olive was removed and reference plots (no removal) for soil fungi, ciliates, and nematodes. Soil bacterial abundance in removal plots decreased after removal (2011) and decreased in the following year (2012). Bacterial abundance showed the opposite pattern in the reference plots. We will continue to monitor for delayed establishment of the seeded revegetation and are examining the impact of removal on insect, bird, and small mammal communities. *Contact: Dr. Erin Espeland, Erin.Espeland@ARS.USDA.GOV*

Tolerance of desirable grasses to Milestone® and Perspective™ herbicides (Celestine Duncan, Weed Management Services, Helena). A field experiment was established on native rangeland near Helena, MT, to measure tolerance of cool-season perennial bunchgrasses to applications of Milestone® (aminopyralid) and Perspective™ (aminocychlopyrachlor) herbicide. Native grasses were dominantly bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), and prairie junegrass (*Koeleria macrantha*) at 45, 15 and 10% visual cover, respectively. There were no noxious weeds present on the site. Milestone was applied at 7 oz/A in spring and fall, and the spot treatment rate of 14 oz/A (spring only). Perspective was applied in both spring and fall at the noxious weed control rate of 4.75 oz/A and a higher rate of 9.5 oz/A. Herbicides were applied with a non-ionic surfactant (NIS) at 0.25 percent. Results showed no visual injury symptoms on grasses 30 days after application with any herbicide treatment. However, bluebunch wheatgrass was significantly impacted by Perspective applications 1 and 2 years after treatment (YAT). Injury was greater with the higher rate of Perspective; however, even the noxious weed rate of 4.75 oz/A significantly reduced bluebunch wheatgrass biomass 2 YAT. Injury and biomass reduction to bluebunch wheatgrass was greater with Perspective when compared to Milestone. There was less than 10% visual injury to prairie junegrass and Idaho fescue the year following treatment. The application of Perspective shifted the plant community from a site dominated by bluebunch wheatgrass to one dominated by Idaho fescue, prairie junegrass and tolerant forbs. The change in plant structure caused by removal of bluebunch wheatgrass by Perspective herbicide could have long-term ecological implications to the rangeland resource, and an overall reduction in productivity of the site.

Due to the length of this Weed Post, there is no crossword puzzle. It shall return in the January 2014 issue!