Weeds and Wildfire

Introduction. The hot, dry, and fiery summer experienced in much of Montana and many other states in the Rocky Mountain region has prompted a great deal of interest in weed management following wildfire. Weed response to fire is dependent on many factors including propagule pressure (reproductive structures like seeds and root fragments, both above- and belowground), time since invasion, competition with desired vegetation, disturbance history, rainfall patterns, soil characteristics, plus the actual dynamics of the fire itself (e.g. temperature, duration, season), and the type of plant community where the fire burned, for example mountain grasslands versus lodgepole or ponderosa pine forest. Weed response to fire also depends on the regeneration strategy of the weed species of concern. Research suggests that most post-fire plant cover originates from resprouting. So, weeds that resprout from vegetative structures may respond quickly following fire as compared to weeds that have to regenerate from seeds.

Some generalizations. In spite of the many factors that contribute to weed response to wildfire, some generalizations can be made.

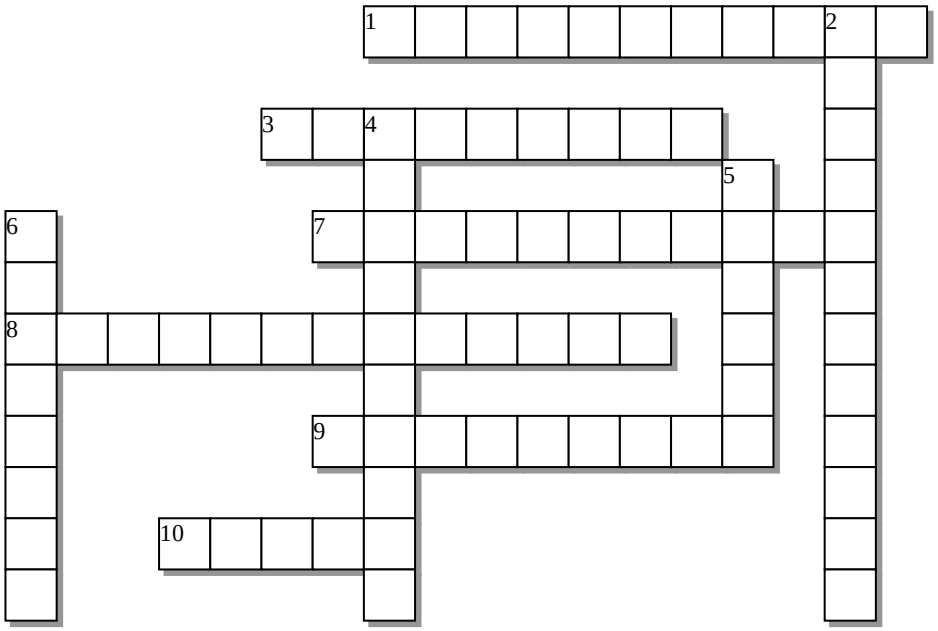
- Weeds may increase following fire, but in many cases do not result in long-term persistence.
- As fire severity and frequency increase, so does the risk of invasion.
- Risk of invasion varies by plant community type.
- Weed invasion can be more pronounced in areas that were highly disturbed prior to fire.
- Activities related to fire management can create disturbance and introduce seeds of new weeds.
- Annual grasses (e.g. cheatgrass, Japanese brome), forbs capable of long-distance dispersal, and resprouting perennial forbs are most likely to increase following wildfire.
- As fire severity and pre-fire cover of weeds increases, the need for revegetation after fire increases.

Research: There have been a handful of fire and weed-related research projects in Montana. Jacobs and Sheley (2003) studied Dalmatian toadflax response to fire. They found that toadflax biomass increased by up to 330% and seed production by up to 450% after a spring prescribed fire. Grass biomass also increased in response to the fire, but only by 60-75%. A study by Ferguson et al. (2007) looked at spotted knapweed response to forest fires in western Montana. They measured about 280 plots three times during a five-year period after burning. Spotted knapweed appeared in about 20% of plots the first year or two after fire, 26% at three years, and about 37% at five years. They found that knapweed cover declined over time on plots with low burn severity and increased over time on plots with high burn severity. Vermeire and Rinella (2009) investigated the effect of fire on the emergence of four weedy species from seeds that had been deposited on the soil surface. They found that emergence of all species decreased as the fuel load increased, suggesting that fire-induced seed mortality may decrease weed abundance, especially for those species that rely on seeds for reproduction. Pokorny et al. (2010) sprayed and seeded spotted knapweed-infested rangeland following fire in eastern Montana. They found that spot spraying picloram controlled spotted knapweed, increased native grasses, and conserved species richness. Seeding did not increase native species, but instead natural recovery seemed adequate.

Fire as an opportunity: Fire can create opportunities to get a jump on weed control. Weeds may be some of the first plants to show up following rainfall this fall or next spring. They may be highly visible and vulnerable to carefully-timed control measures like herbicide applications. Monitor to detect which populations are increasing as well as for any new invaders. Fire can also be used as a spring-board for conveying information on weed ecology and management, especially in regards to how weeds respond to disturbance.

You can view a webinar on "Managing Weeds after Wildfire" on the MSU Extension Montana Wildfire and Drought Resources page http://www.msuextension.org/wildfire/. If you'd like a PDF of any of the research papers mentioned above, please email jane.mangold@montana.edu or call (406)994-5513.

Weed Post Puzzle: Test your knowledge of weeds and wildfire



Across:

1 - _____, duration and season are three important dynamics of a fire

3 - The Vermeire and Rinella study found that emergence of all species decreased as fuel load _____

7 - Following fire, plants that can emerge by _____ may appear more quickly than plants that emerge by seed

8 - Risk of invasion varies by plant _____ _____ (two words)

9 - The risk of plant invasion increases with fire severity and _____

10 - In spring of 2013, these will likely be the first things to emerge in burned areas

Down:

2 - As fire severity increases, the need for _____ post-fire increases

4 - Annual grasses such as Japanese brome or _____ are likely to increase following wildfire

5 - Areas _____ disturbed prior to fire are more vulnerable to weed invasion post-fire

6 - The Ferguson et al. study found that knapweed cover _____ over time in plots with low burn severity

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
http://www.msuextension.org/invasiveplantsMangold/extensionsub.html

MONTANA STATE UNIVERSITY EXTENSION

Pulling Together Against Noxious Weeds