Burning, cheatgrass and Conservation Reserve Program grasses: A 2011 revisitation

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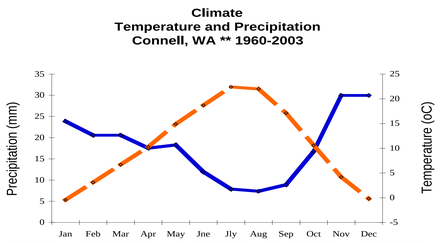
Introduction

In the Columbia Plateau of Washington State, perennial grasses are the vegetative cover crop used most often for erosion control in fields enrolled in the USDA Conservation Reserve Program (CRP). The perennial bunchgrass species used are approved for use in CRP native grass plantings and include Big bluegrass (*Poa secunda* J. Presl). Snake River wheatgrass (*Elymus wawawaiensis* J. Carlson & Barkworth*)* thickspike wheatgrass (*Elymus lanceolatus* (Scribn. & J.G. Sm.) Gould ssp. *lanceolatus).* Cheatgrass (*Bromus tectorum* L.), an invasive annual grass, is found in most fields. Prescribed burns are used to control cheatgrass in CRP fields.

Cook et al. (1994) determined that after a prescribed burn, perennial bunchgrass biomass was reduced the first season but increased the second season. The time of year, burn temperature and species burned affect perennial bunchgrass response to burning (Wright and Klemmedson 1965). Daubenmire (1975) reported no difference in canopy cover of cheatgrass in the second season post-burn. In the second year after a shrub steppe wildfire, mean algal densities for burned and unburned plots showed little difference (Johansen et al. 1993).

The long-term effects of burning on CRP stands have not been analyzed. The purpose of this project was to revisit the CRP stands studied in 2008, the second season after a prescribed burn, to evaluate the response of seeded species, microbiotic crust and cheatgrass in 2011, the fifth season after burning.



The climate is semi-arid Mediterranean-like with hot, dry summers and cool, wet winters. Fields are located in the low precipitation zone where precipitation ranges from 150-300 mm.

Methods

In 2008 and again in 2011, canopy cover data was collected in six burned and six unburned fields in Franklin County, Washington. The fields were seeded in 2004-2005 with a native grass mix. Six of the fields were burned in October 2006. Data was collected in the marked half of a 1 m^2 frame at 20 points in each field in 2008 and five points per field in 2011.
Mean percent canopy cover of seeded grasses, cheatgrass and microbiotic crust in burned and unburned stands was determined and the values compared.

Results - 2008

Mean percent canopy cover

Species	burned	unburned
Big bluegrass	2	6
Snake River wheatgrass	6	6
Thickspike wheatgrass	0	0
Cheatgrass	10	10

Neither Snake River wheatgrass nor cheatgrass showed a difference in mean percent canopy cover between burned and unburned stands in the second season after burning. The mean percent canopy cover of big bluegrass was reduced by over half in burned fields. One explanation is that the stand was burned when big bluegrass was beginning to resprout.

Results Š 2011

Mean canopy cover

Species	burned	unburned
Big bluegrass	7	9
Snake River wheatgrass	6	7
Thickspike wheatgrass	1	2
Cheatgrass	8	10
Microbiotic crust	6	0
Bare ground	6	2
Plant litter	28	38

A 2011 comparison of mean percent canopy cover of perennial grasses and cheatgrass in burned and unburned fields showed little difference. The mean percent canopy cover of microbiotic crust was significantly greater (P=0.002) in burned fields.

Comparison - 2008 and 2011

mean percent canopy cover

- Big bluegrass in burned stands increased 3X;
- Big bluegrass in unburned stands increased 50%;
- Snake River wheatgrass increased 1% in unburned stands;
- Thickspike wheatgrass was present in 2011;
- Cheatgrass decreased 2% in burned fields .

Big bluegrass is a later maturing perennial bunchgrass that reaches full productivity in its fourth through eighth years. The increases in canopy cover may reflect big bluegrass maturity.
Changes in Snake River wheatgrass and thickspike wheatgrass were minimal.
The 2% reduction in cheatgrass canopy cover in burned fields in 2011 is associated with increased big bluegrass canopy cover and the presence of microbiotic crust.

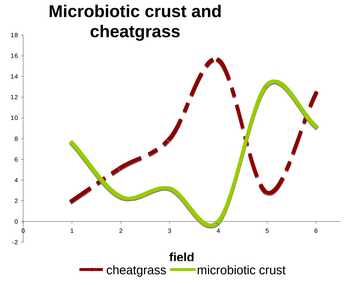
Biological soil crust

- Made up of living organisms;
- Also called cryptogamic or microbiotic crust;
- Thin layer at or just below the soil surface;
- Made up of bryophytes (mosses and liverworts), lichens, algae, cyanobacteria;
- Stabilizes soil surface;
- Improves water infiltration.

Results and Discussion

Microbiotic crust

In 2011, the fifth season after a prescribed burn, big bluegrass mean percent canopy cover in burned fields increased threefold when compared to 2008, microbiotic crust was present and cheatgrass canopy cover showed a slight decrease from 2008 values. Plant litter cover was greater in unburned fields.
One explanation for the lack of microbiotic crust in unburned fields is that the lack of bare ground and greater cover of plant litter prevented the microbiotic crust from developing. The decrease in the mean percent canopy cover of cheatgrass is associated with the presence of microbiotic crust in burned fields and the increased big bluegrass canopy cover. Similarly, in the Wyoming shrub-steppe, growth of perennial bunchgrasses and microbiotic crust occurred together following burning (Hilty et al. 2004).



Fields with a greater cover of microbiotic crust had less cheatgrass. Microbiotic crust suppresses cheatgrass germination (Hilty et al. 2004).

References

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