

Effectiveness of Pre-Emergent Herbicides in Rangeland Rehabilitation

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Fuel, Fuel and More Fuel

Cheatgrass Seed Production and Seed Banks



- Produces more seed than is required to renew the stand

- At maturity seeds are not dormant, but over winter those that do not germinate acquire a dormancy

- Build persistent seed banks

- 100 sites resulted in a range of over 2,000/ft² foot down to 0/ft²,
Average = 252/ft²

- Potential to germinate at a wide range of seedbed temperatures

* Stebbins (1957)“.....genetic variability must be very slow, unless the number of individuals is enormously large and reproduction is very rapid.....a few generations of outcrossing can give rise to hundreds or even thousands of new genotypes”

* Novak and Mack(2003) found no outcrossing in 2,000 cheatgrass seedlings from 60 North American populations.

* Young and Clements (2006)”...we propose that cheatgrass is expressing hybrid vigor”

* Ashley and Longland (2007) found outcrossing in 1/3 of the cheatgrass populations they tested.

* Fortune et al. (2008) reports *B. fasciculatus* (Eastern Mediterranean) and *B. tectorum* (cheatgrass) are the parents of *B. rubens* (red brome).

* Merril et al. (2012) reported that outcrossing of cheatgrass was too low (0.58%) to be consequential.

$$173/\text{ft}^2 \times 54,360 = 9,404,280 \times 0.58\% = 54,545$$











*****Goal is to establish perennial grasses that can compete with cheatgrass whereas the density of cheatgrass and associated fuels are significantly reduced. Thereby reducing the chance, rate, spread and season of wildfires.**



Plant Material Testing
Seed Mixes
Seeding Methodologies







7-2015

-Record cheatgrass above/below ground densities ($144/\text{ft}^2$ and seed bank = $316/\text{ft}^2$)

-Record perennial grass/shrub and forb densities (28 perennial grass/acre, 0 forbs or shrubs)



10-2015

Landmark XP @ 1.75 oz/ac



6-2016

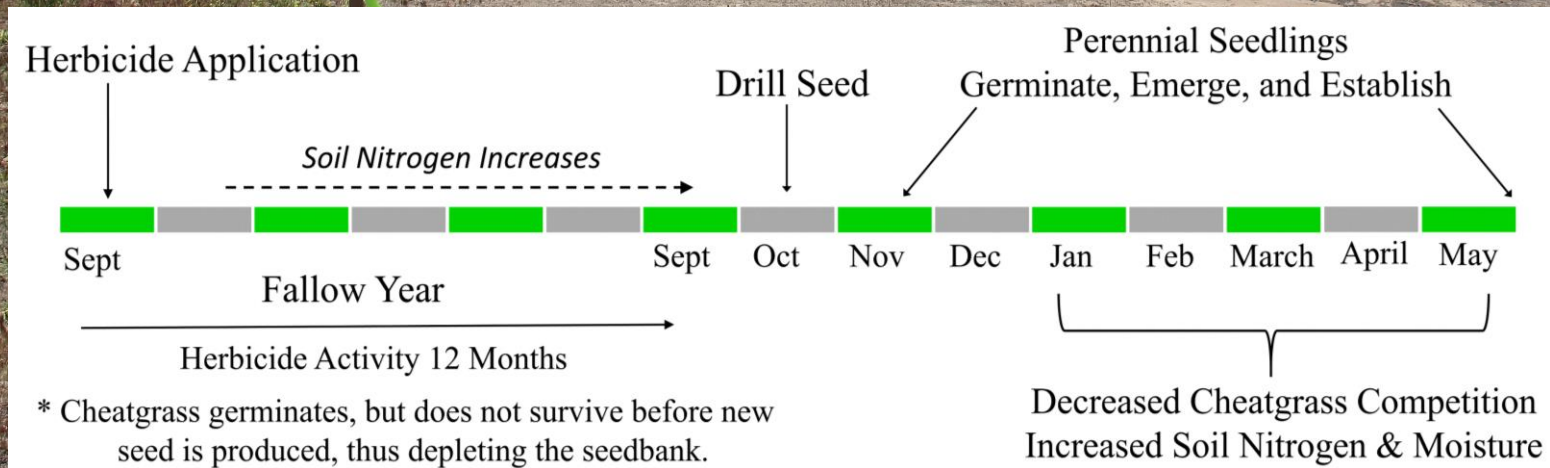
*****Apply pre-emergent herbicide in September/early October before fall germination.**

*****This nearly eliminates any fall, winter, spring and following fall cheatgrass emergence.**

*****Fallow for one-year and seed to desirable and adaptable species (late-September to late November).**

**Landmark XP
99.3% Control**

Plateau 98.6 % Control



10-2016

**-Native Mix = 'Anatone' Bluebunch Wheatgrass
Sherman Big Bluegrass
Sandberg's Bluegrass
Wyoming Big Sagebrush
Western Yarrow**

**-Introduced Mix = 'Hycrest' Crested Wheatgrass
Siberian Wheatgrass
Forage Kochia**

**Native/Introduced Mix = Bluebunch Wheatgrass
Sherman Big Bluegrass
Wyoming Big Sagebrush
Western Yarrow
Siberian Wheatgrass
Forage Kochia**



4-2017

- **Notice the lack of residual perennial grasses**
- **Seeded seedlings emerging and growing in the absence of cheatgrass competition.**
- **Increased available moisture to seeded seedlings by 43%**



*****Pre-emergent herbicide working perfectly
to reduce cheatgrass competition at the
seedling stage.**



6-2018

Introduced Seed Mix Plot

3.3 perennial grass/ft²

1.2 cheatgrass/ft²



6-2018

Native Seed Mix Plot

3.3 perennial grass/ft²

3.6 cheatgrass/ft²



6-2018

Native/Introduced Seed Mix

2.4 perennial grass/ft²

3.4 cheatgrass/ft²





-Significantly reduced cheatgrass seed bank
from $> 300/\text{ft}^2$ to $< 40/\text{ft}^2$



2015



-Decreased Cheatgrass Densities > 93%

-Increased Perennial Grass Densities from < 30/acre to < 100,000/acre

-Increased Sustainable Grazing Practices and Significantly Reduced Wildfire Threats to Critical Wildlife Habitats

2016



2018





9-2018

2016/2017 = 13.2"



9-2019

2017/2018 = 7.9"





Plateau @ 6 oz/ac

Control





