Pheno-cam monitoring for management of *Salsola tragus* (Russian Thistle)

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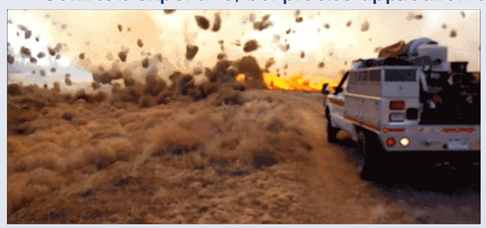
Introduction

Salsola tragus is an invasive tumbleweed, well-adapted to disturbed and very harsh environments. While individual populations may be transient, increasing frequency and severity of disturbance in its invaded range encourages spread.

Current Cal-IPC Rating: Limited, but *S. tragus* produces significant harm:

- Dead plants are a potent, mobile fire hazard.
- Host of Beet leafhopper *Circulifera tenellus*, vector of curly-top virus (beets, tomatoes, *Curcubita* spp.).
- Excessive consumption can harm livestock & wildlife.
- Pollen causes seasonal allergies in sensitive individuals.
- Control is expensive, but precise application can reduce cost.

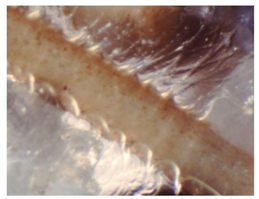


Thomas Rogers, interagency Rx burn at Rocky Mtn. Arsenal

Life Cycle & Phenology

- Annual of family Chenopodiaceae, classified as a halophyte.
- Can germinate year-round, particularly with small pulses of moisture.
- Germination most prolific and competitive dominance greatest when warm (>17 C)
- Flowers July-October; may vary with site conditions.
- Small plants produce up to 2,000 seeds, large plants up to 100,000, annually
- Most seeds persist 1 year, some up to 3 years.
- Dispersal occurs by wind in classic tumbleweed fashion.
- *S. tragus* is nonmycotrophic; it does not associate with mycorrhizal fungi. When infected, even my generally mutualist species, its roots brown and die (Allen & Allen 1989).

Salsola root with browning response following attempted penetration by AMF hyphae



Materials and Methods

- 2 Stardot HD Cameras
- Rain Gauge
- Antenna
- Air Temperature
- Data Logger + Solar Panel
- Larger Solar Panel
- Cradlepoint 3G Modem + 3 Deep Cycle Marine Batteries
- (Underground) 2 Soil Moisture Probes, vertically integrated

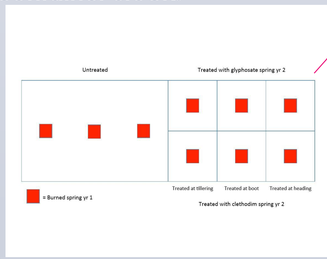
Cameras and other instruments take photos and readings twice daily.

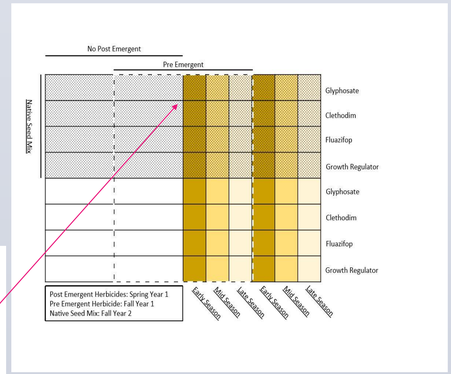
Data sent via cell towers to a server at UC Riverside

View from camera 1 @ UCR Garden

Plot design allows application of 4 different herbicides at 3 timings.

Local varieties of CSS species will be used to revegetate, comparing effectiveness of seeding vs. container stock.





Small fireproof "burn boxes" allow safe, cheap method to investigate fire impacts.

Multiple stations will be deployed along a temperature and precipitation gradient to capture regional variability from Riverside (xeric) to Irvine (mesic).

Predictions

- *S. tragus* relative abundance to other species will increase along the drought stress gradient.
- Postemergent herbicide treatments will be most effective when applied mid-season.
- Preemergent herbicide treatments will be most effective when applied early-season.
- Container stock will exhibit a greater competitive effect on *S. tragus* than seeding due to mycorrhizal infection.

References

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2. Allen, E. B. 1982. "Germination and competition of Salsola kali with native C3 and C4 species under three temperature regimes." Bulletin of the Torrey Botanical Club: 39-46.
3. Dwyer, D. D. and K. Wolde-Yohannis 1972. "Germination, Emergence, Water Use, and Production of Russianthistle (Salsola kali L.)." Agronomy Journal 64(1): 52-55.
4. Renz, Mark J. No date. "Management and restoration of areas infested with Russian thistle and Kochia in southern New Mexico." New Mexico State University. Accessed 4/17/2017.

Contact

We are excited to hear your comments, questions, and suggestions! Please contact:

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