Selective Bacteria:

Putting an end to invasive grasses at the cellular level

Lindsay Gowin NASA CoP at Great Basin College, Elko Nevada

Introduction

Bromus tectorum **(cheatgrass) is an annual grass effecting many ecosystems. The majority of studies done involve winter wheat crops as *B. tectorum* competes better for the nutrients needed for growth. However, *B. tectorum* has become a rangeland problem and is a very efficient fuel source during fire season. Previous studies using the bacteria *Pseudomonas fluorescens* strain D7 showed promising control of *B. tectorum* germination. Before testing could be attempted in northern Nevada ecosystems, the company making the bacterial mixture discontinued its supply.**

Hypothesis

Pseudomonas flourescens **strain D7 inhibits the growth of *Bromus tectorum* without harming natural vegetation.**

Hypothesis Null

Pseudomonas flourescens **strain D7 inhibits the growth of *Bromus tectorum* while harming natural vegetation.**

Bacteria

Pseudomonas flourescens **is a gram-negative, rod-shaped bacilli. *P. flourescens* is a predominant inhabitant of soil and aquatic environments. They are obligate aerobes using oxygen as a final electron acceptor during cellular respiration. However, they are able to use nitrogen in place of oxygen. This is the working theory of how *P. flourescens* can potentially inhibit the growth of *B. tectorum*.**

Research

Future research will involve an attempt at isolation of *Pseudomonas flourescens* from local soil samples. Once isolated, different techniques will be used on varying stages of growth for *Bromus tectorum*.

Fig. 1: *Bromus tectorum*
Photo Courtsey: bugwood.org

Fig. 2: *Bromus tectorum*
Photo Courtesy:
bugwood.org

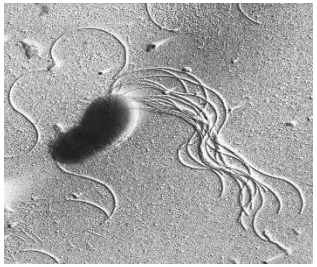

Fig. 3: *Pseudomonas flourescens*
Photo Courtesy:
ncbi.nlm.nih.gov

Fig. 4: *Bromus tectorum* inferno
Photo Courtesy:
npr.org

Conclusion

With the previous studies performed using *Pseudomonas flourescens*, there are promising results at slowing and even inhibiting the growth of *Bromus tectorum*. Stopping the ever increasing spread of the invasive grass has been a goal of biologists for a long while. The ultimate goal is to be able to control *B. tectorum's* spread without killing all vegetation around it.

References

Carpenter, Alan T, and Thomas A Murray. "Bromus Tectorum." *Bromus Tectorum - Bugwoodwiki*, wiki.bugwood.org/Bromus_tectorum.

Gealy, David R., et al. "Metabolites FromPseudomonas FluorescensStrain D7 Inhibit Downy Brome (Bromus Tectorum) Seedling Growth." *Weed Technology*, vol. 10, no. 2, 1996, pp. 282–287., doi:10.1017/s0890037x00039968.

Gurusiddaiah, S., et al. "Isolation and Characterization of Metabolites FromPseudomonas Fluorescens-D7 for Control of Downy Brome (Bromus Tectorum)." *Weed Science*, vol. 42, no. 3, 1994, pp. 492–501., doi:10.1017/s0043174500076827.

Harding, Dylan P., and Manish N. Raizada. "Controlling Weeds with Fungi, Bacteria and Viruses: a Review." *Frontiers in Plant Science*, vol. 6, 2015, doi:10.3389/fpls.2015.00659.

Lazarus, Brynne E, and Matthew J Germino. "An Experimental Test of Weed-Suppressive Bacteria Effectiveness in Rangelands in Southwestern Idaho, 2016-18." *USGS*, 2019, pubs.usgs.gov/of/2019/1050/ofr20191050.pdf.

Scales, Brittan S, et al. "Microbiology, Genomics, and Clinical Significance of the Pseudomonas Fluorescens Species Complex, an Unappreciated Colonizer of Humans." *Clinical Microbiology Reviews*, American Society for Microbiology, Oct. 2014, www.ncbi.nlm.nih.gov/pmc/articles/PMC4187640/.

This project is supported by the National Aeronautics and Space Administration under grant number: NNX15AI02H issued through the Space Grant Community of Practice.