

Competitive mechanisms of *Festuca rubra* on native *Leymus mollis* and invasive *Ammophila arenaria* in coastal sand dunes of USA

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Introduction

Coastal dunes are a sensitive habitat that has been degraded over many years of anthropogenic interaction. Invasive non-native plants are of concern mainly due to their impact on native ecosystem structure and function and their considerable adverse economic impacts (Greipsson 2011). Some plants, both native and non-native, have developed strategies for controlling their environment such as releasing chemicals through the process of allelopathy. Other non-natives succeed due to a lack of negative feedback, also called the "enemy release" hypothesis.

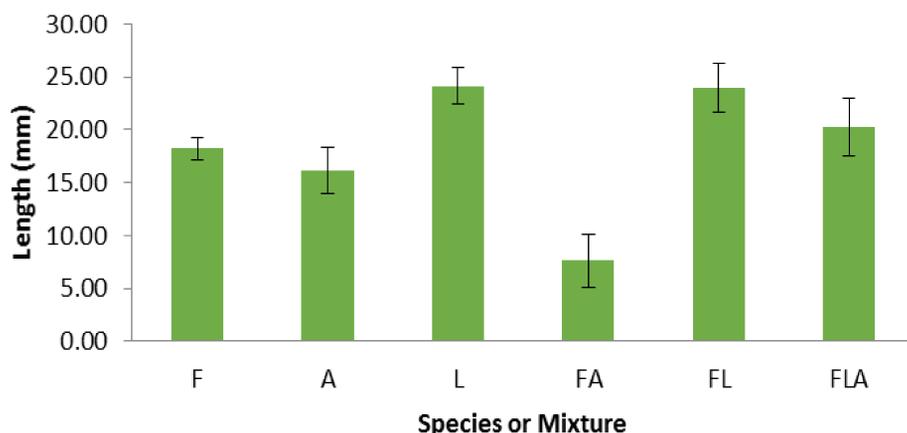
Festuca rubra is a perennial turf grass known for its applications around the world on golf courses and other athletic fields. It grows on the transition from dune systems to coastal meadows in its native habitats.

In North America, it has been widely cultivated for many years making its original native range difficult to ascertain. It is an allelopathic species that releases the chemical m-tyrosine from its roots, negatively affecting most seeds it encounters.

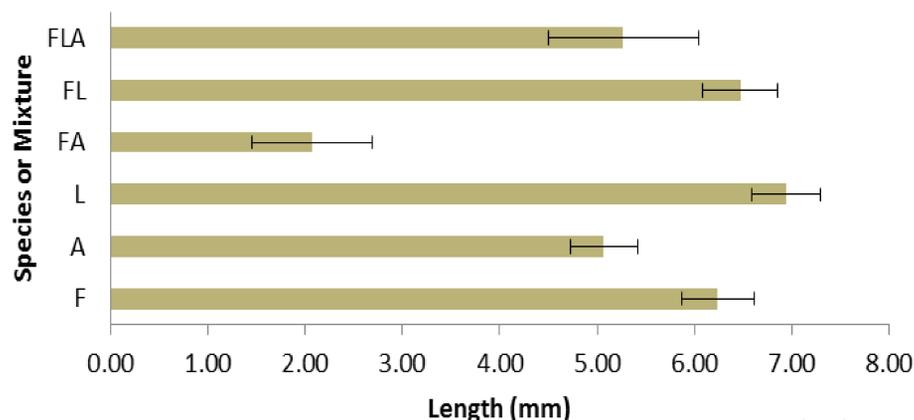
Ammophila arenaria is an invasive species across the West coast, introduced from northern Europe in the 1930's. It grows anywhere in the dune system from the beach to the back dunes. It tends to form large, monospecific stands.

Leymus mollis is a native bunch grass that tends to grow on embryonic dunes but can grow anywhere along the beach and dunes. It is native to most of the West coast, from just north of San Diego up to Alaska. On the East coast, it grows from Long Island sound north to parts of Quebec and Newfoundland.

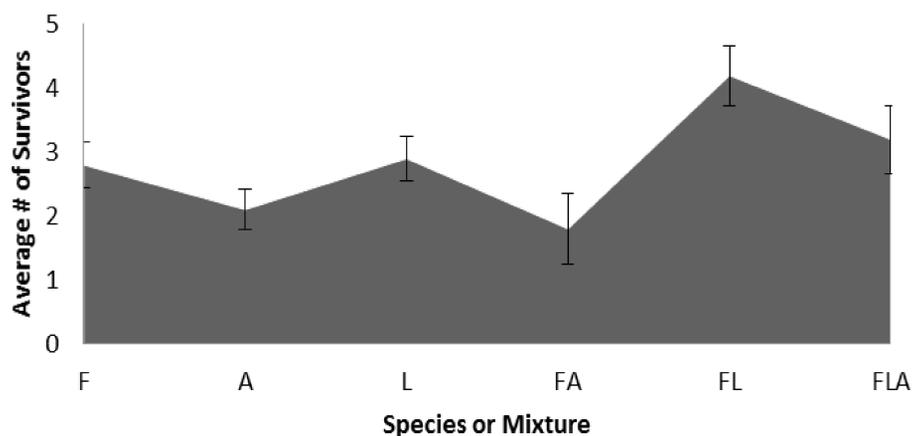
Shoot Growth of Seedlings in Isolated and Mixed Cultures



Root Growth of Seedlings in Isolated and Mixed Cultures



Average Survivors Per Pot in Isolated and Mixed Cultures



Objective

The objective of this study is to determine the effects, if any, of *Festuca rubra* or red fescue on the competition between *Leymus mollis*, American dunegrass, and *Ammophila arenaria*, European beachgrass. The study is composed of two parts: a greenhouse experiment and a germination/chemical assay experiment.



Figure 1: Oregon Dunes National Recreation Area, *L. mollis* in the foreground by the flag, *A. arenaria* in the background on the dune.



Figure 2: Cape Cod National Seashore, *L. mollis* in the foreground, unknown species in the background.

Results and Discussion

Results from the greenhouse study support the hypothesis that *L. mollis* and *A. arenaria* have different susceptibilities to *F. rubra* and m-tyrosine. This was evident in the survival and growth observed in the FA mixed cultures as compared to the controls and the FLA mixed cultures. Preliminary evidence from the germination trials show limited variance in phytotoxic concentrations.