

## Abstract

The seeds of many invasive and weedy plant species can persist in the soil, allowing these species to disperse their seeds over time, and making management difficult. Phenolic compounds are thought to be linked to seed persistence characteristics such as dormancy, vigor, and resistance to microbial decay. Environmental conditions during seed maturation have been found to influence these seed persistence traits. The proposed study seeks to investigate the impact of elevated atmospheric carbon dioxide on phenolic composition, dormancy, and resistance to decay in seeds of wild oat (*Avena fatua*), a problematic agricultural weed. It is hypothesized that elevated carbon dioxide will mitigate the effects of environmental stress, such as drought or shading, on seed quality, leading to an increase in dormancy, vigor, and resistance to microbial decay, PAL gene expression and phenolic composition. This mitigation may allow wild oat to expand its range under future environmental conditions, as well as become more competitive in its current habitat. The data generated by this study will increase our understanding of the mechanisms regulating seed bank persistence, and be useful to modelers, extension agents and farmers who wish to predict the extent to which weedy and invasive plants will be a management issue.