

## The Effects of *Puccinia jaceae* on Yellow Starthistle Competition and Growth

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A new bio-control rust, *Puccinia jaceae* var. *solstitialis*, was introduced to control yellow starthistle (*Centaurea solstitialis*) in 2003. To test the effects of the rust on the weed under field conditions, we performed two experiments in 2006 and 2007. The objective of the first experiment was to examine the effects of the pathogen on the above ground biomass production of yellow starthistle (YST) using both an additive and replacement series design. As part of this experiment, we also evaluated the effect of the rust on the competitive ability of YST with the common rangeland annual grass wild oat (*Avena fatua*). The objective of the second experiment was to test the interaction of the rust with two common insect bio-control agents (*Eustenopus villosus* and *Chaetorellia succinea*). In both experiments, we measured infection rates over time, YST chlorophyll levels, seedhead production, and vegetative biomass. Insect attack rates were also determined on a subset of mature seedheads. On a per leaf basis, chlorophyll levels were significantly reduced by increased infection with the rust. In YST monocultures, the rust had no effect on any of the growth or reproductive variables measured. However, in the competition experiment with wild oat, there were several rust-induced reductions in YST performance. Infected plants had fewer leaves overall than non-infected plants. The rust decreased overall YST biomass/m<sup>2</sup> over both years of the experiment, and seedling diameters in 2007. Seedheads in inoculated plots developed earlier in the season than those in non-inoculated plots. No interaction effect was found between the rust and the insect bio-control agents. The results indicate that the rust had minor negative effects on yellow starthistle growth, especially under conditions of interspecific competition. However, these effects do not appear to be biologically significant and the presence of the rust is unlikely to lead to large-scale declines in the YST populations statewide.

## **Assessing Research Priorities for Invasive Plants in California**

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California has over a thousand introduced plant species, many of which are invasive in wildlands. In 2006, the California Invasive Plant Council rated the most invasive plants in the “California Invasive Plant Inventory.” During the research compilation process for the list it became evident that information was lacking on many species. However, the limited availability of funding for management and control programs makes it important to know where research should be focused. The Research Needs Assessment project was formed in 2005 at UC Davis. The project will summarize existing research pertaining to invasive plants in California through literature review and interviews with researchers, and identify high-priority areas for future research. It will address 12 topics including biology, effects of human alterations (i.e. climate change, nitrogen deposition), weeds of horticultural origin, and policy. Through this effort, we seek to further energize the academic and land management communities by: (1) facilitating connections between disciplines by increasing awareness of the range of ongoing research on invasive plants; (2) creating a forum for assessing high-priority research needs; and (3) guiding future research (especially graduate student projects) toward these high-priority needs. Our talk summarizes the research areas where we would like to see efforts continue and provides sample projects for each area. A directory of invasive plant researchers is also available.