

**Annual Report of California Department of Food and Agriculture's Contributing Project  
to Cooperative Regional Research Project W-1185  
II. Biological Control of Weeds**

**January 1, 2006 to December 31, 2006**

**1. PROJECT: W-1185, Biological Control in Pest Management Systems of Plants**

**2. PRINCIPAL LEADERS AND COOPERATING AGENCIES:**

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### **3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS:**

#### **Goal A: Import and Establish Effective Natural Enemies**

Objective 5: Release, establish, and redistribute natural enemies.

#### **Yellow Starthistle (*Centaurea solstitialis*)**

Releases of the rust disease, *Puccinia jaceae* var. *solstitialis*, continued throughout California in 2006. This year, the rust was released at 99 locations in 38 counties using spores propagated in

our greenhouse in Sacramento during 2005. Each release occurred in a plot 1 meter by 1 meter using a suspension of spores and water. Follow-up surveys approximately one month following treatment showed evidence of infection at almost all the sites. In total, the rust has been released at 204 locations in 38 counties since 2003. Objectives for 2007 are to follow establishment and natural spread of the rust at release sites to determine if it performs equally well in all areas.

### **Purple Loosestrife** (*Lythrum salicaria*)

Releases of biological control insects were made at two purple loosestrife infestations in 2006. Approximately 5,000 *Galerucella* leaf beetles (consisting of *G. pusilla* and *G. californiensis*) were released near Palermo in Butte County and approximately 3,000 *Galerucella* leaf beetles were released near Sanger in Fresno County. The leaf beetles were collected from the Big Lake cove site bordering Ahjumawi Lava Springs State Park near McArthur, California.

### **Water Hyacinth** (*Eichhornia crassipes*)

Releases of the water hyacinth weevil, *Neochetina bruchi* were made at Freedom Reservoir in Santa Cruz County. Approximately 400 water hyacinth weevils were collected from Whiskey Slough in San Joaquin County and transported to Watsonville for release at Freedom Reservoir which was completely covered water hyacinth.

### Objective 6: Evaluate efficacy and study ecological/physiological basis for interactions

### **Yellow starthistle** (*Centaurea solstitialis*)

1. A field study to determine the effect of the seed-feeding biological control agents on seedling recruitment as initiated in 2005. Twenty of 50 monitoring plots at the long-term study site in Sonoma County were treated with an insecticide bi-weekly during the flowering period to prevent attack by the seed head insects. The objective is to determine if seed loss due to the seed head insects resulted in a decrease in seedling recruitment the following spring. Results will be determined next spring.
2. A co-operative research program with USDA-ARS on impact of the rust *Puccinia jaceae* var. *solstitialis* on yellow starthistle seed production continued in 2006. The field portion of the study ended this year. Field samples are now being processed and data analysis will occur in spring, 2007.

## **4. USEFULNESS OF FINDINGS**

The rust disease *Puccinia jaceae* var. *solstitialis* is the first pathogen approved for release as a classical biological control agent in the United States. It is also the first biological control agent to be released against yellow starthistle in over 10 years and is the first of the second crop of agents being examined for release against this weed. Greenhouse production of the rust during summer has provided spores for a release in almost every county in California infested with

yellow starthistle. Releases in the several climatic regions of California will indicate where this beneficial disease will likely have its greatest impact. Release and establishment of beneficial insects on purple loosestrife, Mediterranean sage, and water hyacinth are the first steps toward the development of a biological control program against these noxious weeds.

## 5. WORK PLANNED FOR NEXT YEAR

Efforts will be directed at post-release monitoring of the rust disease, *Puccinea jaceae* var. *solstitialis*, on yellow starthistle and determine its establishment and spread from release sites. Releases of insects on purple loosestrife and Mediterranean sage will continue in 2007. Data from studies to the impact of the seed head insects on yellow starthistle will be analyzed. If the population build-up of the *Diorhabda* leaf beetle continues at one site in Yolo County, California, a new implementation effort on tamarisk throughout northern California will be initiated in 2007.

## 6. PUBLICATIONS ISSUED AND MANUSCRIPTS APPROVED

- DiTomaso, J. F., G. Kyser, and **M. J. Pitcairn**. 2006. Yellow Star thistle Management Guide. Cal-IPC Publication 2006-03, California Invasive Plant Council, Berkeley, CA. 74 pp.
- Fisher, A., L. Smith, and **D. M. Woods**. 2006. Biological control of yellow starthistle with the rust fungus, *Puccinia jaceae*. Proceedings of the Western Society of Weed Science, 59: 55-56.
- Pitcairn, M.J.**, S. Schoenig, R. Yacoub, and J. Gendron. 2006. Yellow starthistle continues its spread in California. California Agriculture, 60(2): 83-90.
- Pitcairn, M. J., D. M. Woods, and V. Popescu**. 2006. Changes in densities of biological control agents and yellow starthistle at long-term study sites in California. Proceedings of the Western Society of Weed Science, 59: 58.
- Woods, D. M.** (ed.) 2006. Biological Control Program Annual Summary, 2005. California Department of Food and Agriculture, Plant Health and Pest Prevention Services, Sacramento, California. 57pp.
- Woods, D. M.** 2006. Establishment and impact of biological control agents on spotted, diffuse, and squarrose knapweeds in California. Proceedings of the Western Society of Weed Science, 59: 57-58.
- Balciunas, J. K. and **B. Villegas**. Laboratory and realized host ranges of *Chaetorellia succinea* (Diptera: Tephritidae), an unintentionally introduced natural enemy of yellow starthistle. Environmental Entomology, In Press.
- DiTomaso, J. F., G. Kyser, and **M. J. Pitcairn**. Exotic plant management in California annual grasslands. In: M. R. Stromberg, J. Corbin, & C. M. D'Antonio (eds.). *Ecology and Management of California Grasslands*. University of California Press, Berkeley, CA. In Press.

Maddox, D. M., **D. B. Joley**, and **M. J. Pitcairn**. Studies on the biology of the gorse seed weevil, *Exapion ulicis* (Forster 1771) in northern California. Pan-Pacific Entomologist, In Press.