Predation and Interference by Phytoseiid Mites on the Spider Mite *Tetranychus lintearius* (Acari: *Tetranychidae*), an Established Biological Control Agent of Gorse (*Ulex europaeus*)

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Gorse (*Ulex europaeus* L.), an introduced weed, infests coastal areas of the western USA. The spider mite (*Tetranychus lintearius* Dufour) severely damages gorse and has been introduced for weed control in parts of New Zealand, Oregon, California, Washington, and Hawaii. In most, if not all, natural plant ecosystems spider mites are regulated by natural enemies at levels far below those needed to suppress weeds. Therefore we questioned 1) if native predators were becoming associated with this biological control agent, 2) which major groups of predators were involved, and 3) what possible negative effect might they pose to biological control of gorse. Monthly surveys of gorse stands demonstrated that predaceous arthropods were present in *T. lintearius* colonies. The most common were the predaceous mites in the family Phytoseiidae, including specialist (i.e. *Phytoseiulus persimilis* A.H.) and generalist feeding (i.e. *Typhlodromus pyri* Scheuten) predators of spider mites. Laboratory feeding studies showed that most phytoseiid predators aggressively fed and reproduced on *T. lintearius*. Results show that phytoseiid mites can interfere with the biological control of gorse. The potential long-term effects of specialist and generalist phytoseiid predators on *T. lintearius* are discussed.

Failing to Make the Successful Leap from Small to Large Scale Application of a Fungal Pathogen of *Hydrilla verticillata* (L.f.) Royle

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*Mycoleptodiscus terrestris* (Gerd.) Ostazeski, a fungal pathogen of hydrilla, has been undergoing formulation development as a bioherbicide for the past three years. In 1997, a prototype granular formulation that combined the fungus with an EPA approved biocarrier, Biocar 405, was efficacious in reducing hydrilla biomass in laboratory and greenhouse studies. In 1998, procedures and equipment were scaled-up to meet the requirements for field testing the formulation. Although it was realized that each change in the scale-up process had the potential to be concomitant with a change in viability and/or pathogenic-
ity of the fungus, the rush to field test imposed in part by financial backers did not permit laboratory evaluation of the effect of the changes on formulation performance. The newly developed formulation was ineffective in reducing hydrilla biomass in pond and mesocosm studies. In comparison, the fungus applied as a slurry reduced hydrilla biomass by approximately 89% 3 weeks after treatment. One of the notable changes between the prototype and field formulation was in Biocar itself. In reevaluating the formulation process, we will begin by scrutinizing potential differences in lot numbers of Biocar and their effect on the fungal component and then proceed to other aspects of the formulation process.