

Searching for Microbial Biological Control Candidates for Invasive Grasses: Coupling Expanded Field Research with Strides in Biotechnology and Grassland Restoration

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Abstract

Highly invasive grasses (*e.g.*, *Bromus* spp., *Pennisetum ciliare* (L.) Link., *Taeniatherum caput-medusae* (L.) Nevski) are largely unabated in much of the arid Western U.S., despite more than 70 years of control attempts with a wide array of tools and management practices. The development and sustained integration of new approaches and potentially new tools is warranted in order to combat these destructive species. An expanded program of field exploration for microbial biological control agents is needed. However, any biological control agent must display a high level of efficacy, specificity and genetic stability to preclude any host range extension to native grasses or valued introduced species, especially cereals. A principle limitation to this research in the past – the seemingly insurmountable hurdle of characterizing the full genetic variation among target invasive species and their potential biological control agents – has been much reduced by impressive and continuing strides in sequencing technology (*e.g.*, 454 sequencing, RAD tag sequencing). These rapidly developing tools can enormously speed the screening of effective pairings between host and pathogen. Any biological control program would be only one part of a holistic integrated management against these invaders. Effective restoration of these vast grasslands also includes massive and sustained re-introduction of native grasses and the cryptobiotic crust – essential aspects of effective control that should proceed even now.