

DEFINING THE ENVIRONMENTAL REQUIREMENTS OF A CANDIDATE BIOHERBICIDE FOR COMMON WATERHEMP. David A. Smith, David A. Doll¹, Daljit Singh* and Steven G. Hallett, Department of Botany & Plant Pathology, Purdue University, West Lafayette, IN. ¹ Department of Plant Pathology, University of California, Davis, Davis, CA 95616, USA

Common waterhemp has emerged as a key weed in midwestern cropping systems in recent years. Delayed and prolonged periods of emergence and resistance to some herbicides may have contributed to the widespread distribution of the species. *Microsphaeropsis amaranthi*, currently under investigation as a bioherbicide for common waterhemp, is a virulent pathogen with a host range restricted to the Amaranthaceae. Environmental factors were investigated to identify the optimum and limiting conditions affecting the virulence and weed control efficacy of *M. amaranthi* on common waterhemp. Conidial germination was greatest at approximately 20 °C, and hyphal growth was greatest at approximately 25 °C. Disease expression was greatest when inoculated plants were incubated with a leaf wetness period of 18 h at 18-23 °C. In a field experiment, common waterhemp seedlings (4-6 leaves) were sprayed with *M. amaranthi* conidia (3×10^6 conidia /ml) every week from April 15 to August 12, 2004. Significant disease severity was observed when prevailing weather conditions presented a leaf wetness period of at least 10 h at temperatures of approximately 16-24 °C. These conditions occurred on seven separate occasions. In contrast, on eleven occasions no disease was found. The study shows that there is potential of *M. amaranthi* to be used as bioherbicide, but environmental constraints may play a major role in its effectiveness. Future research will focus on methodologies for the enhancement of activity of *M. amaranthi* under field conditions.