Biological Control of Weeds as an Alternative to Methyl Bromide

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The impending loss of methyl bromide for soil fumigation presents a significant challenge to vegetable producers, particularly in Florida and California. Weed control without this tool will require an integrated approach in which biological control can play a central role. Studies were conducted during the 1998-1999 vegetable production seasons to determine which weed species will increase in importance without methyl bromide for their control. Phytopathogenic fungi were sought as biological control agents for these weeds. *Phomopsis amaranthicola* has been under evaluation for control of pigweeds and amaranths (*Amaranthus* spp.). Environmental conditions necessary for optimal performance of this fungus were previously determined and field efficacy has been confirmed. Current studies focus on compatibility of this fungus with fungicides and insecticides that are used in vegetable production. Similar studies are underway with the fungus *Dactylaria higginsii* for control of nutsedges (*Cyperus* spp.) Systems for inoculum production of these fungi are underway, as well as for *Dichotomyphora portulacae*, a pathogen under development for control of *Portulaca* spp. These fungi will be incorporated into an integrated pest management program for tomatoes and peppers grown in Florida.

The Impact of Parthenium Weed in India and the Development of an Integrated Management Strategy Based on Australian Experiences

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*Parthenium hysterophorus* L. (Asteraceae) or Parthenium weed is a major weed of agricultural and urban situations throughout India, whereas in Australia it is currently a weed principally of agriculture. The weed was first noted in India near Poona in
Maharashtra State in 1951 and it is now present throughout the Indian subcontinent. It is probably the dominant weed in Karnataka State where it infests about 5 million ha. The weed is an aggressive coloniser of fallows, wastelands, pastures and roadsides in India. It competes strongly with crops such as sunflowers, and in infested sorghum, *P. hysterophorus* suppresses yield and contaminates grain samples. As well as being toxic to livestock, *P. hysterophorus* taints both the meat and milk, making them unsafe for human consumption. However, it is in human welfare that parthenium weed has had the most dramatic impact in India. Regular contact with the plant induces an acute form of contact dermatitis, photo-phytodermaitis, asthma and even death. In 1995, a collaborative project was started between IIBC (now integrated into CABI Bioscience) and four Indian research centres (Tamil Nadu Agricultural University; Kurukshetra University; Indian Council for Agricultural Research (PDBC-Bangalore & ICRWS-Jabalpur)). The project has involved several components: a socio-economic survey, undertaken to establish the impact of the weed in the Indian state of Tamil Nadu; evaluation of the exotic neotropical rust *Puccinia melampodi*, as a classical biocontrol agent; screening of native, adapted Indian pathogens for their mycoherbicide potential; and evaluation of suppressive plants. The results of these studies are presented and the possibilities of an integrated control strategy for Parthenium weed in India are discussed in comparison with the Australian biocontrol programme.