A. PROJECT TITLE
Creating a Safer Environment for Greenhouse Vegetable Workers Production and Validation of Native Entomopathogenetic fungi \(V.\) \textit{lecanii} and \(P.\) \textit{fumosoroseus} to Control WhiteFly \(T.\) \textit{vaporariorum}

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C. PROJECT DESCRIPTION

Within the last decade, the use of greenhouses to produce vegetables has been widely adopted by small family producers throughout the United Sates and throughout the Americas. Greenhouse tomatoes in particular represent a major economically important horticultural crop. Today, in fact, practically all commercial tomatoes are produced in greenhouses. For example, in 1999, greenhouse vegetable acreage in Canada, the US and Mexico were estimated at 630, 280 and 450 ha, respectively, showing substantial increases from 1995 mainly because greenhouse tomatoes represent an increasingly important segment of North American tomato consumption.

One of the major factors that have limited greenhouse horticultural production has been damage caused by infestations of whitefly (\textit{Trialeurodes vaporariorum}). Once whiteflies are well established within greenhouse crops, they develop rapid resistance to malathion, permentrina and other synthetic piretroids. Whitefly control through applications of conventional chemical pesticides has become increasingly more difficult in the past several years. Many greenhouse producers have been applying pesticides at the rate of two applications per week, which has served to accelerate the insects resistance as well as killing beneficial insects that naturally prey on whitefly larva and causing threats of water and soil contamination. Additional, most greenhouse workers wear little if any protective clothing or breathing devises while applying these toxic chemicals in the enclosed greenhouse structures, greatly increasing their risks of exposure. In the South American nation of Uruguay, between the years 1997 - 2001 Uruguay imported approximately one billion US dollars worth of insecticides specifically for whitefly control, primarily imidaclorpid, buprofezim, diafentifuron, butocarboxim and pyriproxyfen. According to data from the Center for Toxicology Research, however, in 2001 there were 1,200 reported cases of pesticide poisoning in Uruguay, the majority of these cases occurring as a result of exposure to imidacloprid, the most widely used pesticide in Uruguay for
controlling whitefly infestations in greenhouses. Imports of imidacloprid average approximately 200 kg annually at a cost between 144 -598 thousand US dollars. This is just one reason why there is growing awareness and concern among farmers and consumers in Uruguay concerning the human health and environmental hazards resulting from the accelerated and largely unregulated use of toxic chemical pesticides.

These factors have created the urgency for research to find safer, biological means of control that can be integrated into IPM management planes. Among the alternative methods that are considered to have great potential for controlling horticultural greenhouse pests are entomopathogenetic fungi, which have been proven to be safe for humans, animals and the natural environment.

This project seeks to provide safer working environments and reducing the risks of pesticide exposures for agriculture greenhouse workers throughout the United States and the Americas by testing the viability and effectiveness of cultivating and applying bio-pesticides derived from native entomopathogenetic fungi such as *V. lecanii* and *P. fumosoroseus* to control pests such as whitefly *T. vaporariorum* in greenhouse vegetable production.

D. PROJECT ACCOMPLISHMENTS

1) Developed a systematic cultivation protocol for the mass production of native entomopathogenetic fungi utilizing locally available substrates at Batovi Instituto Organico-Internacional’s Biological Control Laboratory, located in Tacuarembo, Uruguay.

2) Conducted participatory on-farm evaluations of the entomopathogenetic spores with greenhouse vegetable producers in Uruguay to determine the effectiveness, appropriate application rates, proper doses, timing of application etc. for the control of whitefly *T. vaporariorum*

3) Documented and disseminated all findings through demonstration, field days, workshops, on-farm visits, conferences and publications etc. for researchers, farmers and students throughout the United States and the Americas.

E. PROJECT BUDGET

$21,731.00