

Research Proposal for 2000-2001

Submitted To: San Luis Valley Research Committee and the Colorado Potato Committee (Area II)

Title: Biological Control of Soil-Borne Pathogens Related To Potato Production In The San Luis Valley

Project Leader: Nick David, Graduate Student, Department of Bio Agricultural Sciences and Pest Management, Colorado State University

PROJECT JUSTIFICATION:

First let me introduce myself, my name is Nick David and I am an alum of Colorado State University. I am native to the San Luis Valley of Colorado and have been employed as an independent consultant, farm manager, and most recently as an agronomist for Poole Chemical Inc. in Monte Vista, Colorado. Throughout my career I have had the opportunity to observe many different farming practices in the potato/grain rotation that are common to the San Luis Valley. The one glaring observation that is common to all practices is the increasing reliance on chemical inputs to control soil-borne pathogens. Following is a proposal for graduate study that I have prepared.

It is my belief that as a farming community we have failed to view our soil as a compilation of many diverse organisms, but rather as a sterile growing medium. This misunderstanding has led to the reduction of microbial activity necessary to maintain a healthy, productive soil. Consequently, heavy reliance on chemical inputs is required to combat soil-borne pathogens. Some examples are the use of metalaxyl to help control the fungi *Phytophthora erythroseptica* and *Phythium ultimum*, and the increasing use of metam sodium to control pathogens including; but not limited to, *Meloidogyne chitwoodi*, *Rhizoctonia solani*, and *Verticillium dahlia*. It is not my intention to dispute chemicals have a place in production agriculture, but rather address the issues of declining soil biodiversity and the efficacy of microbial products used to control soil-borne pathogens. The pathogens used in this study include: *Alternaria solani*, *Phytophthora infestans*, *Rhizoctonia solani*, and *Spongospora subterranea*.

OBJECTIVES FOR 2000:

The first objective for this project will be done in an independent lab in Tempe, Arizona. The procedures required are as follows: 1) Isolation of *Alternaria*, *Phytophthora*, *Rhizoctonia*, and *Spongospora* from tubers produced in the San Luis Valley, 2) Screening of microbial products by performing diversity analysis, and 3) Performing pathogen inhibition assays on *Alternaria*, *Phytophthora*, *Rhizoctonia*, and *Spongospora* using both microbial products and industry standard chemicals.

The second objective for this project will be performed in the greenhouse. At this point replicated trials of tubers inoculated with the above pathogens will be produced. The infected plants will be treated with both microbial products and industry standard chemicals to determine if specific microbial products, and possibly specific microorganisms, control the pathogens as well as chemical products.

FUNDING REQUEST:

The funding request is comprised of lab, greenhouse, and research expenses. The projected amount required for the laboratory work is \$5,000. This includes the isolation of the pathogens, the diversity analysis of different biological products, pathogen inhibition assays of both biological products and industry standard chemicals, and a visit to BBC Labs in Tempe, Arizona. The projected amount required for the greenhouse work is \$2000. This includes greenhouse expenses at \$0.50/ square foot/month for 5 months and 50 pounds of seed at \$25/cwt. The projected amount for labor and research is \$10,800. This includes direct labor requirements at \$15.00/hour. The total funding requested for the project is \$17,800.00.

TIME LINE:

<u>Summer/Fall 2000</u>	<u>Winter 2000</u>	<u>Summer 2001</u>
Isolation of Pathogens	Greenhouse Trials	Field Trials
Diversity Analysis of Products	Ft. Collins, CO	S.L.V., CO
Pathogen Inhibition Assays		

COOPERATORS:

Dr. Joe Hill and Dr. Howard Schwartz are the initial cooperators on this project.