SUMMARY RESEARCH PROGRESS REPORT FOR 1997 AND RESEARCH PROPOSAL FOR 1998

Submitted to:

SLV Research Center Committee and the
Colorado Potato Administrative Committee (Area II)

Title: Potato Disease Studies

Project Leader(s): R.D. Davidson; plus R.T. Zink, A. Thompson-Johns and D.G. Holm (*An Integrated Approach to Early Blight Management on Potato*)

Project Justification:

The impact on the San Luis Valley potato crop from potato diseases is significant. While there have been some major strides in controlling many of the seedborne disease problems which have been present for years, other non-seedborne diseases and new seedborne problems are emerging which can be just as devastating. Growers are also at a disadvantage in this battle. In particular, growers are being hit with rising production costs, the necessity of growing multiple cultivars to spread market risk, and the need to use better cultivar by cultivar growth models to maximize saleable yield. Thus, there is a greater potential for significant crop losses because of disease.

A substantial effort has been put forth in the certified seed program to reduce the impact of potato leafroll (PLRV), mosaic viruses (PVX, PVS & PVY), blackleg (*Erwinia* spp.) and bacterial ring rot (BRR - *Clavibacter michiganensis* pv. *sepedonicus*), but success has been varied. Overall, there have been reductions in the percentage of seed lots with PLRV, blackleg and BRR. Lots with mosaic problems, however, are still increasing, primarily because of the growth of susceptible cultivars, presence of additional sources or reservoirs of disease, and dealing with latent (non-visual) infections. In addition, newer disease problems such as early blight tuber decay (*A. solani*) have become serious threats because of the loss of chemicals, the importation of diseases in seed, and the reduction of rotation years between potato crops. Therefore, continued research of these diseases and others with potential impact in the future is warranted. Emphasis for this project is on practical, grower oriented methods of control.

Project Status:

This is an ongoing project which has been funded at various levels for the past several years. Numbered clones are graded annually for their reaction to BRR, PLRV, and common storage diseases, which includes a rating of each clone for symptom development and potential susceptibility to these diseases. Reducing the impact and spread of bacterial diseases, specifically blackleg and BRR, and the mosaic virus PVY are also areas of focus. Last year a comprehensive two year project using an integrated approach to early blight management on potatoes was funded.

Significant Accomplishments for 1997:

Sixteen (BRR) and ten (PLRV) advanced clones and six established cultivars were screened for symptom expression to PLRV and BRR. Also, tubers from sixteen advanced clones and seven established cultivars were evaluated for symptom expression to *Erwinia* spp., *Fusarium sambucinum*, and *Alternaria solani*.

All clones tested had adequate symptom expression to leafroll. In addition, three clones, AC90017-2, CO90045-4 and CO90052-1, demonstrated high risk levels for in-field spread of leafroll. BRR expression was marginal to adequate for the majority of the clones tested. Two clones, AC90017-2 and NDC4655-1 showed no BRR symptoms during the season. First year clones will be retested in 1998. Two clones, AC88042-1 and AC88162-4 which were tested for a third year in 1997 demonstrated adequate symptoms (AC88042-1) and very mild symptoms (AC88162-4). Three other clones, AC82363-3, CO86030-1 and CO86153-2 were tested in plantlet form. While all clones showed significant height increases in the healthy vs. the infected plants (1.5 to 4x taller), only one, AC82363-3, demonstrated adequate visual BRR symptom expression. The other two still showed no visual BRR symptoms and are recommended for dropping from the Cultivar Development program.

Clones with tubers tested for common storage related diseases demonstrated various symptom expressions depending upon the disease being screened and the clone being tested. Overall, there did appear to be a separation between clones and cultivars which might indicate different levels of disease susceptibility or resistance for future reference.

The project using an integrated approach to early blight management on potatoes met several of its objectives for the first year. A report was given reviewing the current project accomplishments at the 1997 Rocky Mountain Potato/Grain Conference. Production scenarios for four widely grown cultivars (Ranger Russet, Russet Norkotah, Centennial Russet, and Russet Nugget) were compared under SLV conditions to assess their potential to cause early blight tuber decay. Results from 1997 indicate that the cultivar grown has a major impact on early blight tuber decay with the most susceptible cultivars, i.e. Ranger Russet, showing the greatest damage. However, there was no significant effect due to increased fertility, increased foliar fungicide application or foliar and tuber inoculation with *A.solani* on tuber decay. In addition, there was no effect on early blight tuber decay seen between gradually cooling down tubers in storage and rapidly cooling down tubers, even when tubers were inoculated with *A.solani* spores. Preliminary indications are that a mature crop with good skin set is quite resistant to early blight tuber decay; the expected outcome of this research.

Other parts of the project which are currently ongoing looked at characterizing the virulence of *A. solani* isolates collected in the SLV, assessing and documenting the degree of early blight tuber decay in the SLV industry, and comparing different chemistries for control of early blight tuber decay. Vine kill agents were examined with a significant advantage for control of early blight tuber decay shown by either the use of sulfuric acid or the use of propane burning of the vines and soil just prior to harvest. Additionally, use of fungicides as a field applications after vine kill, but prior to harvest is being evaluated.

1998 Objectives:

1) To continue screening all numbered clones which are potential releases from the Colorado Cultivar Development program for symptom expression to BRR, PLRV, and common storage diseases.

2) To continue research dealing with an integrated approach to early blight management on potato.

Funding:

1997 Allocation:	$22,000
1998 Request:	**$22,000**