

RESEARCH PROPOSAL FOR 2001

Submitted to:
Dr. Lee Sommers, Director AES

Funding source: Royalties collected from the Russet Norkotah Selections 3 & 8 for the 1999 crop.

Title: Evaluation of Cultivars and Advanced Clones for Susceptibility to Powdery Scab

Project Leaders: Robert Davidson and Richard Zink (Co-PI)

Project Justification: The potato industry in the San Luis Valley continues to be faced with serious disease management challenges. The certified seed potato industry is in an even more tenuous position. The presence of many traditional disease problems such as bacterial ring rot, *Erwinia carotovora* subsp., the potato viruses, potato leafroll, PVY and PVX, and many of the fungal problems (late and early blight, *Fusarium* spp., *Rhizoctonia*, etc.) are still significant players in overall disease management. However, in the past few years, more insidious problems have developed. These problems are quite often invisible to the grower until after the damage is done. These problems fall into the categories of seed-borne and soil-borne diseases and pests and require increasingly sophisticated management strategies for control. Among them are pink rot, silver scurf, nematodes and powdery scab. Powdery scab, *Spongospora subterranea*, is by far the most dangerous of the group.

Powdery scab is surface defect problem on the tubers that generally begins during the growing season and may progressively deteriorate once the tubers are in storage. The scab or lesion is often hard to detect until it has burst open to release the resting spores (generally after harvest). These spores look like dust and are easily moved because of their small size. As little as 0.3 spores per gram of soil may cause infection and, thus, disease. As a surface defect, the lesions are counted against the tuber product during grading of the potatoes and can cause significant shrinkage from loss of water through the wound. As a pathogen, certified seed can be an avenue of moving spores into un-infested soils.

There are no known effective controls for powdery scab short of good luck, some potential chemical help and good production management. The most promising control measure to-date is the use of resistant potato germplasm. The pathogen is readily moved into the soil in a variety of ways; wind blown spores, infected seed stocks, adhering soil, etc., and is able to maintain adequate populations of resting spores to cause disease for up to twenty years between susceptible crops. Conditions for disease development are variable and often difficult to predict. While many russet cultivars are resistant to the disease, that is, they do not demonstrate tuber symptoms, most reds, whites and yellows are quite susceptible. In addition, many russets allow the pathogen to increase on their roots, thus building up inoculum even though the tubers produced from that crop do not show symptoms. This inoculum, in turn, is moved to other non-infested soils by adhering dirt on seed tubers and, in the field in question, is available for causing disease when a susceptible cultivar is grown.

The San Luis Valley is a very unique growing region for potatoes and has traditionally been a major producer of russet-type cultivars. Increasingly, however, growers are being forced to raise non-traditional cultivars (non-russets) to compete in the market place. The Certified seed

program is even more competitive on a national and international scale, raising most types of potatoes and over 120 different cultivars. This problem, however, could create significant difficulties in moving both commercial (table stock) and certified seed product out of the Valley. Thus, there is a need to develop a research program aimed at understanding and reducing the effects of powdery scab. It is apparent after many years of research in other regions of the world and the U.S. that the best chance for success is growing cultivars resistant to inoculum increase and tuber symptoms.

Proposal for 2001: The proposal for 2001 is to develop a comprehensive evaluation program for all cultivars currently being produced in Colorado and the advanced germplasm coming from the Colorado Cultivar Development program. Dr. David Holm, the Leader of the Cultivar Development Program, will be a cooperator. These funds will be used in combination with other monies to:

- Establish a permanent powdery scab research site within the San Luis Valley.
- Evaluate both existing cultivars and advanced selections for root increase and tuber symptom expression to powdery scab.
- Collaborate with Dr. Barbara Christ at Pennsylvania State University in a national, USDA funded powdery scab project.
- Identify potential sources of resistant germplasm for future breeding purposes.

Funding Request: 2001 \$10,000

Brief Literature Review:

Braithwaite, M., R.E. Falloon, R.A. Genet, A.R. Wallace, J.D. Fletcher and W.F. Braam. 1994. Control of powdery scab of potatoes with chemical seed tuber treatments. *New Zealand Journal of Crop and Horticultural Science*, 22: 121-128.

Burgess, P.J. and S.J. Wale. 1994. Development of an integrated control strategy for powdery scab of potatoes. *Brighton Crop Protection Conference - Pests and Diseases*. pp. 301-306.

Christ, B.J., January, 2001. Evaluation of potato germplasm for resistance to powdery scab. Growers' workshop put on by Richard Zink and Robert Davidson, Holiday Inn, Alamosa, CO.

Wale, S.J., 2000. New thinking on seed-borne skin problem. *Potato Review*, November issue, pp. 11-12.

Wale, S.J., January, 2001. The A to Z of powdery scab and its control. Growers' workshop put on by Richard Zink and Robert Davidson, Holiday Inn, Alamosa, CO.