

To: The San Luis Valley Area II Administrative Committee

1983-1984

Budget Request

to

Support Research on Handling, Storage and Quality Characteristics of New Potato Clones and to Study Biochemical Factors Related to Blackspot and Soft Rot Susceptibility.

Objectives

1. To cooperate in the plant breeding and cultivar development program in respect to evaluation of the handling, storage and quality characteristics of advanced selections.
2. To conduct research to understand the physiological and/or biochemical basis for clonal differences.

Personnel

Milton Workman, Department of Horticulture

in cooperation with

David Holm, Department of Horticulture

Budget

Travel	\$350.00
Supplies	\$450.00
Labor	<u>\$3300.00</u>
	\$4100.00

1983-1984

Research Proposal to the
Area II Administrative Committee

From

Milton Workman, Department of Horticulture
Colorado State University

March 9, 1983

Research Objectives

1. To cooperate in the plant breeding and cultivar development program in respect to the evaluation of the handling, storage and quality characteristics of advanced selections.
2. To conduct research to understand the physiological and/or biochemical basis for clonal differences.

Rationale

High yield and grade out are essential if a new potato clone is to succeed. However, in addition, the potato must withstand to a reasonable degree the stresses of harvesting, storage, transportation and marketing. The consumer then makes the final evaluation. During this time from harvest to reaching the consumer the potato is exposed to stresses of temperature, impact bruising, pressure bruising, water immersion, pathogenic infection, etc. Tuber wholesomeness in respect to the absence of undesirable constituents such as glycoalkaloids is also necessary.

When considered as a seed potato, additional stresses are imposed such as cutting in preparation for planting. The ability to heal properly under sub-optimum conditions is essential to reduce moisture loss, reduce pathogenic infection and produce good stands.

Research Areas

1. Clonal Evaluation

Work is now in progress to compare 7 test clones with R. Burbank and Centennial. The fall evaluations (1982) are presented in the March 9, 1983 report. New and promising clones will be evaluated this coming fall (1983). Primary evaluations will again include bruising and blackspot susceptibility, soft rot susceptibility at harvest and after storage. Measurements of dry matter, redox potential, ascorbic acid and elemental analyses will accompany the bruising and soft rot testing. Observations of dormancy and sprouting characteristics and weight loss of cut seed will also be made.

2. Research to explain clonal differences

This research will be focused primarily on why clones differ so greatly in bruising and blackspot susceptibility. Susceptible and resistant clones have been evaluated in respect to their relative sap darkening rates (See March 9, 1983 report to Area II Research Committee). We have found that the presence or absence of the cell fragments effects the browning of the sap extract differently. In some resistant clones, browning rate is not effected by the presence of cell fragments but in susceptible clones browning is increased. Possibly, cell walls of susceptible clones carry additional browning enzymes or additional browning substrate while cell walls of resistant clones lack in one or the other or both factors. Also, the addition of a browning substrate to the sap extracts increased browning more of sap from resistant than susceptible clones. These observations will be further explored. Phenolic content and phenolic enzyme activity of resistant and susceptible clones will also be evaluated.

Our original hypothesis that the relative oxidizing or reducing capacity of the tuber is related to blackspot susceptibility will be explored. For this purpose, dyes that change color at specific redox potentials will be used in various ways to compare susceptible and resistant clones. Reducing substances and oxidation inhibitors will also be infiltrated into susceptible clones prior to bruising to determine their effect on the browning reaction. If any show promise

to prevent blackspot the chemicals will be tested as foliage treatments in the fall (1983).

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