

SUMMARY RESEARCH PROGRESS REPORT FOR 1990  
AND RESEARCH PROPOSAL FOR 1991

Submitted to:

SLV Research Center Committee

and the

Colorado Potato Administrative Committee (Area II)

TITLE: ENVIRONMENTAL FACTORS CONTROLLING POTATO SEED VIGOR

PROJECTS LEADER(S): Cecil Stushnoff, Ken Knutson, Frank Moore and Dave Holm.

PROJECT JUSTIFICATION: High quality seed is an essential first step in obtaining consistent production with high marketable yields. Freedom from disease has been recognized as an essential prerequisite. Research on detection and handling methods has led to implementation of handling procedures that have vastly improved the availability of disease free seed for grower use.

On the other hand, the physiological status of the seed tubers has only recently been implicated as another key factor contributing to seed quality, especially from the standpoint that previous growing and storage history might have a profound influence on subsequent marketable yields.

During the past five years, research conducted at The University of Saskatchewan, has shown that potato seed tubers grown in northern Saskatchewan have produced higher marketable yields than the same quality and disease status seed grown approximately 1000 miles southwest at Becker, Minnesota. Initial studies on this aspect were expanded during the past two years to include seed production at SLV, a high altitude, cool night temperature site and Greeley, CO, a medium altitude, but cooler night temperature site than Becker Minnesota. Prince Albert, Outlook and Saskatoon, Saskatchewan represent the most northerly sites with long days and cool nights.

PROJECT STATUS: New.

SIGNIFICANT ACCOMPLISHMENTS FOR 1990: In addition to seed production, replicated yield trials were conducted at Greeley, CO; Becker, MN; and Saskatoon, Sask. The higher marketable yield response was found to occur consistently for Russet Burbank at all production sites and less consistently for Norland. In 1990, seed tubers from SLV and Greeley were tested for the first time in the replicated production trials. The response of SLV and Greeley produced seed was far superior to those grown at Becker, Mn and almost equal to the northern Canadian sources (Figures 1-5). Although, these data are from one year only, the response is similar to four year's data from previous work. This supports our

hypothesis that seed produced in areas with cool night temperatures have greater vigor because cooler temperatures favor metabolism leading to the production of yet unidentified constituents that enhance seed vigor.

The implications are intriguing for seed producers located in cool regions. Seed that will produce higher marketable yields represents a low energy based input and an input that does not pollute or require capital expenditure for cultural application that is different from existing practices. Growers of seed in such regions should be able to develop a marketing edge for their seed and the industry should benefit overall because of increased efficiency in seed and consumable tuber production.

OBJECTIVES FOR 1991: The cooperative project with The Department of Horticulture at The University of Saskatchewan will be continued. We intend to plant a replicated yield trial at a grower site in Weld County near Greeley using seed produced from the same six sites as last year. This will provide two years data on the yield response for the Colorado grown seed sources in comparison with the Canadian and Minnesota sources.

In addition, we intend to plant a research plot that will be harvested at regular intervals for the purpose of obtaining growth analysis data. Knutson and Moore have established a protocol from earlier trials and we now wish to implement this same procedure to evaluate plants grown from the different seed sources. We anticipate that this study will pin-point critical differences in growth response to further elucidate why seed grown in cooler regions produces higher marketable yields. Leaf area measurements will be taken at regular intervals along with dry matter accumulation for component plant parts.

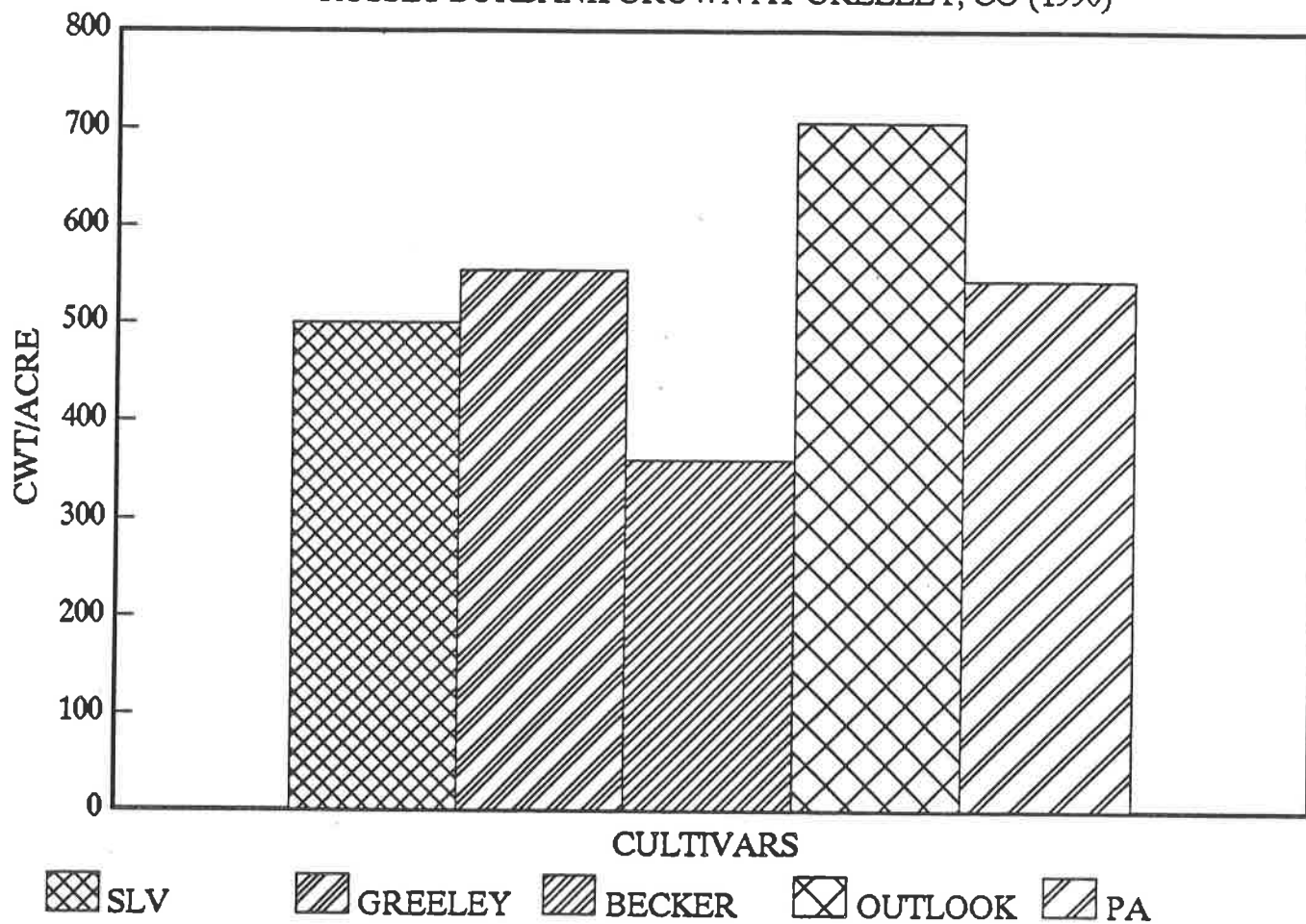
#### FUNDING REQUEST:

1990 Allocation: None for this project. Up to this point, funds for the seed vigor replicated plots were provided by a grant to the project at The University of Saskatchewan and seed increases from SLV were done courtesy of Dave Holm.

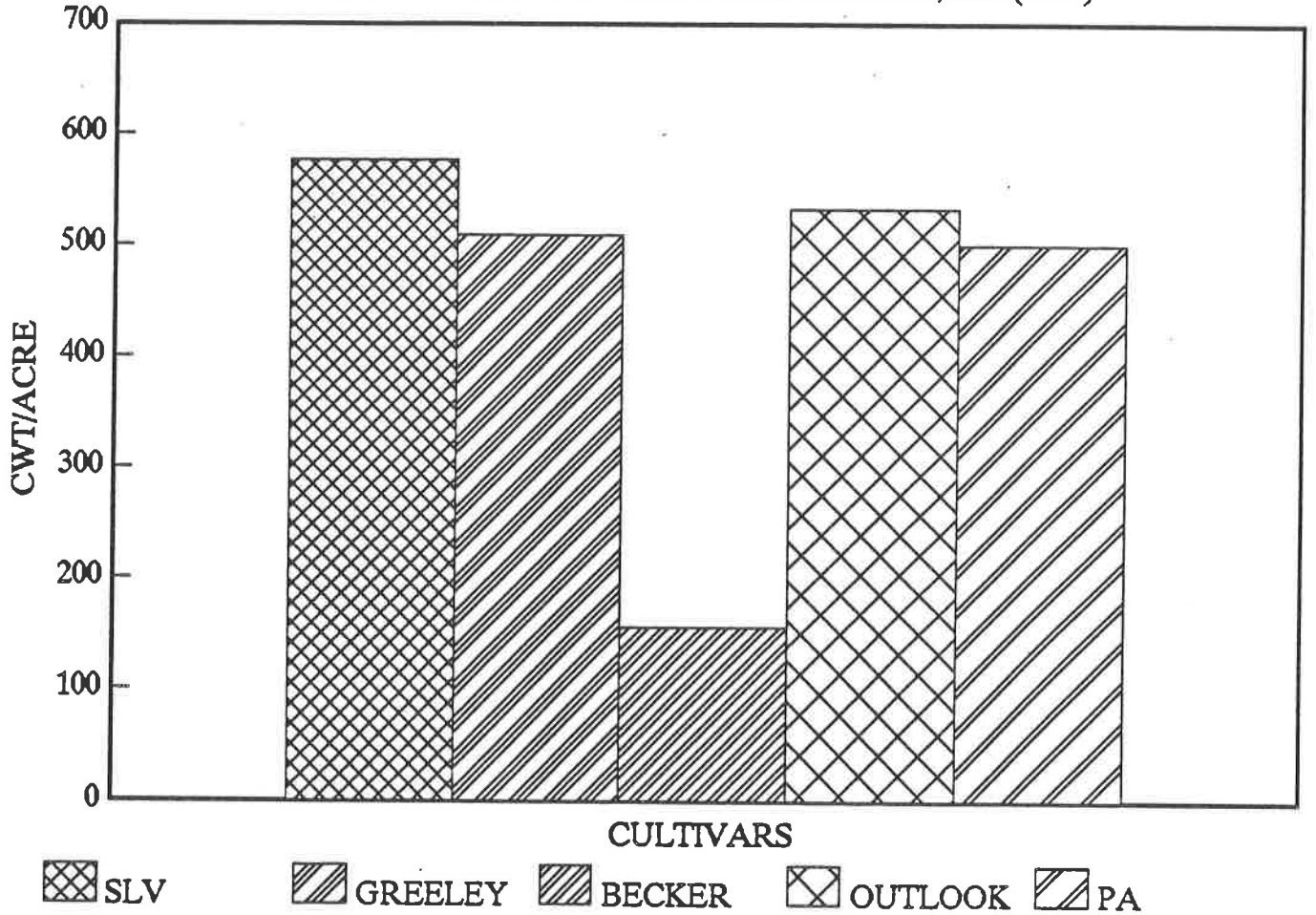
1991 Request: We are requesting funds for:

- a. A summer student salary to take data for the growth analysis study and to assist with planting and harvest, (May through Sept.). \$2500.

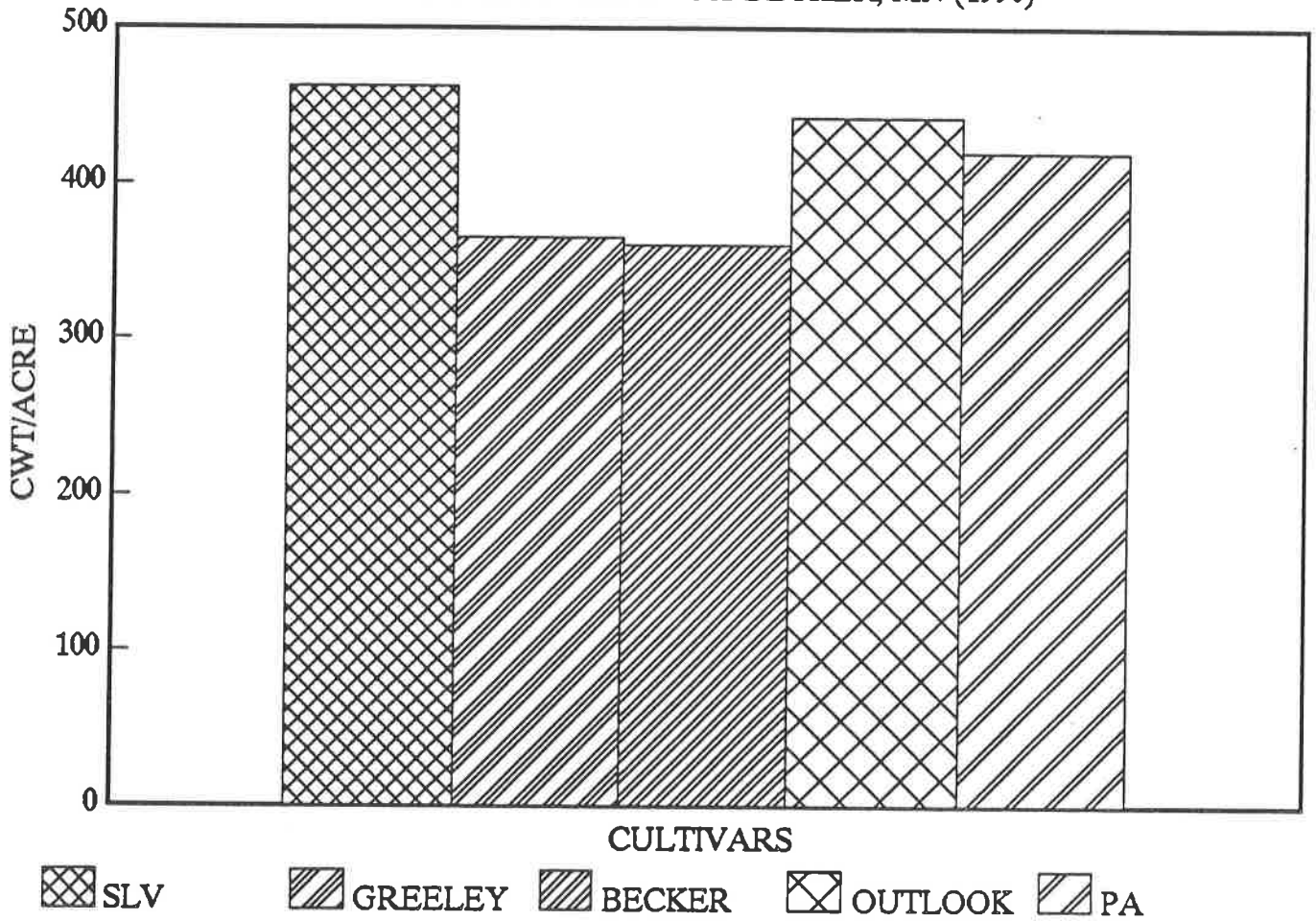
MARKETABLE YIELD—FINAL HARVEST (120DAP)  
RUSSET BURBANK GROWN AT GREELEY, CO (1990)



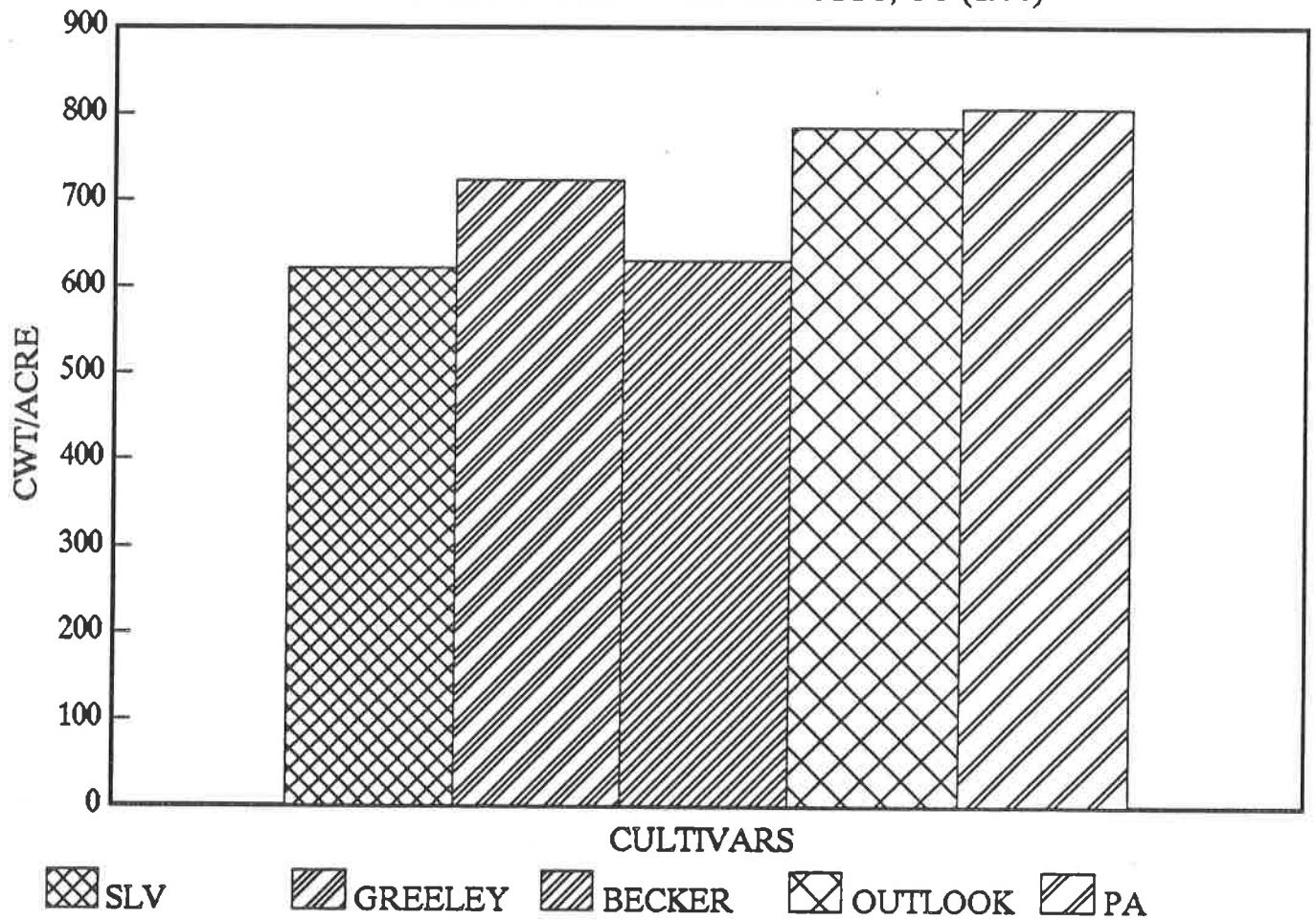
MARKETABLE YIELD—FINAL HARVEST (120DAP)  
RUSSET BURBANK GROWN AT BECKER, MN (1990)



MARKETABLE YIELD—FINAL HARVEST (120DAP)  
NORLAND GROWN AT BECKER, MN (1990)



MARKETABLE YIELD—FINAL HARVEST (120DAP)  
NORLAND GROWN AT GREELEY, CO (1990)



MARKETABLE YIELD FOR FINAL HARVEST (120DAP)  
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