

**SUMMARY RESEARCH PROGRESS REPORT FOR 1998
AND RESEARCH PROPOSAL FOR 1999**

Submitted to:

**San Luis Valley Research Center Committee
and the Colorado Potato Administrative Committee (Area II)**

TITLE: Cultural and Physiological Studies

PROJECT LEADER: Asunta (Susie) Thompson-Johns, Research Horticulturist, San Luis Valley Research Center

PROJECT JUSTIFICATION:

The objectives of the current research program include development of cultivar specific management profiles for advanced selections and new cultivars, providing cultural management guidelines for nuclear seed producers and investigation of physiological factors related to potato production. Trials are tailored to address problems and production requirements for the San Luis Valley. However, much of what is learned may be applicable in other growing areas, for example, providing a base when trying a selection for the first time.

Development of cultivar specific management strategies may mean a more successful experience for producers and the industry, and in the development process, shortcomings of the selections may be recognized and appropriate management systems identified. Information related to nutrient management, plant population, pest susceptibilities, water requirements and storage considerations is included in management profiles. At the present time little work has been done to aid nuclear seed producers, however, work is scheduled on the older greenhouse complex beginning in 1999, and perhaps in the interim a local cooperator may be identified to aid in initiating some experiments. Investigations of physiological or biochemical factors provide basic information, but also impact management considerations. These aspects are then assimilated into the appropriate management profile.

PROJECT STATUS: Ongoing

SIGNIFICANT ACCOMPLISHMENTS FOR 1998:

As in previous years, the scope and number of trials conducted increased in 1998. Abbreviated results for many of the studies are presented in the following narrative. Many trials had lower yields than in previous years. This can be attributed to the hot weather prior to July fourth, followed by ten days of optimum potato production

temperatures and cloudy weather, as well as the many closely spaced fungicide treatments through August which seem to slow bulking. The weather conditions also resulted in some misshapen tubers, deeper eyes and a few jelly ends.

Alpha Production - Seven production scenarios were evaluated in 1998. Early vine kill and GA treatments were not included in this year's study. Marketing of Alpha requires a different grading scheme as buyers desire nothing larger than a 60 mm top. In the smallest grade (25-40 mm) double cropping produced the most, while the full-season scenario (control) and chitted treatment produced the fewest. In the 40-50 mm grade, double cropping performed most poorly, while the seed piece spacing of six inches was most superior. For the 50-60 mm category, double cropping and vine chopping provided the lowest yields and these were significantly different from the other treatments. The control and chitting resulted in the highest yields. The control and excess nitrogen treatments resulted in the highest yields of the +60 mm grade, which becomes undesirable due to too large of size. Double cropping and vine chopping had the lowest yields for this category.

Boron Rate - Two cultivars, Russet Norkotah and Russet Nugget, were produced at 3 rates of boron, 0, 1 or 2 pounds pre-plant incorporated. Yield was significantly different for the clones, across boron treatments, but not for boron rate across clones. For the interaction term of clone x boron, Russet Norkotah performed best with no added boron, while there were no significant differences in total yield between treatments for Russet Nugget. There were no significant differences for any grade parameters across boron treatments, however there was for clone. Russet Nugget always out yielded Russet Norkotah in this trial. This study will be repeated in 1999. It is surmised that despite our low soil readings on the southwest corner, that adequate boron is being supplied through the irrigation water.

Diquat Bulking - Five vine kill treatments were evaluated in a commercial Russet Nugget field. Harvests were conducted at 0, 14 and 21 days after treatment. The untreated check (natural vine death) was the lowest yielding treatment, while the 2 pts. rate of Diquat was the highest. This treatment was significantly different from the other yields. Total yields ranged from 387 cwt./acre (check) to 520 cwt./acre (Diquat @ 2 pts.). US No. 1's ranged from 79 percent for the untreated check to 88 percent at the 2 pt. rate of Diquat. US no. 2's and culls were not significantly different for the various treatments. Specific gravity ranged from 1.069 (sulfuric acid) to 1.078 (Diquat @ 1 pt.). The breakout most likely may be attributed to speed of vine kill, continued bulking and attaining chemical maturity.

Growth Analysis - Five advanced selections were produced utilizing standard production practices. Within-row spacing was 12 inches. Weakly destructive harvests were conducted beginning at emergence. No canopy, root and tuber development profiles are reported here. BCO894-2, the very early chipper, was the lowest yielding selection. AC83064-6, Silverton Russet, was the highest yielding. Yields were not significantly different for the 5 selections. Russet selections tended to be higher yielding for the larger

tuber grades, while the red and chipper had lower yields for these categories, and higher ones for the smaller sizes. This is acceptable as these categories generally provide the premiums for these market types.

NYL Russet Norkotah Agronomic Performance Trial - Six selections were grown at the SLVRC in 1998. The materials included four transformed selection and two controls, the standard and Colorado Selection 3. RNCTRL00-6 (CO Selection 3) was the highest yielding entry at 790 cwt./acre. The lowest yielding clone was RNBTVY15-350 at 382 cwt./acre. Ranking of the clones for yield of US No. 1 tubers matched that of total yield. US No. 1 yield ranged from 200 to 570 cwt/acre. Percent US No. 1's was low, ranging from 52 to 76 percent. Rankings differed for the entries. Colorado Selection 3 produced the most over-sized tubers, while RNBTVY15-350 had the fewest. Undersized tubers were most prevalent for RNBTVY15-350, while RNCTRL00-5 (standard control) produced the fewest in terms of yield. Bottlenecks, jelly ends, growth cracks and generally rough tubers resulted in US No. 2's and culls for all entries.

Seed Piece Spacing - Six advanced selections were produced at three within-row spacings (9, 12 and 15 inches). Yield and grade profiles indicate maximum production for the advances selection varies by the within-row spacing. Tuber quality parameters were unaffected by within-row spacing, but occasionally varied for clone. Total yield across clones was superior at the 9 inch spacing, as were most yield components. Inferior yields were obtained at the 12 inch spacing. AC83064-6, AC87084-3, and CO85026-4 performed best at the widest spacing. Conversely, maximum yield and grade for AC88165-3 was reached at the 9 inch within-row spacing. BCO894-2, an advanced chipping selection, performed best at the narrow spacing as expected. Total yield for CO86218-2, a dark red selection which retains good skin color in storage, was superior at the narrow spacing, however the tuber grade profile was best at the 12 inch spacing. Producers should adjust within-row spacing for this clone by desired end use or premium price within the market place.

Management profiles were updated for Cherry Red and Russet Legend. Profiles near completion include Russet Norkotah compared with selections 3 and 8, Silverton Russet (AC83064-6), Keystone Russet (AC83064-1), Yukon Gold and Alpha.

OBJECTIVES FOR 1999:

1. Continue development of cultivar specific management profiles for advanced selections and named cultivars.
2. Begin more directed research toward cultural management guidelines specific to nuclear seed production.
3. Continue investigations of physiological affects of production related factors. Develop a chapter or section related to precutting for inclusion in the San Luis Valley Potato Production Manual.

FUNDING REQUEST:

1998 Allocation: \$9,900

1999 Request:

Supplies	\$1,000
Sample Analysis	3,000
Support Personnel	<u>5,500</u>
Total	\$9,500