

**SUMMARY RESEARCH PROGRESS REPORT FOR 1999
AND RESEARCH PROPOSAL FOR 2000**

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

TITLE: **Cultivar storage profiles of field tubers, and dormancy in potato minitubers**

PROJECT LEADERS: Cecil Stushnoff, Ann McSay, David Holm, Susie Thompson, Robert Davidson

PROJECT JUSTIFICATION: This proposal is based on the continuing need to: (1) develop storage performance profiles of new introductions, (2) determine mechanisms which impart postharvest dormancy in minitubers and to develop well defined protocols to overcome dormancy.

PROJECT STATUS: (a) Field tuber dormancy 1999 crop. Storage temperature and duration tests were continued for seven cultivars and selections (AC83064-1, AC83064-6, DT6063-1R, Russet Burbank, Russet Norkotah #3, Russet Norkotah #8 and Russet Nugget). (b) Minituber dormancy. Dormancy breaking agents including hormones, dormancy release chemicals, red light and temperature have been tested with mixed results. Storage studies are underway to determine how long minitubers can be stored after the dormancy requirement has been satisfied. Data will be collected an additional 4- months.

SIGNIFICANT ACCOMPLISHMENTS FOR 1999: (a) Field tuber dormancy. There is little difference in storage life of field tubers at storage temperatures of 38, 40, 42, 44 °F, but a very significant difference when stored at 36 °F, approximately double for most cultivars. The cultivars can be ranked with the longest to shortest storage life as follows: R. Burbank, DT6063-1R, R. Norkotah #8, R. Norkotah #3, AC83064-6, R. Nugget and AC83064-1. Cultivar storage profiles can be used to predict storage performance at these specific temperatures.

(b).Minituber dormancy. Using cultivar AC88042-1 (provided by David Holm), red light seemed to enhance bud break of minitubers when using 60 °F(15 °C) stratification. However, other cultivars did not respond in the same manner and in fact the dark treatments had a higher percentage of bud break. The optimum incubation temperature to break buds was 59 °F in these studies; 55 °F was also successful, but slower. Fluctuation between 50 and 86 °F and 50 and 68 °F inhibited bud break compared to constant 59 °F. Pro-Gibb (PG) and GA3 were the most effective in enhancing bud break, and in some cases p-coumaric acid (PC) also stimulated bud break. Soaking minitubers for 4, 8 or 24 hours was far more effective than a surface spray application. Soak treatments broke dormancy in 80% of minitubers, in as little as 23 days compared to 55 days or longer with the spray application. Greenhouse grown potted plants had elongated stems and chlorotic leaves when treated with Pro-Gibb, but not minitubers grown in test plots at SLV.

Treatments applied at Martinez Farms showed that R. Nugget broke dormancy 100% after 25 days at 59 °F in the dark regardless of treatment and Centennial broke 80-90% with PG and PG+PC in the dark, but less than 40% in red light. Atlantic buds broke 60% with PG+PC in

the dark, but less than 10% in red light. R. Norkotah broke less than 20% in the dark and not at all in red light. At Zapata, standard R. Norkotah broke 100% with PG+PC in the dark, but only 40% in red light with PG. R. Norkotah#3 was by far the least responsive. Only 20% minitubers broke bud with PG or PC+PG in the dark and 0% response to other treatments.

Forty five other treatment combinations including thiosulfates, hydroxyquinolines, ethylene, cytokinins, calcium nitrate and fluridone were subjected to preliminary trials. These need to be repeated because of uncertain dormancy status with our test material as storage progressed.

A study was initiated with mintubers that had lost dormancy (a gift from Martinez Farms) to try and answer the following questions:

- how long can we store non-dormant minitubers at 34, 36, 38 and 40 °F;
- do any of these temperatures cause chilling injury following prolonged storage;
- can alginate encapsulation and sucrose prolong storage, if so which is the best temperature;
- how serious is moisture loss during storage;
- are there cultivar differences among Atlantic, Centennial, Chieftan, Kennebec, R. Norkotah #3, R. Norkotah #8?

Preliminary results after 104 days storage in the non-dormant condition in paper bags with restricted moisture loss show that all cultivars are still alive, but all are dead after storage in mesh and burlap bags. All cultivars had 80-100% bud break in storage at 38 and 40 °F, and 0 to 60 % break at 34 °F storage. Alginate and sucrose inhibited bud break, especially at 34 and 36 °F.

OBJECTIVES FOR 2000:

1. **Develop storage temperature profiles for new introductions not yet tested.**
2. **Continue testing minituber cultivar response to dormancy breaking agents at CSU and at cooperator sites under different conditions. It appears that specific protocols will be required for each cultivar.**
3. **Assign some aspects of this project to Oktay Kulen, a PhD student funded by the Turkish government.**

FUNDING REQUEST:

1999 allocation: \$6,500

2000 request: \$6,500

1.	Greenhouse rental	500
2.	Dormancy breaking chemicals	500
3.	Travel, San Luis Valley (2 trips x 150) potato meeting for Ann McSay (\$300)	600
4.	Purchase minitubers	2000
5.	Student hourly and work study	2900
6	Total	6500