

RESEARCH PROPOSAL FOR 2001

TITLE: Characterize antioxidants and possible other healthy chemicals in potatoes

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

PROJECT JUSTIFICATION: This proposal is based on the need to investigate the role potatoes might have improving the diet of individuals. We propose to: 1) study existing cultivars and 2) test potential new cultivars as they progress thru the cultivar release process. This may help marketing of cultivars as 'healthy spuds'.

BACKGROUND INFORMATION: Preliminary tests, done by Cecil Stushnoff in New Zealand, indicate that potatoes, especially the skin, may have very important antioxidants. Some of the antioxidants may even be better than vitamin E. Cecil, during his leave, has learned of several tests which can be utilized to better understand the chemistry of the potato. The tests include 1)total phenolics, 2)ABTS test which measures radical scavenging of any antioxidant, 3)FOX3 assay which measures the potential of food to inhibit lipid peroxidation by forming foamy plugs from LDL cholesterol in the blood, and 4)TRAP assay which measures the kinetics in terms of lag time to measure oxidation of dichlorofluorescein by peroxy radicals as compared to vitamin E. Cecil suspects that some of the colored cultivars may have high levels of antioxidants.

OBJECTIVES FOR 2001

1. Develop protocols for screening potatoes and quantifying antioxidants as well as other beneficial compounds.
2. Determine if all tests can be accomplished at CSU with existing facilities.

FUNDING REQUEST:

New project, no budget for 2000

2001 budget:

1. Chemicals	1000
2. Student Hourly and workstudy	7000
Total	8000

**SUMMARY RESEARCH PROGRESS REPORT FOR 2000
RESEARCH PROPOSAL FOR 2001**

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) to 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 2000 crop. Storage temperature(34, 36, 38, 40, and 44F) and duration tests were continued for seven cultivars and selections (Cherry Red, Chipeta, CO86218-2, Keystone, R. Norkotah #3, R. Norkotah #8, and R. Nugget). (b) Minituber dormancy. Dormancy breaking agents including hormones and dormancy release agents have been tested with mixed results. Storage studies have shown that minitubers can be stored for almost a year after the dormancy requirement has been satisfied.

SIGNIFICANT ACCOMPLISHMENTS FOR 2000: (a) Field tuber dormancy. Once again there is little difference in storage life of field tubers at 38, 40, 44F, but a very significant difference when stored at 36F and 34F. At this point, we have not noted any chilling injury at 34F. Starch and sugar analysis for the cultivars at the respective temperatures have not been performed. The cultivars can be ranked longest to shortest storage life as follows: Cherry Red, CO86218-2, R. Norkotah #3, R. Norkotah #8, Chipeta, R. Nugget, and Keystone. Dry weight (%), determined at the end of the storage time, for fall 1999 harvest was not affected by the storage temperature within a cultivar. The cultivar Keystone seems to have less dry matter than the other cultivars in the experiment.

(b) Minituber dormancy. Experiments, using R. Norkotah #3 minitubers (from Wade Price), which included Pro-Gibb, Calcium nitrate, ethylene as well as many other chemicals indicate that calcium nitrate and ethylene seem to be as effective as Pro-Gibb in breaking dormancy. Further studies should be done to explore additional rates as well as combinations of calcium nitrate and ethylene on other cultivars.

Several cultivars which had been treated with ethylene or other growth regulators were planted in the field at the SLV research center. The minitubers were monitored for emergence and plant growth characteristics. There were no obvious differences between the control (not treated) and the respective treatments in emergence (%) which ranged from 87 to 100%. Plant height was measured during the growing season and just prior to harvest time with no differences due to dormancy breaking chemicals. Observations on daughter tubers were not taken.

A second set of minitubers which had been evaluated for dormancy breaking was planted at the Hort Research Center near Fort Collins. In some cases, approximately 40 days after planting, plants had not emerged even though at least 50% of the tubers had sprouts when they were planted.

The long term storage study has shown that we can most likely hold minitubers for about a year after they have broken dormancy. This is very temperature dependent i.e. the cooler the storage temperature the longer the tubers can be kept. Although not all of the data has been analyzed, some of the preliminary results indicate that are differences in the responses of the tubers depending on the conditions in which they are placed following the storage period. As an example the tubers held at 36F when warmed to 60F (15C) in a dark incubator ranged from 80 to 100% of the tubers having sprouts after 37 days, depending on the cultivar. In a companion study, the minitubers were put in 4 inch pots using a potting mix in the greenhouse, with 60 to 100% of the tubers having sprouts after 44 days. Also, there is some concern regarding the vigor of the resulting plants. The tubers which were in storage for a year did not seem to produce as much top dry weight as those which were shipped to us in July 2000 for RNK#3 and RNK#8.

OBJECTIVES FOR 2001

- 1. Develop storage temperature profiles for new introductions of field tubers not yet tested. Finish sugar analysis on 2000 fall harvested tubers as well as storage profiles which are started.**
- 2. Continue testing minituber cultivar response to dormancy breaking agents using other cultivars and sources of minitubers.**

FUNDING REQUEST:

2000 request: \$6,500

2001 budget:

1. Greenhouse rental	500
2. Dormancy breaking chemicals	500
3. Travel, San Luis Valley (2 trips x 150)	300
4. Purchase minitubers	2300
5. Student hourly and workstudy	2900
Total	6500