

2013

**Title:** Testing Colorado potato germplasm for taste, flavor and cooking quality

**Most relevant funding source:** CCPGA

**Investigator names and department:**

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**Flavor and Taste**

**Nature, scope, objectives of proposed research:**

Flavor is a critical trait in potatoes since it can determine the success or failure of new cultivars in the market place. However, potato breeders do not have the tools to focus on selection for superior flavor. Breeding progress for improved flavor requires both genetic diversity for the trait and an effective way to identify superior clones. The first requirement is not likely to be a problem because tremendous diversity is found in cultivated and wild relatives of potato. The second requirement is more problematic because flavor evaluation based on sensory panels is extremely time consuming and can be carried out on only a few samples at a time. Breeders must be able to associate specific components of flavor in potatoes with more objectively measurable traits (such as chemical compounds) and with the genes underlying those traits. This will facilitate the identification of clones with superior flavor in their breeding programs. Components of flavor include taste, aroma, texture, and umami (a Japanese word meaning delicious). The major taste (nonvolatile) components in potato tubers are glycoalkaloids, sugars, amino acids, lipids, acids, and nucleotides (Maga, 1994). Glycoalkaloids can produce a bitter flavor (Sinden et al., 1976). Bryan et al (2008) reported that alpha copaene was a major aroma component in flavorful Phureja Group clones, but not in bland Tuberosum Group clones.

**Research Objectives:**

1. To evaluate a Colorado potato germplasm for major volatile components (pyrazines, methoxypyrazines, methional, and alpha copaene) identified as contributing to the "baked potato" flavor desired by consumers.
2. To relate volatile components to taste panel evaluations of flavor.
3. Determine cooking quality.

**Research Plan:** Germplasm in the potato breeding program will be evaluated for types and levels of the major volatile components of baked potato flavor (pyrazines, methoxypyrazines, methional, and alpha copaene). This population is expected to have more genetic diversity than the standard cultivars used. Within one month of harvest, sensory analyses will be carried out using tuber samples baked at 200C for one hour. Tubers of a standard weight (~200g) will be baked at 200C for one hour and then volatile compounds will be collected for analysis on Tenax traps and SPME fibers in sample flasks at 37C. Volatile compounds will be desorbed on to thermal desorption injector unit connected to Gas Chromatography-Mass Spectrometry. Samples

will be analyzed specifically for alpha copaene, methoxypyrazines, methional and other compounds that are showing associations with taste panel tests. These compounds will be quantified using appropriate internal standards. Sensory analysis data will be compared with the biochemical analyses in an effort to identify the major determinants of flavor in this germplasm. Biochemical analyses will also be repeated after three months to determine the effects of storage on flavor components.

**Relationship of proposed research to overall problem for potato growers:**

The development of potato cultivars with enhanced flavor has the potential to increase consumer interest in fresh market potatoes and boost consumption.

**Timeline and expected short term (1 yr) and longer term (3-5 yrs) outcomes.**

1<sup>st</sup> years: Volatile compounds will be analyzed in the cultivars released from SLVRC breeding program and will be compared with taste tests using untrained panel (10-15) at SLVRC.

**Detailed annual budget (personnel, materials and supplies, travel, equipment, services) and a budget justification.**

<b>Requested funding for 2013:</b>	<b>21,500.00</b>
Research Associate (50%)	10,000.00
Equipment	5,000.00
Chemicals	5,000.00
Travel	1,500.00