THE FLAVOR OF SMALL IMMATURE TUBERS COMPARED WITH MATURE KATAHDIN TUBERS

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ABSTRACT

The flavor quality of seven immature potato samples (three varieties, four numbered selections) was found to be 'equal to' or 'poorer than' the flavor of mature Katahdin tubers stored for 10 months at 45 F (7.2 C). The samples were evaluated by a panel of 21 experienced judges.

INTRODUCTION

In some areas, including Maine, it has long been considered that small early-harvested potatoes are far superior in flavor to fresh or stored mature potatoes. Experimental evidence is lacking to confirm this belief which, if true, could provide a new market and possible premium prices for immature small potatoes, fresh, canned, or frozen.

There is no evidence in the literature showing that the flavors of small immature potatoes are in fact superior to those of mature full-sized tubers. Thus, in 1971, an investigation was pursued at the University of Maine to test by sensory evaluation the hypothesis that such potato samples do not differ.

MATERIALS AND METHODS

Three varieties and four numbered selections from the breeding plots were grown at Presque Isle, Maine under the same cultural conditions. The tubers, ca. 1.5 x 2.0 inches (3.8 x 5.1 cm) were harvested on July 26, 1971, washed and sorted into four comparable replicates of 20 tubers each. The Katahdin standard, grown at Presque Isle in 1970, MH-30® treated, was stored at 45 F (7.2 C) for 10 months. The mature Katahdins, ca. 3 x 4 inches (7.6 x 10.2 cm) were peeled and cut into pieces of the same size as the whole tubers of the early immature samples.

Cooking: Twenty tubers of the selections and 40 of the standard were cooked in boiling distilled water in stainless steel kettles, 2 liters (1.8 qt) per sample and 4 liters (3.6 qt) for the standard, until tender to a fork. Cooking time to tenderness varied from 33 min. for the standard to 52 min. for Norchip.

Taste test: Preliminary observations showed that dicing the cooked small tubers resulted in waxy lumps for some of the samples. To obviate this unattractive appearance from influencing flavor judgments, all of the cooked tubers were peeled and riced for serving to the panel.

The eight samples were served in randomized complete blocks with four replications. Twenty-four experienced judges were asked to rate the samples for flavor only against the labeled Katahdin sample as: 'equal to, better or poorer than', with degree of difference. The standard was also included as a 'blind' sample in the line of unknowns, the rating of which

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6Maleic hydrazide-30, 1,2-Dihydropyridazine-3,6-dione is a sprout inhibitor.
was the actual reference for comparison. It has been shown (6) that panels frequently rate a blind standard lower than the assigned rating for the labeled standard. In addition, the unknown reference sample provided a check on judge performance: if judges rated the unknown standard two or more grades from that assigned to the identified standard in two or more replicates, records from those judges were not included. Three of the 24 judges were eliminated by this inability to define the standard grade.

After serving, 20-g (0.7 oz) samples of the remaining homogeneous potato mixtures were dried in vacuum for 17 hours at 70 C (158 F) and 28 psi to determine total solids.

**RESULTS**

Data from the combined 21-judge records were analyzed by the variance method using the treatment x judge interaction as error for treatment (2). The L.S.D.'s were the yardsticks used to compare the sample scores to the score of the internal standard sample (Table 1).

Because the total solids of the cooked samples varied from 16.8 to 21.6% (Table 1) and there is some evidence that flavor rating may be influenced by mealiness differences (9), the flavor means were adjusted for total solids differences by covariance analysis.

By both methods of analyses, three samples, (Seminole, Cobbler, B-5735-5), were 'equal' to the standard in flavor and the other four were significantly lower-scored (two at 5%; two at 1% level) and interpreted as 'slightly poorer' than the standard (Table 1).

Thus it appeared that none of the small immature potatoes was better-flavored, three were equal, and four were poorer than the stored Katahdin.

**DISCUSSION**

The literature has yielded no evidence to link the biochemical composition of immature tubers to superior flavor quality compared with fully mature potatoes. Indeed, there is a lack of published flavor components of immature tubers. The reported chemical constituents which are known or suspected to affect flavor were reviewed by Smith (11) in 1968 and Burr (4) in 1966. These authors quoted investigative results which showed that immature tubers were much higher in sucrose than mature ones. Excessive sweetness in potatoes is known to impart an undesirable flavor. Smith (11) pointed out that % total and protein nitrogen increased steadily during the growth of the potato. There is no real evidence that nitrogen influences flavor although Burr (4) quoted Buttery to the effect that methional had a strong earthy potato aroma, but methional had not been demonstrated in cooked potato vapor. In Burr's (4) discussion of potato flavor (taste plus aroma), sour (ca. pH 5.5 to 6.15) and salt (ca. 0.063% chloride) were not considered to be part of the potato flavor profile. It is possible that bitterness could be caused by solanine, sometimes associated with potato greening (4). Bomer and Mattis (3) found lower solanine in mature than immature tubers of six varieties from four harvest dates (range of decrease was 34 to 87%) as well as 19 to 64% more solanine in the small tubers of three varieties on the same harvest date.

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7Murphy, E. F. 1960. Unpublished data.