

Elaboration, shelf life and quality of dishes prepared with new sweet potato selections¹

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ABSTRACT

Dishes prepared with new sweet potato selections were sensory-evaluated by a trained taste panel. Selections SPV-63 (Francia), SPV-55 (Toquecita), SPV-44 (Papota), SPV-56 (Viola), SPV-3 (Sunny) and SPV-71 (Tapató), released by the Mayagüez Institute of Tropical Agriculture (MITA), were used in this study. Dishes prepared included sweet potato croquette, cake, puddings, custards and a cake formula adapted to microwave baking. All were found acceptable in overall quality by the taste panel. A batter of mashed sweet potato and other ingredients suitable for preparing fritters was highly acceptable after 5 months storage at -23.3°C (-10°F). Mashed sweet potato, constituting 33% of total dough weight, was also incorporated in a bread dough formula to produce a highly-acceptable coffee cake.

RESUMEN

Elaboración, almacenamiento y calidad de platos preparados con nuevas variedades de batata

Se realizó un estudio de viabilidad para elaborar, evaluar y determinar la calidad de varios productos utilizando nuevas variedades de batata (*Ipomoea, batatas* (L) cultivadas en la zona de Mayagüez, Puerto Rico.

Se prepararon croquetas, bizcochos, pudines, pan, flanes, bizcocho para microondas y una mezcla apropiada para buñuelos de batata, la cual se conservó congelada a -23.3°C . (-10°F .) para evaluación sensorial mensual.

Se desarrolló una fórmula para "coffee cake" incorporando la batata cocida y majada (33% del peso total de la mezcla) para pan. El producto resultó de gran aceptabilidad para los catadores.

Los datos recopilados mostraron buena aceptabilidad para las croquetas, bizcocho, flanes, pudines, pan y el bizcocho para microondas. La mezcla congelada para buñuelos mantuvo la calidad durante 5 meses.

INTRODUCTION

In 1986-87, the production of sweet potato in Puerto Rico was 78,000 cwt., with a farm value of \$2.84 million (4). The total for all starchy vegetables for that year was \$54.7 million.

Starchy vegetables such as plantain, tanager, cassava and sweet potato, among others, are usually eaten boiled or fried in Puerto Rico. Ordinarily, they are served with meat, chicken or fish. Sweet potato,

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Ipomoea batatas (L.) Lam, is a tropical and subtropical root crop widely studied as a starchy food staple (2,3,7,9,15,16,17). In Puerto Rico, thirteen new selections varying in sweetness were tested by Martin and Caloni (12) for mashing, frying and baking suitability. They concluded that individual selections were frequently more useful for one purpose than another. They also found that overall acceptability was correlated to texture and flavor but not with appearance or sweetness. Taste-panel studies performed locally by Martin et al., indicated a preference for sweetness, softness and texture over other parameters (13).

In contrast to other carbohydrate staples, sweet potatoes have limited flexibility in the number of ways they are traditionally prepared (11). Hence, there is considerable interest in developing new products made from sweet potato.

Sweet potato products of acceptable quality have been developed and evaluated by sensory panels (6,18). These include the freezing preservation of sweet potato bars (1), a preparation method for sweet potato patties (8), and the use of sweet potato paste for improvement of bread (5).

The purpose of this study was to explore the feasibility of developing and evaluating good quality sweet potato dishes with some of the new selections studied by Martin and co-workers (12,13,14,15).

MATERIALS AND METHODS

The new sweet potato cultivars in this study were released by the Tropical Agriculture Research Service, USDA, at Mayagüez, Puerto Rico. They include: SPV-63 (Francia), SPV-55 (Toquecita), SPV-44 (Papota), SPV-56 (Viola), SPV-43 (Sunny) and SPV-71 (Tapato). These cultivars were used in preparing eight recipes suitable for Puerto Rico households, depending on the availability. Probably all six selection were acceptable to make all the dishes developed, since the basic difference among them was their sweetness, especially after cooking. The recipes were for sweet potato fritters, croquettes, regular cake, pudding, bread, custard and coffee cake, and a special cake formula for baking in microwave ovens (table 1).

The fritters (buñuelos) were prepared with selection SPV-55 (Toquecita), cooked in salted water and mashed. Sugar, margarine, eggs, wheat flour, milk, baking powder and salt were added to the mashed sweet potato and blended with an electric mixer into a thick batter. The mixture was thoroughly heated, placed in plastic containers, covered with a tight lid, and stored at -23.3°C (-10°F). It was evaluated monthly up to 5 months. Tablespoons of the batter (previously thawed at room temperature) were fried in cooking oil at 160°C (320°F). The fritters were drained on absorbent paper towel and submitted to evaluation +2 to -2 (10) by a 10 to 14 member taste panel.

TABLE 1.—*Ingredients in eight dishes prepared from newly released sweet potato selections*

Ingredient	Sweet potato preparation (Dish)							Coffee cake	Cake ¹
	Fritter	Croquette	Cake	Bread	Custard	Pudding			
Sweet potato, mashed	1816 ²	800	500	242	908	1362	250	270	
Sugar	28	120	249	60	115	340	60	319	
Margarine	148	47	207	52	—	28	52	147	
Eggs (number)	10	3	4	1	4	6	1	4	
Wheat flour	360	250	—	500	—	102	500	—	
Baking powder	20	—	—	—	—	—	—	—	
Salt	13	5	—	11	1.5	6.5	10	—	
Cheese, hard	—	220	—	—	—	—	—	—	
Bread crumbs	—	215	—	—	—	—	—	—	
Milk	470	—	219	—	265	176	—	72	
Cake flour	—	—	427	—	—	—	—	225	
Ground cinnamon	—	—	1	—	—	1.5	2	—	
Vainilla	—	—	—	—	10	2	—	3	
Raisins	—	—	—	—	—	1.5	3	—	
Granulated yeast	—	—	—	2 ³	—	—	2	—	
Cornstarch	—	—	—	—	22	—	—	—	
Lemon juice	—	—	35	—	—	—	—	—	
Water, lukewarm	—	—	—	170	—	—	170	—	

¹Baked in a microwave oven.

²All quantities are in grams.

³Envelopes.

For croquettes, variety SPV-52 99 was cooked, mashed and then blended with all ingredients except the eggs and bread crumbs. Table-spoonfuls of the mixture were formed into croquettes, stuffed with cheese, rolled in beaten eggs, then in bread crumbs, and fried in cooking oil at 160° C (320° F) until crisp and golden brown. They were then drained on absorbent paper and submitted to the taste panel. The -2 to +2 scale was again used.

Cake was prepared with variety SPV-55. Mashed sweet potato was added to margarine creamed with sugar, along with beaten eggs and spices. Cake flour was added alternately with milk. The batter was ladled into greased cake pans and baked for 70 min in a pre-heated oven at 162.7° C (325° F). The cake was cooled for a few minutes before unmolding.

Bread was prepared with sweet potato selection SPV-43 (Francia). We dissolved the yeast in lukewarm water at 46.2° C (115° F), then added sugar and salt and allowed the mixture to stand for 5 minutes. Then we added eggs, melted margarine and mashed sweet potato. We added flour gradually, beating after each addition. The dough was kneaded on a floured table for 5-10 minutes until thoroughly elastic,

placed in a covered bowl, and allowed to rise for 70 min, or until it doubled in volume. The dough was then "punched down" and allowed to rise again for 30 minutes. After the second rising, the dough was shaped into a loaf, placed in a greased pan and allowed to rise until it doubled in bulk. The loaf was baked for 40 to 45 minutes in a preheated oven at 177° C (350° F), or until the bread shrank from the sides of the pan.

For custards, we used mashed sweet potato varieties SPV-43 (Sunny) and SPV-44 (Papota). All ingredients were blended into a batter, poured into a prepared caramelized baking pan (8" x 8"), placed over a double boiler (bain marie), and baked in a pre-heated oven at 177° C (350° F) for 50-55 minutes, or until a toothpick inserted in the center of the custard came out clean. The custard was cooled and refrigerated overnight before being unmolded.

Sweet potato pudding was prepared with selections SPV-55 (Toquecita), SPV-43 (Sunny) and SPV-71 (Tapató). Margarine was creamed and sugar, eggs and seasoning were added. Then the sweet potatoes were mixed with flour, milk and raisins. The final mixture was poured into a well-greased square pan and baked in pre-heated oven at 177° C (350° F) for 70 minutes.

For coffee cake we used selections SPV-44 (Papota) and SPV-56 (Viola). We followed the above standard method for making bread. After the second rising, the dough was stretched into a rectangle, sprinkled with a mixture of sugar, cinnamon and raisins, rolled and shaped into a ring. The ring was placed on a greased oven pan and allowed to rise until it doubled in bulk. The coffee cake was baked in a pre-heated oven at 177° F (350° C) for 45 minutes.

The cake suitable for microwave oven was prepared from sweet potato selection SPV-43 (Sunny) with the method ordinarily used for cakes. It was baked on medium power (No. 8) for 12 minutes, then on high power (No. 10) for 8 minutes. The cake was allowed to stand for 15 minutes before being unmolded. It was cooled and then submitted to sensory evaluation.

RESULTS AND DISCUSSION

Results of the overall evaluation (average of all tests conducted from the dishes prepared with sweet potato selections) indicated that sweet potato cake, coffee cake, pudding and custard were highly acceptable. The panelists' mean scores were 1.85, 1.75, 1.67 and 1.86, 1.52 and 1.54, respectively on a scale in which 2.0 was the highest possible score. The overall quality appraisal for sweet potato bread, croquettes and microwave-baked cake was 1.40, 1.38 and 1.33, respectively as shown below.

<i>Dishes</i>	<i>Taste panel mean values³</i>
Croquette	1.38 ⁴
Cake	1.85
Puddings	1.67 ⁵ , 1.86 ⁶
Bread	1.40
Custards	1.52 ⁷ , 1.54 ⁸
Coffee Cake	1.75 ⁹
Cake	1.33 ¹⁰

The monthly mean values for overall acceptability of sweet potato fritters appear below. The taste panel found no significant difference between fritters from the 5-month-old frozen batter and the fresh batter.

<i>Days frozen in storage</i>	<i>Taste panel mean values¹¹</i>
0	1.45
30	1.39
60	1.67
90	1.57
120	1.54
150	1.67

The results of this study indicate that it is feasible to prepare good quality dishes with different selections of sweet potato, thus increasing the ways in which this vegetable can be served.

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³ +2, -2 scale for overall acceptability. +2= like very much; -2= do not like.

⁴ Average of three evaluations.

⁵ Prepared with selections Sunny and Tapató (3:1).

⁶ Prepared with selection Toquecita.

⁷ Prepared with selection Sunny.

⁸ Prepared with selection Papota.

⁹ Prepared with selections Papota and Viola (1:1).

¹⁰ Baked in microwave oven.

¹¹ The scale +2 to -2: +2= very acceptable; +1 acceptable; 0= questionable; -1= slightly unacceptable; -2= not acceptable.

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