

Research Note

THE PREPARATION OF CUPCAKES FROM GREEN BANANA FLOUR¹

Bananas are extensively cultivated in Puerto Rico, mainly in the mountainous region where they are sometimes used to provide shade for newly planted coffee trees. During the fiscal year 1975-76 banana production was around 750 million fruits, with a cash value of \$8 million. The farm price was \$10.70/thousand. The purpose of this study was to find new uses for green bananas.

The green banana flour was prepared as described by Rodríguez-Sosa et al.² Cup cakes were prepared by mixing wheat and green banana flour in the following proportions:

<i>% Wheat flour</i>	<i>% Banana flour</i>
100	0
70	30
60	40
50	50
40	60
30	70
20	80
10	90

Butter, sugar, whole eggs, vanilla, baking powder, salt, and evaporated milk were added to the flour mixtures. All ingredients were well mixed, poured in baking paper cups, placed in cupcake pans and baked for 45 min at 340° F (171.1° C). Cupcakes thus prepared were cooled at room temperature and sensory-evaluated for appearance, texture, flavor, and overall acceptability. A cupcake was served per sitting and a 6-point hedonic scale ranging from 6 points (like very much) to 1 point (dislike) was used.

Cupcakes were also analyzed for total and reducing sugars, color and shear press. Shear-press analyses were performed on a cupcake with the press adjusted to a 1 min stroke. A 300 lb proving ring and the standard cell were used, the recorder was adjusted to 10%. Color was determined using a tri-stimulus color instrument. For color analyses, equal amounts of water and sample were mixed in a blender for 1 min. The resulting slurry was poured in the cuvette and color measured. A white standard tile ($L = 92.8$, $a = -0.5$, and $b = + 2.5$) was used to

¹ Manuscript submitted to Editorial Board May 10, 1977.

² Rodríguez-Sosa, E. J., González, M. A., Beauchamp de Caloni, I., and Parsi-Ros, O., The preparation of green banana flour, *J. Agric. Univ. P.R.* 61 (4):470-8, 1977.

standardize the color meter. Total and reducing sugars were determined essentially as in AOAC.³

Table 1 shows the sensory evaluations performed on cupcakes. As the percentage of green banana flour increased, the acceptability level decreased in all quality attributes examined. Nevertheless, samples containing as high as 90% banana flour were rated as "like moderately" for overall acceptability, flavor, and texture, while appearance was scored as "neither like nor dislike".

Reducing sugars tended to increase with the increase in banana flour in the formula, while total sugars tended to decrease (table 1).

Yellowness (+b) in cupcakes tended to decrease as percentage of banana flour was increased. No steady trend was observed in "L" and

TABLE 1.—Sensory evaluation and analyses performed in cupcakes prepared using wheat and banana flour in various proportions

Sample		Quality attribute ¹				Shear press maximum force	Color b value ²	Sugars	
Wheat flour	Banana flour	Appearance	Texture	Flavor	Overall acceptability			Total	Reducing
%	%						%	%	
100	0	5.6	5.3	5.2	5.2	51.1	+15.44	33.29	1.46
70	30	4.9	4.4	5.1	4.8	58.0	+12.91	32.63	1.76
60	40	4.9	4.5	4.8	4.8	72.9	+12.86	29.59	3.46
50	50	4.4	4.2	4.7	4.5	102.1	+12.50	30.57	2.77
40	60	4.6	3.5	4.2	4.1	91.4	+11.78	28.56	3.96
30	70	4.1	3.7	3.9	3.7	99.7	+11.35	28.53	4.05
20	80	3.4	3.4	4.2	3.7	68.6	+11.75	28.94	5.11
10	90	2.8	3.7	4.2	3.7	30.8	+11.00	27.02	4.25

¹ Evaluations performed using a 6-point hedonic scale ranging from "like very much" (6 point) to "dislike" (1 point).

² A tri-stimulus color meter was used with a white tile of L = 92.8, a = -0.5, and b = +2.5 as a standard.

"a" measurements. The external crust had the characteristic brown color, but inside the cake, a grayish color increased in intensity as banana flour increased.

Shear-press maximum force increased as banana flour percentage increased to a maximum when 50% of each flour was added. Beyond that point, maximum force showed a tendency to decrease. It was also observed that as green banana flour percentage in the mixture increased the cupcake volume decreased.

It is concluded that green banana flour can partially substitute for

³ Official Methods of Analyses of the Association of Official Agricultural Chemists, 12th ed., Washington, D.C., 1975.

wheat flour in the preparation of cupcakes. Cupcakes thus prepared are of good quality. Countries which are high producers of banana can use them in the preparation of this type of commodity, thus reducing importations of wheat flour.

*E. J. Rodríguez-Sosa
I. Beauchamp de Caloni
O. Parsi-Ros
M. A. González
Food Technology Laboratory*