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## Consumer Acceptance of American Peanut Products by Bulgarian Consumers

P. Paraskova<sup>1</sup>, J. Jordanov<sup>1</sup>, A. V. A. Resurreccion<sup>2\*</sup>, W. Moon<sup>3</sup>, W. J. Florkowski<sup>3</sup>,  
M. S. Chinnan<sup>2</sup>, and L. R. Beuchat<sup>4</sup>

### ABSTRACT

A 1997 nationwide survey in Bulgaria revealed a high demand for roasted peanuts (*Arachis hypogaea* L.) and peanut products. The study reported here was conducted to determine the level of acceptance by Bulgarian consumers of three American cultivars of roasted peanuts and to identify the type of commercial peanut butter preferred using sensory affective tests. Consumers (N = 601) participated in central location tests at an international fair in Plovdiv, Bulgaria in May 1999 to evaluate roasted peanuts (spanish type, cv. Georgia Green, and cv. Flavorrunner) and three types of commercial American peanut butter [very low sodium (creamy), regular creamy, and extra crunchy]. Each consumer was interviewed and asked to evaluate these products by pointing at a printed 9-point hedonic scale (1 = dislike extremely, 9 = like extremely). Most (98.7%) of the participants were Bulgarian. Ages ranged from 18 to 50 yr (79.9%) or older (20.1%); 53.7% were females. The mean overall acceptance rating for roasted Flavorrunner peanuts (6.9, like slightly) was significantly higher ( $P \leq 0.05$ ) than that for Georgia Green (6.1, like slightly), which was significantly higher than for spanish type (5.6, neither like nor dislike). Mean overall acceptance of extra crunchy peanut butter was higher (6.7, like slightly;  $P \leq 0.05$ ) than acceptance of regular creamy (6.4, like slightly) and very low sodium (5.4, neither like nor dislike) types. Consumers rated the overall acceptance of regular creamy peanut butter higher ( $P \leq 0.05$ ) than that of very low sodium creamy peanut butter. Results of the survey indicate good potential for

sale of Georgia Green and Flavorrunner roasted peanuts and extra crunchy and regular creamy peanut butter in Bulgaria.

Key Words: Flavor, peanut butter, roasted.

Snack foods available in Bulgaria include imported and domestically manufactured products. Brand name candy bars promoted by American and western European companies and traditional snack foods such as pastries and roasted peanuts are examples of product choices. The popularity of peanuts (*Arachis hypogaea* L.) is evident in farmers' markets and grocery stores, and at street vendors' stands, where raw, roasted, and flavored peanuts are sold. A nationwide survey conducted in Bulgaria in 1997 (Moon *et al.*, 1998; Florkowski *et al.*, 2000) revealed a high demand for roasted peanuts and peanut products. Results indicated that 86% of respondents in a 2500-household survey liked peanuts and 83% responded that they would like to eat more peanuts. These opinions indicate that potential exists for increased consumption of peanuts and peanut products in Bulgaria.

The 1997 survey indicated that roasted peanuts were preferred (83% of consumers indicating 'like' or 'like very much') to chocolate-covered peanuts (55%), peanut tahina (finely ground peanuts), fried peanuts, peanut paste (similar to peanut butter), peanut kernels with sugar coating (dragee), and boiled peanuts. The taste of roasted peanuts consistently and positively influenced purchase decision and consumption (Moon *et al.*, 1999).

The objectives of this study were to determine the acceptance by Bulgarian consumers of three American cultivars of roasted peanuts and to identify the type of commercial peanut butter preferred using consumer sensory affective tests.

<sup>1</sup>Canning Res. Inst., 154 Vassil Aprilov Blvd., 4000 Plovdiv, Bulgaria.

<sup>2</sup>Dept. of Food Science and Technology, 1109 Experiment St., Univ. of Georgia, Griffin, GA 30223-1797.

<sup>3</sup>Dept. of Agric. and Appl. Econ., Univ. of Georgia, 1109 Experiment St., Griffin, GA 30223-1797.

<sup>4</sup>Center for Food Safety and Dept. of Food Science and Technology, 1109 Experiment St., Univ. of Georgia, Griffin, GA 30223-1797.

\*Corresponding author (email: aresrr@griffin.peachnet.edu).

## Materials and Methods

### Products Evaluated

**Roasted Peanuts.** Three different types of roasted peanuts (spanish type, cv. Georgia Green and cv. Flavorrunner) were evaluated. Spanish peanuts were grown in Texas, and Georgia Green peanuts were grown in Georgia, where they represent about 70% of commercial production. The Flavorrunner peanuts also were grown in Georgia.

Raw peanut kernels were heated at 157.2°C (315°F) in 4.5-kg (10 lb) batches in a rotary gas roaster (Model L5, Probat Inc., Memphis, TN) to a medium roast (Hunter color parameter, Lightness, L = 50). Peanuts were air-cooled, passed through a dry peanut blancher (Model EX, Ashton Food Machinery Co., Inc., Newark, NJ) twice, hand sorted to remove attached testae, and passed through the blancher a third time. Blanched peanuts were visually inspected to remove damaged peanuts. Roasted spanish, Georgia Green, and Flavorrunner peanuts were coded as Samples 1, 2, and 3, respectively, for sensory evaluation.

**Peanut Butter.** Three commercially processed peanut butters with distinct flavor and texture profiles were evaluated. The following products were evaluated: Sample 1, a very low sodium, no salt or sugar added, creamy peanut butter (Peter Pan, Hunt-Wesson, Inc., Fullerton, CA); Sample 2, a creamy peanut butter (Skippy, Best Foods, Englewood Cliffs, NJ); and Sample 3, an extra crunchy peanut butter (Jif, Procter and Gamble, Cincinnati, OH). In Sample 1, with no sugar added, the label declared a sugar content of 2 g per 32 g of product, compared to 3 g in Samples 2 and 3. Sample 1, with a low sodium declaration on the label, contained 5 mg of sodium per 32-g serving, compared to Samples 2 and 3, which contained 150 and 130 mg of sodium per 32-g serving, respectively.

### Experimental Design

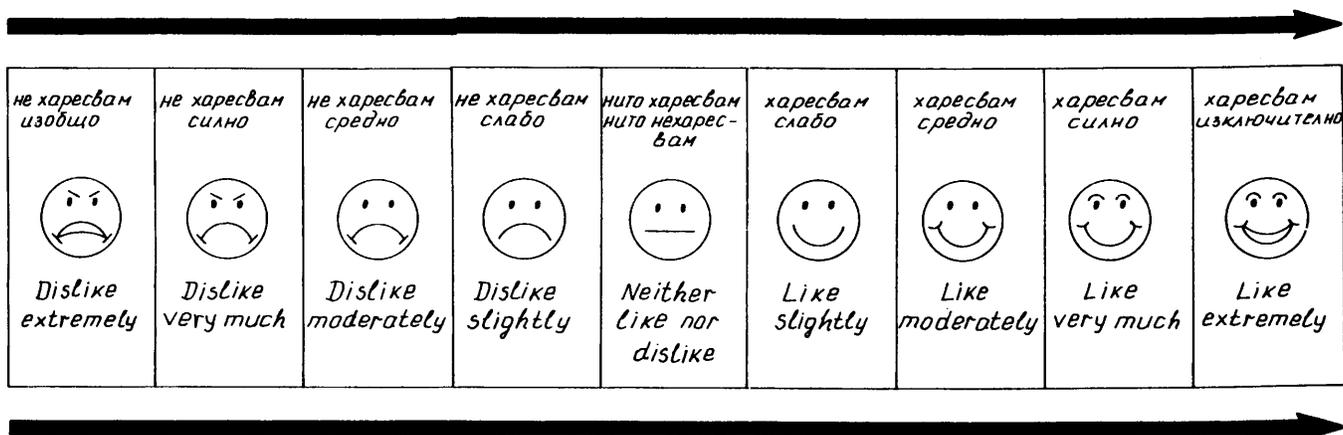
All untrained consumers who approached the central location test (CLT) area at an international fair in Plovdiv, Bulgaria in May 1999 were intercepted, screened, and asked

to participate. Each consumer participated in two sensory tests where they first evaluated roasted peanuts and then peanut butter. A total of 601 consumers participated in each test; 1803 responses (three samples × 601 panelists) were obtained for each product. Each consumer panelist was screened to qualify for participating in the test. Prospective panelists who stated that they have an allergic reaction to peanuts were excluded from the test. In addition, participating consumers must have consumed peanuts once in the past 6 mo and be at least 18 yr old. During recruitment, an effort was made to include an equal number of participants representing gender and age groups. Before evaluating the samples, consumers were asked to complete a demographic questionnaire that requested information concerning their province or country of residence, age, gender, household income, employment status, and educational background.

Consumers were asked to rate each of three samples of roasted peanuts and peanut butter for overall acceptance. Three samples of the roasted peanuts, each in color-coded, 60-mL paper cups, were presented by trained Bulgarian interviewers to each consumer in a balanced sequential order. Each consumer was asked by the interviewer to evaluate a sample, then to indicate his or her feeling about the sample by pointing to a category on a 9-point facial hedonic scale with categories written in Bulgarian and English (Fig. 1). Hedonic scale categories were: 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, and 9 = like extremely. Consumer ratings of overall acceptance of each sample were recorded by the interviewer. Evaluations were carried out in a glass booth, with two consumer panelists and the interviewer present at any given time. Panelists were asked to drink water between evaluating each sample.

Panelists were then asked to move to another glass booth to evaluate the three peanut butter samples. Each peanut butter sample was spread on a bland cookie manufactured in Bulgaria by Zaharen Kombinat 'Kristal', Plovdiv, to simulate common consumption practice. The three samples were

### Ниво на харесване



### Level Of Liking

Fig. 1. Nine-point facial hedonic scale for rating roasted peanuts and peanut butter.

presented on a white plate marked with color-coded labels. The procedure for rating overall acceptance was the same as that used for rating roasted peanuts.

### Statistical Analysis

Statistical analyses of sensory data were performed using the Statistical Analysis System (SAS Inst., 1994) software on a personal computer. Analysis of variance procedures and mean separation tests were used to determine whether there were significant differences ( $P \leq 0.05$ ) among samples. Frequencies and percentages of individuals giving each hedonic rating for each sample were likewise determined. The LSD mean comparison test was used. Means and standard deviations of ratings were calculated. The test for mean separation was applied to all demographic characteristics and income categories.

## Results

### Demographic Characteristics of Consumer Panelists

Demographic characteristics of consumer panelists are shown in Table 1. Only 1.3% were from countries other than Bulgaria. Consumers from four geographical regions in Bulgaria (Fig. 2) participated in the study, with the majority (58.4%) living in the southern region of Bulgaria. The fewer number (9.2%) resided in the coastal (Black Sea) region. Over 36% of consumer participants were 18-30 yr old. The age of other participants was evenly distributed [30-40 yr old (21.6%), 40-50 yr old (22.1%), and 50 yr old and older (20.1)]. Although attempts were made during screening to include an equal number of males and females in the panel, 53.7% of the participants were female. Most (30.1%) of the participants had a monthly income less than 200,000 leva (1 U.S. \$ = 1800 leva in May 1999). Those reporting monthly incomes of 500,000 leva or higher made up 18.7% of the panel. The largest employment group (32.5%) was composed of civil service workers, followed by workers employed in private industry (24.9%) and students (16.9%). Only 5.6% of participants were unemployed. Participants were highly educated with over half (51.1%) having a university degree and 19.7% having a technical degree.

### Overall Acceptance of Peanut Products

No statistically significant ( $P \leq 0.05$ ) differences were found in overall acceptance ratings of roasted peanuts or peanut butters across age, income, or gender categories. Likewise, employment status and educational level did not result in statistically significant differences in overall acceptance.

**Roasted Peanuts.** Mean ratings of overall acceptance of roasted peanuts by consumer panelists are listed in Table 2. The mean rating for overall acceptance of roasted Flavorrunner (= 6.9, like slightly) was significantly higher ( $P \leq 0.05$ ) than the rating for Georgia Green (6.1, like slightly) which, in turn, was significantly higher than the rating for spanish-type peanuts (5.6, neither like nor dislike). The percentages of panelists giving each hedonic rating for each cultivar of roasted peanut are shown in Table 2. Approximately 60.1% of respondents rated the overall acceptance of spanish-type peanuts from 6 (like slightly) to 9 (like extremely), whereas Georgia

**Table 1. Demographic characteristics of consumers (N = 601) participating in sensory evaluation of roasted peanuts and peanut butter.**

Characteristic	Percent of participants
<b>Region of residence</b>	
Foreign	1.3
Coastal	9.2
Metropolitan	14.9
Northern	16.2
Southern	58.4
<b>Age (years)</b>	
18-29	36.2
30-39	21.6
40-49	22.1
50 and older	20.1
<b>Gender</b>	
Female	53.7
Male	46.3
<b>Household income (leva)*</b>	
< 200,000	30.1
200,000-299,000	24.3
300,000-399,000	17.3
400,000-499,000	9.6
500,000 and higher	18.7
<b>Employment status</b>	
Not employed	5.6
Farmer	0.8
Contractor	5.6
Retired	6.1
Freelance	7.6
Student	16.9
Private	24.9
Civil	32.5
<b>Education</b>	
Vocational school	4.0
Postgraduate degree	4.4
Junior high school	7.4
High school	13.4
Technical school	19.7
University graduate	51.1

\*1 U.S. \$ = 1800 leva at the time of the consumer study (May 1999).

Green and Flavorrunner peanuts were given the same range of ratings by 70.7 and 85.0%, respectively, of consumer panelists.

**Peanut Butter.** Mean consumer ratings for overall acceptance of peanut butters are shown in Table 3. The overall acceptance for Jif extra crunchy peanut butter was rated significantly ( $P \leq 0.05$ ) higher (6.7, like slightly) than for Skippy (6.4, like slightly) or Peter Pan (5.4, neither like nor dislike) peanut butters by consumers. Consumers also rated Skippy creamy peanut butter significantly higher ( $P \leq 0.05$ ) than the Peter Pan very low



**Fig. 2. Geographic regions (metro, north, south, and coast) in Bulgaria in which 98.7% of the consumers who participated in the panel to evaluate peanut products lived; 1.3% of the participants were from countries other than Bulgaria.**

sodium, creamy peanut butter. Percentages of individuals giving each hedonic rating for each peanut butter are shown in Table 3. Fifty-six percent of respondents rated the overall acceptance of Peter Pan peanut butter as like slightly or better ( $\geq 6$ ), whereas Skippy and Jif products

were rated  $> 6$  by 77.2 and 83.2% of the consumer panelists, respectively. These ratings reflect preferences for flavor and texture of peanut butter, but should not necessarily be viewed as preferences for a particular commercial brand because panelists were not aware of the brands being evaluated until after ratings were assigned.

## Conclusions

There is a preference among Bulgarian consumers for roasted Flavorrunner peanuts compared to Georgia Green peanuts which was, in turn, favored over roasted spanish-type peanuts. The selection of the peanut cultivar is critical in predicting the potential for acceptance of roasted peanuts in Bulgaria. A central location test involving 601 respondents revealed that very crunchy peanut butter rated higher than regular or low-salt, low-sugar peanut butters for overall acceptance. The potential for successful introduction of a peanut butter in Bulgaria would be enhanced by development of a crunchy peanut butter that contains added sugar and salt.

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**Table 2. Number and percentage (in parenthesis) of panelists giving consumer ratings for overall acceptance of roasted peanuts (N = 601).**

Roasted peanut	Hedonic rating <sup>a</sup>									Overall acceptance <sup>b</sup>
	1	2	3	4	5	6	7	8	9	
Spanish type	30 (5.0)	36 (6.0)	33 (5.5)	58 (9.6)	78 (13.0)	117 (19.5)	171 (28.4)	66 (11.0)	12 (2.0)	5.6 ± 2.0 c
Georgia Green	13 (2.2)	11 (1.8)	24 (4.0)	42 (7.0)	86 (14.3)	121 (20.1)	202 (33.6)	81 (13.5)	21 (3.5)	6.1 ± 1.7 b
Flavorrunner	2 (0.3)	5 (0.8)	15 (2.5)	25 (4.2)	43 (7.2)	83 (13.8)	187 (31.1)	186 (30.9)	55 (9.2)	6.9 ± 1.5 a

<sup>a</sup>A 9-point facial hedonic scale (Fig. 1) with 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like or dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, and 9 = like extremely was used.

<sup>b</sup>Mean overall acceptance values not followed by the same letter are significantly different ( $P \leq 0.05$ ), according to the LSD mean separation test.

**Table 3. Number and percentage (in parenthesis) of panelists giving consumer ratings for overall acceptance of peanut butter (N = 601).**

Peanut butter <sup>a</sup>	Hedonic rating <sup>b</sup>									Overall acceptance <sup>c</sup>
	1	2	3	4	5	6	7	8	9	
Peter Pan, very low sodium, no salt or sugar added, creamy	47 (7.8)	19 (3.2)	46 (7.7)	61 (10.1)	91 (15.1)	127 (21.1)	117 (19.5)	76 (28.8)	17 (12.7)	5.6 ± 2.0 c
Skippy, creamy	16 (2.7)	6 (1.0)	24 (4.0)	33 (5.5)	58 (9.6)	119 (19.8)	167 (27.8)	130 (21.6)	48 (8.0)	6.4 ± 1.8 b
Jif, extra crunchy	11 (1.8)	6 (1.0)	23 (3.8)	15 (2.5)	46 (7.7)	97 (16.1)	195 (32.4)	150 (25.0)	58 (9.7)	6.7 ± 1.7 a

<sup>a</sup>Peter Pan (Hunt-Wesson, Inc., Fullerton, CA); Skippy (Best Foods, Englewood Cliffs, NJ); Jif (Procter and Gamble Co., Cincinnati, OH).

<sup>b</sup>A 9-point facial hedonic scale (Fig. 1) with 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like or dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, and 9 = like extremely was used.

<sup>c</sup>Mean overall acceptance values not followed by the same letter are significantly different ( $P \leq 0.05$ ), according to the LSD mean separation test.

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