Preparation and Taste Panel Acceptance of Sunflower Butter

Commercially prepared sunflower butter is presently not available in supermarkets but some natural food stores have supplies. This commercially prepared "natural" sunflower butter is similar to peanut butter in characteristics such as texture, spreadability, and nutritive value although it often has a greenish-gray color, and, since stabilizers are not added, it often separates. Perhaps this product would eventually become competitive with peanut butter, but consumers demand homogeneity and attractive color in their spreads. Also, with the publicity of the peanut crop shortage in 1980, alternatives to peanut butter are receiving much attention.

In response to the growing interest in sunflower butter, the NDSU Food and Nutrition Department, with partial support from the North Dakota Sunflower Council, began looking at sunflower butter preparation and acceptance. It was thought that a sunflower butter with better color control, a stabilizer, and selected flavor adjuncts could become a competitive product with peanut butter, both nutritionally (Table 1) and economically. The purpose of this study w s to determine an acceptable roasting temperature and roasting time to produce a desirable color, flavor, and texture for the sunflower kernel and butter; and to find an organoleptically desirable combination of roasted sunflower, dextrose, salt, and stabilizer for sunflower butter.

Materials and Methods

Raw, hulled confectionery sunflower kernel samples were roasted in a forced air laboratory oven. Samples were baked in a single layer on an aluminum pan (15½" × 10½" × 1"). Eight roasting temperatures ranging from 300°F to 370°F and two roasting times, 18 minutes and 24 minutes, were tested. Samples were cooled to room temperature and colorimeter readings were taken on roasted kernel using a Gardner Tristimulus XL-23 Colorimeter. The degree of lightness or darkness of the kernel was determined on the L, a_L, b_L scale, using the white standard. A 200 g sample from each treatment was processed into a butter by grinding in a Sunbeam or Panasonic Food Processor for 10 minutes. During processing, scraping down of the processor bowl was necessary, but this scraping time was not included in the time recorded for grinding. The temperature of the butter was determined immediately following grinding. Colorimeter readings of the butter were taken on the cooled butter samples.

Based on colorimeter values and an informal taste session with both the kernel and butter, a block of treatments, 320°F for 18 minutes to 330°F for 24 minutes, was selected for a closer evaluation of roasting time. Additional roasting times of 19, 20, 21, 22, 23, and 24 minutes for the temperatures 320°F and 330°F were studied (Table 2). A single treatment of 330°F for 20 minutes was selected from these as the treatment to use for further analysis with the additives dextrose, salt, and stabilizer.

Samples used for these analyses with additives were processed as previously described. During processing, the friction from grinding the kernel and the heat given off by the processor motor caused the temperature of the butter to rise. If the temperature was less than 175°F, the dextrose, salt, and stabilizer were added. The levels of dextrose studied ranged from 4.0% to 6.0%, increasing in increments of 0.5%. The levels of salt studied ranged from 0.5% to 2.5%, increasing in increments of 0.5%. This results in 26 combinations.

The stabilizer was used at a single level of 1.5% in all treatments.[1] Processing continued for 10 minutes to ensure even dispersal of the stabilizer throughout the mixture. Samples were transferred into labeled containers and allowed to remain at room temperature for storage.

Six treatments were chosen from these 26 combinations to be tested by a taste panel. They were samples 0, 1, 13, 19, 22, and 25. A taste panel of seven untrained judges formally evaluated the butter for appearance, aroma, flavor, sweetness, saltiness, and after taste. Al samples were randomly arranged before each judge. Judges scored the characteristics from 1 to 5 (1 = poor, 5 = very good). Between samples, judges were instructed to use the water and white bread provided to revive their sense of taste.

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Results and Discussion

Kernel

Visual color differences for treatments roasted at all temperatures for minimum and maximum times vary directly with colorimeter readings. Texture and flavor differences of kernel were also observed. (Table 2). Treatments with roasting times of 18 minutes and roasting temperatures less than 320°F were considered too light in color and too chewy in texture by informal taste testing, whereas samples roasted at temperatures higher than 340°F for 24 minutes were too dark and had a burned flavor.

Colorimeter values for the kernel ranged from 59.44 for the roasting time and temperature of 18 minutes at 300°F to 35.14 for maximum roasting time and temperature of 24 minutes at 370°F (Table 3).

,The stabilizer used was Eastman Chemical Products, Inc., Myvatex® Peanut Butter Stabilizer.

Treatments that were selected as most desirable in kernel color and texture were those roasted at 320°F for 24 minutes and 330°F for 18 or 24 minuts.

Butter

Colorimeter values for the butters are shown in Table 3. Treatments that were considered too light were recorded in the butter form only for the maximum roasting times: 300°F — 24 minutes and 310°F — 24 minutes. Treatments that were considered too dark were recorded in butter form for the minimum roasting time: 340°F — 18 minutes, 350°F — 18 minutes, and 360°F — 18 minutes, 370°F — 18 minutes. Colorimeter values of the butter ranged from 43.36 for 300°F for 24 minutes to 19.74 for 370°F for 18 minutes. The values for range of acceptability of butters were 41.87 for 320°F — 24 minutes to 37.65 for 330°F — 24 minutes.

Colorimeter values of six national brands of peanut butter ranged from 51.28 to 45.96. This means that the acceptable brands of peanut butter ranged from 51.28 to 45.96. This means that the acceptable color range for sunflower butter is darker than most commercially prepared penaut butter.

The levels of dextrose, salt and stabilizer studied are found in Table 4. Treatment 19 with a 2% level of salt and a 5.5% level of dextrose was chosen as the most desirable butter. Both the salt and dextrose levels were near the highest levels studied. The lowest rated treatment was the control, treatment 0, where neither salt nor dextrose were added.

Although mouthfeel was not evaluated, considerable attention was given to the stickiness of the product. "It sticks to the roof of the mouth like peanut butter," was an observation made by the majority of tasterss.

Conclusions

Different roasting temperatures and roasting times for this study can be used as a basis for commercial roasting of sunflower kernel for the production of sunflower butter. Ovens used for commercial roasting of nuts can be controlled to the degree of the laboratory oven, but may be better for evenly browning the kernel. Based on this study, commercial roasting tests have been conducted through a national peanut butter manufacturer. Slight differences have been found in the roasting of the sunflower kernel due to the even browning ability of the commercial ovens. However, commercial ovens can be readily calibrated to acceptable roasting times using the time and temperature regime presented herein.

The levels of dextrose, salt, and stabilizer studied were minimum levels when compared with ranges present in commercial peanut butter. These levels were found to be palatable in a sunflower butter. Further testing may be desired, however, to select optimal levels in commercially prepared sunflower butter.

TABLE 1

Nutritive Composition of Peanut Butter* and Sunflower Butter*

	Wt (g)	Cal	Pro (g)	Fat (g)	CHO (g)	Ca (mg)	P (mg)	Fe (mg)	NA (mg)	K (mg)	Vit A (IU)	Thi (mg)	Rib (mg)	Nia (mg)
Peanut Butter	100	582	25.5	49.5	21.4	61	395	2.0	606	652	--	.12	.12	15.3
Sunflower Butter	100	531	21.8	43.0	27.0	114	762	6.5	802	837	45.5	1.80	.21	4.9

Calculated from USDA Agricultural Handbook Number 8, Composition of Foods, 1975.

*Peanut Butter contains: small amounts of fat, sweetener, and salt.

**Sunflower Butter contains: 91.0% Sunflower kernel, 5.5% dextrose, 2.0% salt, and 1.5% stabilizer.

TABLE 2

Roasting Times and Temperatures for Sunflower Kernel with Informal Color and Texture Ratings

Temperatures	Time (minutes)						
°F.	18:00	19:00	20:00	21:00	22:00	23:00	24:00
300	L/C						L/C
310	L/C						L/C
320	L/C	L/C	G/A	G/A	G/A	G/A	G/A
330	G/A	G/A	G/A	G/A	G/A	G/A	D/A
340	D/U						D/U
350	D/U						D/U
360	D/U						D/U
370	D/U						D/U

L = Light color
D = Dark color
G = Good color
C = Chewy texture
A = Acceptable texture
U = Unacceptable texture

TABLE 3

Colorimeter Values* for Sunflower Kernel and Butter

	Roast		
Temp. (°F.)	Time (min.)	Kernel	Butter
Unroasted	00:00	60.06	46.58
300	18:00	59.44	
	24:00	57.77	43.36
310	18:00	59.07	
	24:00	57.73	43.25
320	18:00	59.90	45.33
	24:00	55.39	41.87
330	18:00	54.73	41.77
	24:00	53.85	37.65
340	18:00	51.90	33.76
	24:00	48.26	
350	18:00	51.31	35.01
360	18:00	50.79	36.43
370	18:00	40.08	19.74
	24:00	35.14	
	24:00	35.14	

Peanut Butter (the range of six national brands of peanut butter)-51.28-45.96

*The L value was used for color comparisons and varies indirectly with the degree of lightness.

TABLE 4

Levels of Sunflower*, Stabilizer**, Dextrose, and Salt

Sample #	O***	1	2	3	4	5
% Sunflower	100	94.0	93.5	93.0	92.5	92.0
% Dextrose	0	4.0	4.0	4.0	4.0	4.0
% Salt	0	0.5	1.0	1.5	2.0	2.5
Sample %		6	7	8	9	10
% Sunflower		93.5	93.0	92.5	92.0	91.5
% Dextrose		4.5	4.5	4.5	4.5	4.5
% Salt		0.5	1.0	1.5	2.0	2.5
Sample %		11	12	13	14	15
% Sunflower		93.0	92.5	92.0	91.5	91.0
% Dextrose		5.0	5.0	5.0	5.0	5.0
% Salt		0.5	1.0	1.5	2.0	2.5
Sample %		16	17	18	19	20
% Sunflower		92.5	92.0	91.5	91.0	90.5
% Dextrose		5.5	5.5	5.5	5.5	5.5
% Salt		0.5	1.0	1.5	2.0	2.5
Sample %		21	22	23	24	25
% Sunflower		92.0	91.5	91.0	90.5	90.0
% Dextrose		6.0	6.0	6.0	6.0	6.0
% Salt		0.5	1.0	1.5	2.0	2.5

*For all treatments, sunflower kernel was roasted at 330°F. for 20 minutes.

**Stabilizer was added at the 1.5% concentration to each treatment.

***Underlined samples were selected for organoleptic testing.

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tionship. The results indicated how changes in supply and demand estimates affected post harvest price changes and allowed for identification of the normal seasonal price rise. The latter occurred when changes in fundamentals were assumed nil. The results indicated that the normal seasonal price rise was 5.6 per cent from August to November for hard red spring wheat, 5.7 per cent from August to October for durum wheat, and 12.9 per cent from August to October for barley. A revealing conclusion from these results is that returns to barley storage are greater than returns to wheat storage. Thus, if cash is needed or storage space is limited, storage of barley would be preferable to wheat. In any particular year, these may not evolve because of changes in fundamental market variables. Resuts presented in this study approximate the returns to storage or the appreciation in revenues which accrue from storage. These must be balanced against individual situations regarding taxes, storage costs, etc. in making storage decisions.

References

1. United States Bureau of the Census. 1967. **The X-11 Variant of the Census Method II Seasonal Adjustment Program.** U.S. Government Printing Office, Washington, D.C.

2. Wilson, W. W. 1981. **Factors Affecting Post Harvest Changes in Grain Prices Received by North Dakota Producers.** Agricultural Economics Report No. 146, Department of Agricultural Economics, North Dakota State University.