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Assessment of the knowledge and practice of natural preservation of soybean cake among its producers in northern Nigeria

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Abstract
A well-structured 25 items questionnaire was designed and used by the researchers to assess the knowledge and practice of preservation of soybean cake among its producers in Bauchi State (North East) and Kano State (North West) Nigeria. The questionnaire was validated and administered randomly to the respondents through verbal interview. Cronbach's Alpha statistical tool was used to determine the reliability of the instrument and was found to be 0.815 which shows that the instrument was highly reliable. The data obtained were presented in tabular form and analyzed using frequency and percentages. The results obtained showed that 60% of the respondents were between 20 – 24 years of age, predominantly female (96.7%) with SSCE as the highest educational qualification (33.3%). The results of the research also revealed that soybean cake producers from Northern Nigeria had little knowledge on the natural preservation of the cake and are not actively involved in the practice of its preservation. At present, the best and common method being used at home in the preservation of the cake is refrigeration (46.7). The inclusion of Entrepreneurial studies in the secondary and tertiary school's curriculum/programmes and the evaluation of spices such as Cinnamon, Turmeric, Ginger, Pepper, Garlic etc for their antimicrobial effects against food borne pathogens in an effort to discover natural and safe preservatives were recommended.

Keywords: knowledge, practice, preservation, soybean cake, northern Nigeria

Introduction

Soybean cake (Awara in Hausa) is a popular snack commonly found in Northern Nigeria. It is a cake produced from soy bean seed and is a very rich healthy source of protein (Idris & Dabo, 2016; Efiosa *et al.,* 2017) [11, 8]. Soybean (*Glycine max*) is a legume of an exceptionally high protein content ranging between 38% and 42% with Lysine constituting a substantial proportion (Odun *et al.*, 2012) [14]. Odun *et al*. (2012) [14] further opined that soybean as a plant protein is cheaper and could serve as an alternative to cow milk since it contains up to 40% protein compared with 1 - 5.6% protein content of most animal milk. According to Arnarson (2019) [5], among cereal and other legume species, Soybean has the highest protein content (around 40%); other legumes have a protein content between 20% and 30%, whereas cereals have a protein content in the range of 8-15%. The soybean also contains about 20% oil, the second highest content among all food legumes (Arnarson, 2019) [5].

Fasoyiro *et al.* (2012) [9] reported that retailed legume products serve as a means of economic empowerment for individuals which also help to boost the national economy of some Countries. Odun and Egbo (2012) [15] observed that in recent years, different edible varieties of legumes have been identified that have nutritional value and therefore could help to address a number of diet related problems globally. Idris and Dabo (2016) [11] opined that as the data from proximate analysis had proved the high nutritive quality of soybean cake, the public should patronize it more since it is more readily available and cheaper in our community than animal protein.

Foods obtained from plant or animal sources begin to spoil soon after harvest or slaughter. The growth of spoilage organisms will shorten the shelf life of the Soybean cake which has been reported to be rich in protein and essential elements (Idris & Dabo, 2016; Efiosa *et al*., 2017) [11, 8]. This in turn would have financial implications for food manufacturers (Amit *et al*. 2017) [3].

It is estimated that one third of the total harvested foods are spoiled and lost before it is used (Pal, 2014) [16]. Hence, the preservation of food is very important in order to avoid the huge financial losses occurring due to deteriorative changes brought by microbial, chemical, and physical process. The main principle of preservation is to create unfavourable conditions for the growth of microorganisms in food. The conventional preservation methods are based on single parameter that makes changes in sensory and nutritional quality of the food. However, hurdle technology brings minimum sensory and nutritional changes in the food that causes the product to be more valuable and acceptable than obtained by conventional ways (Pal, 2014) [16].

Wilfred (2015) [18] pointed out that among the oldest methods of preservation are Drying, Refrigeration and Fermentation. According to him, modern methods include Canning, Pasteurization, Freezing, Irradiation and addition of chemicals. Advances in packaging materials have played an important role in modern food preservation (Willey *et al.* 2011) [19].

The antimicrobial effects of spices and their derivatives have been tested against a wide range of microorganisms over the years, yet their mode of action is still not completely understood. Spices and their essential oil can contain many different bioactive compounds present in variable amounts. Basically the bioactive constituents of spices can be divided into volatile and non-volatile compounds (Gottardi *et al.,* 2012) [10].

Many natural food ingredients which are traditionally added to foods to achieve a desired flavor also have the potential to control microbial growth. This is known to be true for vegetable extracts, mustard, onion, garlic, horse radish, spices and herbs etc. (Jay, 2005; Adams & Moss, 2009; Ukwuru & Uzodinma, 2010 and Adedeji & Omowaye, 2013) [13, 1, 17, 2]. Ihekoronye and Ngoddy (1985) [12] had earlier asserted that an even greater increase in the amount of food available for human consumption could be realized by using appropriate food preservation methods.

Bukar and Magashi (2013) [6] suggested the application of waxes and plant aqueous extracts to preserve seasonally available fruits and vegetables which could provide a cheap and economically viable method of food preservation that can be adopted by farmers in Nigeria. The evaluation of plant constituents for antimicrobial and preservative activities on food products is part of the ongoing search for natural food preservatives (Bukar & Sani, 2018) [7]. The development and preservation of new food products like Awara from soy bean which has been reported to be rich in protein and essential elements can help immensely in the reduction of hunger, malnutrition and improve food security conditions.

Several health hazards associated with artificial preservatives such as hypersensitivity, allergy, asthma, hyperactivity, neurological damage and cancer have been reported and extracts of basil, clove, neem and rosemary are promising alternatives to their artificial counterparts (Anand & Sati, 2013) [4]. It is against this background that this study was undertaken to evaluate the knowledge and practice of natural preservation of soybean cake among its producers. The objectives of the study included:

1. To assess the knowledge of preservation among Soybean cake producers
2. To assess the practice of preservation among Soybean cake producers

Research questions

1. What is the knowledge possessed by Soybean cake producers on its preservation?
2. Do Soybean cake producers practice the preservation of the cake?

Methodology

Descriptive survey research design was adopted for the study where a well-structured 25 items questionnaire was designed and validated by experts at the Department of Microbiology, Bayero University Kano and School of Education, Aminu Saleh College of Education, Azare, Bauchi for the verbal interview of the respondents. The questionnaire was divided into three sections: A, B and C. Section A covered the personal data of the respondents, section B covered the respondents' knowledge on preservation while section C dealt with the respondents practice of preservation of the soybean cake.

The researchers interviewed 30 soybean cake producers on their knowledge and practice of preservation of the cake using purposive sampling technique. 18 producers sampled were from Bauchi state while 12 producers were interviewed in Kano state. The researchers visited the producers in their shops and verbally interviewed them. Cronbach's Alpha statistical tool was used to determine the reliability of the instrument and was found to be 0.815 which shows that the instrument was highly reliable. The data obtained were presented in tabular form and analyzed using frequency and percentages.

Results and Discussion

Table 1 revealed that majority of the respondents were female (96.7%) under the age group of 20 – 24 years (60%). Higher percentage of them were business women (36.7%) which was followed by students (30%). Most of the respondents had SSCE as their highest educational qualification (33.3), this was followed by those who are NCE holders with a percentage of 20. Majority of those interviewed were from Bauchi State in North East Nigeria (60%) while 40 % were from Kano State in North West Nigeria.

Table 1: Personal Data of Respondents

S/No	Item	Number (No)	(%)
1.	Sex		
	Male	1	3.3
	Female	29	96.7
2.	Age		
	10 – 14 years	0	0
	15 – 19 years	4	13.3
	20 – 24 years	18	60
	25 – 29 years	8	26.7
	30 and above	0	0
3.	Occupation		
	Students	9	30
	Business	11	36.7
	Farming	0	0
	Civil Servant	4	18.3
	House wife	6	20
4.	Educational Level		
	Primary Cert	5	16.7
	SSCE	10	33.3
	OND	5	16.7
	NCE	6	20
	HND	0	0
	BSc	4	13.3
	MSc	0	0
	PhD	0	0

5.	State of Residence		
	Bauchi	18	60
	Kano	12	40

Source: Field survey, 2021

Table 2: Respondents' knowledge on preservation of Soy bean cake

S/N	Item	Responses	
		Yes (%)	No (%)
1.	Are you aware that soybean cake can be preserved?	14 (46,7)	16 (53.3)
2.	Do you experience problem(s) in soybean cake storage?	18 (60)	12 (40)
3.	There are natural preservatives that can increase life span of the cake	12 (40)	18 (60)
4.	Soybean cake prepared with spices can last longer	2 (6.7)	28 (93.3)
5.	Adding Alum, Dantsami, Ruwan tsami and Lemon can make soybean cake last longer	11 (36.7)	19 (63,3)
6.	Soybean cake can be preserved by packaging in plastic rubber container	14 (46.7)	16 (53.3)
7.	Soybean cake can be preserved by packaging in sealed plastic leather	3 (10)	27 (90)
8.	Which of these preservatives do you think is the best? Salt Oil Pepper Sugar Sodium benzoate Ginger Turmeric Cinnamon No idea	5 (16.7) 5 (16.7) 10 (33.3) 5 (16.7) 0 (0) 0 (0) 0 (0) 0 (0) 5 (16.7)	
9.	How long can soybean cake stay without spoiling? 1 – 5hrs 6 – 10hrs 11 - 15hrs 16 – 20hrs 21 – 25hrs 2 days More than 2 days No idea	0 (0) 0 (0) 21 (70) 0 (0) 5 (0) 2 (6.7) 0 (0) 2 (6.7)	

Source: Field survey, 2021

Table 3: Practice of preservation among soy bean cake producers

S/N	Item	Yes (%)	No (%)
1.	I do produce soybean cake (Awara)	30 (100)	0 (0)
2.	Have ever use spices to preserve soybean cake?	5 (16.7)	25 (83.3)
3.	Do you cover Awara during storage?	23 (76.7)	7 (33.3)
4.	Have ever attempted packaging Awara?	9 (20)	21 (70)
5.	I do prepare soybean cake using coagulants like: Alum Ruwan tsami Dan tsami Lemon	9 (30) 15 (50) 3 (10) 3 (10)	
6.	I do add the following during preparation of soybean cake: Salt Maggi Onion Pepper Ginger Turmeric Cinnamon Others (specify)....	1 (63.3) 10 (33.3) 1 (3.3) 0 (0) 0 (0) 0 (0) 0 (0) 0 (0)	
7.	At what stage of production do you use to apply preservative? Before frying After frying During frying No idea	 18 (60) 3 (10) 0 (0) 9 (30)	
8.	For one measure of soy bean seed, what quantity of spice do you think should be used? Half tea spoon One tea spoon Two tea spoon Three tea spoon No idea	 5 (16.7) 5 (16.7) 0 (0) 5 (16.7) 15 (50)	
9.	How long will it take before soybean cake preserved with spices gets spoil? 1 – 5hrs 6 – 10hrs 11 - 15hrs 16 – 20hrs 21 – 25hrs	 0 (0) 5 (16.7) 5 (16.7) 0 (0) 10 (33.3)	

	2 days More than 2 days No idea	0 (0) 0 (0) 10 (33.3)	
10.	What do you think will happen if spice used is more than required? The cake: will be tasteless will be unsafe to eat No idea	 10 (33.3) 0 (0) 20 (66.7)	
11.	What is the most common preservation method being used at home? Refrigeration Salt / Oil Drying Packaging Others	 14 (46.7) 5 (16.7) 1 (3.3) 0 (0) 0 (0)	

Source: Field survey, 2021

Table 2 showed that most of the respondents had little knowledge on the natural preservation of the soy bean cake as pointed out by their responses to item numbers 1, 3, 4, 5, 6 and 7. They admitted (60%) that they use to experience problems in the storage of the cake. The respondents do not have much knowledge on the packaging of soybean cake either by using plastic rubber containers or plastic leather bags, refer to item 6 and 7 of table 2. This part of the finding means that Awara producers have less knowledge on packaging materials and modern preservation methods which is in contrast to the report of Willey *et al*. (2011) [19] who observed that advances in packaging materials have played an important role in modern food preservation.

The respondents however opined that Pepper (33.3%) is one of the best preservatives common to people and this position is in line with the submission of Jay (2005) [13]; Adams and Moss (2009) [1]; Ukwuru and Uzodinma (2010) [17] and Adedeji and Omowaye (2013) [2] who said many natural food ingredients which are traditionally added to foods to achieve a desired flavor also have the potential to control microbial growth. Adding that this is known to be true for vegetable extracts, mustard, onion, garlic, horse radish, spices and herbs etc. The response to the item number 9 revealed that Awara can last for 11 – 15hours with a percentage response of 70.

The fact that all the thirty interviewed do produce and sell the soy bean cake coincides with the finding of Fasoyiro *et al*. (2012) [9] who reported that retailed legume products serve as a means of economic empowerment for individuals which also help to boost the national economy of some Countries.

Table 3 indicated that most of the respondents do not practice the preservation neither do they have much idea about natural preservation of the soy bean cake. The few that are involved in the usage of spices for the preservation of the cake usually add the preservatives before frying. The method of preservation being used by the producers of the soy bean cake is refrigeration as pointed out in item 11. This shows that old method of preservation is still being used or practice today as reported by Wilfred (2015) [18] who pointed out that among the oldest methods of preservation are Drying, Refrigeration and Fermentation. According to him, modern methods include Canning, Pasteurization, Freezing, Irradiation and addition of chemicals. 63.3% of the respondents admitted that they do add salt during the production of the cake but not as a preservative.

Conclusion

Soybean cake producers have little knowledge on its preservation hence they do not practice the preservation of the cake using natural means. Soybean cake can be stored in refrigeration for days.

Recommendations

1. Emphasis should be made on the inclusion of Entrepreneurial Studies in the Secondary and Tertiary School's Curriculum/Programmes which will in turn create more business awareness to the students and empower them economically.
2. Spices such as Cinnamon, Turmeric, Ginger, Pepper, Garlic etc should be evaluated for their antimicrobial effects against food borne pathogens in an effort to discover natural and safe preservatives.

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