International Journal of Research in Engineering and Applied Sciences(IJREAS)
Available online at http://euroasiapub.org/journals.php
Vol. 11 Issue 6, June -2021,
ISSN(O): 2249-3905, ISSN(P) : 2349-6525 | Impact Factor: 7.196| Thomson Reuters ID: L-5236-2015

GREEN CHEMISTRY APPROACH TO ANALYSE PHYSICAL, CHEMICAL PROPERTIES OF PREPARED NUTRACEUTICAL FOOD PRODUCTS

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Abstract

The increasing availability of economically viable nutraceuticals and the wide range of applications for which they are suitable are evidence of their extensive use globally. As a result, a unique opportunity exists for their further research into developing and manufacturing next-generation nutraceuticals using advanced, reliable, accurate, cost-effective, and high hit rate approaches.JS – 335 and MAUS – 47 -the two types were chosen for the study because, with 44.25 percent protein and 22.08 percent oil, respectively, they outperform all other varieties. Tofu/soy paneer and soymilk were both made using conventional and green methods, respectively. The data obtained clearly indicated that soy milk prepared from variety MAUS – 47 had higher Protein (4.06 %), fiber (0.67 %) and fat (1.90%) content while moisture (91.56 %) and carbohydrates (4.36 %) were higher in soy milk that was prepared by using variety JS – 335 beans.

Keywords: *green chemistry, yield percentage, total solids, nutraceuticals.*

Introduction

Green chemistry, also referred to as sustainable chemistry, is an area of sustainable science. The objective of green chemistry, is to develop goods and procedures that reduce the consumption and production of hazardous materials. Anastas and Warner's "Green Chemistry: Theory and Practice,"(Anastas et al;1998) outlined the 12 principles of green chemistry, the most well-known and widely quoted work on the topic. Nutrigenomics, a new area of study has caught the interest of food nutritionists all around the world (Shahidi F (2009). The identification of "various functional foods" and their mechanisms that aid in the treatment of

chronic illnesses, prevention of these illnesses, the enhancement of health, and ultimately the decrease in healthcare expenses is the focus of "concentrated efforts" (El Sohaimy 2012).The aim is to investigatethe physical, chemical properties of prepared nutraceutical food products through green chemistry approach.

Materials and Methods

Research process is a multidimensional process which includes either the whole food or Active component separation. JS-335 and MAUS-47 are superior to all other varieties with 44.25 percent and 22.08 percent protein and oil respectively, these were selected for the study. Both the Soymilk and tofu/soy paneer was prepared through green method and general method.

Method of preparation of soymilk

If enough antioxidants are added to the water, the study recommended using a temperature range of 60 to 80 °C as well. Flour with a particle size range of less than 0.5 mm and more than 0.5 mm is the end product of processing these beans (Manaloor et al; 2016).

The yield percentage of tofu from soymilk calculated by:

$$\text{Percentage Yield} = \frac{\text{Wt. of Tofu Prepared}}{\text{Wt. of Soy milk}} \times 100$$

equation no.1

Soymilk's total solids were calculated using the usual gravimetric method.

$$\text{Total Solids} = \frac{\text{Wt. of Residue}}{\text{Wt. of Sample}} \times 100$$

equation no. 2

Results and Discussion

Table 1: Evaluation of textural parameters of treated tofu prepared from general and green method

Sr. No.	Textural Characteristics	Tofu by Green Method	Tofu by General Method
1.	Hardness (N)	42.20	36.50
2.	Brittleness (N)	4.33	4.66
3.	Cohesiveness	0.36	0.33
4.	Springiness (cm)	1.41	1.44
5.	Gumminess (N)	14.27	14.02
6.	Chewiness (N-cm)	19.32	20.18
7.	Adhesiveness (N)	6.10	6.10

According to the data provided in table1, tofu produced using the green approach had a harder rating (42.20 N) than tofu produced using the conventional method. Soy-paneer made from soy milk and soymilk-skim milk mixtures is evaluated for its physical quality. Utilizing soymilk and skim milk, soy paneer with total solids equal to milk paneer was created (80:20). The product only lasts a few days at room temperature, but if it is kept at 5°C, its shelf life might be increased to seven days. The product's smoothness was greatly improved with the addition of merely 0.02 percent calcium chloride. The protein content of the variety was significantly correlated with the proteins in soymilk and soy paneer (r=+0.92 and r=+0.76, respectively). Furthermore, it was determined that there was no significant association between the amount of protein in the bean and either the yield of paneer or the proportion of the bean's protein recovered in the finished product. The porosity and shear strength of the product were significantly influenced by the moisture content (r=+0.96 and r=+0.99). Its moisture content and fat content were dramatically reduced by "deep fat frying" at 180°C for 5 minutes. Each value represents the mean of three observations in all the tables.

Physical characteristics of Soy milk

Table2: Total Solid % in Prepared Soya milk samples

Soy milk samples	Total Solid %
JS - 335	4.52
MAUS - 47	4.92

According to studies on the physical characteristics of soymilk, the colour of milk made from different varieties ranged from yellowish to greyish white. One crucial element is the soymilk's total solids content (TS). Soymilk has less viscosity than regular milk because it contains less solids, giving the impression of watered-down milk. The milk had a total solid content of 10.2%, an acidity level of 0.08%, a specific gravity of 1.010, a relative viscosity of 1.28 centipoises, and a positive clot-on-boil test result.

Sensory quality assessment of Soya milk

Table3: Consumer feedback of 'soya milk samples' (Score as 9 = like extremely, 1 = dislike extremely)

'Samples'	'Overall'	'Appearance'	'Flavour'	'Mouth feel'
JS -335	5.43	6.53	5.28	5.41
MAUS - 47	6.12	6.54	5.26	6.04

It was found that neither the flavour nor the look of the soy milk samples varied considerably. The overall perception and mouthfeel, however, varied greatly. Therefore, variety MAUS -47 performs better in terms of customer approval than variety JS - 335.Any experimental research of food processing that involves organoleptic evaluation is crucial since sensory qualities are a fundamental criterion that customers use to decide whether to accept a meal sample. The

soymilk extraction technique, "storage temperature, and storage period" have an impact on the sensory quality criteria that are measured.

Analysis of Prepared Nutraceuticals Food Products' Chemical Properties

Table 4: Chemical composition of tofu

Sr.No.	Parameters	JS -335 Variety	MAUS – 47 Variety	Mean
1.	Moisture (%)	74.60	73.33	74.31
2.	Fat (%)	3.33	3.80	3.57
3.	Protein (%)	15.05	15.55	15.30
4.	Carbohydrate (%)	5.63	5.28	5.45
5.	Ash (%)	1.38	1.32	1.35

The tofu made from the JS-335 type had significantly more moisture than the tofu made from the MAUS-47 variety, according to the percentage of moisture. The analysis of the data revealed that the tofu produced from variety JS-335 (5.63%) had significantly more carbohydrates than that produced from variation MAUS-47 (5.28%).

The chemical examination of the tofu revealed that the MAUS-47 variant had the highest protein and fat scores. This might be due to the fact that JS-335 seeds have less protein and fat than seeds from the MAUS-47 strain. The genetic variety of the parents who gave rise to the variations could be the reason for the variations.

Chemical characteristics of Soya milk

Both the samples of Soya milk prepared from JS – 335 and MAUS – 47 were analyzed for Moisture, fat, protein, fibre, carbohydrate and ash contents.

Table5: Chemical Composition of Soya milk

Sr. No.	Parameters	JS - 335	MAUS - 47
1.	Moisture %	91.56	88.09
2.	Fat %	1.82	1.90
3.	Protein %	3.07	4.06
4.	Carbohydrate %	4.36	2.33
5.	Fiber %	0.28	0.67
6.	Ash %	0.94	0.92

According to the information in the table 5 above, soy milk made from variety MAUS - 47 beans have higher protein content (4.06%), fibre content (0.67%), and fat content (1.90%) than soy milk made from variety JS - 335 beans, which has a higher moisture content (91.56%) and a higher carbohydrate content (4.36%).

Soy milk has been found to contain 10.8% of total solids, 2.53 percent protein, 1.8% fat, 5.5% of carbohydrates, 0.5 percent ash, 210 lU of vitamin A, 0.087 mg of thiamine, 150 lU of vitamin

D, 0.172 mg of riboflavin, and 1.4 mg of nicotinic acid, according to research on the nutritional value and composition of soymilk (Shinde et al; 2014).

Chemical comparisons between soymilk and cow's milk revealed that soymilk had a significantly lower concentration of total solids (9.12% vs. 13.8%).Alpha-linolenic acid, one of the several omega-3 fatty acids found in soymilk, is present, but there are no short-chained fatty acids. The main finding was that soymilk had less fat and cow milk had more. The pH ranged between 6.3 and 6.7, the titratable acidity was between 0.13 and 0.17 percent, the specific gravity was between 1.01 and 1.03, the centipoises of viscosity were between 1.25 and 1.28, and the freezing point was between -0.5 and -0.8°C.

Conclusion

It is reported to be a dish with few calories, a good source of calcium and iron, and little saturated fat. Currently, tofu (also known as soy paneer) prepared from unfermented soymilk is eaten all over the world. It can substitute for traditional milk paneer. It practically has the same nutritional content as "cow's milk." Soy paneer, however, costs around one-third less than milk paneer. The shelf life of milk paneer and soy paneer are nearly comparable.

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