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Nutritional and organoleptic attributes of novel pancake fortified with spirulina (*Arthrospira platensis*)

DEVENDER KUMAR
Assistant Professor
Department of Home Science, Kurukshetra University, Kurukshetra (Haryana) India

ABSTRACT

Complete nutrition is the need of the hour. Spirulina is a nutrient dense micro alga which can be added to traditional dishes for their enrichment. Spirulina has very high quantity of complete protein along with important minerals and vitamins such as iron, manganese, riboflavin and thiamin etc. we prepared pancakes by incorporating varying amounts of spirulina. Organoleptic evaluation of pancakes was done by a panel of seven judges on a 9-point hedonic scale. The pancake dish PC1 PC1 scored maximum for appearance, colour, texture and aroma having values 7.71± 0.48, 7.42 ±0.97, 7.57 ±0.97 and 8 ±0.81 respectively. Furthermore, PC1 again scored highest for overall acceptability with a value of 8 ±0.57. Recipe PC3 scored a maximum for Taste with a value of 7.42 ±0.78.

Key Words : Spirulina, Organoleptic evaluation, Fortification, Pancakes

INTRODUCTION

Food industry faces the challenge of evolving new products so that nutrients in addition to the common ones can be incorporated in the diet regimen of potential consumers. A pancake which is a ready to eat snack of importance because of its mass appeal, its composition can be targeted for modification. The constitution of a pancake is usually improvised as a result a huge variety of pancakes are available. Integration of spirulina in pancake recipe is but a natural course for improving nutritional value of the latter. Historically spirulina has been cultivated as protein rich whole food in many cultures outside Europe and North America (Gantar and Svircev, 2008). Spirulina is a nutrient dense filamentous blue green alga (*A. cyanobacterium*). It is generally recognized as safe (GRAS) material by United States Food and Drug Administration (USFDA) when harvested in pristine environment (FDA 2016). It has about 60% of high quality protein, by dry weight, notably containing all of the essential amino acids and myriad of other nutrients particularly B vitamins (thiamin and riboflavin 207% and 306% of DV, respectively), dietary minerals such as iron (219% DV),

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manganese (90% DV) and lipid content of 8% by weight providing gamma-linolenic acid, alpha-linolenic acid, linoleic acid, stearidonic acid, eicosapentaenoic acid, docosahexaenoic acid and arachidonic acid, which make it complete food item (FDA 2016). Spirulina is a well domesticated crop added to many foods to increase their protein and other nutritional content. Thus addition of spirulina can be way to prepare novel and nutritious recipes (Yogambal, 2009).

A number of novel dishes can likewise be designed by integrating spirulina which is usually called as a '*super food'* (Sánchez *et al*., 2003). Nutritional and organoleptic attributes must be assessed for the commercial success of any such recipe thus formulated. The present study is about developing the recipe of pancake fortified with spirulina (*Arthrospira platensis)* and its nutritional and sensory evaluation for viable production.

METHODOLOGY

The purpose of current study was to develop and standardize recipes of pancake using spirulina in considerable quantities. It was a step to find whether the nourishing cupcakes comprising of spirulina can be made appetizing or not.

Collection of raw material :

All the raw materials were procured from local market of district Kurukshetra, Haryana, India except nutricost spirulina powder *(Arthrospira platensis)* which was purchased online from https://www.amazon.in.

Tools, equipments and instruments :

Different instruments and equipments used for different unit operations like measuring, mixing and product development etc. were weight measuring device, volume measuring cylinder, electrical hand mixer, mixing bowl, spoons, baking pan and baking oven.

Pancake preparation :

50 grams of whole wheat flour was mixed with varying quantities of spirulina powder depending upon the recipe (10g for PC1, 20g for PC2, 30g for PC3 and 40g for PC4), one-fourth table spoon of baking powder, a pinch of salt, a pinch of turmeric and one finely chopped green chilly. A thick batter was formed by adding water. Poured the batter on a hot frying pan greased with mustard oil and cooked it on both sides until golden brown and thoroughly done.

Nutritive value :

Nutritive value of Indian foods compiled by Gopalan et al (2016) was used a guide for the calculation of values of different nutrients, per 100g of edible portion, in the various recipes of pancakes. Nutrient composition of spirulina was sourced from United States Food and Drug Administration (USFDA). Nutritive values of recipes thus prepared are illustrated in Table 1.

Evaluation of organoleptic attributes :

The panel of 7 judges was chosen, at random from faculty and students of Kurukshetra university, Kurukshetra, for evaluation of organoleptic attributes which included color, appearance, aroma, texture, taste and overall acceptability. A copy of Hedonic Rating Scale card was also provided to each of the judges.

Organoleptic evaluation was carried out while keeping the following parameters in mind:

1. Access to the preparation area was denied as the judges could get influenced in their judgment.
2. For unbiased opinion, judges were not allowed to consult each other.
3. A glass of water was provided to the judges for washing mouth between the samples.
4. Time intervals were kept between the samples tasted.

Organoleptic attributes of every sample were scored on a nine-point Hedonic Rating Scale measuring from 9 to 1. The scale range was represented as extremely liked, liked very much, liked moderately, liked slightly, neither liked nor disliked, disliked slightly, disliked moderately, disliked very much, disliked extremely, respectively. Results are shown in Table 2.

RESULTS AND DISCUSSION

Nutritive values of recipe PC1, PC2, PC3 and PC4 are depicted in Table 1. While keeping the amount of other constituents constant, quantity of spirulina was varied in the different recipes (increasing from PC1 to PC4), that is why PC4 is bound to have higher nutritional value as shown in the table below.

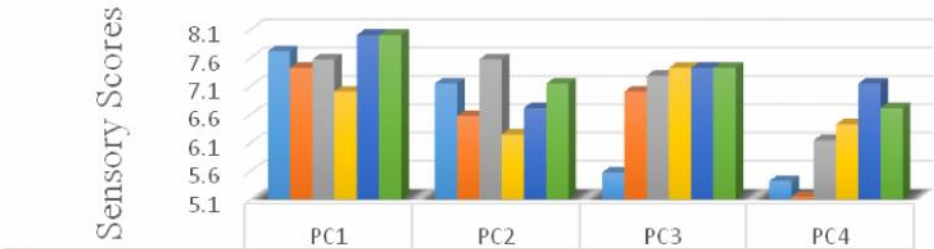
Table 1 : Nutritional content of pancakes formulated with different quantities of spirulina

Recipe	Calories (Kcal)	CHO (g)	Protein (g)	Fat (g)	Fiber (g)	Iron (mg)	Manganese (mg)	Magnesium (mg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)
PC1	199.50	37.09	11.79	1.62	1.31	5.30	1.33	88.50	0.47	0.44	3.43
PC2	228.50	39.48	17.53	2.39	1.67	8.15	1.52	105	0.70	0.80	4.71
PC3	257.50	41.87	23.27	3.16	2.03	11	1.71	124.50	0.93	1.16	5.99
PC4	286.50	44.26	29.01	3.93	2.39	13.85	1.90	144	1.16	1.52	7.27

Results of organoleptic evaluation of different pancake varieties are shown in Table 2. All developed products were acceptable and palatable as revealed by sensory evaluation. All of the recipes scored well for appearance, color, texture, taste and aroma as indicated by

Table 2 : Sensory evaluation score of pancakes with varying amounts of spirulina

Pancake label	Appearance	Colour	Texture	Taste	Aroma	Overall acceptability
PC1	7.71 ±0.48	7.42 ±0.97	7.57 ±0.97	7 ±0.81	8 ±0.81	8 ±0.57
PC2	7.14 ±1.34	6.57 ±0.78	7.57 ±0.78	6.42 ±1.81	6.71 ±1.38	7.14 ±0.69
PC3	5.57 ±1.61	7 ±0.81	7.28 ±1.11	7.42 ±0.78	7.42 ±0.78	7.42 ±0.78
PC4	5.42 ±2.29	5.14 ±1.86	6.14 ±0.69	6.42 ±1,51	7.14 ±1.46	6.71 ±1.11



	PC1	PC2	PC3	PC4
Appearance	7.71	7.14	5.57	5.42
Colour	7.42	6.57	7	5.14
Texture	7.57	7.57	7.28	6.14
Taste	7	6.24	7.42	6.42
Aroma	8	6.71	7.42	7.14
Overall acceptability	8	7.14	7.42	6.71

Fig. 1 : mean scores for organoleptic evaluation of pancakes

the panel of judges. PC1 scored maximum for appearance, colour, texture and aroma having values 7.71± 0.48, 7.42 ±0.97, 7.57 ±0.97 and 8 ±0.81 respectively. Furthermore, PC1 again scored highest for overall acceptability with a value of 8 ±0.57. Recipe PC3 scored a maximum for Taste with a value of 7.42 ±0.78. The results are also depicted in Fig. 1. The above results are in agreement with previous studies (Siva Kiran *et al.*, 2015)

Conclusion :

Novel pancakes fortified with spirulina were successfully developed as a result of the present study. The nutrient dense spirulina made sure that a high quality protein source along with that of vitamins and minerals was available to the consumers in a humble dish like pancake (Ciferri, 1983). The pancake thus produced were highly palatable and could become an integral part of diet. The author is of the opinion that these unique pancakes minimize the chances of protein, vitamin and mineral deficiency diseases (Gershwin and Belay, 2007).

REFERENCES

Ciferri, O. (1983). Spirulina, the edible microorganism. *Microbiol. Rev.*, **47** (4): 551–78.

FDA (2016) Summary: Substances Generally Regarded As Safe (Final Rule). U.S. Food and Drug Administration (HHS). http://www.fda.gov/AboutFDA/ReportsManualsForms/ Reports/ EconomicAnalyses/ucm517103.htm. Accessed 20 Sep 2017.

Gantar, M. and Svircev, Z. (2008). Microalgae and cyanobacteria: food for thought. *J. Phycol.*, **44** : 260–268.

Gershwin, M.E. and Belay, A. (2007). Spirulina in human nutrition and health. CRC Press, USA.

Gopalan, C., Ramasastri, B.V. and Balasubramaniyam, S.C. (2016). Nutritive values of Indian Foods. Indian Council of Medical Research, Hyderabad, India.

Sánchez, Bernal-Castillo, Van Niel, J., Rozo, C. and Rodríguez, I. (2003). Spirulina (arthrospira): an edible microorganism: a review. *Universitas Scientiarum*, **8** (1) : 7–24.

Siva Kiran, R.R., Madhu, G.M. and Satyanarayana, S.V. (2015). Spirulina in combating Protein Energy Malnutrition (PEM) and Protein Energy Wasting (PEW) - A review. *J. Nutri. Res.*, **3** (1): 62–79.

Yogambal, A.K. (2009). Theory of bakery and confectionery. PHI Learning Private Limited.

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