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Development and quality evaluation of *Pancakes* prepared by utilizing Field Pea (*Pisum sativum* var. *arvense*) grown in Himachal Pradesh

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Abstract

The research was conducted with the aim to develop and evaluate the acceptance of healthy *Pancakes* by utilizing Field pea (*Pisum sativum* var. *arvense*) grown in Himachal Pradesh. *Pancake* or *Besan ka Cheela* or *Besan Chilla* is one of the most popular breakfast snacks in Northern India. It is a crispy, quick to make, nutritious, low calorie and protein rich snack made of *besan* or chickpea flour and mild spices. In the present study *Pancakes* were developed by incorporating field pea flour in *besan* in different ratios and were evaluated both subjectively and objectively. The sensory evaluation was done with 15 panel members using Nine Point Hedonic Scale. The result shows that the developed *Pancakes* were highly acceptable. The moisture, ash, crude protein, fat, crude fiber, carbohydrate and energy content of the developed *Pancakes* was found in the range of 4.93-7.49, 1.57-3.07, 12.56-16.28, 13.18-27.11, 1.05-6.53, 42.41-55.67 per cent and 438.55-505.37 Kcal/100 g respectively.

Keywords: *Pancakes*, breakfast snacks, nutritious, sensory evaluation, nine point hedonic scale

1. Introduction

Breakfast is the most important meal of our daily diet. In this era of urbanization everyone is skipping the most important part of their daily diet. People are ignoring their first meal of the day due to their busy schedule but they are unaware of the consequences of skipping their breakfast. This habit of skipping breakfast may lead to development of metabolic disorders like diabetes mellitus, cardio vascular diseases, obesity and so on. An attempt was made to prepare healthy and quick to make *Pancakes*. Pulses are a rich source of protein and play a significant role in correcting the prevalent malnutrition in countries like Bangladesh and India (Singh *et al.*, 2015). Among the pulses, field pea (*Pisum sativum* L.) is an important grain legume in Asia, Europe, North America, Japan and Australia but in Bangladesh, field pea has the potential to be a major pulse crop within a few years (BBS, 2016) [2]. It is highly nutritive which contains high proportion of digestive protein (20 to 22.5%) (Singh *et al.*, 2015). Pulses are rich in macronutrients such as proteins (usually 21–26%), carbohydrates and are low in calories and fat (Marinangeli and Jones 2011) [5]. Pulse proteins can be used in gluten-free products, including muffins and edible biodegradable films (Shevkani and Singh 2014; Shevkani and Singh 2015) [10, 9]. Dietary fibre (8–28% in concentration) as a bioactive component of pulses is another area of interest, which depends on the variety, species and processing methods used.

The smooth, green- and yellow-seeded varieties are used for human consumption as dry split field pea. Field pea have high levels of essential amino acids, lysine and tryptophan, which are usually low in cereal grains. Consequently, field pea can supplement the low amount of protein present in food and feed processed from cereal grains. These are used as protein concentrates for livestock and are popular pigeon feeds. Field pea flour is valued due to its unique functional properties besides being cherished as a source of vegetable protein. The use of vegetable proteins as functional ingredients in the food industry is increasing tremendously and special attention has been given to the use of field pea since they are already an accepted part of the human diet throughout the world. The viscosity of slurried pea flours makes them useful in aqueous food systems.

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The nutritional, agronomic as well as economic benefits of dry pea are substantial (Muramoto *et al.* 2011; Chen *et al.* 2012; Miller *et al.* 2015) [7, 3, 6]. Dry pea is an important source of protein, complex carbohydrates, vitamins, and minerals (Wang and Daun 2004; Hood Niefer *et al.* 2012) [12, 4].

2. Material and Methods

The study was carried out in the Department of Food Science Nutrition and Technology, College of Community Science, CSKHPKV, Palampur during 2016-2020.

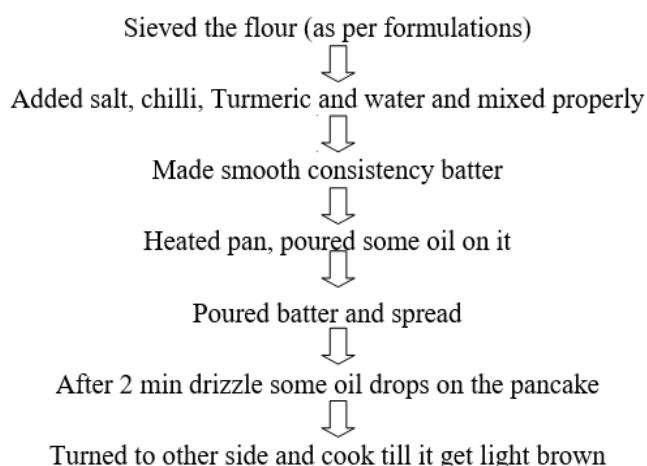
2.1. Procurement of Materials

The grains of selected crop, field pea (*Pisum sativum* var. *arvense*) were collected from local landerries of the Regional Research Station, Sangla (Tribal area of Himachal Pradesh). The procured samples were cleaned manually for removing any kind of adhering dust, debris and foreign particles. The grains were then ground into a fine powder with the help of stainless steel mixer grinder and stored in airtight food-grade polyethylene terephthalate containers at ambient temperature for further analysis. The other required materials were purchased from the local market of Palampur. The analytical grade chemicals and reagents were used for precision and the analysis was carried out in triplicate to minimize the determinants error.

2.2. Preparation of Product

Pancakes were prepared in the Food laboratory. All required ingredient were measured separately. All the four formulations were prepared separately (Table 1).

Flowchart for the preparation of *Pancakes*



2.3 Chemical analysis of *Pancakes*

The chemical composition of the *Pancakes* was determined by following the standard procedure as laid down in literature of AOAC (2010) [1]. The fat content was analyzed by means of Soxhlet extraction method, and protein content was determined by the Kjeldahl method. The ash content of the samples was estimated by means of Muffle furnace operated at a temperature of 550 °C.

2.4 Sensory evaluation

The samples were evaluated organoleptically for checking the consumer's acceptability. The parameters like colour, flavor, texture, taste and overall acceptability were analyzed at Nine Point Hedonic Scale Performa. The samples were evaluated by a panel of semi-trained judges from the department. The index of acceptance (IA%) was measured by using the

equation given by Schumacher *et al.* 2010
 $Index\ of\ Acceptance\ (\%) = M/9 * 100$

where, M = the average of evaluations carried out by the sensory panel

2.5 Statistical analysis

The experiments were carried out in triplicate and the data obtained have been presented as mean \pm standard deviation. The obtained data were subjected to Analysis of Variance (ANOVA) using OP Stat software, for the analysis of commonly used experimental designs. The obtained data were interpreted at 5 per cent level of significance ($p \leq 0.05$).

3. Results and Discussion

3.1 Chemical Analysis

The Chemical composition of *Pancakes* depicted in Table 2 showed there was a significant difference in the moisture content of PC₁, PC₂, PC₃, and PC₄ as compared with PC₀ (control). The moisture content was highest in PC₂ (7.49) followed by PC₃ (6.92), PC₁ (6.35) and PC₄ (6.30) where as PC₀ (control) sample showed the lowest moisture content (4.93). An insignificant difference existed between the samples PC₁ and PC₄. However the difference was significant in case of PC₂ sample when compared to the control (PC₀), PC₁, PC₃, PC₄ respectively. A significant difference existed in the ash content of control when compared to all other samples. However the difference was non-significant between sample PC₂ (2.84), PC₄ (2.45), PC₁ (3.04), PC₃ (3.07). The highest ash content was recorded in the sample PC₃ (3.07) whereas the lowest value was found in the control (PC₀) i.e. 1.57 followed by PC₂, PC₄, PC₁ respectively. Protein content was significantly higher in the PC₄ (16.28) when compared to all other sample including control, it was significantly lower in control (12.56). All the samples except PC₁ and PC₂ varied significantly amongst each other. The addition of field pea increased the ash, protein and fiber content in the formulations which indicates the health benefits of this amendment as increased ash content gives an index to the increased mineral content in the food material. The protein content was increased by increasing the amount of field pea which is likely to be helpful in combating malnutrition in children. Fat content was highest in the control (27.11) sample followed by PC₄, PC₃, PC₁, and the lowest fat content was recorded in sample PC₂ (13.44). There was significant variation in the fiber content of PC₁, PC₂, PC₃ and PC₄ when compared to PC₀. The crude fiber content was found the highest in the sample PC₄ (6.53) followed by PC₃ (4.60), PC₂ (3.39) PC₁ (2.58) and the lowest was found in the control (1.05). The variation was found to be significant among all the samples when compared to the control. The increased fiber content showed positive health benefits for managing metabolic disorders. The carbohydrate content was significantly highest in the sample PC₁ (55.67) when compared to all other samples, with the minimum value recorded in the sample PC₄ (42.41). All samples except PC₂ and PC₀ varied significantly to each other. The energy content was highest in the PC₀ (505.37) sample whereas the least energy content was found in sample PC₃ (438.55). All the samples except PC₂ and PC₃ varied significantly to each other.

3.2 Organoleptic Evaluation

Table 3 represents the sensory evaluation of *Pancakes* prepared by field Pea and *Besan*. Different formulations were prepared with the use of different amounts of flour and

Pancakes evaluated for sensory characteristics. The colour scores of PC₀ (control) sample was highest (8.03) as compared to all other formulations. PC₂ had maximum colour scores after control sample. However, no significant difference was recorded among the samples. The scores for flavor were found in the range of “like moderately” to “like very much”. The flavor score for control (PC₀) was found to be highest as compared to other samples. Samples PC₂ and PC₃ were evaluated as equal (7.81) for flavor. Sample PC₁ was found to have minimum acceptance for flavor as compare to the others, however the samples varied non-significantly. The texture scores for *Pancakes* was highest in sample PC₂ as compared to all other formulations as well as control (7.97), whereas the sample PC₁ was scored minimum for texture. The difference between samples varied non-significantly. The scores for taste was highest in control (PC₀) i.e. 8.06 followed by sample PC₃ (7.97), with the difference between samples being non-significant. Sample PC₁ scored minimum score for taste (7.47). The overall acceptability of *Pancakes* was found highest in sample PC₀ (control) followed by sample PC₂ i.e. 7.95 and 7.82 respectively. All samples were acceptable but varied non-significantly.

4. Conclusion

From the aforesaid discussion it is inferred that field pea flour can be used in the preparation of healthy and nutritious

Pancakes which found its acceptability not only with the consumers but at the same time nutritional value is also improved as the ash, protein and fiber content increased significantly with the use of field pea in the formulation.

5. Acknowledgment

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6. Conflict of Interest: The authors declare that they have no conflict of interest of any kind.

Table 1: Ingredients used in Formulations

Ingredients	PC ₀ (Control)	PC ₁	PC ₂	PC ₃	PC ₄
Besan (Gram flour)	100 g	75 g	50 g	25 g	-
Field pea flour	-	25 g	50 g	75 g	100 g
Salt	5 g	5 g	5 g	5 g	5 g
Green chilli	5 g	5 g	5 g	5 g	5 g
Turmeric	2 g	2 g	2 g	2 g	2 g
Oil	10 ml	10 ml	10 ml	10 ml	10 ml
Water	150 ml	150 ml	150 ml	150 ml	150 ml

Table 2: Proximate composition of *Pancakes*

Parameters Samples	Moisture (%)	Ash (%)	Protein (%)	Fat (%)	Crude fiber (%)	Carbohydrate (%)	Energy (Kcal/100 g)
PC ₀	4.93±0.05	1.57±0.08	12.56±0.68	27.11±0.25	1.05±0.02	52.79±0.68	505.37±1.64
PC ₁	6.35±0.13	3.04±0.13	13.99±0.32	19.37±0.17	2.58±0.07	55.67±0.36	448.96±0.58
PC ₂	7.49±0.18	2.84±0.02	13.44±0.15	13.18±0.15	3.39±0.16	53.66±0.51	441.01±0.52
PC ₃	6.92±0.39	3.07±0.15	14.79±0.13	19.38±0.07	4.60±0.03	51.25±0.66	438.55±0.95
PC ₄	6.30±0.25	2.95±0.19	16.28±0.33	25.53±0.40	6.53±0.06	42.41±0.23	464.52±2.65
CD(p≤ 0.05)	0.41	0.24	0.68	0.43	0.15	0.95	4.98

Table 3: Sensory score of *Pancakes*

Parameters Samples	Colour	Flavor	Texture	Taste	Overall acceptability
PC ₀	8.03±0.94	7.88±0.96	7.81±0.91	8.06±0.93	7.95±0.80
PC ₁	7.59±1.28	7.34±0.85	7.47±1.18	7.47±0.99	7.47±0.91
PC ₂	7.69±1.00	7.81±0.77	7.97±0.69	7.81±0.85	7.82±0.74
PC ₃	7.34±1.25	7.81±0.68	7.91±0.52	7.97±0.78	7.76±0.71
PC ₄	7.63±0.94	7.69±0.95	7.94±0.77	7.72±1.00	7.74±0.84
CD(p≤ 0.05)	0.77	0.60	0.60	0.65	0.56

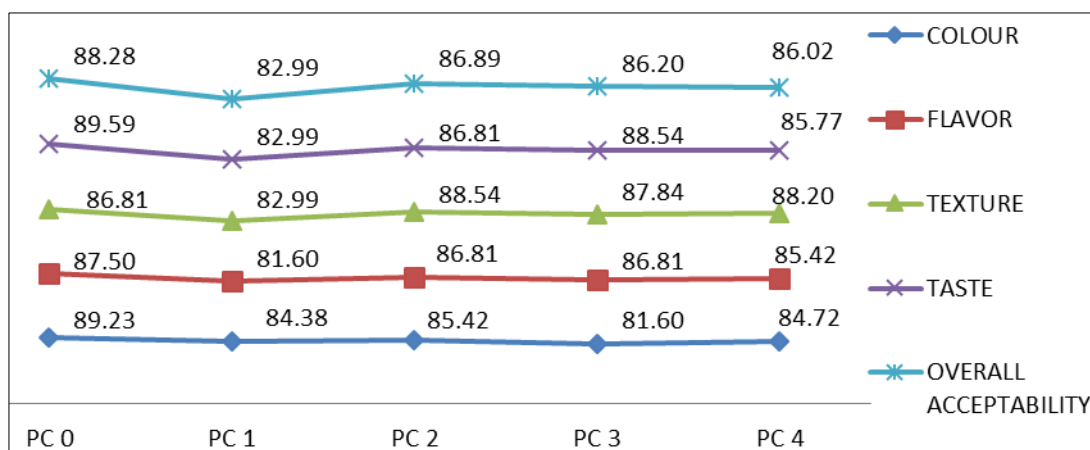


Fig 1: Index of Acceptance of *Pancakes*

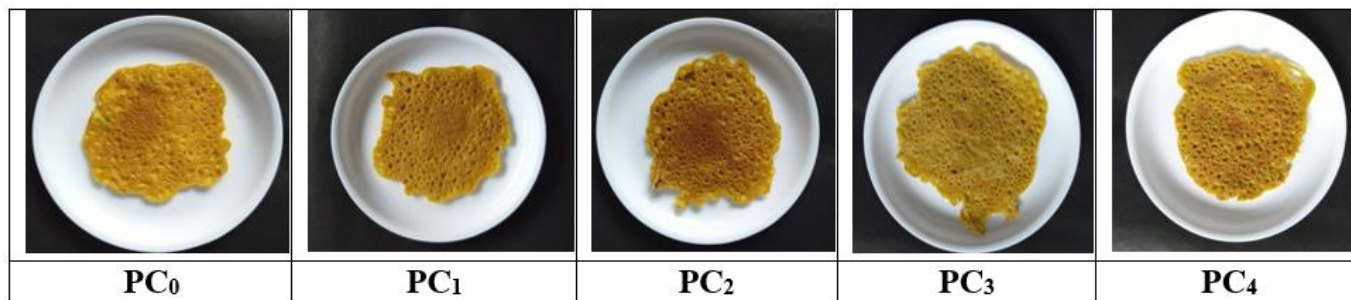


Fig 2: Physical appearance of *Pancakes*

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