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## Development sensory evaluation of millet based pizza base

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**Abstract**

Bakery has been marked the fast-growing industry in food sector over the years. Incorporating the foods that are nutritious and healthy to the individuals was a concern to food industries to develop new products. Pizza was highly consumed and easily acceptable bakery product. Enrichment of pizza can mark the nutritional and health benefits of people. The product millet-based pizza base was developed by incorporating proso millet flour and refined flour in different proportions of 70:30 (PMPB1) and 60:40 (PMPB2) along with control (RFPB) at various temperatures (i.e. 180°C, 190°C, 200°C and 205°C). Among these the PMPB1 was selected at 200°C. The results indicated that the sensory attributes such as texture, taste, crust colour and overall acceptability of developed pizza base was significantly relatable with the control pizza base.

**Keywords:** Pizza base, proso millet flour, refined wheat flour, sensory evaluation

**Introduction**

Minor millets are the small seeded with different varieties which includes proso millet (*panicum miliaceum*), finger millet (*eleusine coracana*), pearl millet (*pennisatum glaucum*), kodo millet (*paspalum setaceum*), foxtail millet (*setaria italic*), little millet (*panicum sumatrense*) and barnyard millet (*echinochloa utilis*). They were known as coarse cereals. (Balasubramanian *et al.* 2012) [2].

Minor millets which consists of low glycaemic index, low glycaemic load and gluten free content showed that it has many health benefits. It has anticancer, antioxidant, anti-cholesteremic, anti-hypertensive properties which help in improvement certain disease conditions like cancer, gastro intestinal disorders, atherosclerosis. (Rao and Deepika, 2016) [8].

Recent urbanisation has made to increase the demand for the therapeutic bakery products as most of the people are becoming health conscious and with the advancing of many health-related conditions. So, there is a need to develop the low cost and therapeutic bakery products with minimum changes in the composition and procedure, yet suitable in the working conditions (Kamaliya, 2000) [4].

Baking is important because several fundamental complex physical processes are coupled during baking, such as, evaporation of water, volume expansion, gelatinization of starch, denaturation of protein and crust formation etc. As soon as the dough is properly baked into bread, a product with superior quality and sensory features occurs. Fresh bread usually presents an appealing brownish and crunchy crust, a pleasant aroma, fine slicing characteristics, a soft and elastic crumb texture, and a moist mouthfeel (Giannou *et al.* 2003) [3].

There has been two-fold increase in the production of bakery products in India during recent years. Increasing growth of fast food companies selling products such as puff, pizza, bread, burger, pastries and hotdog. Along with traditional bakery items like biscuits, cakes, cookies etc has made bakery industry a remarkable place in the of Indian industrial market (Kamliya and Rema, 2003) [5].

Pizza was one of the most commonly purchased items in retail food stores and maintained its market share through the changing nature of the processed food industry and even gained popularity. Pizza was one of the popular consumer foods. It markets in America, Europe and other continents and boosted the trend towards international cuisine and convenience foods. As a result, pizza production has been increased enormously and is expected to increase further in the next decade in relation to growing world population (Preeti and Goyal, 2011) [7].

## Material and method

### Raw material

Proso millet was procured from Millet processing incubation centre, PGRC, Rajendranagar. Refined flour, compressed dry yeast, sugar and other ingredients were procured from local markets of Hyderabad.

### Development of pizza base

According to Kamaliya and Kamaliya (2001) the pizza base (control) was developed using the following ingredients and respective quantities. Thus, incorporating the millet flour and refined flour in different proportions, millet-based pizza base was developed by addition of millet flour along with refined flour and other common ingredients like yeast, sugar, baking powder and salt. Accordingly control pizza base (RFPB) and millet-based pizza base of 70:30 ratio of proso millet flour and refined wheat flour (PMPB1) and 60:40 ratio of proso millet flour and refined wheat flour (PMPB2) was developed at various temperatures as 180°C, 190°C, 200°C and 205°C.

Pizza Base formulations

Ingredients	RFPB	PMPB1	PMPB2
Refined flour (in gms)	100g	30g	40g
Proso millet flour (in gms)	-	70g	60g
Yeast (g)	3	3	3
Sugar (g)	3	3	3
Salt (g)	2	2	2
Water (ml)	60	55	55

### Sensory evaluation of pizza base

The semi trained panel of 15 members from college of community science, saifabad and from Post Graduate and Research Centre, PJTSAU had evaluated the control pizza base (RFPB) along with the millet based pizza base (PMPB1 and PMPB2) for appearance, crust colour, aroma, texture, taste and overall acceptability using the 9 point hedonic scale at different temperatures as 180°C, 190°C, 200°C and 205°C. Scores were based on the 1-9 of hedonic scale, where 1 indicates dislike extremely (very bad) and 9 indicates like extremely (excellent) (Meilgaard *et al.*, 1999)<sup>[6]</sup>.

### Statistical analysis of data

All the results will be analysed to test the significance of the results using percentages, means, standard deviation and analysis of variance (ANOVA) technique. (Snedecor and Cochran, 1983)<sup>[9]</sup>.

## Results and discussion

### Sensory evaluation of developed pizza base at 180°C

The developed pizza bases PMPB1 of 70:30 proso millet flour and refined wheat flour and PMPB2 of 60:40 proso millet flour and refined wheat flour along with control pizza base (RFPB) baked at 180°C were evaluated for sensory scores

The appearance for developed pizza base PMPB1 (7.20±0.0.77) at 180°C was significantly higher than PMPB2 (6.66±0.48) and was not on par with the control pizza base (7.73±0.70). There was a significant difference ( $p<0.05$ ) between the control and developed pizza bases.

The crust colour showed that the control (RFPB) of 7.66±0.72 was on par with developed pizza base PMPB1(7.40±0.63) but

not on par with the PMPB2 (7.06±0.59). Aroma was highest for RFPB (7.46±0.74) and lowest in the developed pizza base PMPB1 (6.53±0.74) and PMPB2 (5.46±0.74).

The texture was higher in RFPB (7.93±0.25) and lower in the developed pizza bases PMPB1 (7.40±0.50) and PMPB2 of (6.86±0.63). The sensory evaluation for taste when evaluated showed that the developed pizza bases PMPB1 (6.53±0.74) and PMPB2 (5.93±0.79) was lower when compared to control (7.93±0.70). There was a significant difference ( $p<0.05$ ) among the developed pizza base and the control for texture and taste.

The overall acceptability of the developed pizza base PMPB1 (6.53±0.70) was higher than PMPB2 (5.93±0.70) but lower than RFPB (8.26±0.45). There was a significant difference between ( $p<0.05$ ) between the developed pizza bases and control.

### Sensory evaluation of developed pizza base at 190°C

The sensory scores for control pizza base RFPB along with PMPB1 and PMPB2 with 70:30 and 60:40 ratio of proso millet flour and refined wheat flour baked at 190°C were represented in the Fig: 1.1.1

The appearance, crust color, texture and taste of PMPB1 (7.53,7.80,7.20 and 7.33) and PMPB2 (7.86,7.40,7.46 and 7.20) were correlative baked at 190°C but distinct with control pizza base (8.40,8.40,8.46 and 8.33). The sensory score of aroma for RFPB (8.20±0.56) was equivalent with that of PMPB1 (8.20±0.63) but showed difference in value with PMPB2 (7.40±0.73). The results manifested that there was a significant difference between the control and developed pizza bases.

The overall acceptability of the developed pizza base PMPB1 (7.26±0.59) was not on par with PMPB2 (7.53±0.83) and RFPB (8.33±0.48). There was a significant difference ( $p<0.05$ ) between control and the developed pizza bases.

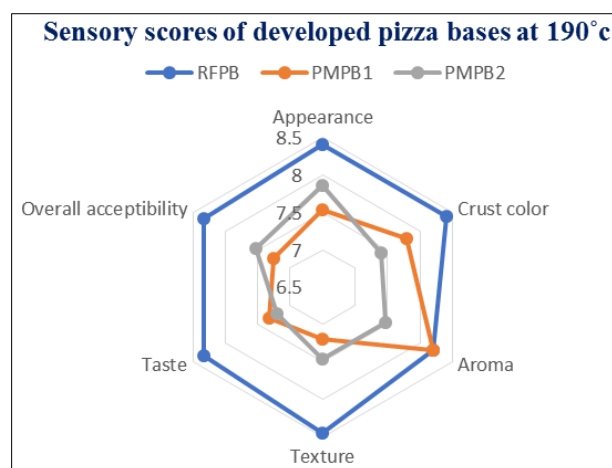


Fig 1.1.1: Sensory scores of developed pizza bases at 190°C

### Sensory evaluation of developed pizza base at 200°C

The developed pizza bases PMPB1 of 70:30 proso millet flour and refined wheat flour and PMPB2 of 60:40 proso millet flour and refined wheat flour along with control pizza base (RFPB) was evaluated at 180°C for sensory evaluation and represented in the Table 1.1.

Table 1.1.

Pizza base	Appearance	Crust colour	Aroma	Texture	Taste	Overall acceptability
RFPB	8.46±0.51 <sup>a</sup>	8.40±0.50 <sup>a</sup>	8.66±0.48 <sup>a</sup>	8.66±0.48 <sup>a</sup>	8.60±0.50 <sup>a</sup>	8.33±0.48 <sup>a</sup>
PMPB1	7.53±0.51 <sup>b</sup>	8.00±0.65 <sup>b</sup>	7.80±0.56 <sup>b</sup>	7.86±0.35 <sup>b</sup>	8.00±0.53 <sup>b</sup>	8.06±0.45 <sup>a</sup>
PMPB2	7.06±0.79 <sup>c</sup>	7.20±0.56 <sup>c</sup>	7.13±0.63 <sup>c</sup>	7.26±0.59 <sup>c</sup>	7.46±0.51 <sup>c</sup>	6.93±0.45 <sup>b</sup>
Mean	7.38±0.12	7.43±0.13	7.51±0.12	7.58±0.12	7.70±0.11	7.33±0.13
CD	0.36	0.33	0.40	0.33	0.35	0.30
S.E. of mean	0.17	0.16	0.20	0.16	0.17	0.15
CV (%)	6.67	6.05	7.39	6.07	6.23	5.71

**Note:** Values are expressed as mean ± standard deviation of three determinations.

Means within the same column followed by a common letter do not significantly at  $p \leq 0.05$

RFPB (control): 100% refined wheat flour pizza base

PMPB1: 70% proso millet flour and 30% refined wheat flour.

PMPB2: 60% proso millet flour and 40% refined wheat flour.

The pizza base baked at 200°C indicated that the appearance of PMPB1 (7.53±0.51) was higher than PMPB2 (7.06±0.79) and lower than RFPB (8.46±0.51). There was a significant difference ( $p < 0.05$ ) between the sensory scores of appearances for control and developed pizza bases.

The crust color showed that the PMPB1 (8.00±0.65) was lower than RFPB (8.40±0.50) higher than PMPB2 (7.20±0.56). There was significant difference ( $p < 0.05$ ) between. The developed pizza base when assessed for aroma showed that PMPB1 (7.80±0.56) was higher than PMPB2 (7.13±0.63) but lower than RFPB (8.66±0.48). The texture and taste when evaluated indicated that PMPB1 (7.86±0.35 and 8.00±0.53) was lower than the RFPB (8.66±0.48 and 8.60±0.50) but higher than PMPB2 (7.26±0.59 and 7.46±0.51). There was a significant difference ( $p < 0.05$ ) among the developed pizza base and the control for texture and taste.

The overall acceptability of the developed pizza base (8.06±0.45) was on par with that of RFPB (8.33±0.48) but contrasting with PMPB2 (6.93±0.45). The results determined that there was no significant difference between ( $p < 0.05$ ) RFPB and PMPB1.

#### Sensory evaluation of developed pizza base at 205°C

Anu and Anisha, (2016) [1] studied about the sensory quality evaluation for multi grain pizza base incorporating wheat flour, oats, buckwheat along with finger millet and pearl millet in different proportions. The results for crust color of multigrain pizza base (7.3) was relatable with the sensory scores of crust color for developed proso millet pizza base PMPB1 (7.26) baked at 205°C. The appearance of PMPB1 (7.60±0.50) was higher than PMPB2 (6.66±0.61) and contrary with RFPB (8.26±0.45). There was a significant difference ( $p < 0.05$ ) between developed pizza bases and control. The aroma and texture values for PMPB2 (6.80 and 6.93) was contrasting with the values of RFPB (8.33 and 8.73) and PMPB1 (7.46 and 7.46). The taste of the developed pizza base PMPB1 (7.26±0.70) was lower than the RFPB (8.26±0.59) but higher than PMPB2 (6.93±0.45). There was a significant difference ( $p < 0.05$ ) between control pizza base and developed pizza base for texture and taste.

The overall acceptability of the developed pizza base PMPB1 (7.26±0.59) which was higher than PMPB2 (6.86±0.63) but lower than RFPB (8.33±0.61). There was a significant difference between ( $p < 0.05$ ) control and developed pizza bases.

#### Conclusion

Millet based pizza base can be prepared in different proportions by adding proso millet flour along with refined wheat flour as 100% control, 70:30 ratio of proso millet flour

and refined wheat flour (PMPB1) and 60:40 ratio of proso millet flour and refined wheat flour (PMPB2) at different temperatures of 180°C, 190°C, 200°C and 205°C which will dramatically improve the nutritional and functional characteristics of the developed pizza base.

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