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RESEARCH PAPER

Organoleptic evaluation of the noodles prepared with iron rich millet flour and dehydrated leaves powder

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Abstract : Purpose: The research study was undertaken to develop value added food product noodleswith the incorporation of low-cost millets and dehydrated leaves powder mix. **Methodology:** Noodles were formulated with the incorporation of selected millets and dehydrated leaf mix powdersuch as Drumstick leaf powder and Amaranthus leaf powder. Sensory evaluation was done by using a 9 point hedonic scale Performa. **Results and Discussion:** Results shows that average sensory scores of different parameters in control and treated sample in relation to color and appearance which that T_2 (8.3) had the highest score followed by T_0 (8.2), T_1 (7.7) and T_3 (7.3), respectively. Scoring shows that the treatment T_2 was liked very much while T_0, T_2 and T_3 were moderately liked by the panel judges. **Conclusion:** Millets and dehydrated green leaves based value added food productswell acceptable by the community can help in promoting the millet and green leafy vegetables consumption and thereby nutritional intake of the consumers significantly.

Key Words : Millets, Dehydrated leaves, Sensory evaluation, Product development

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INTRODUCTION

The term ‘‘millet’’ is used for small seeded grains belonging to the family ‘‘Poaceae’’. Millets rank as the sixth most important cereal in the world. These are staple foods for low income groups of populations in rural areas. Millets are generally consumed as whole grains and these serve as recognized sources of many health- promoting components. As these are rich sources of fibre, vitamins, minerals and phytochemicals such as phenolics, lignans, b-glucan, inulin, resistant starch, sterols and phytates. These could impart beneficial health effects to prevent and delay the occurrence of non-communicable diseases (NCDs) (Gull *et al.*, 2016).

Finger millet (*Eleusine coracana*) also known as ‘ragi’is consumed without dehulling. Its kernel is a nakedcaryopsis consists of seed coat, germ and endosperm in the range of 13–15 %, 1.5–2.5 % and 80–85 %, respectively (Hulse *et al.,* 1980). It is nutritionally superior to most other cereals (Obilana and Manyasa,

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2002) and being rich source of calcium (350 mg/100 g) than othercereals. This tiny millet grain has a dark brown seed coat, richer in polyphenols. It is also reported as a potent source of antioxidant compounds (Sripriya *et al.,* 1996). High tannin finger millet grain types exhibited higher antioxidant activity than non-tannin types (Siwela *et al.,* 2007).

In Indian culinary, green leafy vegetables are one of the most valued components for their colour, flavour and therapeutic value. These serve as good source of minerals such as calcium and iron. The leafy vegetables are relatively less expensive, easy-to cook and rich in several nutrients essential for human health. Therefore, dietary modifications to increase the consumption of green leafy vegetables that are rich in micronutrients, is essential.

Buckwheat belongs to genus Fagopyrum and family Polygonaceae and its use as a food is believed to have started in the Himalayan region in Western China or Northern India (Léder *et al*., 2010). Unlike wheat and other cereals, buckwheat proteins have a well-balanced amino acid composition along with the presence of all essential amino acids (Wijngaard and Arendt, 2006). It also contains numerous nutraceutical compounds like rutin, catechins and polyphenols (Fabjan *et al*., 2003 and Watanabe, 1998) which confer health benefits like reducing high blood pressure, lowering cholesterol controlling blood sugar and preventing cancer risk (Fabjan *et al*., 2003 and Kim *et al*., 2004). However, the presence of some antinutritive factors, like phytates, saponins, tannins or heat-labile trypsin inhibitors and lectins limit its food applications (Tanwar *et al*., 2019). Buckwheat is generally classified into common and Tartary buckwheat. Both common buckwheat (*F. esculentum*) and Tartary buckwheat (*F. tartaricum*) are widely used to prepare various cultural foods such as kasha, pizzoccheri and naengmyeon as well as bread, cakes, instant noodles, dried noodles or vermicelli, pasta, cookies, crackers, muffins, pancakes (Mota *et al.*, 2016 and Yilmaz *et al.,* 2020).

Amaranth plants grow as weed and are available abundantly during rainy season in Uttar Pradesh, India, are very good source of calcium ranging from 300-800 mg/100 g. Fresh amaranth often provides from 2 to 3 times the amount of nutrients found in other vegetables. Vegetable amaranth is also an important source of vitamins, especially pro vitamin A, the lack of which results in a most serious nutritional deficiency in the tropics and leads to blindness in thousands of children each year (Singh *et al.*, 2009).

Moringa (*Moringa oleifera* Lam.) is native to the Indian subcontinent and has become naturalized in the tropical and subtropical areas around the world. The tree is known by such regional names as Benzolive, Drumstick tree, Horseradish tree, Kelor, Marango, Mlonge, Mulangay, Saijihan and Sajna.It is considered as one of the World's most useful trees, as almost every part of the Moringa tree can be used for food, medication and industrial purposes.People use its leaves, flowers and fresh pods as vegetables, while others use it as livestock feed. This tree has the potential to improve nutrition, boost food security and foster rural development (Moyo *et al.,* 2011).

Noodles are widely consumed throughout the world and their global consumption is second only to bread. Instant noodles are widely consumed throughout the world and it is a fast growing sector of the noodle industry. This is because instant noodles are convenient, easy to cook, low cost and have a relatively long shelf-life. Wheat flour which is usually used to make instant noodles is not only low in fibre and protein contents but also poor in essential amino acid, lysine. Flour of hard wheat (*Triticum aestivum* L.) is the main primary ingredient and the addition of alkaline salts can help strengthen the structure and hence improve the firmness of the final product (Kulkarni *et al.,* 2012).

MATERIAL AND METHODS

Millets such as finger millet, buckwheat grainsand other ingredients were procured from local market of Prayagarj district.Uncommon leaves such as Amaranthus and Drumstick leaves were collected from organic farm of SHUATS, Prayagraj.The study was conducted in the Nutrition Research Laboratory, Department of Food Nutrition and Public Health, Ethelind College of Home Science, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj-211007, U.P. India.

Finger millet and buckwheat flour :

Millet flour is the basic ingredient used in the preparation of noodles and millet flour if prepared from the milling of whole millets. Millets are rich in fibre and proteins.

Refined wheat flour: Refined wheat flour (Maida) commonly used for the preparation many extruded products. When hydrated with water it gives a network

like structure called gluten. The wheat flour was purchased from the local super market.

Preparation of dried leaf powder:

The amaranth leaves were cleaned and washed under running tap water to remove dirt and dust. The washed leaves were spread over filter paper to remove excess water. Then the leaves were dried in hot air oven at 50 ± 5 C for 8 h. The dried leaves were ground into fine powder and kept in airtight plastic bottles. Amaranthus and Drumstick leaves have a high nutritional value and are extremely rich in antioxidants and rich source of vitamin A and Iron.

Value addition using by the prepared of millet flour and leaf powder mix:

Extruded food product like noodles was prepared and standardized. For product, the basic recipe (control T_0) had three variations T_1, T_2 and T_3, respectively, where the amount of one or more ingredients was varied. Treatments and replication of the developed food products:

Table A : Percentage of ingredients use to developed the value added extruded food products

Ingredients	Treatments			
	To (g)	T_1 (g)	T_2 (g)	T_3 (g)
Refined flour	100	75	67	60
Millet flour mix	-	20	25	30
Leaf powder mix	-	5	8	10

Replication- The controls and each of the treatments for each product were replicated six times

Noodles making:

Noodle was making by blending of composite flour with warm water. The blending mixture was kneading from dough. The formed dough was rest for 20 minutes, for the kneaded. The noodles strands were put in cleaned trays and hot air oven dry up at 60%C temperature.

Mixing of ingredients (Mixing flour and leaves powder, warm water)

⇩

Dough kneading

⇩

Extruding/cutting

⇩

Drying at 60^R C

⇩

Packaging noodles in polyethylene pouches

Source: Sushila *et at. (*2018)

Sensory evaluation of the developed extruded food product:

The dried noodles were dehydrated in boiling water for 5 min and were served hot for the sensory evaluation. Sensory evaluation of the food product for their acceptability was done by a panel of eight judges for different sensory attributes like appearance, flavor, taste, texture and overall acceptability. The score card based on the 9 point Hedonic scale was used for sensory evaluation.

Statistical analysis:

Analysis of variance technique (ANOVA) and Critical difference were used to analyze the data (Gupta and Karoo, 2002).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Organoleptic characteristic of the developed extruded food product noodles :

The Table 1 shows the average sensory scores of different parameters in control and treated sample in relation to colour and appearance which indicates that T_2 (8.3) had the highest score followed by T_0 (8.2), T_1 (7.7) and T_3 (7.3), respectively. Scoring shows that the treatment T_2 was liked very much while T_0, T_2 and T_3 were moderately liked by the panel of judges.

The texture of noodles clearly indicates that the treatment T_2 had highest values of (8.1) followed by T_0 (7.5) T_1 (7.6) and T_3 (7.5), respectively. The T_2 ratio (Ragi flour, Buckwheat flour, Refined flour, Drumstick leaves powder and Amaranthus leaves powder, 15:20:20:45) was like very much.

The effect of selected ingredients on the taste and flavour of noodles indicates that treatment T_2 (8.4) held the maximum scores as compared to T_1 (7.8) T_2 (8.4) and T_3 (7.6).

The mean scores of noodles in relation to overall acceptability indicates that the treatment T_2(8.4) observed maximum scored followed by T_0(7.3) T_1(8) and T_3(7.7), respectively. Scoring shows that the treatment T_2 was liked very much while T_3, T_1 and T_0 were moderately liked by the panel of judges. This is due to the incorporation of ragi flour, buckwheat flour, refined flour, drumstick leaves powder and amaranthus leaves powder

Table 1: Average sensory score of different parameters in control and treated sample of 'Noodles'

Treatments	Sensory characteristic (Scores on 9 point hedonic scale)				
	Colour and appearance	Texture	Flavour	Taste	Overall acceptabil
T_o (Control)	8.2±0.29	7.5±0.59	8.3±0.44	8.31±0.44	7.3±0.5
T_1	7.7±0.31	7.6±0.43	7.8±0.16	7.8±0.16	8.0±0.14
T_2	8.3±0.31	8.1±0.24	8.4±0.46	8.4±0.46	8.4±0.39
T_3	7.3±0.5	7.5±0.5	7.6±0.41	7.6±0.41	7.7±0.29
F %	S	S	S	S	S
S.E. ±	0.135	0.118	0.133	0.154	0.161
C. D. (P = 0.05)	0.286	0.251	0.283	0.326	0.342

±SE = (Standard error) S= Significant, NS= Not-significant (p? 0.05) CD= Critical difference

at different proportion. The characteristics like taste of nutrition, convenience, safety, longer shelf-life, and reasonable price have made the noodles popular (Gulia *et al.,* 2014). Quality factors obligatory for instant noodles are colour, flavour and texture, cooking quality, rehydration rates throughout final preparation and the presence or absence of rancid taste after prolonged storage (Jood, 2015 and Kumar and Prabhasankar, 2016) results of sensory attributes of the various noodles prepared in the present study are in tune with the previous research findings. The results is supported by the findings of Kumari Shikha (2018) reported that sensory evaluation of noodles with or without the incorporation of prepared mix powder showed that the overall acceptability was highest in T_3 (8.89) followed by T_1 (6.99), T_2 (7.26) and T_0 (8.8), respectively and there was a significant difference, ($p<0.05$) between the control and the treatment.The overall acceptability of T_3 was significantly better than control (T_0). According to the study of Maghfara *et al.* (2019) sensory characteristics scores significantly decreased as the rice flour content increased. The noodles supplemented with upto 40% rice flour received the same acceptability as the control. Therefore, utilization the rice flour supplementation ratio 40% could observe good sensory characteristics like wheat-based noodles.

Conclusion:

The study has shown that iron rich millet flour and dehydrated green leafy vegetables powder, has the potential to produce noodles of acceptable quality. The research has also been able to achieve good quality noodles with good overall acceptability. Thus, developed nutrient dense noodles can be an excellent source of food for the population.

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