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**Dr. Mohini Gupta**  
H.O.D, Pushp Institute of  
Sciences & Higher Studies,  
Pilibhit, Uttar Pradesh, India

**Neha Kumar**  
Assistant Professor, Pushp  
Institute of Sciences & Higher  
Studies, Pilibhit,  
Uttar Pradesh, India

**Noor Fatima**  
Lecturer, Pushp Institute of  
Sciences & Higher Studies,  
Pilibhit, Uttar Pradesh, India

**Madhuri**  
PG Student, Pushp Institute  
of Sciences & Higher Studies,  
Pilibhit, Uttar Pradesh, India

**Corresponding Author:**  
**Dr. Mohini Gupta**  
H.O.D, Pushp Institute of  
Sciences & Higher Studies,  
Pilibhit, Uttar Pradesh, India

## Awareness and consumption of millets among women

**Dr. Mohini Gupta, Neha Kumar, Noor Fatima and Madhuri**

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### Abstract

Millets are amazing in their nutrition content. The millet is highly nutritious and contains important amino acids and also has several health benefits such as anti-diabetic, antitumorigenic, atherosclerogenic effects, and antioxidant. In this article we analyzed the awareness and consumption of millets by respondents. The present study was done on different millets which are rich source of macro and micronutrients whose consumption is very less in general population due to lack of awareness or ignorance. Therefore, the effort was made to develop products. Two commonly consumed products namely Appe and Idli were developed from millets, Sorghum millet, Pearl millet and Finger millet 60 gm each. Acceptability evaluation of prepared recipes was performed by semi trained panel through 9 point Hedonic rating scale test. The result revealed that among the recipes (Appe and Idli) prepared by adding 60 gm millets in which Sorghum millet product were acceptable when compared to product developed by Pearl and Finger millet. The result of the Nutritive value indicated that Pearl millet had appreciable amount of Protein, Energy, Carbohydrates, Fiber, Iron and Calcium. Therefore, it can be concluded that products developed from Sorghum millet was acceptable by the panel member but nutritive value was found in pearl millet.

**Keywords:** Awareness, different millets, sorghum millet, pearl millet, finger millet

### 1. Introduction

Millets are known as one of the most important cereal grains. Millets are consumed by more than 1/3rd of the world's population. It is the 6th cereal crop in terms of world's agricultural production. Millets are Jowar (*Sorghum*), Sama (Little millet), Ragi (Finger millet), Korra (Foftail millet) and Variga (Proso millet). Bajra and Sama are high in fat while Ragi has the lowest fat. Millets are used as food and are widely used in rural areas. They have been cultivated for a thousand years and are used throughout the world, in the Middle ages the Romans and Gauls were consuming porridges made of millets eaten than wheat. A majority of the world's commercial millet crop is produced by China, India, Greece, Egypt and Africa. But even in rural areas some millets are used for consuming like Finger millet, Sorghum, etc and the remaining are used as animal feed. Millet are having amazing values in their nutrition content <sup>[1]</sup>.

Considering the nutritional parameters, millets are way ahead of wheat and rice. In terms of mineral content, millets have more fibre when compared to rice and wheat. Each one of the millets has more fibre than rice and wheat. Some millets have more than fifty times of fibre than of rice. Finger millet is having thirty times more Calcium than rice while all other millets have at least double amount of Calcium compared to rice. In their Iron content, foxtail and little millet are also high in nutritional content compared to rice <sup>[2]</sup>.

Millets are good source essential fatty acids like linoleic, oleic and palmitic acids found in their free form and monogalactosyl, diacylglycerols, digalactosyl diacylglycerols, phosphatidylethanolamine, phosphatidyl serine and phosphatidyl choline in the bound form present in millets. Other fatty acids i.e. arachidic acid, behenic acid, erucic acid are found in trace amounts. Millet oil could be a good source of linoleic acid and tocopherols. Millet is an alkaline forming grain that is gluten-free. Vitamin B such as Niacin, folacin, riboflavin, and thiamine and phosphorus are present in millets that play a key role in energy synthesis in the body <sup>[3]</sup>.

In India, production and consumption of millets are declined due to many reasons. Despite their superior nutritional qualities and climate resilience cultivation of small millets in India

declined from 7.22 million hectares to 2.29 million hectares from 1961-2009. Harvested area and the consumption of millets in India gradually decreased in an alternative years of 2005-2008 & 2009 onwards it was increased but in the year of 2012 onwards it came to falling. Low productivity, high labour intensity, drudgery of agricultural operations and lack of alternative farm gate prices, easy availability of rice and wheat through public distribution system, inadequate investment in product development and commercialization, inadequate availability of small millets in local markets and high prices, inadequate policy support for small millets when compared to crops like rice and wheat, were the reason for decline of millets <sup>[4]</sup>.

## 2. Materials and Methods

The study was conducted to develop products using different millet. A list of different millet with high fiber content was using food consumption and exhaustive literature. Three millet selected from the list were Sorghum

millet, Pearl millet, and Finger millet. After that the Millets were processed for further investigation and other raw material required for the study was purchase from local market of Pilibhit and then analysis was done in the Food Laboratory of Department of Home Science, Pushp Institute of Sciences & Higher Studies Pilibhit.

The whole methodology was divided into five phase;

1. Collection of raw material.
2. Formulation of food products.
3. Sensory Evaluation by using 9 Point Hedonic Scale.
4. Statistical Analysis and report writing.
5. Nutritional analysis of most accepted products and comparison with the standard food products.

### 2.1 Collection of raw material

The study was done on the Millets to popularize their health benefits. The different raw material was collected from the market, Pilibhit (U.P) District.



**Plate 1:** Collection of raw material

### 2.2 Formulation of food products

#### 2.2.1 Development of products

For the value added Products, a list of daily consumed food items was prepared from the magazines and recipes books. Out of them three commonly consumed products were prepared i.e. Appe and Idli. The standardized recipes for

these preparations were taken. The selected product was developed to enrich them with different Millets incorporated in basic recipe respectively. Developed preparations were standardized in the laboratory of Home Science, Pushp Institute of Science & Higher Studies Pilibhit and were evaluated using 9 point hedonic scale.



**Plate 2:** Developed Idli



**Plate 3:** Developed Appe

### 2.2.2 Standardization of products

The selected preparations viz. Appe and Idli, were standardized in the laboratory for their portion size, cooking characteristics and organoleptic characteristics. Ingredients used in the preparations were carefully balanced along with a procedure by repeated trial to obtain standard product.

### 2.3 Sensory Evaluation by using 9 Point Hedonic Scale

Sensory evaluation is considered to be an important analytical tool in the present day competitive environmental to judge the acceptability of food among the potential consumer. In the present study the sensory evaluation was done by 9 point Hedonic scale presented in table 1.

**Table 1:** Hedonic Scale for Organoleptic Evaluation

Quality description	Score
Liked extremely	9
Liked very much	8
Liked moderately	7
Liked slightly	6
Neither liked nor disliked	5
Disliked slightly	4
Disliked moderately	3
Disliked very much	2
Disliked extremely	1

### 2.4 Nutritional analysis of food products

Nutritional analysis was done by using food value Table of ICMR.

### 2.5 Statistical analysis of the data and interpretation

The data was collected and presented in results Average nutritional and sensory scores values of the enriched Appe and Idli were statistically analyzed by using mean and standard deviation.

## 3. Results and Discussion

The result of the study has been discussed under the following heads.

1. Sensory Evaluation of developed products.
2. Nutritive value of developed products.

### 3.1 Sensory evaluation of developed products

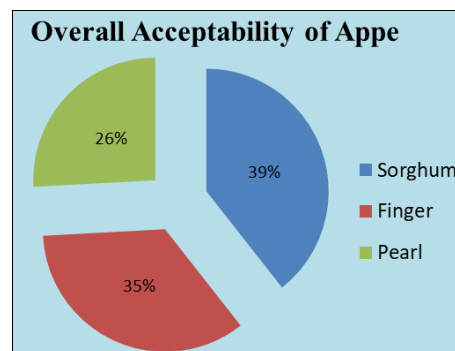
#### Product: 1 Appe

Appe is a snack consumed mostly in India. It is an extruded product with a good texture and appearance; colours adds to the qualities of food whether it is acceptable or refutable by the consumers. Sorghum millet appe was liked very much while Finger millet appee liked moderately. Where as prepared from Pearl millet was neither liked nor disliked. A significant difference was found in the taste among three prepared appe different types of Millets. Sorghum millet appe was most acceptable to more than other Millets made the recipe unacceptable due to taste. Texture of all prepared developed from three millet appe was most accepted among three developed Appe. A difference was found in appearance among all the prepared recepies. A particular food should have a particular flavor and it should not be overlapping with another products. The Sorghum millet appe ( $8.53 \pm 0.50$ ) was liked extremely while finger millet appe ( $7.53 \pm 0.50$ ) was liked very much by the panelist. Sorghum and finger millet Appe were acceptable and the recipes were liked very much. Overall acceptability score revealed that sorghum millet appe was liked very much by the panelist (Table No.

2 Figure No. 1).

**Table 2:** Sensory acceptability score of developed Appe

Attributes of Appe	Sorghum millet (Jawar)	Finger millet (Ragi)	Pearl millet (Bajra)
Colour	$7.63 \pm 0.71$	$7.03 \pm 0.73$	$5.63 \pm 0.49$
Taste	$8.53 \pm 0.50$	$7.6 \pm 0.62$	$5.7 \pm 0.59$
Texture	$7.66 \pm 0.71$	$6.55 \pm 0.50$	$5.6 \pm 0.66$
Appearance	$8.06 \pm 0.73$	$6.66 \pm 0.66$	$6.66 \pm 0.71$
Flavour	$7.76 \pm 0.72$	$6.6 \pm 0.62$	$6.33 \pm 0.66$
Overall	$8.53 \pm 0.50$	$7.53 \pm 0.50$	$5.6 \pm 0.62$



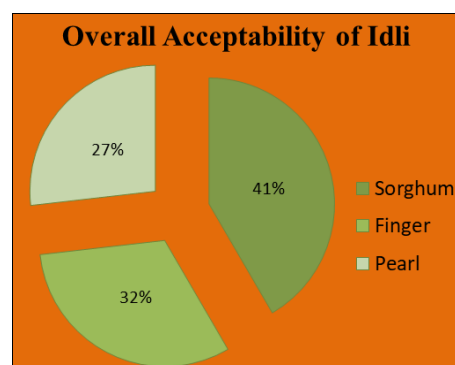
**Fig 1:** Sensory evaluation for overall acceptability of developed Appe

#### Product 2: Idli

Idli is one of the traditional South Indian dish made by wheat, semolina and some amount of curd. Overall acceptability was judged to evaluate the overall sensory quality of the product. The mean acceptability score (table 4.1.2) of sorghum ( $8.63 \pm 0.49$ ), finer millet ( $6.56 \pm 0.56$ ) and pearl millet idli ( $5.56 \pm 0.56$ ) respectively indicating that the was liked very much, while was liked slightly was neither like nor dislike. Significant differences were found in all the three sensory attributes. Overall acceptability score revealed that sorghum Idli was liked very much by the panelist (Table 3).

**Table 3:** Sensory acceptability score of developed Idli

Attributes Idli	Sorghum millet (Jawar)	Finger millet (Ragi)	Pearl millet (Bajra)
Colour	$8.2 \pm 0.40$	$7.63 \pm 0.49$	$5.56 \pm 0.50$
Taste	$8.63 \pm 0.49$	$6.63 \pm 0.61$	$5.73 \pm 0.78$
Texture	$8.5 \pm 0.50$	$6.43 \pm 0.50$	$5.53 \pm 0.50$
Appearance	$8.43 \pm 0.56$	$6.53 \pm 0.50$	$5.5 \pm 0.50$
Flavour	$8.53 \pm 0.50$	$6.56 \pm 0.53$	$5.53 \pm 0.50$
Overall	$8.63 \pm 0.49$	$6.56 \pm 0.56$	$5.56 \pm 0.56$



**Fig 2:** Sensory evaluation for overall acceptability of developed Idli



### 3.2 Nutritive value of accepted Appe and Idli

In the present study two different products i.e. Appe and Idli were developed by using different millets i.e. Sorghum, finger millet and pearl millet. Appe developed by Pearl millet was rich in Fibre, Iron and Calcium whereas carbohydrate was rich in sorghum and finger millets products

(Table 4).

In case of i.e. Idli, show in Table no. (5) That Highest content of protein and Iron was found in product developed by using pearl millet whereas finger millet Idli was rich in Carbohydrate, Fibre and Calcium.

**Table 4:** Nutritive value of developed Appe

Name of products	Ingredients	Amount (gm)	Energy (kcal)	Protein (gm)	Fiber (gm)
Standard Appe	Semolina	70	243	2.08	0.14
	Curd	20	12	0.64	0.16
	Total	90	225	2.72	0.3
Beetroot Appe	Semolina	70	243	2.08	0.14
	Curd	20	12	0.64	0.16
	Beetroot Leaves	40	1.84	1.36	0.28
	Total	130	256.84	4.06	0.58
Radish Appe	Semolina	70	243	2.08	0.14
	Curd	20	12	0.64	0.16
	Radish Leaves	40	11.2	1.52	0.4
	Total	130	266.2	4.22	0.7
Taro leaves	Semolina	70	243	2.08	0.14
	Curd	20	12	0.62	0.16
	Taro Leaves	40	22.4	1.56	1.16
	Total	130	277.4	4.26	1.46

**Table 5:** Nutritive value of developed Idli

Name of Products	Ingredients	Amount (gm)	Energy (gm)	Protein (gm)	Carbo. (gm)	Fiber (gm)	Iron (mg)	Calcium (mg)
Standard Idli	Semolina	60	208.8	6.24	44.88	0.12	0.96	9.6
	Curd	20	12	0.62	0.6	-	0.04	49.6
	Total	80	220.8	6.86	45.48	0.12	01	59.2
Sorghum Millet Idli	Sorghum millet	60	209.4	6.24	43.56	0.96	2.46	15
	Curd	20	12	0.62	0.6	-	0.04	49.6
	Total	80	221.4	6.86	44.16	0.96	2.62	64.6
Pearl Millet Idli	Pearl millet	60	216.6	6.96	40.5	0.72	4.8	25.2
	Curd	20	12	0.62	0.6	-	0.16	49.6
	Total	80	228.6	7.58	41.1	0.72	4.96	74.8
Finger Millet Idli	Finger millet	60	196.4	4.38	43.2	2.16	2.34	206.4
	Curd	20	12	0.62	0.6	-	0.04	49.6
	Total	80	208.8	05	43.8	2.16	2.38	256

### 4. Conclusion

India is endowed with hundreds of nutritious crops whose research and development is still poorly addressed; production of millets has numerous securities, such as securities of food, nutrition, fodder, fiber, health, livelihood and ecology and at the same time increase the development of vulnerable people. Millets are storehouse of dozens of nutrition in large quantity and long term consumption of millets may bring several health benefits of the people. Hence they can help resist malnutrition.

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