International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Nutritional Analysis and Organoleptic Evaluation of Millet Products

Anjali Singh[1], Sunita Mishra[2]

[1]M. Sc Student, Department of Food and Nutrition, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Raebareli Road, Lucknow-226025(U.P) INDIA.
[2]Professor, Department of Food and Nutrition, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Raebareli Road, Lucknow-226025(U.P) INDIA.

ABSTRACT
This study aimed to evaluate the potential of plant-based millet product for the production of Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma. The physico-chemical, antioxidant, and organoleptic properties of the resulting product were characterized. The results indicated that the use of millet resulted in Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma with a desirable texture, flavor, and appearance. The product also exhibited good physico-chemical properties, such as low moisture content, high fibre and high protein content. Additionally, the Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma showed good antioxidant activity, indicating its potential as a functional food. Therefore, plant-based millet product could be considered as a promising alternative to traditional cereals-based for the production of Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma.

KEYWORD- Millet product,Organoleptic evaluation, Physio-chemical properties, Antioxidant activity.

1. INTRODUCTION-

Indian rural and urban households can consume a variety of traditional foods prepared from tiny millet grains to satisfy their daily nutritional needs**(1).** A balanced diet is essential for overall wellbeing and good health. The Energy, protein, fat, vitamins, and minerals are all provided by food to function properly, to live, to grow**.(2)** It takes a wide variety of foods to supply the appropriate levels of nutrients necessary for health. Poor eating practises are the major cause of death and elevated danger for many diseases**. (3-5)**Diet and nutrition are crucial for critical thinking disorders like cancer, obesity, and coronary heart problems, bone conditions, tooth decay, type 2 diabetes, and gall bladder illness, dementia, and malnutrition anaemia. **(4-7)**As we well known, 2023 has been designated as **"International Year Of Millet".** The Government of India requested that the United Nations declare 2023 to be the International Year of Millets with the intention of raising awareness and increasing millets' production and consumption.

Sorghum (Sorghum bicolor L.) and pearl millet (Pennisetum typhoides L.), which belong to the main millet group, are two of the many types of millet cereals farmed worldwide. While finger millet or ragi (Eleusine coracana L. Gaertn) contains a third of the daily necessary calcium intake and phosphorus (P).Comparing the grains to other forms of millet, there is a higher content of calcium (between 162.0 and 358.0 mg/100 g) in the grains.Little millet (Panicum sumatrens L.), proso millet (Panicum

miliaceum L.), brown-top millet (Brachiaria ramosa L. Stapf; Panicum ramosum L), barnyard millet (Echinochloa frumentacea L.), foxtail of Italian millet (Setariaitalica L.), kodo millet (Paspalum scrobiculatum L.**)(6).** The fig.1 shows variety of millets.

Fig.1 shows variety of millets

Antioxidants are a crucial phenomenon for preventing cell damage caused by different types of free radicals created by our biological system. Free radicals are unfilled electrons which induce normal cell damage and finally lead to degenerative diseases in human body. Millet have most phenolic compounds are present in the free form (71%). **(8-9)**The high polyphenols are phenolic acids and tannins, while flavonoids are present in small quantities; they act as antioxidant and play many roles in the body immune system. In this regard, present study utilizes the edible millet based produts like multipurpose millet laddu, millet laktho & millet upma for eradicate and capture the free radicals in a system and its proximate and organoleptic evaluation.The table .1 shows Composition and mineral content of millet species.

Table1. Composition and mineral content of millet species

Nutrient	Foxtail millet	Kodo millet	Barnyard millet	Pearl millet	Finger millet
Proximate composition (g/100g)					
Moisture	**11.2**	**12.8**	**11.9**	**12.4**	**7.15-13.1**
Protein	**11.50-12.3**	**9.8**	**6.2**	**11.6-11.8**	**7.7**
Fat/ Lipids	**2.38-4.3**	**1.3**	**2.2**	**4.8-5.0**	**1.8**
Minerals	**0.47-3.3**	**2.6**	**4.4**	**2.2-2.3**	**2.7**
Dietary fibre	**2.5-8.5**	**2.47**	**1.98**	**11.3**	**15-22.0**
Carbohydrate	**60.9-75.2**	**65.9-66.6**	**65.5**	**67-67.5**	**75.0-83.3**
Energy(Kcal)	**331**	**309**	**307**	**361-363**	
Minerals(mg/100g)					
Phosphorus	**290**	**188**	**280**	**296**	**130-250.0**
Potassium	**250**	**144**	**-**	**307**	**430-490**
Magnesium	**81**	**147-228**	**82**	**137**	**78-201**
Calcium	**31**	**27**	**20-22**	**42**	**398.0**
Sodium	**4.6**	**4.6**	**-**	**10.9**	**49.0**

Zinc	**2.4**	**0.7**	**3.0**	**3.1**	**2.3**
Iron	**2.8**	**0.-5.0**	**5.0-18.6**	**8.0**	**3.3-14.89**
Manganese	**0.60**	**1.10-3.3**	**0.96**	**1.15**	**17.61-48.43**
Copper	**2.4**	**1.60**	**0.60**	**1.6**	**0.47**

2. MATERIAL AND METHOD:

2.1 MATERIAL:

The experiment was conducted in the nutritional laboratory of Department of Food and Nutrition, School of home sciences, Babasaheb Bhim Rao Ambedkar university ,Lucknow UP, India.

2.2 EQUIPMENT:

Weighing Machine,digital pH meter, UV Visible Spectrophotometer, laminar air flow, digital refractometer, muffle furnace, Soxhlet appratus, Kjeldahl apparatus, etc.

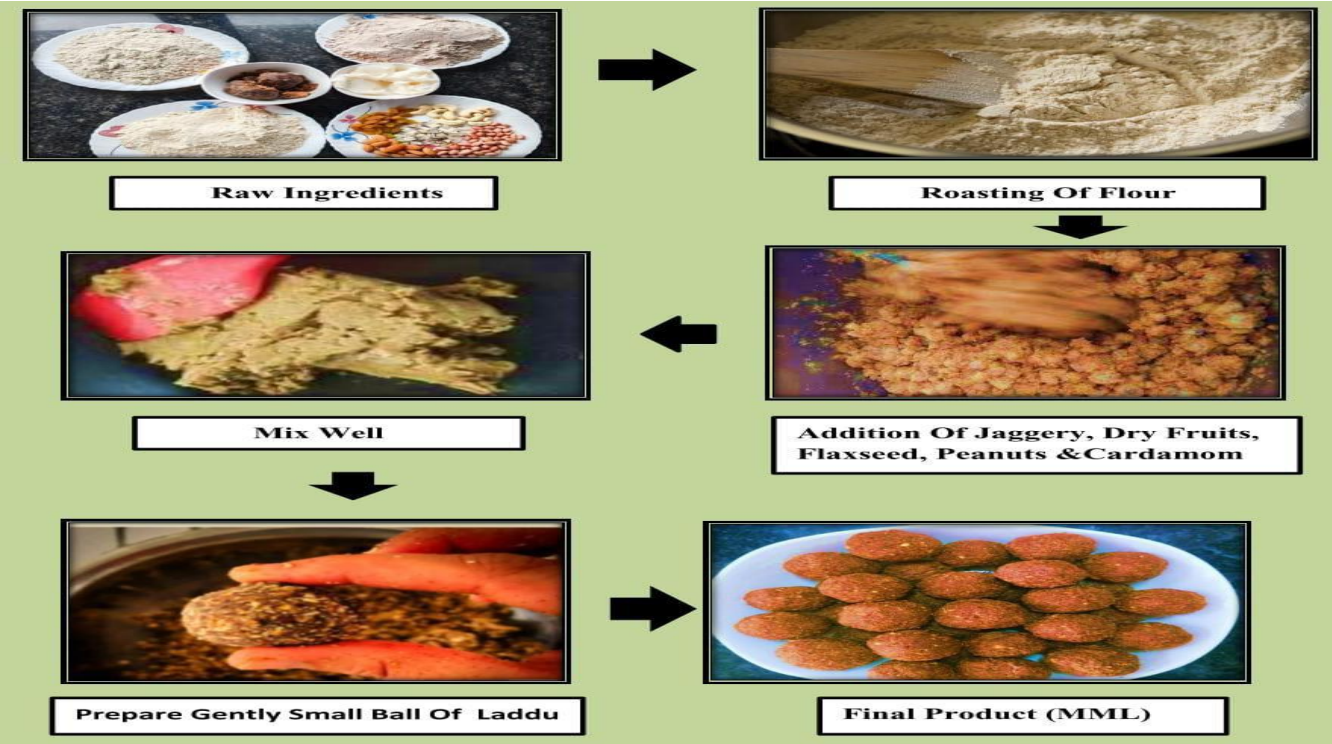


Fig.2 Processing and preparation of Multipurpose Millet Laddu.

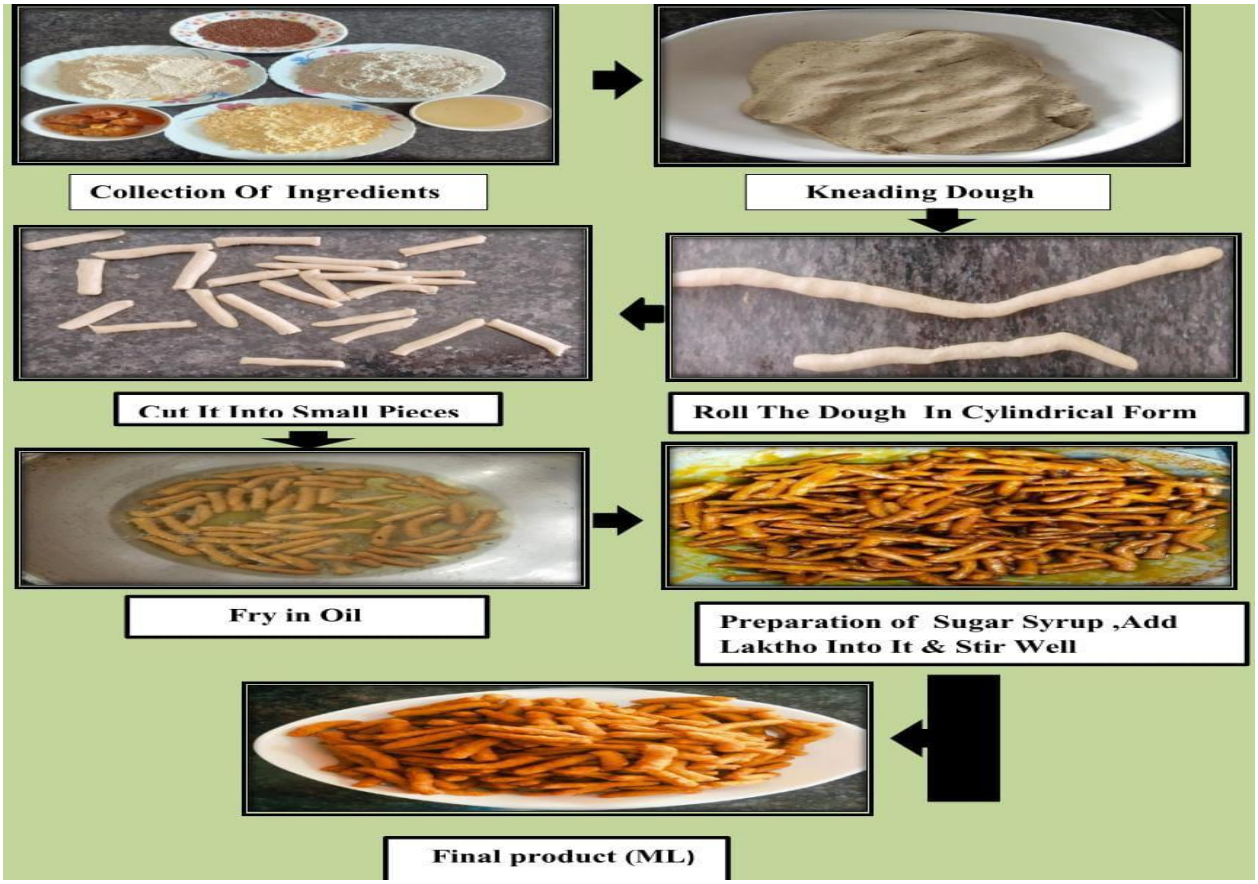


Fig.3 Processing and preparation of Millet Laktho.

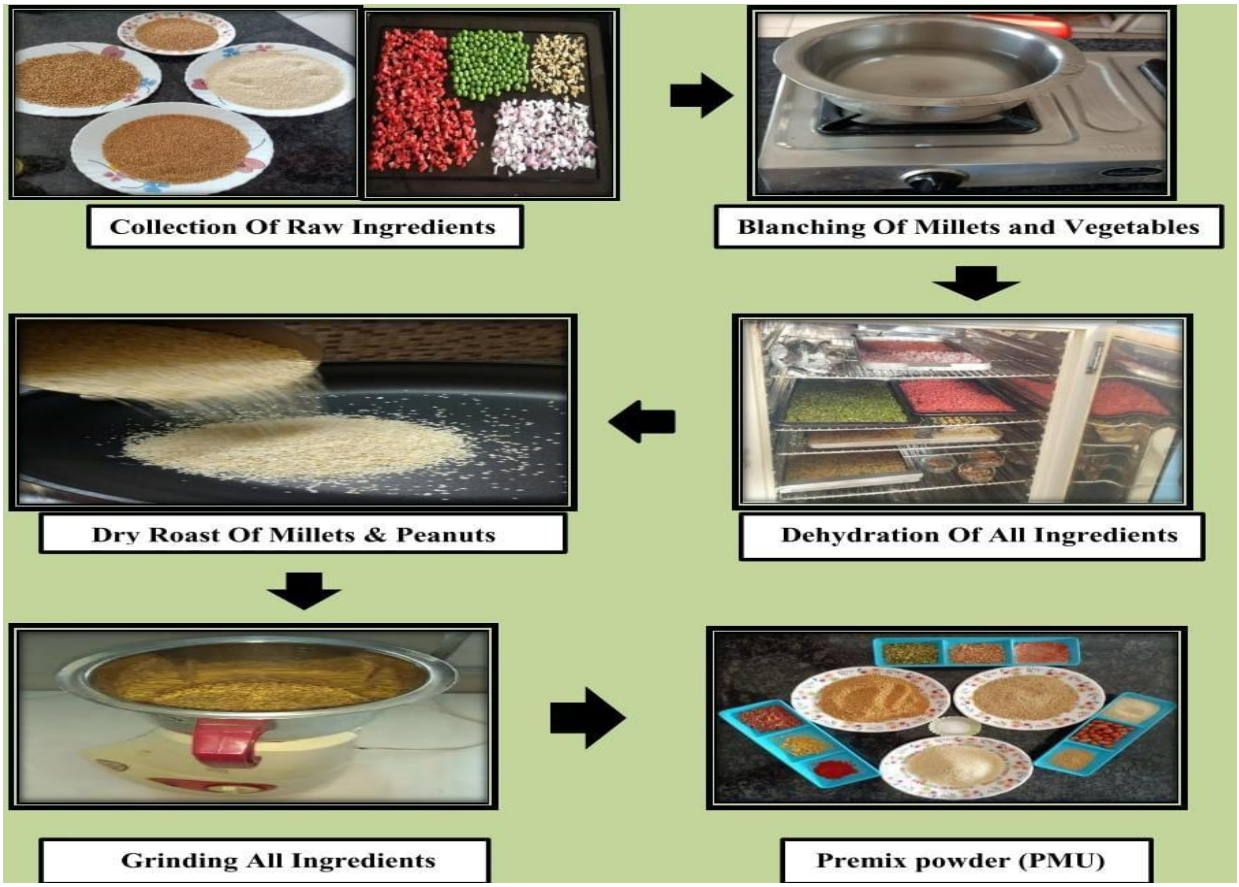


Fig.4 Processing and prepration of Premix Millet Upma.

2.3 PHYSIOCHEMICAL EVALUATION:

2.3.1 Moisture content:

Moisture content was determined by IS 12711(1989) RA 2005 method. Accurately weighed 5gm sample was taken in pre -weighed petri dish and heated in hot air oven at 105 ° C for 4 hrs. The dishes are removed and cooled to room temperature in desiccators and weighed. The moisture content of the samples were calculated from the loss in weight of the sample on heating as follows-

$$\text{Moisture \%} = \frac{(\boldsymbol{Blank\ weight + Sample\ weight}) - \boldsymbol{Dry\ weight}}{\textbf{Sample weight}} \times \mathbf{100}$$

2.3.2 Total Ash Content:

Total Ash content was determined as per IS 12711(1989) RA 2005 method. Total Ash is determined by using muffle furnace. Muffle furnace is used for Ashing. It is a furnace in which the subject material is isolated from the fuel and the entire product of combustion, including gases and flying ash. After the development of high temperature electronic heating elements and widespread electrification. It is a front loading box type oven for high temperature applications such as a fusing glass, creating and coating, ceramic and brazing articles.

- Accurate weighed 5gm of sample was taken in a pre- weighed silica crucible.
- The silica crucible again weighed with the sample in it.
- After, the silica crucible were kept in the muffle furnace and heated at 5500C for 5 hrs to get off white colour ash.
- The crucible were cooled in desiccators and weighed. The percentage of ash was calculated as follows:

$$\textbf{Ash\%} = \frac{\textit{Dry}\ \textbf{weight} - \textit{Blank weight}}{\textit{Sample weight}} \times \mathbf{100}$$

2.3.3 Estimation of Fat- Petroleum ether extractable fat was determined as (IS: 12711- 1989 RA 2005) methods using soxhlet fat extraction apparatus.

- Take 5g moisture free sample.
- Transfer the sample to what man thimble and thimble was placed in soxhlet apparatus.
- Pour petroleum ether in the soxhlet flask up to 1% capacity of the extractor.
- Perform the distillation with the solution.
- Extract liquid for 6 hrs. at a condensation rate of 6-7 drops.
- Collect the condensate in a collection flask and heat it at 600C -700C to evaporate ether.
- Flask is cooled in the desiccators and weighed**.**

$$\textbf{Fat\%} = \frac{\textit{Dry weight} - \textit{Blank weight}}{\textit{sample weight}} \times \mathbf{100}$$

2.3.4 Protein Estimation-

- The nitrogen content was determined By Kjeldahl distillation as described by IS: 7219- 1973 RA 2005 methods and converted to total protein by multiplying with a factor 6.25for nitrogen.
- Accurately weighed 0.5gm of sample, 0.5gm of cupric sulphate and 3gm of potassium sulphate (catalyst).
- Transfer the sample in digestion tube and add 20ml H2SO4.
- The aliquot of digested sample were distillated with of 40% sodium hydroxide in Kjeldahl distillation set.
- The ammonia was distillated out from the digested sample and collected in N/10 Sulphuric acid solution containing a drop of mixed indicator (Bromocrysol green and methyl red).
- After collecting condensed nitrogen, in a conical flask it was titrated with 0.1N sulphuric acid to pink end point.

$$\textbf{Protein\%} = \frac{\textit{titration value} \times \textit{normality of HCL} \times 6.25 \times 2.089}{\textit{sample weight} \times 1000} \times \mathbf{100}$$

If ‘a’ gm. of the sample is taken and if ‘b’ and ‘c’ ml of alkali of normality ‘d’ are required for back-titration and to neutralize 25 ml of N/10 H2SO4, respectively

2.3.5 Carbohydrate Estimation-

It was determined by SP 18(P-6)1981 method. Carbohydrate content was calculated by subtracting the moisture, protein, fat and ash content from the total mass.

Carbohydrate content = [100-(moisture+protein+fat+ash)

2.3.6 Total Energy- It is determined by using formula-

Total Energy= 4(carbohydrate+protein)+ 9 Fat

2.4 PH, TITRATABLE ACIDITY and TSS OF MILLET PRODUCTS (MML,ML,PMU) :

2.4.1 PH: The pH is usually measured with a pH meter, which translates into pH readings the difference in electromotive force (electrical potential or voltage) between suitable electrodes placed in the solution

to be tested. Fundamentally, a pH meter consists of a voltmeter attached to a pH-responsive electrode and a reference (unvarying) electrode. The pH-responsive electrode is usually glass, and the reference is usually a mercury-mercurous chloride (calomel) electrode, although a silver-silver chloride electrode is sometimes used. When the two electrodes are immersed in a solution, they act as a battery. The glass electrode develops an electric potential (charge) that is directly related to the hydrogen-ion activity in the solution, and the voltmeter measures the potential difference between the glass and reference electrodes. Before taking the pH check the pH meter is calibrated and sample mixture's temperature is brought down to room temperature before taking the measurement. Rinse the electrodes and blot do not wipe the electrodes. Dip the electrodes into sample and note the readings.

Steps are:

- Take the 1gm of each samples (MML, ML, PMU)and properly dissolve in the 10ml of distilled water in the 50 ml beaker.
- Clean the pH meter's knob or rod with the help of distilled water.
- Put the pH meter's rod in the sample one by one and take the readings of the samples after cleaning the rod each time after taking the readings.
- Readings were taken thrice and average value is calculated.

2.4.2 TITRATABLE ACIDITY:

Titratable acidity was determined according to AOAC methods A sample (Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma) of 10 ml was titrated with 0.1 N NaOH using phenolphthalein as an indicator. The titratable acidity was calculated as the % Phytic acid and is determined by titration of a known amount of reconstituted Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma with 0.1 N phenolphthalein as indicator and finally calculated by the given formula (IS, 1989)-

$$\%\ \boldsymbol{Titratable\ acidity} = \frac{\boldsymbol{ml \times N\ \times 280.4\ \times 100}}{\boldsymbol{V \times 1000}}$$

2.4.3 TSS: Total soluble solids (TSS) of Multipurpose Millet Laddu and Millet Laktho were analyzed by digital refractometer respectively.

Total Soluble Solids –

- Freshly prepared jagerry syrup used in both Multipurpose Millet Laddu and Millet Laktho samples.
- Switch on the Refractometer.
- Clean the surface of refractometer with the help of distilled water and cotton.
- Then pour only one drop of sample on the refractometer and take the readings.
- Each sample were analyzed for three times and after taking readings clean the refractometer's surface with the help of cotton and distilled water.

2.5 ORGANOLEPTIC EVALUATION: -

Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma samples subjected to sensory evaluation with Panelists.Panelists received a tray containing samples presented at room temperature, a glass of water, and an evaluation sheet. Participants were instructed on how to evaluate the samples and were not required to expectorate or consume the entire volume served. Panelists were asked to evaluate the samples for consumer acceptance of color, flavor, softness, taste, and overall acceptance. The ratings

were carried on a 9-point Hedonic scale ranging from 9 (like extremely) to 1 (dislike extremely). Overall acceptance was evaluated first, and another session was held to evaluate the rest of the attributes.

2.6 DETERMINATION OF ANTIOXIDANT ACTIVITY (DPPH):

The antioxidant activity of 2, 2-Diphenyl-1-Picrylhydrazyl (DPPH) is calculated via spectrophotometer (Tekao et al. 1994)12 with small modifications (Kumarasamy et al. 2007)18. In methanol, the color of DPPH is dark blue. In its reduced form, the antioxidant compound changes color from purple to yellow, allowing DPPH to gain electron. DPPH shows strong absorption at 517 nm, determined by 2,2-diphenyl-1-picrylhydrazine (DPPH). Briefly, 0.002 g .DPPH was taken and made to 50 ml by adding methanol. 1g of food sample has been taken in a round bottom flask and in that 10 ml of methanol was added for extraction. After extraction, the food sample was filtrated by filter paper in a flask. From the sample different concentration has been taken and for control DPPH has taken and incubated in darkroom for 30 minutes at ambient temperature. After incubation, the absorbance of the sample was read at 517nm using a UV Visible spectrophotometer. Methanol was used as a blank. Reduction in the absorbance value, shows high activity in scavenging free radicals (Zubeyir et al. 2017)19. It was measured as a percentage of DPPH scavenging activity by using following formula given below.

DPPH Scavenging activity = (Acontrol – Asample)/ Acontrol × 100

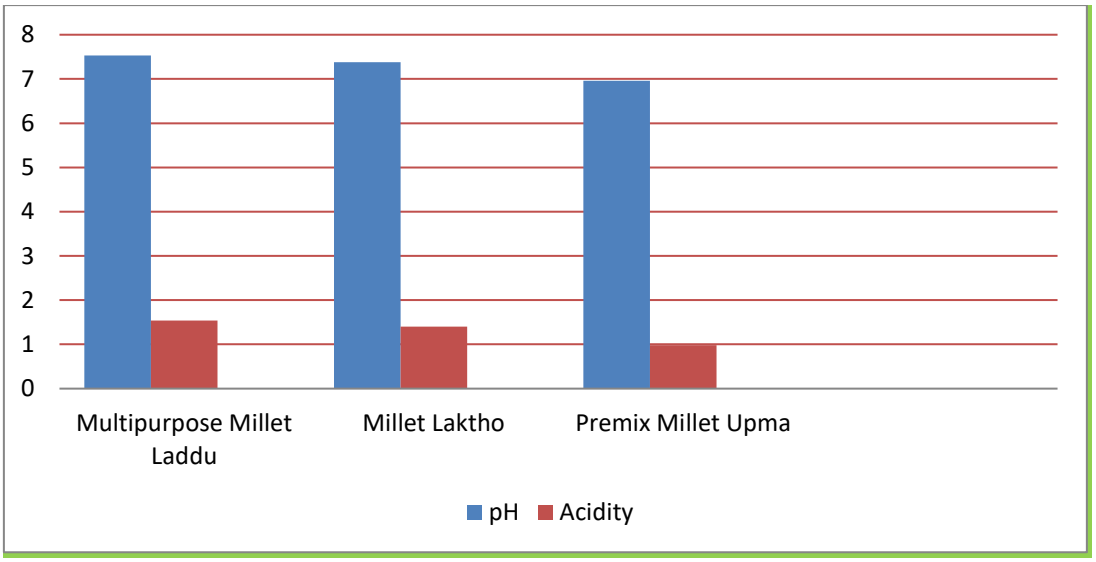
3. RESULT AND DISSCUSION:

3.1 PH ,TITRATABLE ACIDITY and TSS REPORT:

The pH of the Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma was 7.53, 7.38 and 6.96 respectively. pH of the Multipurpose Millet Laddu is greater than Millet Laktho and Premix Millet Upma .pH ,Titratable acidity and TSS of all three samples of millet products is mentioned in the table 2 and graph

Table 2. Results of pH ,Titratable acidity and TSS

Parameters	Multi-Purpose Millet Laddu (MML)	Millet Laktho (ML)	Premix Millet Upma (PMU)
pH	**7.53**	**7.38**	**6.96**
Acidity	**1.54**	**1.40**	**0.98**
TSS	**85° Brix**	**85° Brix**	**-**



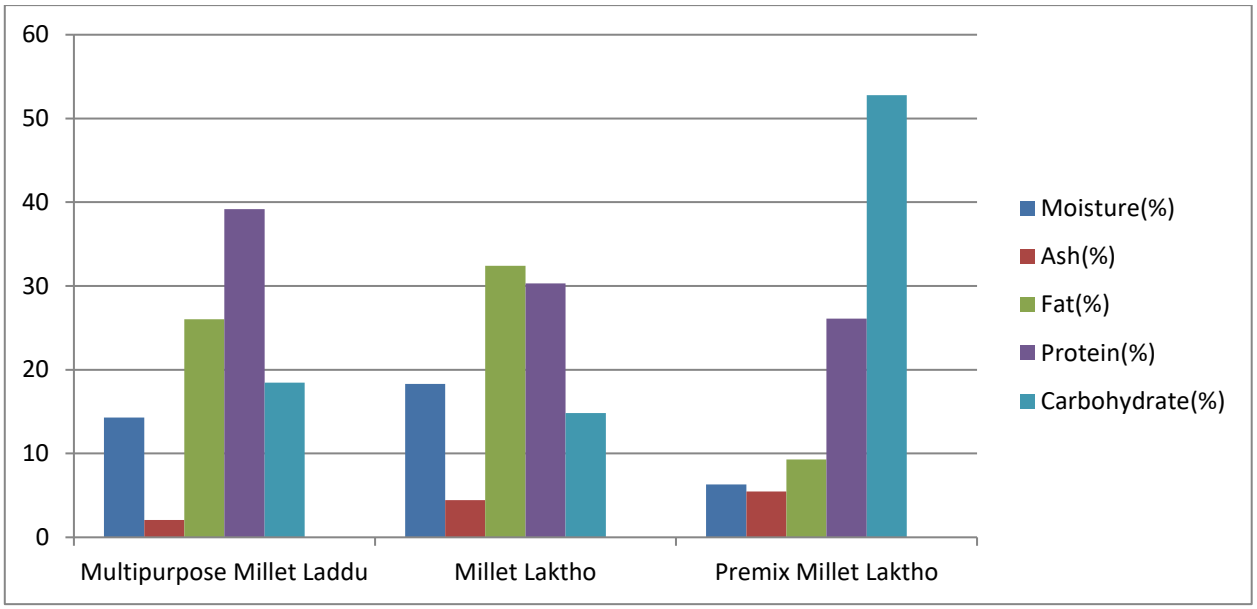
Graph 1. Graphical presentation of pH & Acidity Analysis

3.2 PHYSIO – CHEMICAL ANALYSIS REPORT

All three types of millet product (Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet Upma) was prepared by following the procedure as described above . After preparation the Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet is tested for proximate analysis. In the analysis of Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet samples firstly we go through the moisture test and also required amount of samples should be done moisture free for further analysis of other components of samples such as protein, carbohydrate, fat, ash, and moisture content. There are the results of proximate analysis in the given table 3 and graph 2 –

Table 3. Proximate results of MML, ML & PMU

arameters	Multi-Purpose Millet Laddu (MML)	Millet Laktho (ML)	Premix Millet Upma (PMU)
Moisture (%)	14.28 %	18.31%	6.33 %
Ash (%)	2.06 %	4.42 %	5.46 %
Fat(%)	26.03 %	32.4 %	9.3 %
Protein(%)	39.17 %	30.03 %	26.12 %
Carbohydrate (%)	18.46 %	14.84	52.79 %
Total Energy (kcal/100gm)	464.79	471.08	399.34



Graph 2. Graphical presentation of Physiochemical Analysis

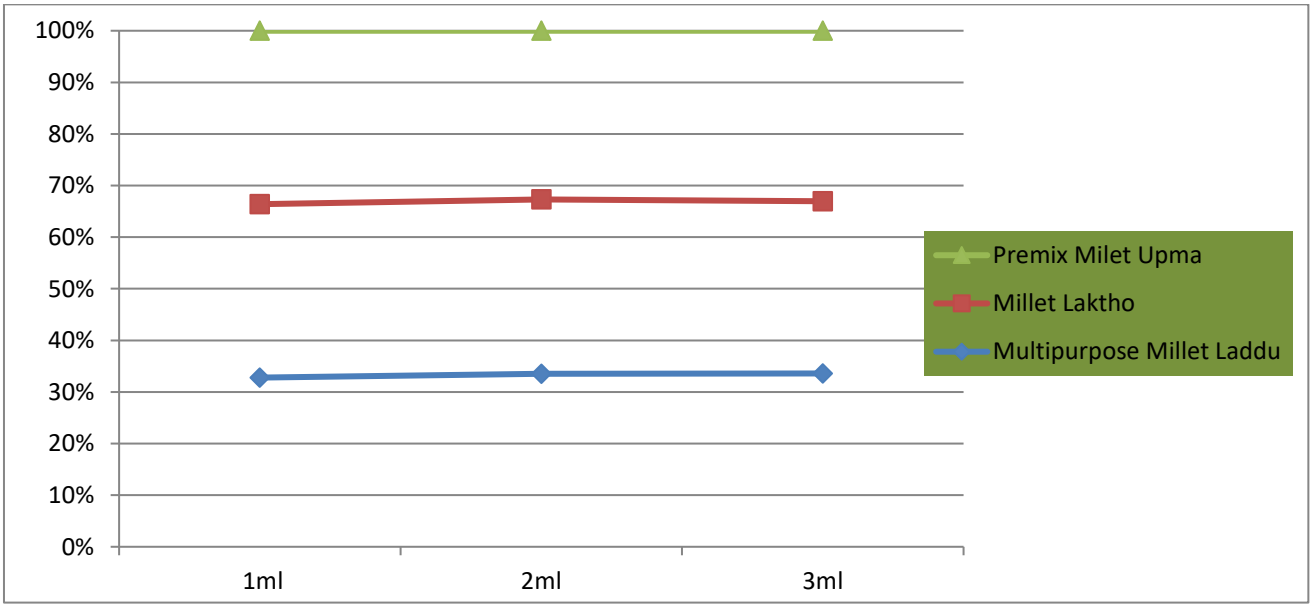
The moisture content of all three type of millet products(MML,ML&PMU) are 14.28%,18.31% and 6.33% which means that the obtained Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma categorized under hard millet products. Ash content in the Multipurpose Millet Laddu 2.06%, Millet Laktho 4.42 and in Premix Millet Upma have 5.46%. Average value of protein is obtained having 39.17gm/100gm ,30.03gm/100 and 26.12gm/100gm of Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma respectively. Fat content in the Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma samples get 26.03%,32.4% and 9.3%. As mentioned in the table Carbohydrate content in the Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma samples were calculated and obtained between 18.46%– 52.79%. There is slightly less energy obtained from Premix Millet Upma as compared to Multipurpose Millet Laddu and Millet Laktho .

3.3 ANTIOXIDANT ACTIVITY (DPPH):

DPPH is the most suitable way to determine the antioxidant property of a sample. The colour of the sample changes from purple to yellow as DPPH free radicals are scavenged by antioxidant chemicals. Figure . Depicts the relationship between Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet Upma sample concentration (mg) and antioxidant activity (%). By using a spectrophotometer, the optical density of a sample and optical density of the control can be calculated to determine DPPH value of a sample. According to (Fridianny et al.2014), if DPPH value is between 50 ug/ml then it has a very strong antioxidant property and if it is above 20.048 mg/ml, it has weak antioxidant property. The antioxidant activity of Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet Upma sample at different concentration (4,8,12u/ml) was evaluated and the result obtained were illustrated in table 2 and figure.8. According to these result, the antioxidant activity of the Multi-Purpose Millet Laddu, Millet Laktho & Premix Millet Upma can be increase.The result shows in table 4and graph 3:

Table 4. Different concentration of antioxidant activity of MML,ML & PMU samples

Sample	1ml conc.	2ml conc.	3ml conc.
MML control	0.10	0.036	0.002
Sample & RSA% of MML	92.3	97.2	99.8
ML control	0.07	0.025	0.01
Sample & RSA% of ML	94.6	98.0	99.2
PMU control	0.07	0.067	0.024
Sample & RSA% of PMU	94.6	94.8	98.1



Graph 3. Graphical representation of different concentration of antioxidant activity of MML,ML & PMU samples

3.4 ORGANOLEPTIC EVALUATION RESULT:

Total 25 people were randomly selected amongst the whole population from the society and were given a set of 3 different millet products (Multipurpose Millet Laddu, Millet Laddu & Premix Millet Upma) samples. The samples were distributed amongst the people and were sensory evaluated on the basis of appearance, taste, texture, aroma and overall acceptance. The results are as Follows in table 5,6,7,8,9 and in graph 4,5,6,7:

Table 5. Sensory scores of millet products (A1 (MML), A2 (ML)& A3 (PMU))on the basis of appearance

Panellist	A1	A2	A3
P1	9	8	9
P2	8	9	9
P3	9	9	9
P4	8	8	7
P5	9	9	8
P6	8	8	9
P7	9	9	9
P8	9	9	8
P9	8	7	7
P10	9	8	9
P11	9	8	8
P12	8	9	9
P13	8	9	9
P14	9	9	8
P15	8	9	9
P16	8	7	8
P17	8	9	8
P18	9	8	9
P19	8	9	7
P20	9	8	8
P21	9	8	9
P22	8	9	9
P23	8	9	8
P24	9	8	7
P25	9	9	8
Total	**213**	**212**	**209**
Mean	**8.52**	**8.48**	**8.36**
Standard Deviation	**0.509902**	**0.509902**	**0.748331**

Table 6. Sensory scores of millet products (A1 (MML), A2 (ML)& A3 (PMU))on the basis of Taste/Flavour

Panellist	A1	A2	A3
P1	9	8	8
P2	9	9	9
P3	9	9	8
P4	9	9	9
P5	8	9	8
P6	8	9	8
P7	9	9	9

P8	9	8	9
P9	9	8	8
P10	9	8	9
P11	9	9	8
P12	8	9	9
P13	9	9	8
P14	9	9	9
P15	8	8	8
P16	9	9	9
P17	8	9	8
P18	9	9	8
P19	8	8	9
P20	9	8	7
P21	8	9	9
P22	9	8	8
P23	9	9	9
P24	9	9	9
P25	9	9	8
Total	**218**	**217**	**211**
Mean	**8.72**	**8.68**	**8.44**
Standard Deviation	**0.458258**	**0.4760952**	**0.583095**

Table7. Sensory scores of millet products (A1 (MML), A2 (ML)& A3 (PMU))on the basis of Texture/consistency

Panellist	A1	A2	A3
P1	8	8	9
P2	9	9	9
P3	9	9	8
P4	9	9	8
P5	8	9	9
P6	9	8	9
P7	9	9	9
P8	9	9	8
P9	9	8	9
P10	9	9	9
P11	9	9	9
P12	8	9	9
P13	8	8	8
P14	9	8	8
P15	8	9	9
P16	9	8	8
P17	8	9	9

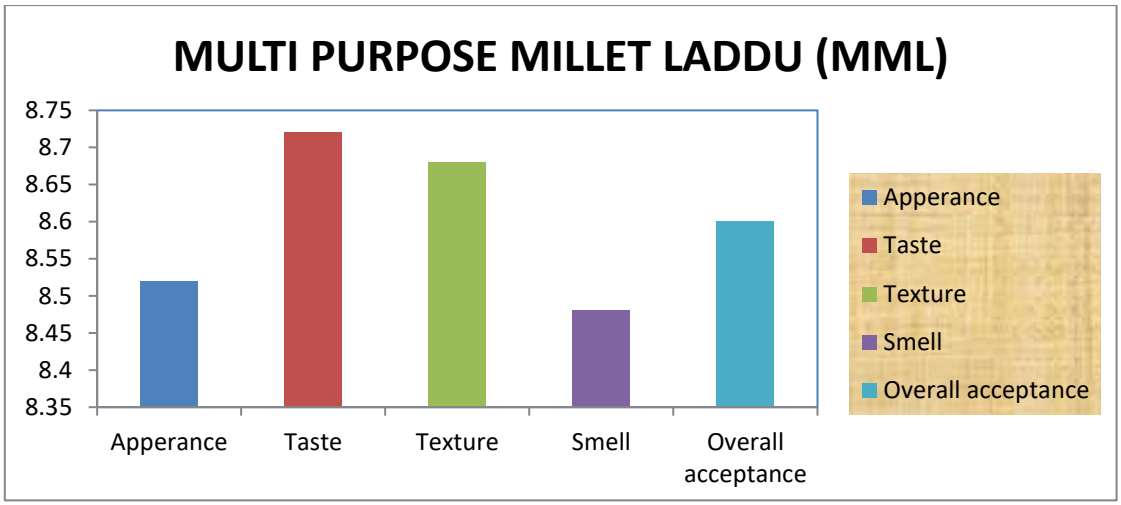
P18	9	9	9
P19	8	9	9
P20	9	8	8
P21	9	8	8
P22	9	9	9
P23	8	8	8
P24	9	9	9
P25	9	9	9
Total	**217**	**216**	**216**
Mean	**8.68**	**8.64**	**8.64**

Table 8. Sensory scores of millet products (A1 (MML), A2 (ML)& A3 (PMU))on the basis of aroma/smell

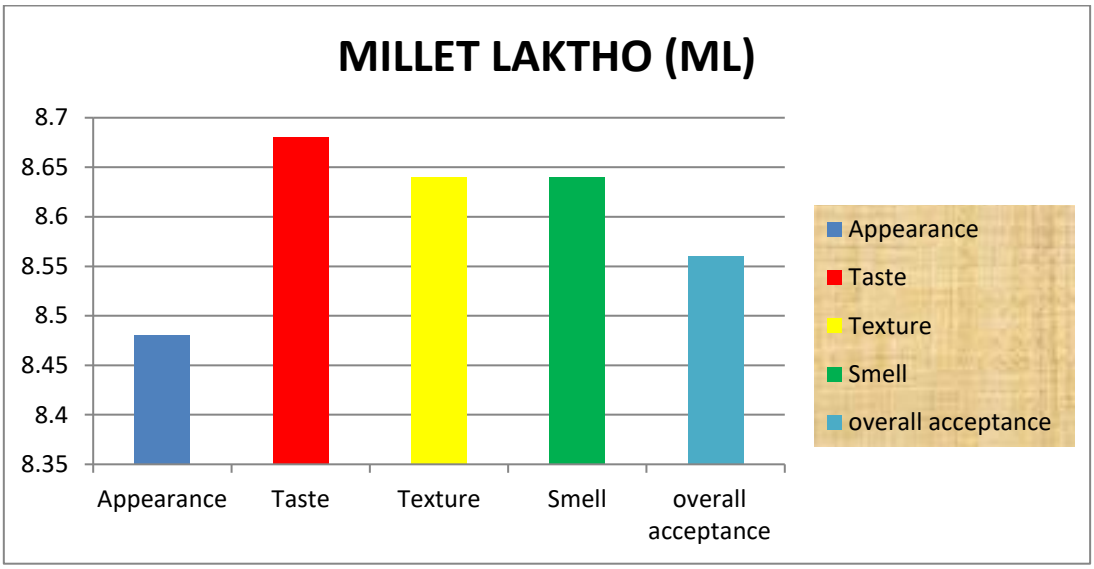
Panellist	A1	A2	A3
P1	8	8	9
P2	9	8	9
P3	9	9	8
P4	9	9	8
P5	9	9	8
P6	8	9	9
P7	9	9	9
P8	9	9	8
P9	8	8	9
P10	9	9	8
P11	8	8	9
P12	8	9	9
P13	9	9	9
P14	8	9	9
P15	8	9	8
P16	9	8	9
P17	8	9	8
P18	8	8	8
P19	8	9	9
P20	9	8	8
P21	8	9	9
P22	9	9	9
P23	8	8	9
P24	8	9	8
P25	9	8	9
Total	**212**	**216**	**215**
Mean	**8.48**	**8.64**	**8.6**
Standard Deviation	**0.509902**	**0.489898**	**0.5**

Table 9. Sensory scores of millet products (A1 (MML), A2 (ML) & A3 (PMU))on the basis of overall acceptance

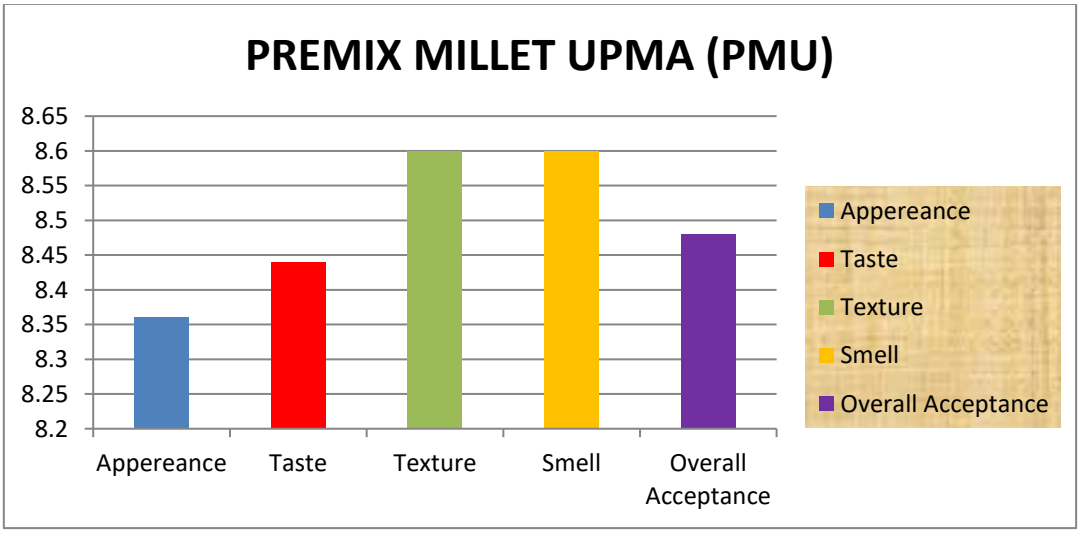
Panellist	A1	A2	A3
P1	8	9	8
P2	9	9	9
P3	9	9	9
P4	8	9	8
P5	9	8	9
P6	9	8	8
P7	9	8	8
P8	8	9	9
P9	8	9	9
P10	9	8	9
P11	9	9	8
P12	9	8	9
P13	8	9	8
P14	9	8	8
P15	8	9	9
P16	8	9	8
P17	9	9	8
P18	9	8	8
P19	9	7	9
P20	8	8	9
P21	8	9	8
P22	9	9	8
P23	9	9	8
P24	9	8	9
P25	8	9	9
Total	**215**	**214**	**212**
Mean	**8.6**	**8.56**	**8.48**
Standard Deviation	**0.5**	**0.583092**	**0.509902**



Graph 4. Graphical presentation of organoleptic evaluation of MML.

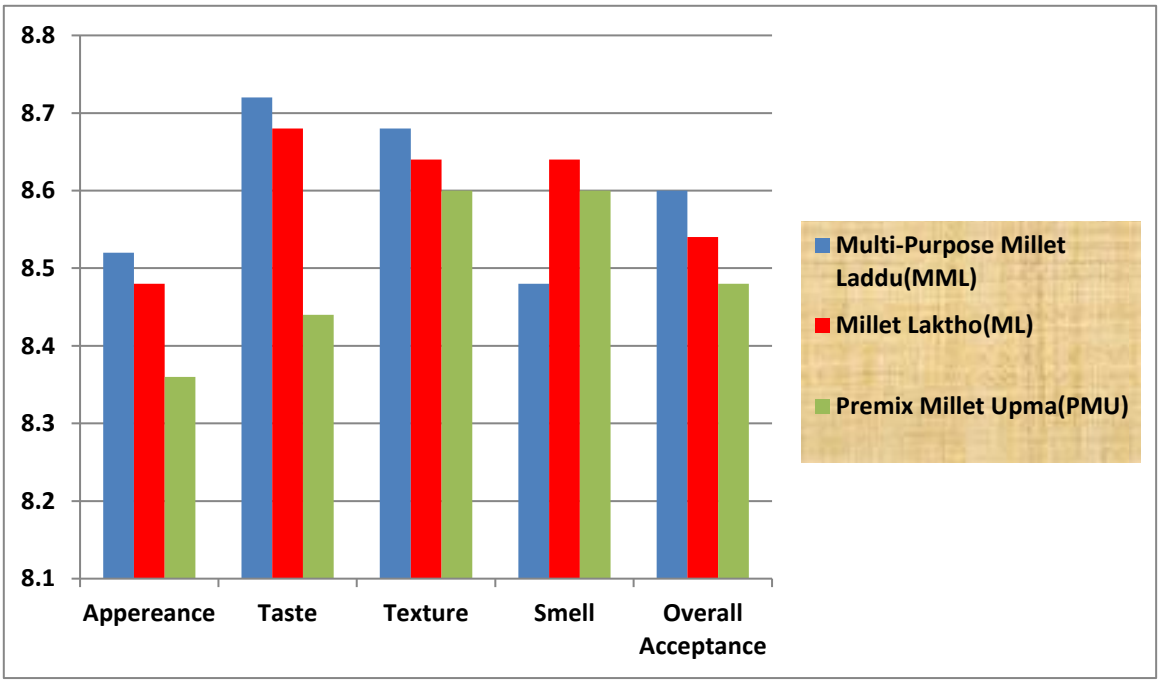


Graph 5. Graphical presentation of organoleptic evaluation of ML.



Graph 6. Graphical presentation of organoleptic evaluation of PMU.

On comparsion basis the Multipurpose Millet Laddu have higher overall acceptance than Millet Laktho & Premix Millet Upma.



Graph 7. Graphical presentation of organoleptic evaluation of MML,ML & PMU.

CONCLUSION:

The millet product such as Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma was successfully developed by using different type of millets. The sample Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma has the good antioxidant value. Many functional group was present in the samples. The Multipurpose Millet Laddu, Millet Laktho & Premix Millet Upma sample was found to have highest nutritional value as campaired to cereal based product. The Multipurpose Millet Laddu have higher overall acceptance than Millet Laktho & Premix Millet Upma.

REFERENCE:

1. Mishra, S., Singh, R. K., & Singh, A. (2016). Dynamics of Adi Women's Traditional Foods and Livelihoods in Varying Socio-ecological Systems of Arunachal Pradesh: A Source of Learning and Inspiration. In The New Cultures of Food (pp. 225-244). Routledge.
2. Ramashia, S. E., Mashau, M. E., & Onipe, O. O. (2021). Millets cereal grains: nutritional composition and utilisation in Sub-Saharan Africa (pp. 1-14). London: IntechOpen.
3. Dekka, S., Paul, A., Vidyalakshmi, R., & Mahendran, R. (2023). Potential processing technologies for utilization of millets: An updated comprehensive review. Journal of Food Process Engineering, e14279.
4. Rubavathi, S., Ganesan, A., & Harini, T. (2022). Formulation and Validation of Probioticated Foxtail Millet Laddu as a Source of Antioxidant for Biological System.
5. Ramashia, S. E., Anyasi, T. A., Gwata, E. T., Meddows-Taylor, S., & Jideani, A. I. O. (2019). Processing, nutritional composition and health benefits of finger millet in sub-saharan Africa. Food Science and Technology, 39, 253-266

6. Banerjee, P., Maitra, S., & Banerjee, P. (2020). The role of small millets as functional food to combat malnutrition in developing countries. Indian Journal of Natural Sciences, 10(60), 20412-20417.
7. Mishra, S., & Singh, S. (2022). Organoleptic and Morphological Analysis of Citrus Peel Powder. Asian Food Science Journal, 1-11.
8. Geisen, S., Krishnaswamy, K., & Myers, R. (2021). Physical and Structural Characterization of Underutilized Climate-Resilient Seed Grains: Millets, Sorghum, and Amaranth. Frontiers in Sustainable Food Systems, 5, 599656.
9. Shaivya, M., & Sunita, M. (2016). Nutritional analysis of value-added product by using pearl millet, quinoa and prepare readyto-use upma mixes. International journal of food science and nutrition, 1(5), 41-43.
10. Dubey, P., & Mishra, S. (2020). Dietary implication of miracle cereal Finger Millet (Eleusine Coracana) and It's product development. Aegaeum Journal, 8(7), 1306-1316.
11. Bidhilika, & Mishra, S. (2022). Physicochemical Properties and Microstructure of Ready-To-Eat (RTE) Breakfast Cereal Made from Popped Pearl Millet, Amaranth Grains and Groundnut Powder. International Journal of Research in Engineering, Science and Management, 5(6), 340–342.
12. Saxena, S., & Mishra, S. (2014). Malnutrition among School Children of Lucknow. International Journal of Science and Research (IJSR) ISSN (Online), 2319-7064.