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# Community Acceptability of Developed Functional Pasta on their Sensory Characteristics

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## A B S T R A C T

Pasta is a rapidly increasing segment of the food sector. Nutrient imbalance can often be caused by the usage of wheat basis goods. The expansion rate, mass density and reasonable texture quality of the elephant foot yam (EFY) products are good. We have prepared a functional pasta using Moringa leaves, Yam and Mushroom flour. This product development and its sensory study has been conducted in the Food Science and Technology Lab, BBAU, Lucknow, Uttar Pradesh, India. The overall time of experiments was 9 months. The current trial consists of experimental studies as well as powdered samples of yam, mushroom, and moringa leaves. Results of this research have indicated that sample $T_5$ and its features of colour and appearance, flavour, smell, taste and general acceptability at composition Y (60%), MF (30%) and MLF (10%) at community level have been approved.

***Key words*:** Pasta, Yam, Mushroom, Sensory attributes, Taste, General acceptability

Pasta is an old foodstuff extensively expanded around the world and, in Mediterranean's diet Pasta is consider as a Staple diet. There are numerous thoughts about its origin. Some researchers said about its origin from the thirteenth century, when Marco Polo returned from one of his visits to China in 1271, and introduced pasta in Italy [1]. The Food industry is fastest growing industry in the world, result of rising the customer demand India's manufacturing industry has bound to prepared pasta for the people. Pasta and other noodles are loaded with carbohydrate and they seem to be Deficient in mineral and protein mostly. Most noodles are cereal based meal, having approximately 0.36-0.4% ash and 8-10% protein [2].

The usage of wheat-based refining products commonly results in nutritional imbalance. Root and tuber products are high in dietary fiber and minerals. Fibrous diets have been linked to benefits such as enhanced bulk motility, lower cholesterol level and minimizing the Blood glucose levels, type 2 diabetes, a lower risk of obesity and cardiovascular disease, and the ability to act as a probiotic, reducing the risk of cancer and constipation [3]. However, several varieties of noodles have been recorded that are enriched with grains such as rice, pulses, millets, buckwheat, potato starch, and other root and tuber kinds. For this reason, to emphasize the use of non-traditional flours sources which are come from plants or plant products to make noodle and pasta are supplemented with its natural plant base protein and other useful components [4].

In the Eastern Nusa region of Tenggara, Indonesia, and India, yam (*Amorophallus campanulatus*) is known with different name like maek and suran in local language This belongs to the clan of Araceae and the plants are vegetal. Native place of the plant belongs to South Asia which is widely spread in Philippines, India, and the Malaysia [5].

The expansion rate, mass density, and texture quality of the Elephant Foot Yam (EFY)-produced items were all outstanding. EFY flour has been found to be suitable for making high-quality meal snacks in studies. Suran possesses a wide range of medicinal and utilitarian characteristics. Suran was used as an ayurvedic medicine in ancient India to treat inflammatory diseases, hemorrhoids, rheumatism, and gastrointestinal ailments. Ear ache, intercostal neuralgia, chronic fiver, and throat swelling are also treated with this herb. The tuber paste is applied to the outside of the body to relieve discomfort from arthritis. In China, yam has long been utilized as an immunological and health food in traditional Chinese medicine [6]. In ancient time mushroom was used as food and medicine for humans. Mushroom is a wondrous cuisine. It is considered to be healthy, as its calories and fat are low, but it is rich in protein and nutritional fiber [7].

Raw mushroom comprises (per 100 g) 1.5 g of carbohydrate, 3.6 g of protein, 0.3 g of fat, 2.5 g of dietary fiber, 5.0 g of ash, vitamins $B_{12}$ (0.26 mg) as well as a good source of, calcium, potassium iron, copper, zinc, vitamin D, and folic acid, etc. [8]. Further mushrooms are known to be an exceptional supplement to grains and bakery goods [9].

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Some studies have been done in which mushroom powder is included 10% to 20% in cereal basis products such as noodles and pasta, which demonstrates that the best acceptability for supplementation of noodles using mushrooms. In these studies, it is also found that at fortification of 10% and 20% oyster mushroom powder would have best acceptability [10-11].

Dry leaves of drumstick tree can also use instead of iron tablets for the therapeutic use in anemia disease because it contains 14 times more iron than beef. Moringa can reduce risk of the anemia disease naturally without use of any synthetic supplement. Moringa oleifera is one of the important sources of zinc, which are also vital for good semen count and zinc is also important for the synthesis of DNA and RNA. Drumstick plants contains zinc 25.5 to 31.03 mg per kg [12-14]. Moringa leaf and oat meal has ability to reduce the moisture content when it is fortified with cereal base flour prepared food, which is further good sign of their ability to prolong the shelf life [15-16]. According to this study when moringa leaf flour and oats are incorporated in wheat base flour up to 25%, and producing pasta successfully after the fortification and it also enhances the physiochemical property of pasta along with its acceptable sensory characteristics [17-19].

## MATERIALS AND METHODS

*Study area*

This section of the present study deal with proposed methodology of pasta preparation and their sensory attributes. The present study was conducted in food science and technology laboratory, BBAU, Lucknow. The total time period of experimental study was consisting of nine month (October 20-June 21). The experimental design and their conceptual frame are as shown in (Fig 1) below:

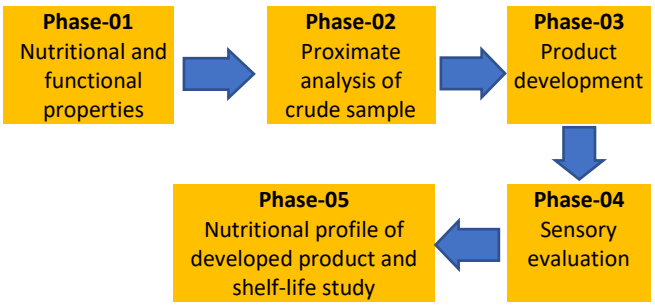


Fig 1 Conceptual experiment research design

In above Conceptual Experimental Design (Fig 1), we have five phases in which phase 1 is Nutritional and Functional properties of Raw sample, phase 2 is Proximate Analysis of Crude Sample. These two phases are pre-determined hence we continue with Phase 3 is product development and phase 4 sensory characteristics for the further demonstration. The sample of any study where selected, collected and characterize as an appropriate raw material for the product development. In the present study 3 sample are taken as raw material where is select as flour. Development of flour from the raw material show in (Fig 3), there collection and amount show in (Fig 2).

*Sampling technique phase -3 (Product development)*

*Raw materials flour preparation*: There are multiple method used for processing of raw material such as washing, sorting, sun drying, etc. shown in (Fig 3). All chemicals and equipment's used for the development and analysis were of analytical grade. These methods which will be followed during this processing of raw material are as follows:

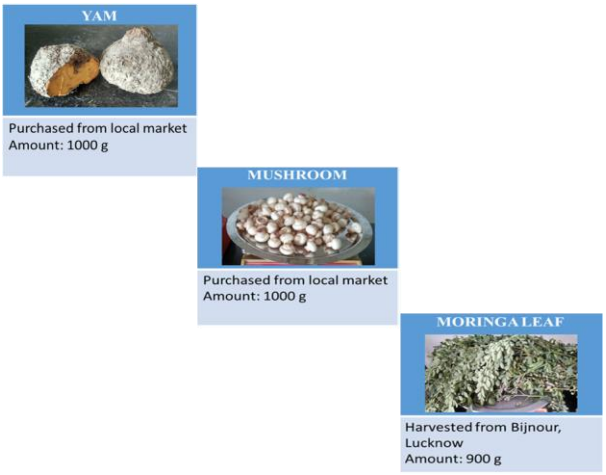


Fig 2 Amount and collection of raw material

This conceptual frame has own sample technique for result and finding.

*Preparation of elephant foot yam flour (EFYF)*

The Suran (EFY) was purchased from the local market. We followed the method of Suriya et al. which she proposed for making the yam flour. The yam tuber was rinsed or cleaned with water. After cleaning of yam it was peeled and trimmed for removal of unwanted parts, then rest of the part were fed in slicer in which they were converted into chips of yam which thickness was 1.5 to 2 mm. Then EFY slices treated with 0.1% of Sodium metabisulfate for preventing the deterioration during the time dehydration. Yam was placed in dehydrator after removal of extra water by spreading on paper towel to reduce the water content which was coming during washing and treatment process. The whole dehydration process was done at temperature 60°C until it reached its moisture below 12%. Dehydrated yam was placed in pastel mortal converted into small pieces then it was placed in grinder for converting into powder form. Powdered yam passed through fine mesh for removal of granules then again fed into grinder until it converted into fine powder. After converting into fine powder, it was placed in air tight plastic container in dark condition for the future uses.

*Preparation of moringa leaf powder (MLP)*

From the Moringa tree fresh moringa leaves were harvested from Bijnour village, near the Babasaheb Bhimrao Ambedkar University, Lucknow, U.P., India. First picked stem from the tree then fresh leaf were de-stemmed. Then sorting and categorizing of the bad quality leaves. Then leaves were washed for removing dirt and impurities and treated with 0.1% NaCl for preventing the growth microorganism during dehydration and Storage (2). Then after that the washed leaves were placed on a cotton cloth for one to two hour for removing extra water which came from washing procedure. Then washed fresh leaves were placed in solar dehydrator until it reaches 3 to 5% moisture content. After dehydration, dehydrated Moringa leaves were converted into powdered form by the help of grinder. After grinding powder it passed through the fine mesh to remove

residual parts of dehydrated Moringa which were not grinded finely. After converting into powder form it was stored in air tight glass container placed in dark place for supplementary use for preparation of pasta.

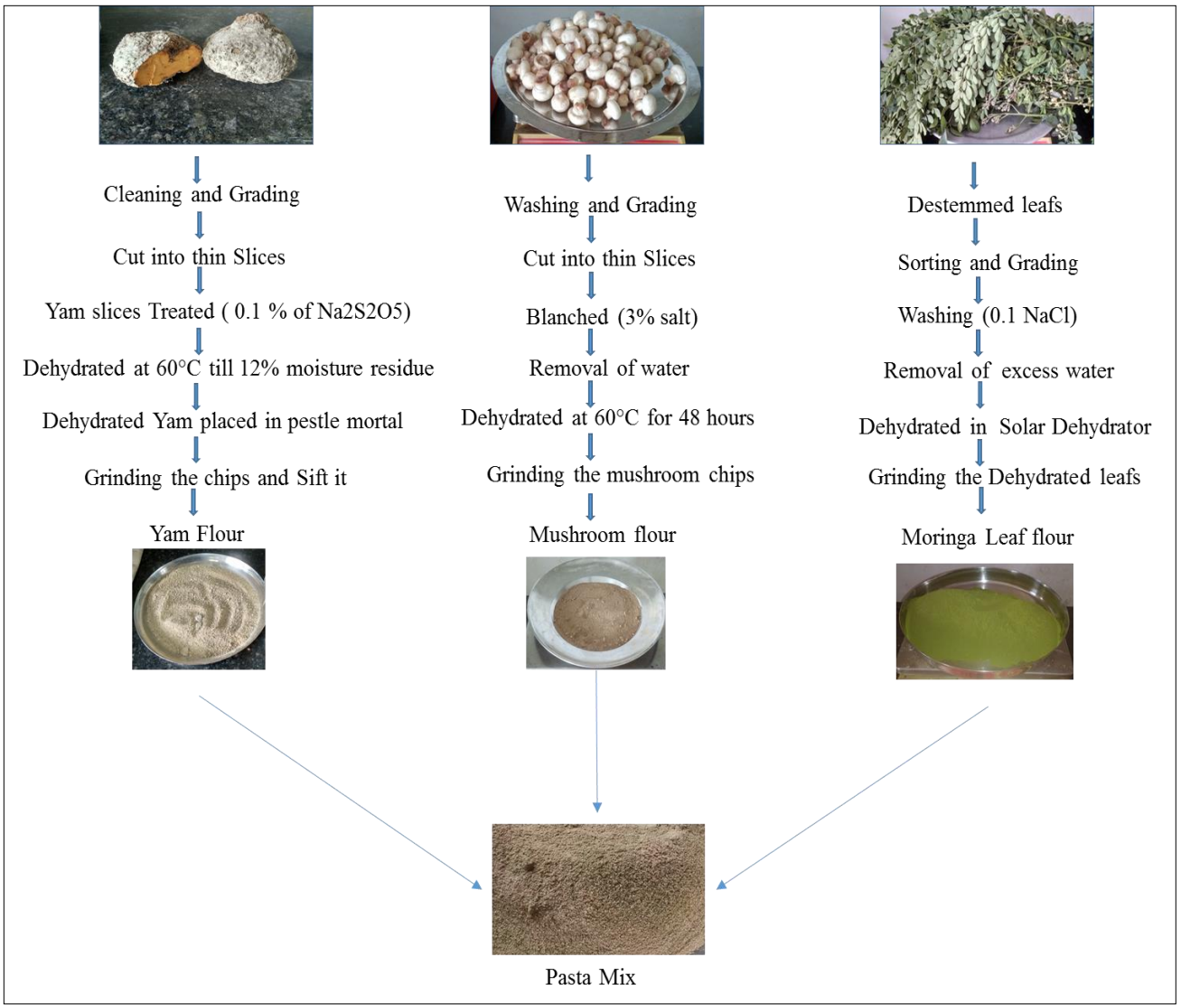


Fig 3 Preparation of Pasta mix from raw ingredient

*Preparation of mushroom flour*: Fresh mushroom were picked from the local market. At the initial stage fresh mushroom were washed with water for removing the impurities. Then it was chopped into thin slices. Then the sliced button mushrooms were given moist heat treatment by blanching for 3 minutes at 100°C. Blanched water having a 0.01% citric acid 3% NaCl. After removal of water mushrooms were spread on cotton cloth for removal of water which came during washing and treatment. Then fresh mushroom were placed on trays and these trays were placed in solar dehydrator for 2 days. Mushroom stayed in room temperature, and after that dehydrated mushroom was converted into fine flour by the use of electric grinder. The mushroom Flour was passed through sifter and stored in air tight glass container at room temperature for the preparation of pasta in future.

*Total extracted solid (%)*: Total extracted solid was calculated by using the formula given in equation 1 as follows:

$$\text{TES (\%)} = \frac{\text{Weight of extracted solid}}{\text{Weight of raw material}} \times 100 \ldots\ldots\ldots (1)$$

*Raw material flour preparation*

*Pasta preparation*

The flow diagram of the pasta product making process is shown in (Fig 3). For the production of pasta use the unconventional flour (Yam flour, Mushroom Flour, Moringa leaf Powder,), water (20%), Salt, Gum Arabic and CMC (Carboxymethyl cellulose). First mix all the powdered ingredient in a big bowl, then add water accordingly. Mixing and kneading process take 15 min to produce a stiff, plastic, homogeneous dough. Then ready dough is fed in extruder and applying pressure so as to extrude the dough through a series of die orifices. The treatments for preparation of Functional pasta were as follows:

*Treatment details*

$T_1$: Yam (90%) + Mushroom powder (5%) + Moringa leaf flour (5%)

$T_2$: Yam (80%) + Mushroom powder (10%) + Moringa leaf flour (10%)

$T_3$: Yam (70%) + Mushroom powder (25%) + Moringa leaf flour (5%)

$T_4$: Yam (75%) + Mushroom powder (10%) + Moringa leaf flour (15%)
$T_5$: Yam (60%) + Mushroom powder (30%) + Moringa leaf flour (10%)

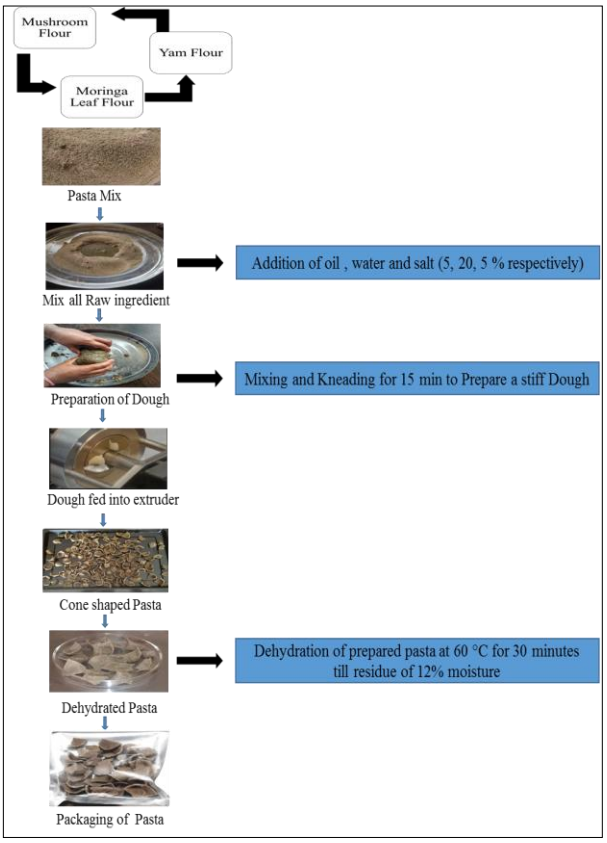


Fig 4 Pasta preparation process

*Pasta making machine*: A pasta-making machine (model: Dolly; La Monforrina, Asti, Italy) was used in the present study, in which relatively dry dough is forced into the holes in the die under a pressure of approximately 6895 kPa. A standard weight of raw material (256g) was used for each experimental run. The extruded products (Macaroni, Rigatoni Form – a tubular shape with a ribbed surface, of 0.92 mm thickness, 5.3 mm external diameter and 32.0 mm length) were cut into pieces of uniform size by means of a knife moving over the outer die surface. After extrusion, the cone shaped pieces were dried at 60°C for 30 min to a final moisture content of c. 12% and packed in commercially available low-density polythene pouches. The detailed process of pasta preparation is shown in (Fig 4) as follows:

*Sampling technique phase -4 (Sensory Evaluation)*

*Cooking recipe of functional pasta*: For the preparation of cooked pasta, there are need of some ingredients, 100g of dehydrated pasta, and 500 g of water for boiling, 1 table spoon olive oil, 1½ tea spoon of noodle masala, salt and chilly use as per taste.

*Sensory evaluation*: The sensory examination of the prepared pasta product was done by a panel of five people. The samples were evaluated for color, appearance, taste, aroma, mouth-feel and overall acceptability. Each of the five attributes were evaluated using a nine-point Hedonic rating scale, shown in (Fig 5), with a liked a lot, like a little much product, retaining its original shape and with a smooth Body and Texture, Flavour and Taste, Colour and Appearance, Aroma and overall acceptability, scoring 9, and a disliked very much, extensively deformed product, scoring 1.

| Panelist Hedonic Rating | Liking Score |
|---|---|
| Like Extremely | 9 |
| Like Very Much | 8 |
| Like Moderately | 7 |
| Like Slightly | 6 |
| Neither Like Nor Dislike | 5 |
| Dislike slightly | 4 |
| Dislike Moderately | 3 |
| Dislike Very Much | 2 |
| Dislike Extremely | 1 |

Fig 5 9-Point Hedonic scale for analysis of sensory attributes

## RESULTS AND DISCUSSION

The yield percentage of yam, mushroom and moringa leaf flour was calculated through equation 1 and the yield % come from raw stage are shown in (Table 1).

Table 1 Tabular representation of total extraction yield

| Selected raw sample | Initial weight (Raw) | Final weight (Dehydration) | Total extracted yield (%) |
|---|---|---|---|
| Yam | 1000 gram | 450 gram | 45 |
| Mushroom | 1000 gram | 115 gram | 11.5 |
| Moringa Leaf | 900 gram | 117 gram | 11.7 |

*Total extracted yield (%)*

All pasta samples with added yam, mushroom and moringa leaves were approved by the study participants. The data pertaining to the Sensory attributes of Yam, Mushroom and Moringa leaf fortified Pasta was prejudiced by diverse treatments are shown in (Table 2).

Table 2 Organoleptic evaluation of functional pasta for flavour and taste, body and texture, colour and appearance, aroma and overall acceptability

| Treatments | Flavour and taste | Body and texture | Colour and appearance | Aroma | Overall acceptability |
|---|---|---|---|---|---|
| $T_1$ | 34 | 33 | 32 | 30 | 32 |
| $T_2$ | 33 | 33 | 35 | 31 | 34 |
| $T_3$ | 35 | 34 | 38 | 37 | 36 |
| $T_4$ | 38 | 37 | 37 | 36 | 37 |
| $T_5$ | 44 | 46 | 42 | 40 | 43 |

The result that we have got from the above calculation for organoleptic evaluation are shown in (Table 1). To verify and statistically validate the result we have done ANOVA one tailed test according to the data set. The result obtained by the statistically validated are shown in the (Table 3) and graphical representation of statistical test is shown in (Fig 6).

From the above the graph in (Fig 6) represents the F-value distribution among the group $T_1$ to $T_5$ and it shows the reliability of statistical analysis of validation of Sensory property [20]. From the (Table 2) the p value obtained is less the 0.05, which shows the result are statistically significant show in (Fig 3).

From the above graph in (Fig 7) we concluded that the sample $T_5$ is most acknowledged sample among the sensory panelist members and it gets highest scoring. The overall quality of pasta with 30% mushroom, 60% yam and 10% moringa leaf powder is the most acceptable composition in the parameters of quality taken in this research [21-22].

Table 3 Statistical analysis of validation of Sensory property

| Source | DF | Sum of square | Mean Square | F Statistic | P-value |
|---|---|---|---|---|---|
| Groups ($T_1$ - $T_5$) | 4 | 291.000000 | 72.750000 | 22.384614 | 0.00000352162 |
| Error (within $T_1$ - $T_5$) | 15 | 48.750002 | 3.250000 | | |
| Total | 19 | 339.750002 | 17.881579 | | |

P>0.05

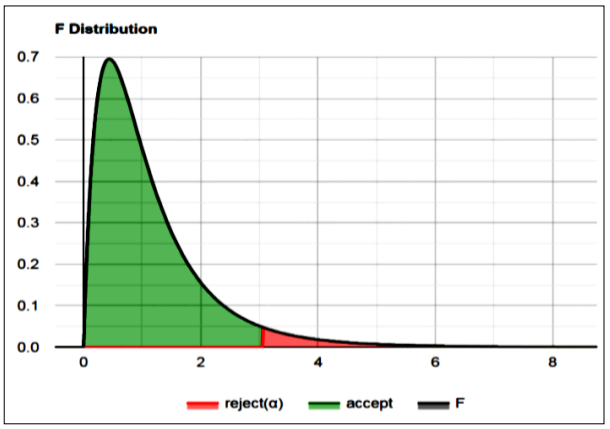


Fig 6 F-value distribution graph

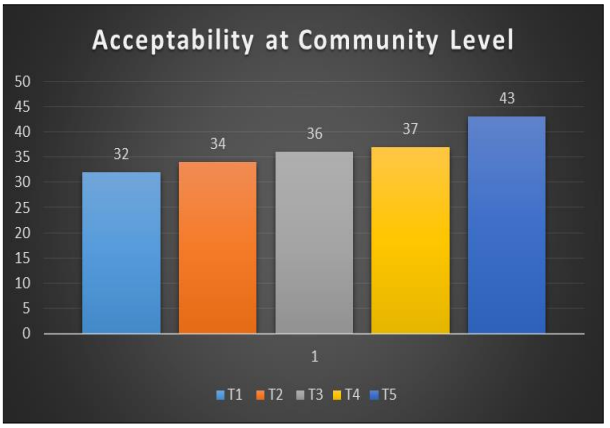


Fig 7 Graphical representation of overall acceptability

## CONCLUSION

Recently pasta is one of the popular breakfasts. The trend of pasta is increases day by day since last decades. It was generated billions world widely from the market. During the processing of raw selected samples, the highest yield % was seen in the yam sample, followed by moringa and mushroom, respectively. Mushroom yield % was low due to excessive moisture content. Sample $T_5$ is the most well-known sample among the sensory panelists, and it receives the highest score. The overall quality of pasta with 30% mushroom, 60% yam, and 10% moringa leaf powder is the most acceptable composition according to the quality parameters used in this study.

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