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Utilization of *Moringa* leaves powder as valuable food ingredients in pasta preparation

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Abstract
Present study was undertaken to evaluate the quality of pasta supplemented with different proportions of *moringa* leaves powder. Five samples (T_0, T_1, T_2, T_3 and T_4) of pasta were prepared by using semolina and different proportion of *moringa* leaves powder. Sample T_0 was prepared as control containing only semolina (100%) while sample T_1 (semolina 90% *moringa* leaves powder 10%), T_2 (semolina 80% *moringa* leaves powder powder 20%), T_3 (semolina 70% *moringa* leaves powder 30%) and T_4 (semolina 60%+ *moringa* leaves powder 40%) were prepared by changing the concentration of semolina and *moringa* leaves powder. All the five samples were evaluated for the physico-chemical and sensory quality. It was found that sample T_2 (semolina 80% *moriga* leaves powder 20%) had ash content 1.460%, moisture 7.8333% & protein 13.433%. According to texture analysis of the selected samples, T_2 was found to be best in quality having better texture parameters and higher overall acceptability.

Keywords: moringa leaves powder, semolina, pasta, and nutritional properties

1. Introduction
Development of food products conforming to consumer needs is the biggest challenge for processed food industries. Food formulators perceive health and wellness as the consumer trend. With the changes in the socio-economic scenario taking place at a rapid pace, increased participation of women in work force and altered attitudes to leisure activities, the time for planning and cooking foods has significantly reduced. This has given boost to the manufacture and marketing of convenience foods. The Moringa consumed by humans throughout the century in diverse culinary ways. Almost all parts of the plant used for taste, flavour or as vegetable and seed activities culturally for its nutritional value, purported medicinal properties. The investigation of the different parts of the plant is multidisciplinary, including but not limited to nutrition, ethno botany, medicine, analytical chemistry, phyto chemistry and anthropology. The purpose of this review is to summarize the uses and benefit of *Moringa oleifera* (Hassann *et al.,* 2013)

Drumstick leaves has enormous potential for benefiting humanity. India's ancient tradition of ayurveda says the leaves of the Moringa tree prevent 300 diseases. Scientific research has proven that these humble leaves are in fact a powerhouse of nutritional value. Besides it contains phytochemical having potent anticancer and hypertensive activity may be attributed to the presence of quercetin. (Bidwe *et al*., 2013) [2]

Pasta is traditionally Italian food made by refined wheat flour. It can also made by durum wheat or mixed grain. In India pasta is used as a fast food and if the nutritional properties of the pasta will be enhanced than it can be easily useful as regular food. Pasta made by refined wheat flour mixed with water after that it is kneaded and breaked after that it is put into the pasta extruder and extracted in various shapes; it is dried and cooked prior to eating. Pasta with ideal sensory and physical quality is characterized by elasticity and strength of the dough, high tensile strength and minimum cooking losses. Pasta products are widely accepted by the children and elder persons, but the major problem is that they are not accepted pasta as a healthy food due to low nutrients and dietary fibres. (Mishra *et al*., 2016) [4] Presence of various types of antioxidant compounds make this plant leaves a valuable source of natural antioxidants and a good source of nutraceuticals. the objective of this investigation was critically planned to assess the characteristics of *Moringaoleifera* leaf powder in order to further use as functional food ingredient in the food and pharmaceutical products of concern also basically to enhance this important less explored readily available in certain parts of the country in a shelf stable easily usable form to the masses for the purpose.

Methodology

The present research work was carried out in Department of Food Process Engineering Vaugh Institute of Agricultural Engineering & Technology this chapter describes the material, process manufacturing method, experimental setup and test parameters used to accomplish the experimental work done to attain the desired objectives are developed pasta supplemented with MLP, effect on nutritional analysis, effect different ratio on sensory attributes. Material used methods adopted during the present investigation have been described under following suitable headings.

Procurement of raw materials

The good quality of semolina purchase from market of Allahabad. Healthy *moringa* leaves collect from *morniga* tree. The other ingredients purchase from local market of Allahabad.

Materials required: semolina, *moringa* leaves powder, water, and salt.

Physico-chemical analysis: Moisture content, ash content, protein content were determined by the Method AOAC (2000) [1]

Sensory analysis: Sensory analysis was done by 9 point hedonic scale (Amerine *et al. 1980)*

Texture analysis: Firmness, adhesiveness, cohesiveness, springiness, and gumminess were determined by texture analyser TA.XT2 I

Statistical analysis: Two way ANOVA classification with 5% significance level was done by method (Gupta 1997).

Flow Chart of Preparation of Pasta

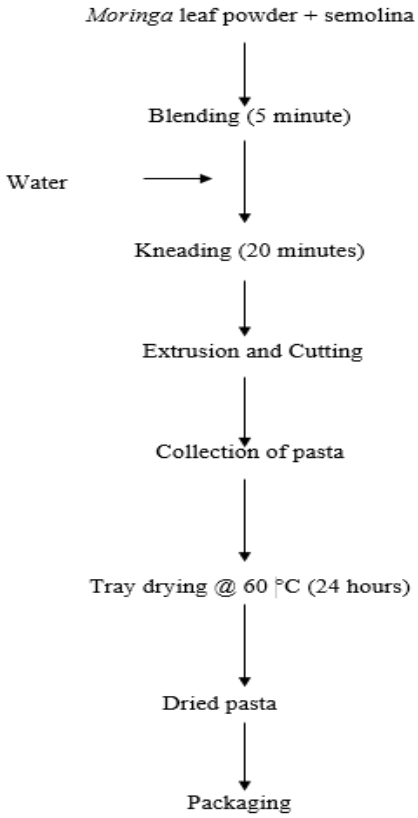


Fig 1: Flow chart of preparation of pasta

Formulation table

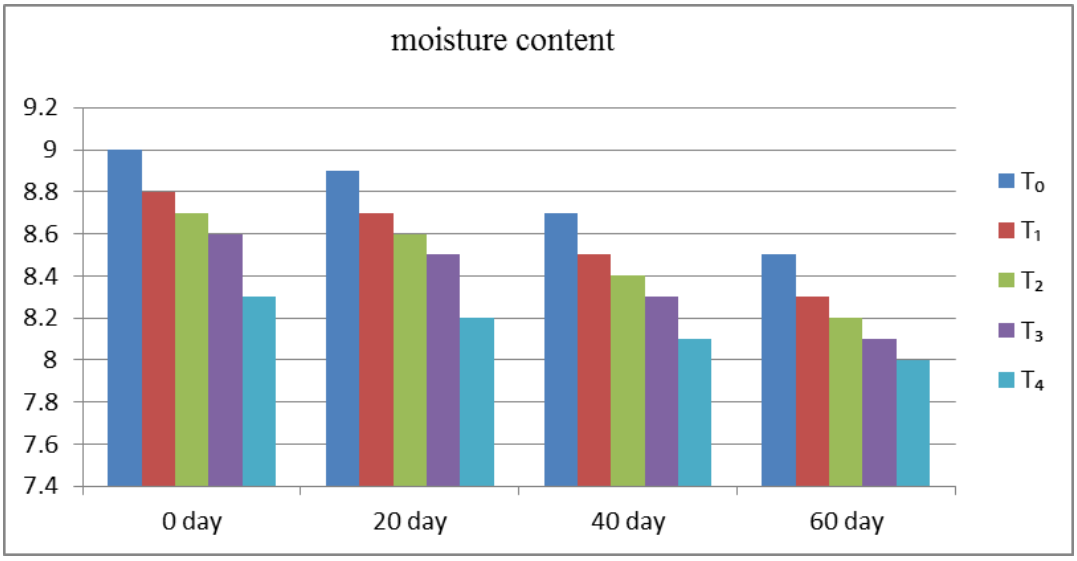
Semolina	100%	90	80	70	60
Moringa leaves powder	-	10	20	30	40

Results and Disscusion

Development of *moringa* leaves powder pasta

In the present study four samples (T0, T1, T2, T3 and T4) of pasta were prepared by using semolina and different proportion of *Moringa* leaves powder.

Effect of storage on percent moisture content of value added pasta

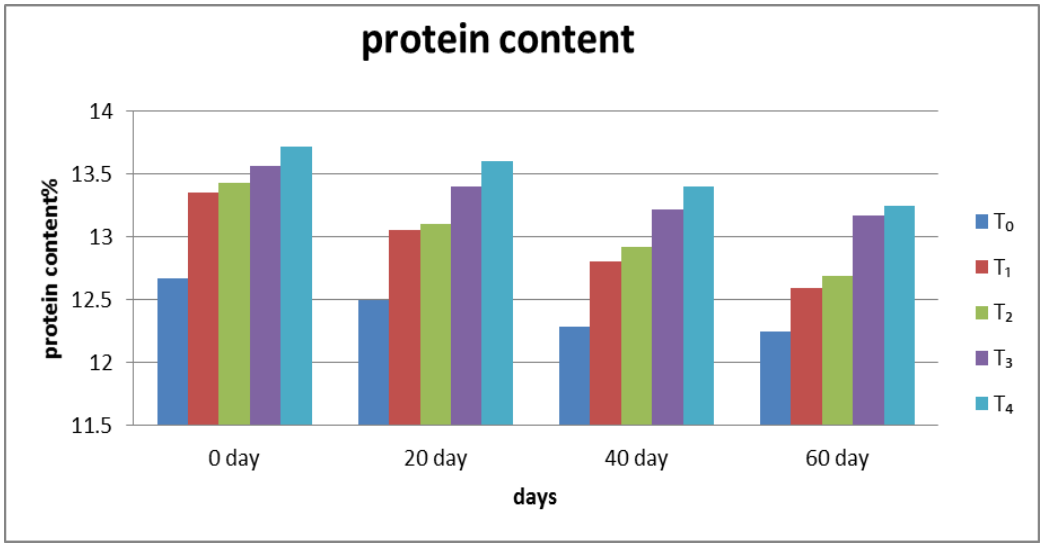


Storage study was conducted shelf for 60days duration with interval of 20days and it was found that maximum moisture content in T_0 sample i.e.9.0 and after 60days of storage it is decrease up to.8.0 in T_4. The effect of moringa leaves powder on pasta is moisture content is high with different formulation. This could be due to the low moisture content of

Moringa leaf powder used in the blends and might have implications in terms of the texture and microbiological quality of bread processed with added Moringa leaf powder. Similar results were found in the studies of, (Olaoye *et al*, 2006). The data clearly indicate that there was a slight decrease in moisture content of control sample (T_0) and experimental sample of pasta (T_1, T_2, T_3, T_4) during storage. The loss in moisture content was attributed to the fact that a relative humidity about food corresponding to Aw lower than that food. Similar results were observed in the studies of (Mishra *et.al*.2016) [4].

The moisture content of foods is usually used as an indicator of food quality. It is important to measure the moisture content in pasta because of its potential impact on the sensory, physical, and microbial properties of the pasta. This finding is in compliance with the findings of Fellows, (1990).

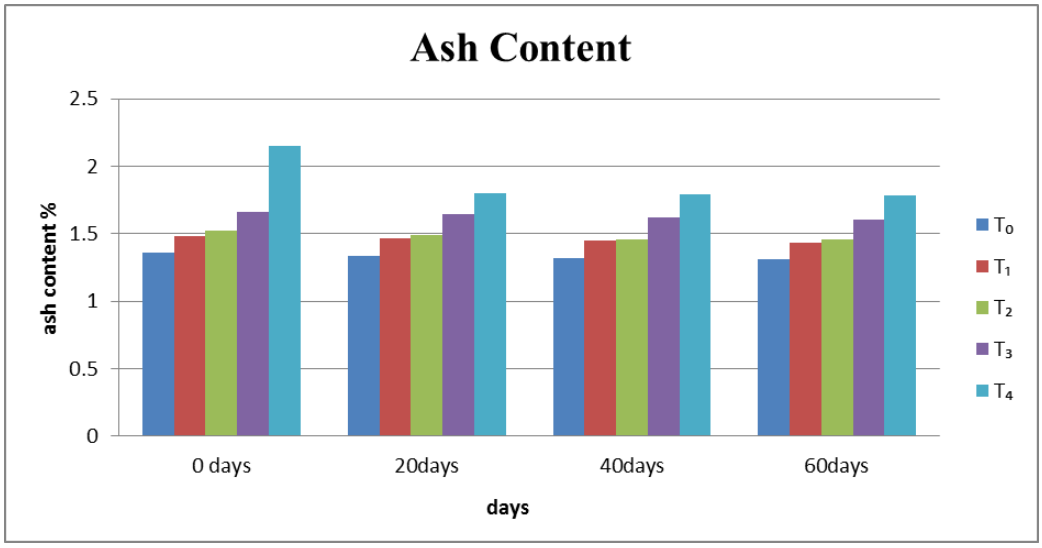
Effect of storage on percent protein content of value added pasta



Storage study was conducted shelf for 60days duration with interval of 20days and it was found that minimum protein content in T_0 sample i.e. 12.7 and after 60days of storage it is decrease up to 12.2. Result was found significance increasing protein content with increasing level of supplementation of moringa leaves powder. After incorporation moringa leaves powder protein content increase from initial 12.6 to 13.7.

Result was found significant (p<0.05) increase in protein content with increasing level of supplementation from 8.70% in 100% Wheat flour to 12.8% in 88:10:2 blend. This could be due to substitution effect caused by the high protein content of Moringa leaf powder and oat flour, similar results were found in the studies of (Gernah and Chinma, 2006) (Tinotenda, 2012) [7] studied end peptidases cleave peptide bonds within the chain where as the exopeptidases cleave single amino acids from either the carbon or nitrogen end of the molecule. Both the end peptidases and the exopeptidases break the protein polypeptide bonds into simple peptide chains. This might have decreased the protein content of the pasta during storage.

Effect of storage on percent ash content of value added pasta



Storage study was conducted shelf for 60days duration with interval of 20days and it was found that minimum ash content in T_0 sample i.e. 1.32 and after 60days of storage it is increases up to 2.1 similarly the highest ash content initially was found in T4 sample i.e. 2.1 And after 60 day of storage it is decreased up to 1.7 The data clearly indicate that there was a slight increase in ash content of control sample (T_0) and experimental sample of pasta (T_1, T_2, T_3, T_4) during storage,

similar result were observed in the studies of (Tinotenda, 2012) [7] The slight decrease in ash content can be attributed to respiration of the wheat during storage. During respiration, there is a decrease in the levels of carbohydrates, hydrogen and oxygen. Respiratory losses of the carbon cause weight losses in the product, hence the ash content subsequently decreases. Respiration also decreases the total food value

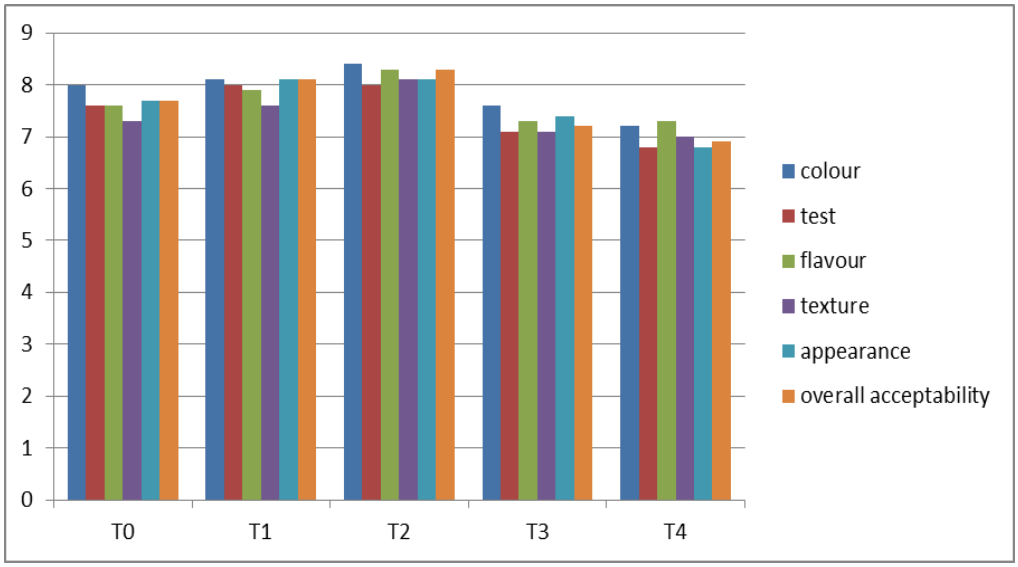


Fig. Sensory evaluation

Sensory analysis of value added pasta during storage was done on the basis of colour, flavour, texture, taste and overall acceptability. Sensory analysis of value added pasta of sample T_0, T_1, T_2, T_3, T_4, was carried out on the basis of colour, flavour, texture, taste, and overall acceptability with the help of sensory evaluator on 9 point hedonic scale.

Texture Profile Analysis

In the present study the texture profile analysis (TPA) for seleted sample T_2 was done. The TPA includes the parameters like firmness 63.5, adhesiveness 62.43, cohesiveness 11.93, springiness 1.075, and gumminess 757.5. The values of TPA determined by texture analyser TA.XT2 I

Conclusion

India is the largest producer of *moringa*. Leaf has highest value of vitamin A and vitamin C. The leaves are beneficial in the treatment of due to their various medicinal properties and their rich iron content. Present dietary scenario necessitates exploring the possibly of incorporating novel ingredients in commonly consumed foods rather than developing new food product. Pasta products are widely accepted by the children and elder persons, but the major problem is that they have not accepted pasta as a healthy food due to low nutrients and dietary fibres. With the current status of nutritional quality of Pasta and growing demand of nutritious foods, it seems worthwhile to take efforts in enhancing the nutritional value of Pasta. Supplementation of wheat with *Moringaoleifera* powder could therefore significantly improve the nutritional quality of the prepared Pasta, especially in micro-nutrients.

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