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Preparation, Processing and Nutritional Attribute of Mango By-Products

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Abstract: ***Mango by-product such as seeds and peel contain a high amount of enhancing substances such as (antioxidant, vitamin c. and dietary fibre). The study was carried out to investigate by different processing method for the production of new product by using mango by-products which include mango peel powder, mango pulp powder and mango seed powder. The determination of nutrient composition of the products were tested by 6 parameters such as fat, protein, carbohydrate, energy, moisture, and ash contain The utilization of mango by-product has become an important aspect in waste management to contribute to more production in food industries as well as pharmaceutical industries. The utilization of mango by- products enhances due to the quality of mango by products that are rich source of many utilizable component. The product formation by using the mango by-products contain many health enhancement substances for a balance diet. These product optimizes the availability of energy, protein, carbohydrate and fat.as the result of phytonutrient and Nutrient analysis per 100gm of product formation revealed 371 kcal, 7.81g protein in mango breakfast cereal and 298 kcal, 5.25 protein present in mango chutney. Thus conforming that the developed product is nutritious and healthy innovation.***

Keywords: mango by-products, processing, nutritional analysis, phytonutrients

1. Introduction

Mango (*Mangiferaindica L.*) is the most important fruit of India and is also known as king of fruit. It is the most popular old and ancient fruit in the world. Pleasurable anticipation due to their pleasant taste and aroma and high nutritional value. Mango fruit are greater source of micronutrients, vitamins and other phytochemical. Moreover it is a nutritionally important fruit being a good source of vitamin A, B and C and minerals. India is the largest and the oldest cultivator and procedure of mango in the world wide that is the reason it is the national fruit of India.

The mango is a very common tropical fruit usually found in Southern Asia, especially in Eastern India, China, Burma, Andaman Islands and Central America. Mangoes belong to the genus Angifera, consisting of numerous species of tropical fruiting trees in the flowering plant family Anacardiaceae. It is cultivated and grown vastly in many tropical regions and widely distributed in the world. The mango is indigenous to the Indian subcontinent and Southeast Asia. **(Fowomola, 2010, Kittiphoom, 2012).**

Mango is considered to be a fruit with tremendous potential for future. Worldwide production of mango is 38.95 million tonnes. Mango has its origin in India and approximately a thousand different types of mango fruits are produced in the country. Annual production of mango in India is 15.19 million tonnes. **(FAO, 2011, Joshi D C et al (2013)**

Mango fruits provide energy, dietary fiber, carbohydrates, protein, fats and phenolic compounds **(Tharanathan et al, 2006)**, which are vital to normal human growth, development and health. Each part of a mango tree, such as its leaves, flower, pulp, peel and seeds contain essential nutrients that can be utilized.

The major by-products from mango processing are peel and seeds. Depending on the cultivars and products made, its industrial by-products, namely peels and seeds, represent 35-60% of the total weight of the fruit **(Larrauri et al,1996).**

Mango By-Products

Several million tons of mango wastes are produced annually from factories. Because mango is a seasonal fruit, about 20% of fruits are processed for products such as puree, nectar, leather, pickles and canned slices, among others, which have worldwide popularity (Loelillet, 1994). During the processing peel and mango kernel, which are good source of nutrients, are discarded. The byproducts are valuable source of nutrients and value addition can generate revenues and can address the disposal issues as well (AmeeRavani* and D C Joshi et al, 2013).

After consumption or industrial processing of the fruits, considerable amounts of mango seeds and pulp are discarded as waste (Puravankara et al., 2000); Therefore, the utilization of mango by-products especially mango seed, peel may be an economical way to reduce the problem of waste disposal from mango production.

The utilization technologies for different categories of mango by-products are- mango ready to eat breakfast cereal, mango dried chutney.

Mango kernel Mango seed kernels have a low content of protein but they contain the most of the essential amino acids. Mango kernel is a good source of starch and fat. A preliminary study showed that the seed represents from 20% to 60% of the whole fruit weight, depending on the mango variety and the kernel inside the seed, which represents from 45% to 75% of the whole seed (Maisuthisakul and Gordon, 2009). Themango seed kernel was also a good source of

phytosterols, such as campesterol, bsitosterol, and stigmasterol and also contains tocopherols.

Mango peel, generally termed as "total waste" is the second most important waste generated in the processing factories. During processing of mango, peel a major by- product, contributes about 15-20% of the fruit (Beerh and Raghuramaiah, 1976). Peel has been found to be a good source of phyto-chemicals, such as polyphenols, carotenoids, vitamin E, dietary fibre and vitamin C and it also exhibited good antioxidant properties (Ajila et al., 2007; Kim et al., 2010).

2. Methodology

Nutritional Analysis
In the present study, the product was analysed for proximate composition. In this phase it involves nutritional analysis in different parameters.

- Determination of total energy
- Determination of moisture percentage
- Determination of ash percentage
- Determination of fat percentage
- Determination of protein content
- Determination of carbohydrate percentage

Source: the following tests were determined at the RFRAC centre (regional food analysis centre) Lucknow.

3. Result and Discussions

3.1 Determination of nutrient composition

Determination of phytonutrient and nutritional analysis of processed mango by-product were tested by 6 parameters such as-

- Fat
- Protein
- Carbohydrate
- Energy
- Moisture
- ash contain

3.2 Determination of Nutrient composition of mango breakfast cereal

Nutritive value of experimental sample (100g). The result shown in the form of table below.

3.3 Fat, Protein and Carbohydrate

Table 9: Nutrient contents in mango breakfast cereal

Parameters	Experimental
Fat(g)	3.91
Protein(g)	7.81
Carbohydrate(g)	76.31

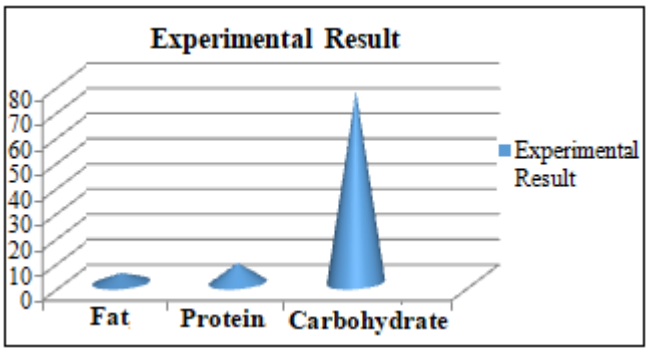

Figure 67: Graphical representation of Fat, Protein, Carbohydrate in mango breakfast cereal

The above drawn graph shows the higher percentage of Carbohydrate than protein and fat in experimental product.

3.3.1 Energy, Moisture and Ash Content

Table 10: Energy, moisture and ash content in mango breakfast cereal

Parameters	Experimental
Energy(Kcal)	371
Moisture	9.40
Ash Content	2.57

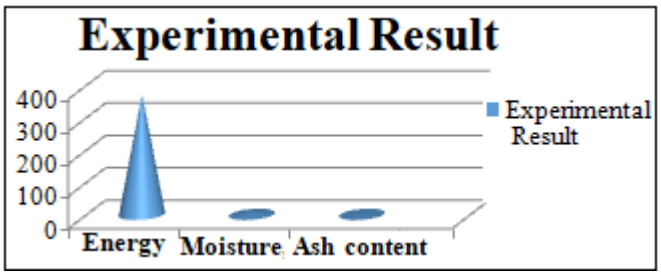

Figure 68: Graphical representation of Energy, Moisture, and Ash content in mango breakfast cereal

The above drawn graph shows the higher percentage of Energy than Moisture and Ash content in experimental product.

Determination of Nutrient composition of mango dried chutney
Nutritive value of experimental sample (100g). The result shown in the form of table below.

3.3.2 Fat, Protein and Carbohydrate

Table 11: Nutrient contents in mango dried chutney

Parameters	Experimental
Fat(g)	10.49
Protein(g)	5.25
Carbohydrate(g)	45.76

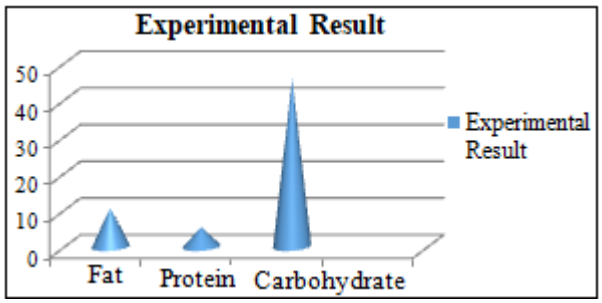

Figure 69: Graphical representation of Fat, Protein, and Carbohydrate in mango dried chutney

The above drawn graph shows the higher percentage of Carbohydrate than Fat and Protein in experimental product.

3.3.3 Energy, Moisture and Ash Content

Table 12: Energy, moisture and ash content in mango dried chutney

Parameters	Experimental
Energy(Kcal)	298
Moisture	7.25
Ash Content	31.25

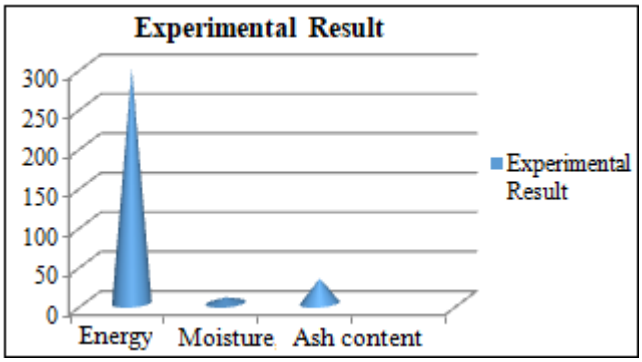

Figure 70: Graphical representation of Energy, Moisture, and Ash content in mango dried chutney

The above drawn graph shows the higher percentage of Energy than ash and moisture content in experimental product.

4. Summary and Conclusion

Mango by-product such as seeds and peel contain a high amount of enhancing substances such as (antioxidant, vitamin c. and dietary fibre). The utilization of mango by-product has become an important aspect in waste management to contribute to more production in food industries as well as pharmaceutical industries.For the insurance product quality, nutritionally analysis is good to determine the quality and freshness of product. Phytonutrientand nutritionallyanalysis of the mango by-product was done by testing as six parameters. The scoring for each of the product was done according to various parameters i.e. fat, protein, carbohydrate, energy, moisture, and ash contain fat.

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