

MANGO PEEL PROCESSING A WAY OF NUTRIENT FEEDING

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Abstract: India is the leading country in the production of mangoes which are main edible fruits of tropical and sub-tropical region. The mangoes are rich source of vitamins, minerals, antioxidants, dietary fibres etc. which help in curing of many diseases. The wastes of fruits increasing day by day even per capita per day consumption are not available for all in developing countries. The increasing waste product creating problems of disposal and environmental pollution and it enhances the management costs of waste treatment. The peel of fruits is a rich source of antioxidants, carotenoids, catechins, flavanoids, phenolic acids, pectin, mangiferin, quercetin and dietary fibres. Pectin is very useful component of food processing due to its emulsifier and additive properties. Dietary fibres of peel positively regulate many health problems such as intestinal movement, risk of cancer, absorption of minerals and glucose in intestine and immune system. Moreover, peel can be also used in processing industry for packaging as biodegradable materials.

Keywords: Mango peel, Pectin, Dietary fibres, Antioxidants.

Introduction

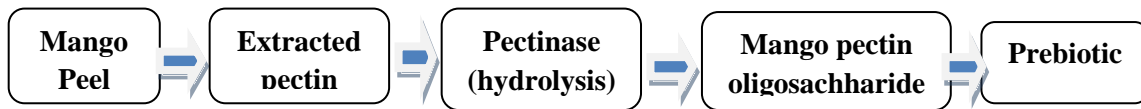
Mango peel constitutes about 5-20% of total weight of mango fruit is a major by-product of mango processing industry. The peel of mango is rich source of carotenoids (0.1–51 mg/g DW), vitamin C, polyphenols (14.85-127.6 mg/g DW), vitamin E, dietary fiber (36–78 g/100 g of DW), potassium (1549.43 to 1883.65 mg/100 g), Phosphorus (90.45 mg/100g), Calcium (94.15 mg/100g), Iron (4.62 mg/100g), Zinc (2.85 mg/100g) and other essential nutrients which are booster of immune system (Rojas et al., 2020). Penta-O-galloyl-glucoside and ethyl gallate in the peel inhibit tumor growth and lower the chance of heart diseases. The production of free radicals causes damage of membrane and ageing can be protected by consumption of processed mango peel because peel is enriched with mangiferin, quercetin, norathyriol, and resveratrol (Wathoni et al., 2019). The component of peel includes carbohydrates (80%), crude fiber (8%), pectin (13%), proteins (4%) and fats (2%) (Wongkaew et al., 2021). The powder of peel can be used for value added products in Jam, Jellies, Pasta as well as Bakery products to increase their antioxidant activity due to additional fiber, phenolic compounds and carotenoids. The bioactive compound found in mango peel is *Mangiferin*, which helps in lower the risk of Cancer (Coelho et al., 2019).

Dietary fibres

Dietary fibres are the very good materials for intestinal movement and function and its two component soluble and insoluble fraction abundantly present in peel with appropriate ratio. The fibres constitute a combination of chemically heterogeneous substances viz. cellulose, hemicellulose, pectins, lignins, gums and polysaccharides (Garcia-Magana Mde et al., 2013). Soluble fibres help in reduction of glucose absorption by the small intestine as well as reduce blood cholesterol while insoluble fibres help in water absorption and intestinal regulation (Ajila and Rao, 2013). The polyphenol bound to dietary fibres breakdown into phenylacetic, phenylpropionic, and phenylbutyric acids after fermentation and non fermented non-absorbable polyphenol acts as antioxidant in scavenging of free radicals and suppressing the effects of dietary pro-oxidants in large intestine (Manthey et al., 2009). Dietary fibres constitute 45% to 78% in fresh peel and its amount increase during progress of ripening. The content of insoluble dietary fibre and soluble dietary fibre determine the absorption and regulation of intestine and in mango peel their ratio varies 2 to 2.2 which is beneficial for health. Major phenolic acid bound to dietary fibre in mango peel is Gallic acid while major flavonoids are kaempferol and quercetin and their content varies among varieties (Marçal and Pintado, 2021)

Peel pectin

The other biopolymer in peel is pectin which constitutes 5-20% of the total component with predominant of galacturonic acid. Quality of peel based on the presence of pectin esterase and pectin having the 65% of galacturonic acid. Ripening stage of fruits affects content of pectin in peel, greater content of pectin found in full ripened fruits (Wongkaew et al., 2021). Galacturonic acid residue considered as the backbone of pectin and degree of esterification determine its strength. Degree of esterification defined as the ratio of methyl-esterified galacturonic acid groups to the total galacturonic acid groups. Higher degree of acetylation has negative effect on gelling while higher degree of esterification has positive effect. Hence induction and inhibition of gelling properties of pectin based on these two modifications which vary among different fruit peel. The pectin and its derivatives used in foods and beverages as emulsifier, stabilizer, thickener, texturiser and gelling agent. The polysachharide from plant modulate the human gut microbiota and used as prebiotic materials for health improvement. The Pectin oligosaccharide (POS) which can be obtained from mango peel pectin by enzymatic hydrolysis recognized as a prebiotic for functional food (Wongkaew et al., 2020).



It has been estimated that mango peel pectin oligosachharide has high potential as a prebiotic property and as a booster of the production of total short-chain fatty acids of *Bifidobacterium animalis* and *Lactobacillus reuteri* (Wongkaew et al., 2021). The short-chain fatty acids regulate blood glucose levels, pathogenic bacteria, colonic cancer, absorption of mineral and modulation of the immune system. Pectin has been applied in Pharmaceutical industry in making thin film for drug carrier. The pectin component acts as an emulsifier and a stabilizer in gelling and thickening agent, hence it is most desirable in jelly and jam preparation, and other domestic products (Chaiwarit et al., 2020).

Peel flour

The flour of peel is gluten free and it may serve as additive in food processing industry for nutrients. It is highly enriched with minerals *viz.* potassium, calcium, magnesium and iron, and appears like *Besan* (chickpea flour). It contains higher amount of potassium and total fibres than pulp flour (Maiqui et al., 2023).

Conclusion

Thus, it will be beneficial strategy to use mango peel as a raw material in processing industry to provide nutritional support to the needed community and reduce pollution from waste.

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