

Abstract

Edible grade gums, gel, mucilaginous materials and fruit extracts from plants are important ingredients as they can play a very important role in the arena of food industry as a thickener, binder, stabilizer and edible coater. Therefore, a survey was conducted in three provinces to identify these plants in natural habitat. Forty six plants were identified as possible sources for edible grade plant extract. Five plants namely *Davulukurudu* (*Neolitsea involucrate*), Durian (*Durio zibesthian*), *Katuanona* or *soursoap* (*Anona muricate*), Nutmeg (*Mristica fragrance*) and Passion fruit (*Passion edius*) along with Yeast (*Saccharomyces cervisiae*) were segregated from these identified plants by taking into account of magnitude of extractable extracts per unit weight and quality characteristics of the extracts as well.

Thus, *Davulukurudu* (*DKL*)leaves and Durian seeds were capable to form a thick jell mass when 20g and 40g of leaves and seed powder were dissolved in one liter of water respectively. Moreover, Nutmeg rind and *Katuanona* fruit pulp extracts were capable to thicken the watery media by dissolving 8g, and 10g of dry powder respectively. Since most of these extracts contained polysaccharides in different consistencies were incorporated to improve existing quality characteristics of commercial products as well as to introduce novel food products while not compromising to their original quality. However, the extract obtained from *DKL* was used to improve quality of rice and wheat noodles, rice & wheat bread, banana fingers and string hoppers. Because, this leaf extract was capable to reduce occurring of broken in noodles by enhancing sticky property of flour, improving of leavening action of bread by cutting down of leavening time and prolonging staling process, prevention of enzymatic browning of banana by coating with the jell and prevention of forming of microscopic cracks on strings of string hoppers

by enhancing sticky property of rice flour respectively. Apart from these improvements, *DKL* extract was capable to improve some organoleptic properties of food product as against same of commercial product. *Katuanona* pulp and Nutmeg rind extracts also contained different degrees of polysaccharides with acidic and spicy substances. Hence, these two extracts were also proportionately mixed with the commercial recipe to modify the product. Some organoleptic properties of modified product were better than the commercial product. Microbial extract collected from yeast, cultured in corn flour media was also capable to enhance leavening action of bread while cutting down of leavening time by half an hour.

In preservation of gum and gel bearing plant parts particularly *Davulkurudu* leaf and Durian seed, four different types of drying techniques namely mechanical drying (Sensible heating at constant humidity ratio), sun drying, cooling with de-humidifying and shade drying were adapted. Results revealed that cooling with de-humidifying drying technique was the only productive drying system to preserve the material without disturbing to the gel forming ability. Hence, an industrial scale dryer was fabricated. Exceptional feature of this dryer is blowing of de-humidified cold air horizontally across the each tray in the drying chamber. An agitator was also fabricated to stir the gel bearing material either in cold or hot water. The agitating rotor blade was fixed to the bottom of the agitator to agitate the material thoroughly. An extrusion device was also fabricated to extrude the rice noodles with *DKL* extract. Extrusion capacity, length and size of a string were 24Kg per hour, 100mm and $1*1\text{mm}^2$ respectively. The technical innovation of this extruder is that extrusion chamber is water jacketed to maintain extrusion temperature at $80^0\text{-}90^0\text{C}$ to enhance sticky property of rice starch by using an electric heater.

Consumer preference for plant extract incorporated food products was measured by conducting sensory evaluations along with the same of commercially popular product. Results revealed that

respondents prefer to have *DKL* extract incorporated noodles (rice and wheat) due to better texture and mouth feel. The bread (rice and wheat) prepared with *DKL* extract have also positively been perceived by the user due to their well developed bread crumb structure and fine texture. The similar way of consumer responses and behavior have shown for the bread manufactured with microbial (Yeast) extract too. The user response for the innovative product “banana fingers” developed for potato fingers by edible coating with *DKL* extract was relatively higher than the potato fingers due to its attractive mouth feel, color and over all acceptability. The consumer preference for ready to cook string hoppers developed by incorporation of *DKL* extract was as same as whole sensory profile of fresh string hoppers. The user response for Nutmeg rind and *Katuanona* pulp extracts incorporated sauce was relatively higher than the ordinary tomato sauce due to higher rate of acceptance on spicy “taste & smell” of nutmeg and creamy thickness of *katuanona* pulp. Kruskali- Wallies non parametric ANOVA and paired comparison statistical test methods were used to analyzed data collected from sensory evaluation and normal ANOVA and mean variation were resorted to analyzed data gathered from parametric variables.

Financial profitability of plant extract incorporated food products was evaluated as against existing commercial products in terms of cost effectiveness of the production process. Results revealed that LKR 0.82 & LKR 0.80 could be saved per packet of wheat and rice noodles, by minimizing dropping rate during slitting and rolling processes, retention of gruel and extending the durability of the cutters, if *DKL* extract is incorporated with the manufacturing process. For bread manufacturing process LKR 0.81 and 0.72 per loaf of wheat and rice bread can be saved, by minimizing yeast incorporation and reduction of leavening time, if *DKL* extracts is incorporated into the bread dough . If *DKL* extract is incorporated into banana fingers and ready to cook string hoppers manufacturing processes, LKR 23.75/Kg and LKR 0.55 per string hopper

can be saved. If Durian seed extract is incorporated to fruit Nectar manufacturing process LKR 0.05/ liter can be saved while saving foreign currency for importing of expensive *Xanthan* gum. In manufacturing of sauce with *Katuanona* pulp and nutmeg rind extracts LKR 5.00/200ml bottle can be saved.