

Development of Instant Pudding Mix Incorporated with Palmyrah (*Borassus flabellifer*) Boiled Seed Shoot Flour

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Abstract

An experiment was conducted to develop instant pudding mix incorporated with boiled Palmyrah seed shoot flour. This study was carried out to produce a value added product with the incorporation of boiled Palmyrah seed shoot flour. Combination of boiled Palmyrah seed shoot flour and corn flour, milk powder, cane sugar, seaweed extract, table salt (NaCl), vanilla, and food colouring was used as ingredients for the product formulation. Product was formulated step by step by changing one ingredient while others maintaining as same in each step. Experiments were done in five steps, and sensory evaluation was conducted in each step with untrained panelists using 9 hedonic scale methods. Friedman test and Turkey's test was used to select the best percentage of ingredient that could be added in instant pudding mix. Final product was formulated with 29.25% of milk powder, 11.37% of boiled Palmyrah seed shoot flour, 2.34% of corn flour, 54.17% of cane sugar, 1.08% of table salt, 1.35% of sea weed extract, 0.22% of vanilla, and 0.22% of food colour. Water was added to prepare pudding in the ratio of 81%:19%, water: pudding mix. As determined protein, fat, total sugar, reducing sugar, starch and ash content, pudding mix contained 7.09% , 7.37%, 65.26%, 7.28% and 3.13%, respectively.

Keywords: Boiled, Palmyrah, Pudding , Seed shoot flour

Introduction

Palmyrah (*Borassus flabellifer*) palm could grow very luxuriantly in arid parts of the world. It is called 'Tree of life', and has contributed immensely to the people especially in the Northern region of Sri Lanka (Theivendirarajah, 2008). There are several kinds of products derived from palm and their production and utilization are based mainly on traditional methods, as cottage level industries. Sap from inflorescence, fruit and tuber from seed are used to produce food products. Fruit contains 2 or 3 seeds. On germination seed produces shoot which grows to 12-15cm in length within 2 months. The cleaned, washed, and sundried seed shoot is referred as odiyial. Odiyial is ground and soaked in water to remove saponins, and then used to produce other food products. Shoot may be boiled and sundried in which case it's traditionally called plukodiyial. It could be consumed directly or ground (Boiled odiyial flour- BOF) and used for food production. BOF has not only starch but also high in fiber and low cost (price of BOF is 400LKR/kg) compare to the corn flour (650LKR/kg) which is normally used in the instant pudding mix to fulfill the starch requirement which is normally used in the instant pudding mix to fulfill the starch requirement. Hence it is possible to partially replace the starch content of instant pudding mix by BOF. Although Palmyrah tuber flour has high nutritional values; 3.2% of protein, 10.8% crude fibre, 2.6% minerals (Vengaiah *et al.*,

2013) different types of products based on it is not available in market of Northern region of Sri Lanka. Since BOF contains 30.4% of starch it could be used as starch source in food product development. Considering all these facts a study was carried out to develop instant pudding mix with the incorporation of BOF.

Materials and Methods

Ingredients of instant pudding mix (Palmyrah boiled odiyial flour (BOF), corn flour (CF), milk powder, sugar, table salt and gelling agents) were selected and purchased from the local market. BOF and CF were used as a source of starch, milk powder was added for casein, sugar was mixed for sweetness, and salt was used for giving ions for gelation of casein and for taste. Gelling agent was used to get the structure of pudding.

In each step one ingredient was changed in different percentage while maintaining others in constant level. In followed step, optimized amount of component was added. Pudding mix was heated up to 80°C, poured into a dish to set and allowed to cool to room temperature.

Sensory evaluation was conducted with 30 numbers of untrained panelists using 9 point hedonic scale method. Minitab 16.0 software (Friedman test) was used to select the best product at 95% confidence level and the mean separation was done by Turkey's test at p=0.05.

Throughout the study ingredients were added in weight basis, and then it was interpreted as percentage. Pre trials were conducted with BOF and CF each separately as starch source. Unless proper structure of pudding was not obtained in both trials, starch content was changed as 2.65, 5.3%, 7.95%, and 10%. From which treatment contains 7.95 % of starch was selected. 2.1% of each gelling agent as gelatin, sea weed extract and lecithin were tested for gellation. Combination of CF and BOF were added in different amounts for five treatments. Starch of CF is replaced by starch of BOF as 0%, 25%, 50%, 75% and 100%. According to that CF and BOF added in weight basis CF: BOF 14.6%: 0%, 10.7%: 5.8%, 7.0%: 11.3%, 3.4%: 16.6% and 0%: 21.7%. Sweetness of the product was changed by changing percentage of cane sugar as 47.4%, 54.6%, 60.0%, and 64.3%. Casein content was changed by altering percentage of milk powder as 12.1%, 21.6%, 29.3% and 35.3%. Volume of water to be mixed with pudding mix was optimized in three treatments as pudding mix: water 21:79, 19:81 and 17:83 respectively. Protein, fat, total sugar, reducing sugar, starch and ash content were determined.

Results and Discussion

Mean values observed for texture when added 2.1% of gelling agents and emulsifier as seaweed extract, gelatin and lecithin was 8.229^a, 5.714^b and 5.429^b respectively. Product with sea weed extract showed significantly highest mean values for taste (8.1) and overall acceptability (8.2) than that of other two. Gelatin did not form perfect texture for pudding. Gelatin is commonly used for produce gels in sugar concentrated products as fruit jellies. On the other hand, use of lecithin gave a rubbery texture to the product, and the flavor of the lecithin affected the taste of the product. Hence the pudding mix with seaweed extract as the gelling agent was selected for further product development.

According to the Table 1, when 25%, 50%, 75% and 100% of required starch content was provided by BOF, product (product 4) contains

75% of required starch from BOF and 25% from CF gave significantly highest mean value for all sensory attributes tested (colour, texture, flavor, after taste and overall acceptability). Products having below 75% level of replacement by BOF did not give actual flavor for BOF while product with 100% level of same flour gave considerably bitter taste. Then the pudding mix containing 75% of replacement by Palmyrah seed shoot flour was selected for further improvement of the pudding mix.

Among four different sugar levels (47.4%, 54.6%, 60.0% and 64.3%), there was no significant difference in mean values for sweetness, flavor and after taste among products containing different levels sugar at $p=0.05$. However higher mean values for all tested sensory attributes were obtained for the product containing 60.0% level of sugar. This level of sugar was selected for development of pudding mix.

There were significant differences in mean values of texture, flavor, after taste and overall acceptability and significantly highest mean values was given by the product containing 29.3% of milk powder among four different percentage of milk powder added as 12.1%, 21.6%, 29.3% and 35.3%.

There was no significant difference among the values for colour or flavor or over all acceptability for pudding prepared with different volume of water. Pudding prepared with 79% of water had hard texture while it was prepared with 82% of water was of watery in nature. Proper texture for pudding was obtained in pudding prepared with 81% of water.

Instant pudding mix contained 7.09% protein, 7.37% fat, 65.26% total sugar, 10.09% reducing sugar, 7.28% starch and 3.13% ash.

Conclusion

Instant pudding mix with incorporation of Palmyrah boiled seed shoot flour could be

Table 1: Mean values for sensory attributes of products with four different starch sources combinations

Sensory attributes	Product 1 (CF: BOF 14.6%: 0%)	Product 2 (CF: BOF 10.7%: 5.8%)	Product 3 (CF: BOF 7.0%: 11.3%)	Product 4 (CF: BOF 3.4%: 16.6%)	Product 5 (CF:BOF 0%: 21.7%)
Colour	6.1 ^{bc}	7.5 ^{ab}	6.3 ^c	8.1 ^a	5.1 ^d
Texture	6.9 ^{ab}	7.1 ^a	6.9 ^{ab}	7.5 ^a	6.1 ^b
Flavour	6.7 ^{ab}	6.3 ^{ab}	6.6 ^{ab}	7.1 ^a	5.9 ^b
After taste	6.4 ^{ab}	6.7 ^{ab}	6.5 ^{ab}	7.1 ^a	5.8 ^b
Overall	6.5 ^{ab}	6.7 ^{ab}	6.5 ^{ab}	7.2 ^a	5.7 ^b

formulated with 29.25% of milk powder, 11.37% of Palmyrah boiled seed shoot flour, 2.34% of corn flour, 54.17% of cane sugar, 1.08% of table salt, 1.35% of sea weed extract, 0.22% of vanilla and 0.22% of food colour. Water required to prepare pudding in the ratio of 81%:19%, water: pudding mix. Mix should be heated up to 80°C, poured into a dish to set, allowed to cool to room temperature. 7.09% protein, 7.37% fat, 65.26% total sugar, 10.09% reducing sugar, 7.28% starch and 3.13% ash were found in instant pudding mix.

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