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Preparation of various processed rice products

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ABSTRACT

Raw rice and parboiled rice are mostly used for the preparation of several processed rice products. The matured and well filled grains are dried in the sun for 3 to 4 days to reduce the moisture to 13 to 14 percent. The non-waxy or non-glutinous rice was found suitable for the preparation of cooked rice, popped and puffed rice, beaten rice, idli and dosai cakes etc. The rice cultivar RR 363-36 yielded good quality popped rice. Beaten rice soaked in water (2 times of its weight) for about 30 minutes under the lid cover gave excellent swelling properties. Kalyani-2 was rated best for preparation of beaten rice.

Key words: *rice, varieties, value added products, ingredients.*

About 85 percent of the rough rice produced in the country is converted into rice. A fraction of rough rice (10%) is used for making rice products (puffed rice and flaked rice) and about 5 percent of production is used as seed for the next crop. Milling can be done using a dehusking pedal or by hand pounding in many remote areas of Asia to modern equipments in parts of developing countries (Reddy, 2006). The rough rice processing helps to increase the total outturn of better quality rice.

This technique acts as efficient tool in converting rice into edible and consumable form and enhance the economic value of rice products as value added product, a valuable source of rice product over conventional paddy. Parboiling is one of the important tools of value addition. It is evident from this study that parboiling can be adopted as a method of value addition to improve head rice recovery and cooking quality of rice hybrids. More than 50% of paddy produced in India is parboiled and it is one of the most wide spread food processing industries of the world (Naik *et al.,* 2006).

Screening was done for identification of elite genotypes for breakfast qualities. A number of high yielding varieties and traditional land races were identified for quality traits at Central Rainfed Upland RiceResearch Station (CRURRS) farm, Hazaribag, Jharkhand. Apart from the inherent chemical grain characteristics, the physical characteristics also influence the acceptability of rice for aroma, cooking, popping, puffing and flattening qualities. Generally, the extra long and long or at least slender medium and bold type grains are preferred for making the value added products. The present study was undertaken to identify rice cultivars for preparation of traditional processed rice products.

Investigations on preparation of various processed rice products derived from rough rice, brown rice, milled rice, cooked rice, broken rice grains, dry milled flour, wet-milled flour or rice starch were conducted in the Central Rainfed Upland Rice Research Station Laboratory, Hazaribag, Jharkhand. At maturity the crop was harvested during the month of October. The raw and parboiled rice were traditionally processed and produced various rice products.

Rice is one of the cereals that is consumed mainly as whole milled and boiled rice. Cooking quality is one of the vital factors for sustaining demand by the consumer's taste for the acceptance of any rice varieties. Indian consumers prefer intermediate

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amylose content (20-25%) rice cultivars (Malik *et al.,* 1994).

Dehulled (brown rice) was milled at 5-6 percent polish. Two grams of milled rice was soaked in distilled water, rinsed three times, drained out excess water to remove dusts and foreign particles and strained through the strainer before cooking. Soaked rice was poured into a long glass tube containing distilled water (20 ml) and immersed in boiling water bath. The tubes were covered with glass marble, making sure that the tube contents reached upto two thirds the height of the tube. Water bath was maintained at 98°C and cooked for 15 to 20 minutes. The doneness was determined by the absence of any white grainy of appearance as well as pressing cooked rice grains between two glass slides. The cooked kernels were transferred to a beaker containing cold water to prevent further cooking.

Popped rice :

Popped and puffed rice are breakfast cereals and snack foods. On heating, the fried grains expand and give rise to popped rice and puffed rice. The sun-dried, clean raw rice sample from each variety was fed batch by batch (25g) into a hot wide mouthed earthen pot (240^{0}C) and grains were allowed to pop for 30-35 seconds on sand (sand and rice grains in 4:1 ratio by weight) still no more popping sound is heard (Juliano, 1993). The grains were fried over low flame. Mud was layered on the front edge of the oven to prevent from burning. The processed grains were removed uniformly by the means of band of dried mid ribs of coconut leaf and the product was partitioned into popped rice, non-parched grains and husks. The popped rice was separated manually from them through shaking on a perforated tray. This separation method improves the value of quality parameters. A short duration variety RR 363-36 was found to give a higher volume expansion (550 ml/100g) of popped rice with recovery ranging from 36-62%.

Puffed Rice :

The parboiled polished rice was mixed with salt solution (30g common salt dissolved in 100ml of plain water per kilogram of rice). Conditioned the salt treated rice for 12 hours at room temperature and then pre-heating treatment for 25 minutes at 110^{0}C was given to whole lot. This treatment enhances the effects to a higher degree of acceptance.

The earthen pot was then placed on the oven and set fire. The pretreated rice kernels were allowed to cool for a few minutes. Then the sample was fed batch by batch (50g each batch) into the earthen pot and kernels were fried on hot sand (sand and rice at 4.1 ratio by weight) for 20-15 seconds. When the act of frying of the grains is over, the fried products were removed by means of a band of dried mid ribs coconut leaf. Good puffed rices were separated from the sand panicles, non-fried grains, charged grains and other materials, through the vibration of sieve. The rice varieties N22 and Kalinga III having long slender grains were preferred for preparation of puffed rice. Puffed rice recovery varied from 72-76%. The puffed rice retains their structure – modifying properties and own rice special flavours. The puffed rice develops crispy structure in the milk and the soaked puffed rice in the milk is eaten as ready to eat cereal foods.

Beaten Rice :

The clean and sun-dried raw rice of varieties viz. Birsadhan 104, Birsadhan 105, N22, Parijat, Banaprava, RR363-36, Brown gora, Vandana, Kalinga III and Kalyani 2 were steeped separately in plain water (water and rice at 2:1 ratio by weight) in a tub for 12 hours. Next day the excess water was drained off and the wet grains were collected in a bamboo basket. The grains were then transferred quantitatively by using a perforated any metal spoon into the aluminum pot and roasted by turning up and down with a wooden spoon or ladle over a strong fire for 40 to 60 minutes. Intermittent sprinkling of water over the grains was done so as to avoid dryness. Half boiled grains were taken out and flattened either by pounding in a wooden mortar and pestle or by an edge runner. The rice product constituting the beaten rice, hulls, bran and germ were dried and separated out to each unit by winnowing.

The bold grains mostly are good for making beaten rice and puffed rice (Dixit and Mohanty, 1989). Variation in beaten rice recovery ranged from 64.18-78.10%. Based on water absorption and volume expansion the cultivar Kalyani 2 (332.0ml 100g^{-1} and 693 ml 100g^{-1} water absorption and volume expansion respectively) was rated the best among the varieties tested.

Puffed beaten rice :

The raw rice grains were steeped in a tub containing plain water for 5–8h. After completion of steeping time, the excess water was drained out and strained by a strainer. The wet grains were then roasted at 75°C air for 45 min with intermittently sprinkling of water over the grains so as to avoid dryness. Roasting of raw paddy is continued until the grains reach light colour and partly swelling stage. The grains were removed and beaten by wooden dehusker to make beaten rice. The products were dried in the sun and cooled to below 30°C and the lighter components were separated out by winnowing. Then the clean dehusked beaten rice was fed batch by batch (30-50g) into puffing chamber (260-270°C) for puffing on hot sand (rice:sand at 1:4 w/w ratio) for 10-15 min. The puffed beaten rice were removed and separated from sand particles and charred grains were removed by vibrating and rotating in a perforated tray. Maximum recovery of puffed flattened rice as value added product was recorded in the variety Brown gora (58.85%) followed by RR363-36 (58.62%) and Kalyani 2 (58.46%). All the tested varieties, rated intermediate whiteness and straightness appearance. The quality parameters like water absorption and volume expansion were found ranging from 10.89 to 16.69 ml per 10g and 149.40 to 229.05 ml per 100g of the rice product, respectively.

Idli :

Idli and dosai (cakes) are prepared in India from a mixture of parboiled milled rice or broken rice and black gram (*Vigna mung)*, in about 3:1 ratio by weight. Rice and decorticated black gram were separately soaked in water for about 10 hours in 2.2 times by weight of water and then wet-milled separately in a stone mortar and pestle to give a coarse (0.6mm) rice flour and a smooth gelatinous gram paste. The rice and gram paste were mixed and the thick batter was allowed to form overnight in an aluminum pot covered with a lid. Next day morning the fermented batter was turned up and down by a metal spoon to bring homogeneity with 0.8 percent common salt. This process enhanced the taste and nutritive value of food. Required quantity of water was added to the bottom of the idli pot and the batter is poured in the pockets of and steamed for 15 to 20 minutes under lid for complete gelatinization. Brokens from fine grain rice varieties like RR 361 and RR 361-2 were found suitable for making *idli* cakes. Cake's recovery recorded was ranging from 6.00 to 56.66 percent.

Dosai :

Dosai usually contains less black gram and prepared from the thinner batter and made round and thin flattened cakes on a frying pan. Little oil is applied all over the pan before pouring the liquid batter. The ingredients added on it include pre-cooked cashew nut, pepper, ginger, sugar, salt, vegetables and spices to make more flavours. These are added in the middle of the frying cakes. The cake is folded and turned upside down on a hot frying pan during the preparation. The milled rice grains from the rice varieties RR 366-7, RR 361 and RR 361-2 were found suitable for making *dosai* cakes. The rice cultivar RR 366-7 exhibited the highest volume expansion (2528.40ml/10 cakes). Recovery of *dosai* cakes varied within a range of 7.44-62.02 percent.

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