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Enhancement of market price of rice by value addition and entrepreneurship

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■ **Abstract :** India is one of the largest paddy producer in the world. However, hunger is one of the burning problem in India. From the literature survey it was found that plenty of paddy are spoiled due to lack of storage and processing. It is estimated that post-harvest processing of paddy using traditional methods leads upto a 9-12% as primary losses. In order to overcome the processing losses, it needs to mechanize the traditional processing methods like harvesting, threshing, cleaning, grading and milling etc. Mechanization like introducing a combine harvester or mechanical thresher and high quality rice mills may reduce the post-harvest losses. Additionally, the secondary losses of paddy which occurs after milling due to lack of storage, can reduce by adding the value to the rice by producing rice based new product. Value added product such as rice based ready to eat food, ready-made mixes (idli, dosa and rava) noodles and flours may enhance the market value of the rice thereby reduction in losses. Also, by-products of paddy such as rice barn processing may increase the extra income by small investment to the rice bran processing. Rice bran may stabilize and can produce the bran oil. Value addition of rice to different product enhances the original market price of the rice but it needs investment. A small or marginal farmer cannot invest the huge amount of equipment cost for processing. So, for the investment on paddy processing equipment/ machineries an entrepreneur may introduces in paddy processing field. These investments may enhance the income of an entrepreneur or group of farmers. Agreement between an entrepreneur and farmer can fulfil the needs of farmer as well as entrepreneur. In this study various methods of value addition of rice are described as well.

■ **Key words :** Paddy processing, Rice mill, Value addition, Entrepreneurship

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India is one of the largest paddy producer after china in the world which contributes about 20% of the total brown rice production. Paddy crop holds a prime position in India as staple food. In other words, it can be say that paddy production dominants the other food crops in India. Rice (*Oryza sativa* L.) a native to South-East Asia is one of the leading food crops of the world. Rice is predominantly an Asian crop, 95 per cent of it is being produced and consumed in the South-east Asian countries extending from Indo-Pakistan sub-continent to Japan. India has the largest area under paddy in the world and ranks second in the production after China (Anonymous, 2010).

Rice is one of the most important staple food crop in India. The nearly three-fourth population of the country subsists on it. It is grown in India under diverse agro-

climatic conditions including irrigated, upland and lowland conditions. In India, rice production was (*Kharif* + *Rabi*) 101.8 million tons in the year 2012-13 (Anonymous, 2013).

The major constituent of rice is starch which fulfills about 90 per cent of rice in dry weight. Except for edible application, the starch finds its application in food, pharmaceutical, textile, paper industries etc. (Suresh *et al.*, 1999). It is also processed for the production of maltose, dextrose, glucose syrups etc. One may consider the utilization of broken rice in biomass formation, saccharification, ethanolic and acetic fermentation. The broken rice of different locally available rice varieties, which are less preferred or almost not preferred commercially for regular use as staple food, can be used for the ethanol production. From the literature survey it was found that about total 9% losses if processed by traditional method and around 2.27% of total production at producer level. Also, it has been found that post-harvest losses of different agricultural products was 5.2% (2005-07) of the 150 million tones as total production (Kachru, 2010).

In order to overcome the processing losses, it needs to mechanize the traditional post-harvest paddy processing methods like harvesting, threshing, cleaning, grading and milling etc. farm mechanization like introduction of combine harvester or mechanical thresher and high quality rice mills may reduce the post-harvest losses. Additionally, the secondary losses of paddy which occurs after milling can reduce by adding the additional value to the rice by producing rice based new product. Value added product like rice based ready to eat food, ready-made mixes (idli, dosa and rava) noodles and flours may enhance the market value of the rice consequently reduction in losses. Also, value addition of rice increases the export market among the different countries. Paddy processing by product such as rice barn processing may increase the income small investment on their processing. Rice bran may stabilize and can produce the bran oil. Value addition of rice to different product enhances the original market price of the rice but it needs some investment. After paddy harvesting value addition of rice are practiced. However, the farmers are not able to control the losses because a small or marginal farmer cannot invest the huge amount for paddy processing. So, the investment on paddy processing equipment/ machineries may enhance the income of an entrepreneur. Agreement between an entrepreneur and farmer can fulfil the needs of farmer as well as entrepreneur. The major value-added products from rice in almost all the states of India are flaked rice and puffed rice. In addition, many rice-based products are available in different states, including *laiya*, a roasted rice produced in Uttar Pradesh and used on special occasions. Rice in Assam is generally waxy in nature and different traditional products, such as *tilpitha*, *komol chaol*, and *joha* (cooked *joha* rice with pigeon meat is a special preparation in the rural areas of Assam), are consumed. In Punjab *rauh di kheer* (rice cooked for a long time in sugarcane juice) is a special dish. In Tamil Nadu and Kerala rice is consumed as cooked rice, cold rice, and modified products, such as *puttu*, *idli* and *dosa*. In Maharashtra traditional rice products available include *pej* for children, *poha*, *bhadang*, *kurmura*, *papad*, *mirgund*, and *laddu*. The main objective present study was to identify the various value addition methods to enhance the rice market price. Ultimately, the value addition of rice increases the farmer's income and thereby living standard of farmers as well entrepreneurs.

METHODOLOGY

Locally available medium quality raw rice samples (MTU-1010) were purchased in bulk from the local market of Chhattisgarh. After procurement of rice sample initial cleaning and sorting of rice was performed and stored at cool, dry and dark place in airtight sample bag. The methods of value added products are described as follows:

Expanded (Puffed, popped) rice products (Using rice) :

Expanded rice (murmura, pori, muri) is a traditional convenience food widely consumed in India either as such or with Jaggery, roasted Bengal gram and shredded vegetables and spices. The product is mostly produced in home or cottage sector by skilled artisans.

In the traditional process, the paddy is soaked in water preferably over night until saturation, drained and then either steamed or dry roasted in sand for parboiling. The parboiled paddy is milled, salted and again roasted in sand for expansion.

This popular ready to eat snack product is obtained by puffing milled parboiled rice. In the traditional process rice is gently heated on the furnace without sand to reduce the moisture content slightly. It is then mixed with

salt solution and again roasted on furnace in small batches with sand on a strong fire for a few seconds to produce the expanded rice. Rice expands about 8 times retaining the grain shape and is highly porous and crisp.

Parched paddy or puffed rice (using paddy) :

Sun dried paddy is filled in mud jars and is moistened with hot water. After 23 min. the water is decanted and the jars are kept in an inverted position for 8-10 hours.

Next the paddy is exposed to the sun for a short time and then parched in hot sand as in the preparation of parched rice. Puffed rice is prepared by throwing pretreated paddy into sand heated to a high temperature in an iron pan. During parching the grain swell and burst into a soft white product. The parched grains are sieved to remove sand and winnowed to separate the husk.

Parboiled rice is used for making grayish to brilliant white colour parched rice and sold either salted or unsalted. It is eaten as such or mixed with butter milk or milk.

Another traditional value added product prepared from raw paddy. The paddy at a moisture content of 12-14% is directly roasted in iron pans using sand as a medium at a temperature of 150-200ºC. The production of popped rice is comparatively less and the product is mainly used in religious functions and ceremonies.

Puffed rice from parboiled rice :

The rice is soaked in salt water to increase the moisture to about 20%. The moist rice is introduced into a hot vessel at about 250-275 ºC for 30-40 seconds. The rice puffs suddenly.

Flaking :

Flaked rice is another important value added product prepared from paddy. Traditionally, it is prepared from soaked paddy, after heat treatment and immediate flattening using a flaking machine (an edge runner).

Flaked rice is made from parboiled rice. Paddy is soaked in water for 2-3 days to soften the kernel followed by boiling water for a few minutes and the water is drained off. The paddy is heated in a shallow earthen vessel or sand in iron pan till the husks break open. It is pounded by a wooden pestle which flattens the kernel and removes the husk. The husk is separated by winnowing. Flaked rice is thin and papery and of white colour.

Quick cooking rice is made by steeping polished rice in water to a moisture content of 35 per cent, cooking under pressure and drying. Alternatively, the rice may be subjected to freezing, thawing and dehydration.

Derived products :

Polished rice may be precooked and canned as rice pudding and also used to make dry breakfast cereals.

Fermented products based on rice :

Idli :

Idli is a small, white and steamed cake made by bacterial fermentation (12-18 hours) of a thick batter made from rice and dehulled blackgram dhal. Idlies are soft, moist and spongy had a desirable sour flavour. For idli, the rice is coarsely ground and the black gram is finely ground. The soft spongy texture observed in the leavened steamed idli made out of black gram is due to the presence of two components, namely surface active protein (globulin) and an arabinogalactan (polysaccharide) in black gram. The mucilaginous principle of blackgram is identified as arabinogalactan. It is believed that this mucilaginous principle helps in the retention of carbon dioxide during the fermentation of the thick batter and is thus responsible for the soft spongy honey comb texture of the idli. Fermentation brings about physical and chemical changes in the idli batter. With the progress of fermentation there is an increase in batter volume, acidity and non-protein nitrogen.

Dosa :

Dosa is another common fermented product used in India. This is prepared from a fermented batter of rice and pulse in the proportions ranging from 6:1 to 10:1. Both the ingredients are finely ground, unlike in the idli batter which contains the rice component in a coarse consistency. The dosa batter is very thin and dosa is baked on a hot pan. The thickness of a thin pancake depends upon the consistency of the batter. Thin batter gives a thin pancake, although it may stick to the pan.

Dhokla :

Dhokla is a fermented food prepared from rice and bengal gram. This is popular in West India, particularly Gujarat. This is prepared from a batter of coarsely ground rice and bengal gram. The fermented batter is steamed in a pie dish, cut into diamond shape and seasoned.

Alcohol :

Alcohol from rice is produced after saccharification of starch by acids, enzymes (especially, commercial amylase) etc. Produced raw alcohol is a complex mixture of organic and inorganic substances like carbohydrates, proteins, amino acids, ethyl alcohol, organic acids, inorganic acids and micronutrients etc. The quality/ quantity of alcohol depends on the composition of rice. The alcohol quality and quantity differs with rice varieties and also with different yeast strains.

Preparation of extruded products :

Extrusion is a process that combines several unit operation including mixing. kneading, shearing, heating, cooling shaping and forming. It involves compressing and working raw material e.g. Flours, starches, proteins, salt, sugar and other minor ingredients to form a semi solid mass under a variety of controlled conditions and then forcing it to pass through a restricted opening such as a shaped hole or slot at a predetermined rate. Heat is applied directly by steam injection or indirectly through a heated barrel. The final process temperature in the cooking extruder can be high as 200°C but the time of exposure to heat is relatively short (10-60 seconds). The extrusion cooking is also called a high temperature short time (HTST) process.

Extruded products :

Rice based extruded products include sevai, idiappam, murukku (chakli) rice based vadagam etc. Rice based noodles and noodles from fermented rice flour are popular in China and Japan.

Instant mixes :

Preparation of idli mix :

Instant idli mixes eliminate the traditional method of grinding of both the ingredients and the leavening is produced by the action of chemical leavening agents.

Preparation of rice and black gram flours :

The parboiled rice is soaked in water for 5 hours. Then the water is drained completely and dried in solar drier for 5 hrs. The dried rice grounded in a mixie and sieved through BS 36 sieve. Black gram dhal was also ground in a mixie and sieved (BS 36). The rice and black gram flour were dried in a cabinet drier at 80ºC for 2 hrs, cooled and packed in air tight containers till they were used.

Preparation of murukku instant mix :

Raw rice and black gram were ground in a mill separately and sieved through 80 BS sieves and used for the preparation of murukku instant mix. The dough is prepared by the addition of hydrogenated fat 5 g, water and extruded in a hand extruder with 4 mm diameter orifice and fried in the heated oil at 180ºC for 3-5 minutes.

Involvement of entrepreneurship :

As discussed above that value addition of rice is fruitful for the farmer but to achieve the profit they need to aware and train with value addition processes and techniques. Also farmers need to establish the various processing units and government regulations at personal level. Since, most of the farmers are not well educated to think and establish the business strategies. On the other hand, most of the farmers are small or marginal they don't have financial support to invest the huge amount of equipment cost for processing. So, for the farmer awareness, guidance, training and investment for value addition of paddy as well as processing equipment/ machineries, an entrepreneur may play important role. These investments may enhance the income of an entrepreneur as well as a group of farmers and thereby nation. Also, peoples get employment. Agreement between an entrepreneur and farmer can fulfil the needs of farmer as well as entrepreneur.

Conclusion:

The above article shows that the rice is available in abundant quantity in most of states in India. However, the rice producer farmers are not able to gain the actual price of their hard work because of surplus in market at the same time. Lack of storage facilities is another major problem that decreases the actual price of the product. So, in order to deliver basic ideas to farmer for value addition of rice to hike their income. The value addition of rice by making different rice product may enhance the income of rice that may helpful to the farmers to get their fruitful income for hard work.

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