

Prologue

Aromatic rice, since mythological period, has been a pride the people of this subcontinent. From birth to death, in agony or ecstasy, aromatic rice is the part of rituals and delicacy. After a long negligence to the conservation and socialization of aromatic rice, India is now showing a belligerent initiatives for the restoration, multiplication and socialization of aromatic rice . At a point of time , India could cherish the luxury of more than 6 thousand land races of rice, which, now has downs sized to around 5-6 hundred only.....and, this the resultant myopic gene policy followed in green revolution.

Rice has got a rich history of tradition, culture and technology in Asia and other parts of the world. The domestication of wild *oryza* has well been directed by anthropogenic need and intervention since mythological period. The role and contribution of aromatic rice have earned a unique residency in Indian culture.

Since time immemorial aromatic rice has been in cultivation in different agroecological zones of theIndia . The long history of non Basmati type traditional aromatic rice varieties in Bengal has been documented in ancient manuscripts (punthi), district gazetteers, books etc. During last 500 years. Amongst them, Gobindabhog, Tulaipanji, Kalonunia, Radhunipagal, Kataribhog Badshabhog, Radhatilak, etc. are very popular in domestic markets due to their excellent quality features and pleasant aroma.

These local cultivars are being used for preparing scented table rice, *payeshm* (desert) *Bhog*, *polao*, *biryani* and home made cakes (*pitha*). It is estimated that about 2.5-3.0 Lakh tones of premium scented rice is produced every year during kharif season from 90,000-1lakh ha. Land in West Bengal (M.Ghosh, : **Research based Strategic Activities and Glorious achievements under RKVY project on Bengal Aromatic Rice**, BCKV News Letter, January –March, 2017, pp1-4

Rice is a staple food in Asia. Its production is also concentrated in Asia. The ten largest rice producers, namely China, India, Indonesia, Bangladesh, Viet Nam, Myanmar and Thailand are located in Asia. While China and India alone supply nearly half total world rice production, Thailand and Vietnam are the two largest rice exporters (FAOSTAT 2012). In 2009, Thailand and Vietnam exports accounted for 48% of total world milled rice exports (FAOSTAT 2012). Philippines, Saudi Arabia, Malaysia, Cote d'Ivoire, Iran, Iraq, Cameroon, Brazil, Yemen and China are the ten largest importers of milled rice. Although most of largest importers of milled rice in terms of quantity are located in Asia and South Africa, the import values of milled rice in France and United Kingdom are among the largest (the 7th and 10th) in the world (FAOSTAT 2012). The productions and exports of rice from major countries are increasing over time, and more prominently in Vietnam. This is due to the success of rice breeding to improve productivity.

The developments in rice varieties have been focusing on yield improvement to meet with the demand of the poor, particularly in developing countries. The most prominent technology breakthrough is the green revolution of high yielding semi-dwarf rice varieties developed by International Rice Research Institute (IRRI) that has been rapidly adopted in several Asian countries during the 1960s. However, recent rice breeding

programs also aim at improving traits to cope with both biotic stresses such as pest resistant and abiotic stresses such as drought and heat tolerant that become increasingly prominent due to the global warming problems. Nevertheless, because rice producing and exporting countries continue to face more competition from stringent trade regulations and changes in consumers' preferences towards higher quality rice, new developments in rice breeding increasingly emphasize on improving quality. Grain quality is one of the major objectives of national rice breeding programs in countries that are selfsufficient in rice production (Juliano and Duff, 1990). Quality rice varieties are notable by high market price. These varieties receive more attentions in the niche markets such as aromatic rice, low amylose rice (for diabetes), and nutrient enriched rice (i.e. golden rice for vitamin A deficiency). Though market for quality rice might be smaller than regular rice, it could generate high value thus more income for farmers. Among quality attributes of milled rice such as amylose content (AC), gelatinization temperature, gelatinize consistency, kernel length and breadth, shape, size, endosperm, kernel color and kernel elongation, protein content, vitamins and minerals, aromatic attribute receives much attention in the breeding programs recently. This is due to an increasing demand of importing countries towards aromatic rice. Currently, there is still a lack of information on available innovations, for adopters and imitators, and there is insufficient economic analysis to provide policy recommendations for countries interested in promoting aromatic rice research. The objective of this paper is to review recent innovations in aromatic rice varieties. The surveys economic impact studies of recent aromatic rice innovations are discussed. Special attention is on the protection of aromatic rice varieties in the context

of geographical indication under Trade Related Intellectual Property Rights (TRIPS).

Aromatic rice demand and markets Aromatic rice contains several biochemicals, but the most significant one is identified as 2-acetyl-1-pyrroline (2AP). It gives a popcorn-like or pandan (*Pandanus amaryllifolius*)-like odor. In Asia, particularly in Thailand, pandan extract is used in several Thai sweets to add flavor. This pandan-like odor makes aromatic rice highly desirable in particular countries. Aromatic rice is perceived as premium quality in several rice-consuming countries though consumer preferences towards aromatic rice are different in among countries. Aromatic rice fetches high prices in some international markets including South Asia, the Middle East, and particularly India, Pakistan, and Thailand (Kaosa-ard and Juliano, 1992). The Middle Eastern consumers highly prefer long grain, well-milled rice with strong aroma while European consumers prefer long grain rice with no scent. To them, scent indicates spoilage and contamination (Efferson, 1985).

However, recent studies show that European consumers demand for aromatic rice varieties, particularly Basmati, significantly increases since the early 1990s, primarily in the U.K., and expect a further increase in aromatic rice consumption throughout Europe due to increasing number of immigrants from far-east countries and the growing interest in ethnic cuisine (Ferrero and Nguyen, 2004). In Asia, Chinese consumers prefer semi-aromatic rice to pure aromatic rice (Singh et al., 2000); however, Chinese Hong Kong consumers prefer Thai rice for its fragrance with intermediate AC. Thai rice supplied to Hong Kong also is superior (i.e. more carefully selected and milled) than what supplied elsewhere (Kaosa-ard and Juliano, 1992). Damardjati and Oka (1992) found that large proportion of urban

Indonesian consumers, particularly in Medan and Ujung Pandang, preferred aromatic local variety but not necessarily purchased as they had to trade off between quality and price. On the contrary, Philippines consumers do not give preferences to aroma, particularly among medium income group, and only less than one third in the low and high income groups give preferences towards aromatic characteristics (Abansi et al. 1992).

For Indians, aroma is rated the highest desired trait followed by taste and elongation after cooking. The study by Suwannaporn and Linnemann (2008) found that consumers from rice eating countries have higher preferences for Jasmine rice than non-rice-eating countries, and it is most preferred by Thais. The unique texture and aroma gives Jasmine rice from Thailand a perception of expensive quality rice among most Chinese and Taiwanese. Furthermore, the U.S. and Canadian consumers have high preferences for long grain rice, and Jasmine rice is well preferred. Suwansri et al. (2002) also found that Asian American consumers prefer imported Jasmine rice to American grown aromatic rice. Two prominent aromatic rices in the world market include Basmati grown in India and Pakistan, and Khao Dawk Mali or Jasmine rice grown in Thailand. Among rice traded in the world market, aromatic rice (Pakistan Basmati and Jasmine rice--Thai fragrant) has been given the highest value. Table 1 shows that the price of Thai Jasmine rice is nearly double the price of regular Thai white rice while the price of Basmati rice is almost the same and frequently valued higher than Jasmine rice. Jasmine rice is continuously being an important export commodity of Thailand; it generates highest value of exports among all rice export commodities from Thailand. Since 2002 Jasmine rice has accounted for more than 20% in quantity and more than 30% in value of total rice exports from Thailand.

The U.S., Hong Kong, China, Singapore and Côte d'Ivoire are major export markets of Thai Jasmine rice during the past five years. These five export destinations alone hold more than 50% of total Jasmine rice exports from Thailand.

Basmati rice is the major rice exports of India. The export values and quantities of Basmati rice are accounted for almost all rice exports from India. The major export markets of Indian Basmati rice are Saudi Arabia, United Arab Emirates (UAE) and Iran. The exports of Basmati rice to these three countries accounted for more than 70% of total Basmati exports from India . Though exports of Basmati rice from India to Saudi Arabia, UAE, the U.K. and the U.S. have decreased during the past few years, exports to Iran, Kuwait, Yemen Republic, Iraq, Jordan, and Netherland increased dramatically. This implies that not only the Middle Eastern countries have preferences towards Basmati rice, but the preferences seem to increase in the recent years.

Aromatic rice is becoming a cost-effective and beneficial economic source commodity, and having recognised this, the Guyana Rice Development Board (GRDB) is intensifying efforts to produce this variety on a larger scale through collaboration with private farmers, according to Research Scientist, Dr Mahendra Persaud. Dr. Persaud, who is stationed at GRDB's research station, Burma, told the Government Information Agency (GINA) that previous trials were carried out on a number of other rice varieties, but the GRDB decided to go large scale with the production of the aromatic variety.

“We are expanding the production and marketing, and it has been going well. From last season we had around 300 acres in the farmers' fields, and

this current season, harvesting is around 3,000 acres and that is, in collaboration with the millers, destined for export,” Dr Persaud explained.

The reason for exploring aromatic rice production on a larger scale is in response to the demand for specialty rice on the international market. The GRDB has recognised the tremendous financial returns that can be garnered from the exportation of the aromatic rice, the Research Scientist stated.

General Manager of the GRDB, Nizam Hassan said that, “the price being paid for specialty rice was in some cases more than 100 percent of what was being paid for regular white rice, and so that became very attractive. Prices meet as much as \$1200 per ton when it’s being traded globally, so you can see, once Guyana can respond to an increasing demand for specialty rice and get the rice to be grown in larger volumes, larger acres which would mean more tons being produced, then we can tap into the appropriate markets, then we can have economic benefits for the stakeholders.”

In addition to the economic benefits attached, the agency is currently trying to make clear to the local farmers the two main attributes that generally promote the product; its nutty, popcorn flavour and aroma.

He further noted that there is hardly any change in cultivating this crop when compared to growing regular rice. “The fertilizer regime is the same, it’s almost yielding the same as other varieties in Guyana, around 38, 40, 42 (bags per acre), that the farmers have reported, and we have data to back-up, but you could get six or seven tons from the aromatic variety.”

In 2015, the Ministry of Agriculture launched a new line of the aromatic rice variety. The product has already been presented to the international market through surveys, boosting awareness. The Government is currently at the stage of securing export markets for the rice.

Since time immemorial the diversity and glory of scented rice varieties have been known in the society and culture of Bengal. Based on ancient manuscripts (punthi), district gazetteers, books, etc, about 30-35 small and medium-grained aromatic rice cultivars are traditionally cultivated for hundreds of years. It is estimated that about 2.5-3.0 lakh tonnes of premium scented rice is produced every year from 90,000-1,00,000 ha. land in west Bengal during kharif season. Among them, gobindovog, tulaipanji, kalonunia, radhunipagal, kataribhog, radhatilak, badshabhog etc are very popular in domestic markets due to their excellent quality features and pleasant aroma. These rices are usually used for preparation of scented table rice, payesh (desert) bhog, polao, biryani and home-made cakes (pitha).

Rice is very ancient and traditional field crop in India. The Indian Civilization in many way to many direction are in the specific crop through this field crop it not only economically significant for Indian agriculture, this have got the other importance like festivals. It involve custom spiritual at the same time, it involve economic and ecological value. India is to produce a variety of scented rice but due to the impact of the organization and the myopic agricultural appropriate, selection crop variety / indomitable dependent on high-yielding variety this races are lost, eroded or reduce to a very small geographical area. Now a re-socialization process is on that is our work on socialization of scented rice enterprise. It is not only socialization; basically it's a re-socialization to bring this variety back. But any variety or any agricultural enterprise will be successful on why this is attempted to a re visited having the following characters:

1. Economically viable,
2. Ecologically suitable and
3. Cultural compatibility.

The project RKVY on this scented rice making very innovative approach to make this selected scented rice have been socialized and possible-rise among the farmer and 90% of them are small and marginal farmers. For agriculture re-socialization process, it has got jerk, it has got confusion, it has got rejection, it has go adoption in agriculture.

Technology and Socialization

Many a time we make mistake in understanding the differences between concept and commodity, need and devices to meet the need. A bag of fertilizer thus presents some inputs, not the concept of nutrient management for getting desired yield, a tractor, on the other way, is just a machine to harrow the land, not exactly in the concept to get the drudgery eliminated substantially and done the work with less of error.

OBJECTIVE OF THE STUDY

The present study was carried out in some selected place of Nadia district in order to investigate the cognitive process like value towards adoption, rejection, discontinuance and cultural practice like reinvention and several barriers relating to Gobinda Bhog Cultivation. Besides few researches have been conducted on the issue pertaining to technology socialization of scented rice enterprise and factors involved in socialization.

The general objective of this study was to investigate, using literature review and field data collection, the level of socialization among the scented rice growers.

Specific Objectives are:

- To study the background and general status of aromatic rice growers
- To study the perception of Bengal aromatic rice growers to mitigate the problems faced by them.

- To study the process of socialization in terms of two sets of variables (x, & y) operations in complex & polyhedral socialization process.
- To study inter and intra relationship between the sets of interacting variables.
- To generate micro-level policy from the empirical study on these sets of variables as applicable in the proper and effective socialization of scented rice enterprise.
- To study marketing and supply chain Management of aromatic rice