



Basmati 370 of R.S. Pura, Jammu: Preserving a Heritage Rice for Sustainable Agriculture and Global Recognition

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"Basmati 370 is not merely a grain; it is the fragrance of Jammu's soil, the heritage of its farmers, and a legacy worth preserving"

Introduction

Basmati 370 is a special variety of Basmati in the agricultural scenario of Jammu. It is known as 'Purani Basmati' in irrigated sub-tropical plains of R.S. Pura and Suchetgarh locally. Basmati rice is one of the most renowned specialty rice of Indian subcontinent where it is cherished for its specialty-the flavor and fragrance. Its elongated and long grains give it different look, sweet smell, softness and fluffiness rather than common rice. These characteristics have led to high market preference for Basmati, not only in local markets but also in the export markets. The fragrance of the word "Basmati" is an attribute; the unique character of this rice is not just attributable to its genetic properties but to its association with soil, water, climate and growing practices of the traditional growing regions.

Origins and Cultural Heritage of Basmati 370 in Jammu

The origin of Basmati 370 can be traced back to pre-independent period. Pure-line selection for the systematic improvement of Basmati rice was started at Kala Shah Kaku Rice Research Institute, from the erstwhile Punjab province. Basmati 370 is a locally adapted landrace that was released in 1933. The success of pure-line selection in Basmati rice improvement using this variety has made it one of the most successful. The significance of Basmati 370 is not just to produce the crop but to help its development. Several Basmati varieties are its parents and its valuable quality traits have been included in the origin of rice variety. For instance, the varieties of Ranbir Basmati, Haryana Basmati and Kasturi consist of a mixture of the Basmati 370, while also other varieties have Basmati 370 in their parentage (Siddiq *et al.*, 2012). This is a contribution for Basmati improvement which says a lot about the genetic aspect and breeding value of the variety. It has an intimate relationship with the R.S. Pura region which makes it a significant heritage of agriculture in Jammu. The conservation and scientific propagation of Basmati 370 provide a chance to tie together heritage, sustainability and premium market value at a time when farming practices are rapidly evolving towards increased yields and intensive systems. A field study by farmers of R.S. Pura and Suchetgarh has revealed that better taste was regarded as an important factor for the preference of Basmati 370 by all the farmers who were surveyed (Slathia *et al.*, 2018). This is why Basmati

370 is not just another commercial crop, but a legacy of the people who have been growing Basmati for generations and a heritage of the traditional Basmati growing region.

Traditional Cultivation Practices in the R.S. Pura Region

The R.S. Pura and Suchetgarh are some of the large scale Basmati 370 producing region of Jammu district. Income is generated through different crops such as paddy as main crop, wheat crop as a successive crop and berseem and sometimes vegetables in *kharif* (rainy season) as a main crop. The farmers mostly start transplanting Basmati 370 in July. Several studies have been conducted, and it was found that most farmers do transplanting during the second week of July. However, there are gaps in the adoption of improved cultivation practices in traditional cultivation. Only a few farmers used seed treatment and many farmers relied on seed that was saved from the previous season. Nearly all growers used Urea as a source of nitrogen and DAP was widely applied. The traditional production system has a potential for improvement when using quality seeds, seed treatment and proper nutrient management and good crop establishment. It should not be the goal to standardize the traditional aspects of cultivation of Basmati 370, but to reinforce them by appropriate scientific interventions that will lead to an increased productivity and minimize unnecessary expenditures and damage to the grain quality.

Unique Features of Basmati 370

Basmati 370 remains very popular because of its taste and aroma. The traditional Basmati rice is characterized by a long and slender grain, excessive elongation after cooking, soft and fluffy grain and pleasant aroma (Siddiq *et al.*, 2012). But Basmati 370 is not a typical and the variety locally enjoys its popularity thumping against other types due to its taste and fragrance. The one most significant quality attribute of Basmati is

- **Aroma:** basmati is distinct, nutty and sweet-floral fragrance comes from a chemical compound called 2-acetyl-1-pyrroline (2AP). It is found in concentration upto 12 times higher than non-aromatic rice. The signature smell of basmati rice is driven by genetics. Aromatic rice varieties possess recessive mutations (specifically the *OsBadh2* gene) that allow plant to synthesis and store 2AP.
- **Appearance:** It is also important to purify the quality of cooking. Basmati grains are preferred by the consumer as they expand more in length as compared to their width as this creates a finer appearance when cooked. The cooking and eating quality of rice is related to kernel elongation, grain length, amylose content and related starch properties (Chopra, 2019).
- **Profitable:** It is also beneficial for farmers to use the straw of Basmati 370. It was found that over 2/3 of the farmers in R.S. Pura and Suchetgarh believed that Basmati straw is palatable to livestock and have nutritional value (Slathia et al., 2018). Hence, not only will the crop provide grain but also valuable biomass will be available to the mixed crop-livestock enterprise.

Importance to Farmers and the Local Economy

- Basmati 370 is an important source of farm income in its traditional growing belt. High cost returns were also the driver of farms growing Basmati 370 with 85 per cent of the farmers mentioning that this was a reason for growing. The average production the farmers generally achieved was 28.41q/ha. The net return was ₹71,469/ha at the market rates and the calculated benefit cost ratio was 1:2.55. These are study values that reflect the prices and production costs of the period.
- The results of a subsequent study conducted in the Public and Private Sector interventions in Jammu district, also revealed that the Basmati production is closely related to a complex farming network that involves a variety of farmers, government programmes, private enterprises and markets.

- Traditional varieties grown here are highly adapted to local soil. This natural compatibility means farmers use up to 84% less chemical plant protection and 76% fewer chemical fertilizers, keeping upfront production costs lower and profit margin higher.

Basmati 370 and Sustainable Agriculture

Basmati 370 brings a set of properties to the table which make it useful for sustainable agriculture. The farmers surveyed in Jammu attributed this to comparatively less use of chemical fertilizers and plant protection chemicals to the variety. During field study, it has been observed that none of the sampled Basmati 370 farmers applied any insecticide or fungicide in the field. The other way around, Organic nutrient management could be another route toward sustainable production of Basmati. Studies conducted on Basmati rice have indicated that inputs like green leaf manure, vermicompost and neem cake are excellent for improving the soil physical and biological quality as well as enhancing rice yield. (Mahajan *et al.*, 2012). Traditional Basmati rice form a unique valuable quality group as a result of the natural conditions under which are they grown and farmers practice that has formed them throughout a long period of time. Basmati 370 has already been used as a breeder in various breeding programs (Siddiq *et al.*, 2012). One of sustainability is making the best use of farm resources. In the study on R.S. Pura-Suchetgarh, some farmers mentioned they kept their productivity at similar levels when they reduced their use of inputs especially fertilizer. This observation will help to define specific nutrient recommendations, soil testing and balanced fertilization. Use of excess fertilizer should be avoided especially as caused lodging in Basmati 370 (Slathia *et al.*, 2018) by farmers.

Major Challenges

Although Basmati 370 is of high quality, there are some issues related to its production and marketing. It is a taller plant with tendency to spread, commonly lodging in heavy wind or a lack of support before harvesting. The availability of appropriate machinery for transplantations, harvesting and threshing, the instability of canal irrigation and problems associated with irrigation infrastructure also remained significant issues of concern (Slathia *et al.*, 2018). Perhaps another important factor is the quality seed available. Use of seed from the previous crop was high and very few farmers treated the seed. It is possible that problems may arise with varietal purity and seed quality if continuous dependency is relied on and there is no systematic work carried out for the maintenance of the purity. Hence, it is crucial to enhance quality seed production and local seed supply chain. The modern high yielding and semi-dwarf Basmati varieties too compete with the Basmati 370. Traditional varieties of Basmati have been reported to be suffering from various shortcomings like tall architecture, lodging, less yield and less photosensitivity (Siddiq *et al.*, 2012). This, however, would entail loss of unique desirable characteristics and useful germplasm in the complete exchange of them. The challenge is trying to enhance crop management and the farmer's profitability. Instabilities in price may deter farmers and lack of brand value may make it "general" for consumers. Price variations can discourage prospective farmers, and good brand value may not be there for the consumers. Debasement and mixing are more general issues in the trade of the Basmati and recently new DNA based authentication techniques have been developed to check Basmati authenticity and to find admixtures (Siddiq *et al.*, 2012). The premium and export markets are going to rely on traceability and purity assurance more and more.

Future Prospects: From Heritage Grain to Premium Global Product

- The sustainability of Basmati 370 will depend on making its promotion more than just another rice it should be a cultural or heritage rice, linked to a specific scenario of rice production. R.S. Pura has a clear traditional identity of producing Basmati rice and it could be presented as its place-based branding. Authentic Basmati 370 can be differentiated from normal aromatic or mixed rice by means of clear labelling, varietal purity, traceability and quality assurance.

- Another potential opportunity is the production of organic and low chemical products. The current relatively low level use of plant protection chemicals gives a good reference point in the drive agricultural practices and if technically and economically possible, certified organic production. Farmer training, record of farming methods and establishment of organized clusters can help to meet the demands of premium markets.
- Equal attention needs to be paid to value addition. Proper handling of grain can preserve its quality and enhance its appeal to consumers by scientific harvesting, attention to drying, hygienic storage, proper milling, grading and attractive packaging. Additional exposure of the heritage of R.S. Pura Basmati can be achieved by digital platforms and regional stories.
- Research institutions have an important role as well. Location-specific nutrient management, soil testing, better crop establishment, lodging management, water-use efficiency and seed purity should be emphasized. Basmati 370 is a proven traditional Basmati parent which further supports the importance of its long-term conservation for its scientific value.
- Authenticity will be the key to gaining global recognition. Geographical environment is closely related to the quality of basmati and the larger the volume of basmati trade, the more relies on traceability and authentication. An effective and transparent production chain from seed in field to the packaging of the miller can enhance consumer confidence, build a strong premium identity of Basmati 370 from R.S. Pura.

Way Forward

To sustain Basmati 370 and to render it an economically viable option, a concerted effort is needed for this purpose.

- Focus should be on producing and getting available good quality seed, farmer education on seed treatment and management of balanced nutrients, site-specific soil and crop management and practical management to minimize lodging.
- Sustainability of the production system can be enhanced with promotion of good agricultural practices, clusters of organic production as well as efficient water management.
- Equally important is the creation of a strong market identity. Collective branding, scientific post harvest activities, quality testing, traceability, modern packaging and direct contacts with end users from premium markets both at home and internationally can boost farmers' value from their produce.
- The work of the public institutions, research bodies, extension bodies, farmers and private market partners should now be coordinated, otherwise the advantages of heritage branding for the skippers who have been able to maintain this variety for generations would not also benefit them.

Conclusion

Basmati 370 is not merely a plain type of “R.S. Pura” rice, it is a priceless asset of agriculture in Jammu and an essence to conserve the quality traits of “Basmati” rice. It is hard to measure its distinctiveness by yield as it is strongly aromatic, tastefully flavorful and has a great cooking quality while being preferred by local farmers because of its long association with them. Meanwhile, lodging, limited supply of quality seed, market price volatility, mechanization and productivity differences pose a risk to its current production. Instead, it needs to be carefully mixed with traditional knowledge and scientific management. The quality seed combined with balanced nutrition, sustainable production, traceability, value addition and potent regional branding will ensure that this ancient grain can be value-added into a high-perceived value globally recognized premium product. Ensuring its authenticity and maximizing returns to farmers, R.S. Pura can keep contributing to the development of the fragrant heritage of Basmati 370 and food security of Jammu farmers for generations to come.

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