



# Fragrance in the Fields....

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■ The mind-boggling numbers related to India's seed diversity across crops is almost surreal and unbelievable. These varieties were bred by ancestral farmers even before this nation-state was born. These were seeds which were shared between farmers, along with associated knowledge.

Historical evidences indicate that the diversity of seeds in India, like in other countries, was deeply integrated with culture, rituals and knowledge systems. *Charaka Samhita* – an ancient treatise on health and food systems clearly defined the role of variety of seeds/ food in curing certain ailments. Evidences from Chola dynasty period (South of India), Ahom dynasty (Eastern India) period and various other periods of history in different parts of India indicate how the local seed varieties were protected and used by farmers for generations during these times. Rituals of several tribes of India (Santhal; Juang; Gadaba and many others) are inherently connected to their seed diversity. Many rituals in temples across India promoted and nurtured diversity in seeds in those regions. (E.g.: Millet seed kept in Kalasams in the Gopurams of south Indian temples; In Puri Jagannath Temple, the "bhog" given to the deity was reportedly with a different variety of rice each day, throughout the whole year which implies at least 365 different varieties having been used).

Documents and studies during British period and soon after India's Independence also indicate that the yields of traditional seeds were very impressive. For example, in "Food Grains of India" by AH Church (1886), pigeon pea average yield was reported to be 1063 kg/ha, with masoor being 845 kg/ha. This is in fact higher than what modern agriculture with its Green Revolution interventions has achieved on an average.

Some of the traditional varieties of seeds are found to be much better than the modern seeds, in terms of yields and other features. Francis Buchanan Hamilton, who travelled in Madras, Mysore and Canara in 1800-01 reported that 24% of the farmers had paddy yields ranging from 3 to 6 metric tonnes per hectare (Source: A journey from Madras through the counties of Mysore, Canara and Malabar, Francis Buchanan Hamilton, 1807).

Even for a crop like cotton, "A Dictionary of Economic Products of India", Volume 4 of Sir George Watt (1890), reported that across 19 districts of British India, yields ranged from 597 kgs/ha to 1779 kg/ha, while trials of indigenous cotton varieties in Sindh gave yields of 1992 kg/ha. The enduring scholarly work of Dr Dharampal, about the yields of paddy in fertile areas of Chengalpattu region of Tamil Nadu as hovering around 5 to 6 tons per hectare on an average way back in the 1760s, is a reflection of this (Source: Indian Science & Technology in the Eighteenth Century, Dharampal, Other India Press, 2000). In fact, the range of yields was between 2.50 tonnes per hectare to 6.25 tonnes/hectare (Source: Paddy Yields in Pre-Industrial South India, Gautam Pingle, Economic & Political Weekly, Vol.LII No.16, April 22, 2017).

The Krishi Pandit awards given during 1949-1955 reflect the very high yields obtained by practicing farmers using indigenous seed varieties, whether of rice (ranging from 6.9 to 12.8 MT/ha) or wheat (5.4 to 9.4MT/ha). Dr R H Riccharia, former Director of Central Rice Research Institute, Cuttack, had reported 164 folk rice varieties with yields higher than 4 metric tons per hectare from modern day Madhya Pradesh and Chhattisgarh states. 7 varieties had yields above 7 MT/ha, in fact, including from Baster, Jhabua, Jabalpur, Durg and Raipur. (Source: Hamari Dhan Sampada, RH Riccharia, 1971).

These experiences and evidences clearly give a deep insight on the contribution of traditional seeds in enriching rural livelihoods and protecting biodiversity, agriculture and culture. The main question for the current generation farmers, scientists, students, markets and governments is – "is there a need to bring back the rich traditional diversity in seeds? Is it possible to bring back the seed diversity in India? If yes, how?" This is a challenging question. There are limited experiences and efforts to revive the vast diversity of seeds in India, that too outside the civil society sphere of work.

There are answers from Agriculture Training Centre (ATC) Fulia, West Bengal, to this intriguing question. These answers are inspiring and provide a roadmap for reviving the agro-biodiversity of India, through reviving folk varieties. It is interesting to realize that these solutions emerged without much policy or financial support. These experiences indicate that a local institute could seize an opportunity that paved the path towards an interesting and farmer-based solution.

### *Let us visit this ATC, Fulia, which is a "Biodiversity Conservation Farm"*

What makes this story stand out is that this initiative was seeded inside a government department, and its Agriculture Training Centre! There are several ATCs in India; however, what make the ATC Fulia unique are the following features...

- Conserved 427 Folk Rice Varieties (FRV) including 51 scented varieties and also distributed the seeds to interested farmers.
- Provides advisory services to 26 seed centers/users' group across the state.
- Advisory? on organic farming.
- Engages in participatory research including morphological studies.
- Capacity building of farmers and entrepreneurs on organic farming and seed related enterprises.

## **The Forays into FRV Conservation and Multiplication**

- ATC Fulia was established in 1952. Since 2001 onwards, ATC Fulia started working on organic farming at the Centre, with a specific focus on rice. As part of this process, Dr. Anupam Paul - former Assistant Director of Agriculture (Trg), ATC Fulia started conserving 5 FRVs. Soon the ATC team realized the importance of protecting FRVs as this is a fundamental step in organic agriculture. The Center subsequently received 22 FRVs from VRIHI a seed bank established by Dr Debal Deb, Conservationist and ecologist.
- ATC Fulia started efforts to conserve and characterize these seeds in their campus. These efforts made by a team at ATC Fulia in collecting, purifying, multiplying and sharing FRV with interested farmers got recognition from a number of like-minded organizations, farmers and movements that are engaged with agro-diversity.
- Over a period of time, ATC Fulia received FRVs from a variety of sources - farmers and organizations like DRCSK (Kolkata), Sambhav (Odisha), Living Farms (Bhubaneswar), Mr. Jacob Nellithanam of Richharia Campaign of Chhattisgarh, Save Our Rice Campaign of Thanal (Kerala), Sahaja Samrudha (Karnataka) and many more. Many of these efforts also shaped the mandate of ATC eventually. The Department of Agriculture, Government of West Bengal declared the Centre as a "Biodiversity Conservation Farm" in 2006. ATC Fulia stands tall among the numerous other ATCs, which tend to have a business-as-usual attitude, for the unique achievements on the agenda of revival of landraces.

## **Revival of FRVs as a response to agro-diversity erosion**

- The experiences of ATC Fulia provide some innovative solutions to the challenges to diminishing agro-biodiversity in the country. Interestingly, Folk Rice Varieties are at the centre of these solutions. Folk rice varieties are traditional landraces with a range of interesting characters. They have high adaptive potential to a wide range of diverse ecosystems (deep water systems; completely rain-fed systems; uplands and several others), and this is invaluable in the age of climate change. Some of these varieties have much superior performance over modern varieties, especially on marginal lands. They have special traits such as diverse nutraceutical properties, aroma etc. They can ensure long-term yield stability of crops. They are easy to reproduce and maintain at farmer level. These varieties can withstand extreme weather conditions and achieve food security as well.
- Prior to Green Revolution, West Bengal had an estimated 4500 varieties of FRVs, which diminished rapidly in the later decades. In response to some of the ill effects of Green Revolution (biodiversity loss/ seed loss; environmental degradation due to excessive use of chemical inputs; groundwater depletion; increasing cost of cultivation and poor profit? for farmers), ATC Fulia, through its experiments and initiatives demonstrated that reinvigorating heirloom agro-diversity through the collection, conservation, characterization, purification, multiplication and promotion of use of landraces/ FRVs is necessary and is possible. This approach could also demonstrate the process of insulating the production systems from the threat of climate change disaster, and secure a low-cost, eco-friendly and remunerative farming system. Further, it was also demonstrated that several varieties are nutritionally superior. This method could be very useful in future breeding related research that benefit from diverse traits of these FRVs.

## **Diversity brought back by ATC Fulia**

- The number of varieties of FRVs at the ATC Fulia is dynamic, depending on the opportunities that the Centre has, in procuring and maintaining a new variety from any source. During 2018-19, ATC Fulia had a repository of 430 indigenous / location specific Folk Rice Varieties (FRVs). Out of these, around 60 varieties were scented, 31 were suitable for deep water ecosystems; 25 were of short duration; 7 were black rice varieties; 23 were high-yielding and 22 were medium to fine-grained varieties and so on.



## Local Farmers Prefer Folk Rice Varieties – Grooming of Farmer - Entrepreneurs

In the area where ATC Fulia works, local farmers were seen to be cultivating FRVs, and there was a strong preference for the same. Scientists of the Centre could understand and appreciate these reasons and completely agreed with the farmers. As part of their contribution to this agenda, ATC Fulia team started collecting these varieties from a variety of sources (including farmers) and cultivated/ multiplied them in the Centre's campus, to produce purified seeds of the same variety. These purified seeds became part of 'organic agriculture' mandate of the Centre. Interestingly, there was no specific project or fund or budget for this initiative. Within the available funds at the ATC Fulia (funds earmarked for contingencies), the FRV seeds agenda was supported. The trainees who visited the Centre became the agents of change. These farmers who were inspired by the interesting characters of the FRVs, started cultivating them in their own fields. Slowly, the number of these farmers increased. Gradually, ATC Fulia became a center for exchange of traditional seeds and a source of inspiration and support to several farmers, on this agenda.



There was also a recognition that farmers prefer scented varieties of rice. These varieties of rice are used for preparing delicacies during various festivals and rituals. There is a good demand for these varieties at consumer level too. The normal seed markets (private companies/ seed companies) do not sell these varieties as it is not viable in their revenue model. Government departments also do not have any specific scheme/ program on these seeds. Given this situation, ATC Fulia had to respond to this emerging need of the farmers, who prefer to cultivate traditional, scented varieties of rice. The demand for scented varieties was particularly high. Given this situation, ATC Fulia started exploring various ways to meet the needs of emerging markets for FRVs.

Since ATC Fulia is mainly a training center with a mandate of promoting organic agriculture and also supporting agri-entrepreneurs, it decided to address this issue through this route. As a first step, ATC Fulia used all government farms to cultivate FRV seeds, as per the farmers needs. This helped to improve the supply of seeds to some extent, that too by addressing the issue of quality of seeds. About 10 government farms in West Bengal including the farm at SARF (Sub-divisional Adaptive Research Farm), Hanskhali, Nadia are now cultivating FRVs by organic method of cultivation. However, this was not sufficient. ATC Fulia observed that there are farmers who are already supplying seeds to others and the seeds from these farmers are always in demand, due to the quality and trust. Some of these farmers also started growing FRVs, by borrowing some seeds from ATC Fulia. ATC Fulia realized that it is a good strategy to nurture these farmers as informal seed entrepreneurs. This approach paid good dividends as the outreach of these farmers is much wider. ATC Fulia started nurturing these farmers and established 26 enterprises on FRVs of seeds. These enterprises are able to fill the gap in the seed supply system by supplying quality seeds as per local farmers' preference.

## Distribution of Folk Rice Seed and Seedlings (Source: DPR on Folk Rice 2019-2020)

Year of Distribution (Harvest of previous year)	No. of Varieties	No. of farmers
2010	50	56
2011	Drought year	
2012	74	121
2013	126	80
2014	100	40
2015	80	45
2016	120	64
2017	150	80
2018	120	72





In 2015, a small experiment was initiated in Nayagram Block, Jhagram. The idea was to promote tomatoes in a chemical intensive manner but the experiment failed, leading to huge losses. The coming year, the same land was prepared for cultivating 13 varieties of indigenous paddy. Later the same year (2016-17), the local farmers' collective upscaled this project with 2500 farmers mainly with Kerala Sundari and Bahurupi paddy varieties. In 2017, the collective explored how they could sell paddy into the value chain by farmers themselves. They did a small study to understand the value chain. By 2019, they managed to put up a rice mill after collecting necessary funds. In 2020, they managed to sell rice with close to 50 lakh rupees' turnover to different vendors. Farmers involved in the initiative will now be setting up a Producer Company, which is awaiting registration. Meanwhile, close to 5200 women are growing different indigenous varieties in a completely organic way which was achieved through hamlet meetings, campaigning, exposure visits.

### **RKVY Projects for taking forward the agenda**

During Year 2015-16, this agenda got support from RKVY. The project titled *"Folk Rice- Collection, Conservation, Multiplication through Distribution and On-Farm Trial for Popularization among the Farming Community of West Bengal"* under RKVY Normal (P&G) was initiated. With the support of the RKVY project, FRVs are promoted in each district through ATCs in each district of West Bengal. In eleven districts, on-farm trials happened in 209 hectares under this project. Later, this got expanded to ten hectares each, in 15 blocks of 15 districts of West Bengal. Here, the land is used for multiplying locally available FRVs by following scientific methods of purification and organic agriculture. These seeds are further distributed to interested farmers. The support to farmers was in the form of subsidy @ 7500 Rs/hectares for on-farm trial (mainly for seeds, bio inputs). When the RKVY project ended in 2020, resources started flowing from the state plan. Meanwhile, the Directorate of Agriculture initiated a separate scheme on promotion of aromatic rice under RKVY, which started in 2017. Here, the state Seeds Corporation is also involved, for promoting Badshahbhog and Govindabhog.







## ■ Some of the challenges related to promotion of FRVs are

- Absence of processing facilities for FRVs at small scale;
- Unable to harness the latent demand (particularly for scented varieties) due to the absence of marketing facilities;
- Government departments/ agencies do not support any action related to FRVs (except distribution of Govindbhog and Badshahbhog on a small scale) and this could be related to lack of SOPs and protocols for the same;
- FRV seeds are still not available in open market as the traders do not find it profitable to sell them;
- State government gives priority to only limited varieties of FRVs (mainly scented varieties) and all other varieties are ignored;
- Production of FRV seeds following organic agriculture protocols;
- Post-harvest storage is a challenge in several places.

Despite all the above challenges, ATC Fulia, which is basically an academic and training institution, tried to propagate the use of FRVs by adopting numerous methodologies. Some of them include:

- Awareness generation through meetings, workshops and mass campaigns on the importance of FRVs.
- Using any emerging opportunities for back-end supply, identification of area and farmers.
- Collaborative initiative with the health department, which was ready to patronize and promote medicinal and nutraceutical properties of folk rice varieties.
- Proximate analysis of folk rice varieties including nutritive values like antioxidants, micro-nutrients like Fe, Zn, Ag, Vit B Complex and Glycemic Index.
- Characterization of folk rice varieties and participatory research with farmers.
- Exploration of marketing linkage with the Agriculture Marketing Department of Government of West Bengal, APEDA etc.

It is clear that more and more state governments should adopt the pioneering path taken by ATC Fulia, and the West Bengal government to reviving folk rice varieties and other traditional varieties, especially in the age of climate change.

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