Folk Rice Diversity in West Bengal: Conserving this Neglected Treasure

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Replacing region-specific, salt-tolerant Folk Rice Varieties (FRVs) with Modern Varieties (MVs) of rice was a costly mistake because it became clear that the MVs could not survive in the marginal environmental conditions. By reintroducing FRVs, efforts are being made to regain the time-tested wisdom of traditional practices and the local population

There are some reports that say that there were once more than 5,000 region-specific, indigenous varieties of rice in West Bengal, and the erstwhile Province of Bengal had as many as 10,000 varieties. Studying our old scattered scriptures and literature in vernacular and in Sanskrit, Sir William Wilson Hunter (1840–1900), a Scottish historian, statistician and an ICS officer, was the first to document 556 rice varieties in Jalpaiguri, Nadia and Malda districts alone in his famous book in 20 volumes—A Statistical Account of Bengal (1875–79). Later, many others have contributed to this seemingly incomplete documentation.

According to a report of the National Bureau of Plant Genetic Resources (2007–08), more than 82,700 varieties of rice were selected and cultivated by farmers in the Indian subcontinent. These varieties were selected and developed from a single crop species of rice called the *oryza sativa* by our visionary forefathers, to meet the food security of future generations. Both their contribution and their vision remain unacknowledged.

British text books on agriculture and files on the economic policies of the then government described the cultivated crop varieties as 'indigenous crop varieties' or 'native crops', investing them with a negative connotation that has continued in post-Raj writings, with the media coverage also favouring mainstream agriculture and suggesting that native crops do not have the potential to feed India's teeming millions.

Apart from the untapped yield potentialities and nutrition, the traditional crop varieties are part and parcel of regional culture of the food habits of the people and their rituals. The loss of these varieties is equivalent of the loss of folklore.

These forgotten varieties are often called land races, native varieties or heirloom varieties, inherited from our forefathers, and are synonymous with the livelihood, culture and rituals of Indian farmers. Therefore, instead of using the term native/ indigenous/land races crops (seemingly a derogatory word), it would be better to use to the term 'folk crops' and such rice may be called Folk Rice Varieties (FRVs).

Farmer-selected crop varieties are not only adapted to local soil and climatic conditions, but are also fine-tuned to diverse local ecological conditions and cultural preferences

Surprisingly, even 10 per cent of this indigenous wealth has not been evaluated, in terms of nutrition, grain-yield and suitability in marginal lands that are drought prone or flood prone. A leading rice scientist, Dr. Radhelal Harelal Richharia of the Central Rice Research Institute, Cuttack, raised questions about the effectiveness of the Japonica varieties in Indian soil and spoke about the spread of pests and diseases in the Indica varieties. His report from the 1960s remains obfuscated.

Each variety is unique with a specific character: disease resistant, high flood and drought tolerant, high grain-yielder, aroma and such others. Farmer-selected crop varieties are not only adapted to local soil and climatic conditions, but are also fine-tuned to diverse local ecological conditions and cultural preferences (Deb 2009). For example, the Kalonunia and the Chamarmani varieties are blast-resistant. The low-lying areas are replete with flood-tolerant varieties. A wide genetic base provides a 'built-in insurance' (Harlan 1992) against crop pests, pathogens and climatic vagaries.

Myth of High Yielding Varieties (HYVs)

In order to combat the perceived threat of famine in the mid-sixties, the concept of crossing Japanese varieties—Japonia (*oryza sativa* var. japonica)—with India rice varieties—Indica (*oryza sativa* var. indica), came into being. The varieties developed out of such crossing were short-statured, fertilizer responsive, bold-seeded, short-strawed, had no dormancy, and had a substantial grain-yield. These were High Yielding Varieties (HYVs) called TN1, IR 50, 20, etc. Subsequently, many HYVs replaced these and more HYVs came into the market, in the name of certified seeds. During the initial years of the Green Revolution, these miracle seeds out-performed FRVs in plain lands, where the farmers could purchase certified chemical fertilizers, pesticides and do other inter-cultural operations. Nearly 600 HYVs were so developed by crossing the indica and the japonica or a selection from the cross. Of these, only four or five HYVs are popular in each state.

The HYVs, however, do not give a high grain-yield everywhere, especially in marginal lands such as flood-, drought-and saline-prone areas, rendering the abbreviation HYV inappropriate. They can at best be called the Modern Varieties (MVs). The average grain-yield of the most popular HYV—MTU 7029 has plummeted from 5.5 tonnes to 4.5 tonnes per ha despite heavy application of fertilizers, pesticides and certified seeds from the market. The grain-yield of any of the indigenous varieties, meanwhile, has remained the same.

Ever since the devastation caused by the hurricane Aila on 25 May 2009, the farmers of the Sundarbans have been searching desperately for true salt-tolerant indigenous rice varieties, able to withstand saline fields—something they used to grow earlier.

Over the past 25 years, farmers have introduced MVs of rice, replacing the region-specific, salt-tolerant rice varieties and have supported the plantation with the erection of high embankments around the saline rivers because they believed that they would produce miracles. With the passage of time, they realized the severe drawbacks of the miracle seeds because it became clear that MVs could not survive in marginal environmental conditions.

The farmers have been lured into growing MVs and offered subsidized fertilizers, pesticides and pump-sets. They have been made to believe that planting these seeds was the only option if they wanted to increase grain-yield to combat the perceived threat of famine

Traditional crop varieties are often recorded to have out-yielded MVs in marginal environmental conditions (Cleveland et al.2000). Aila came as an eye-opener, showing that local varieties, depending on the availability of seeds of folk varieties, are the best suited in marginal conditions. Salt-tolerant varieties such as the Matla, Hamilton and American mota have vanished from farmers' fields whereas nearly 150 FRVs are extant in the fields of West Bengal.

The farmers have been lured into growing MVs along with subsidized fertilizers, pesticides and pump-sets. They have been made to believe that planting these seeds was the only option if they wanted to increase grain-yield to combat the perceived threat of famine. They were never told about the potential of region-specific, indigenous, HYVs and the possible damage and long-term negative effects of agro-chemicals such as depletion of ground water. Nor were they told about the rising cost of cultivation of MVs.

Following good yields in the initial years of the Green Revolution, MVs experienced a decline, despite heavy application of agro-chemicals and use of costly MV seeds. Meanwhile, some 5,000 or more FRVs became extinct from farmers' fields. Thus, chemical-intensive agriculture has not only expunged the local crop's genetic diversities but also that of their wild relatives, which are the only source of unique genes for disease and pest resistance (Deb 2005).

The fundamental question is: Are FRVs really low yielders? There should have been comparative yield studies conducted between FRVs and MVs in the same land situations. For example, mainstream agriculturists consider grain-yield of the folk variety Asanliya in the undulating drought-prone area of Purulia district (marginal lands) poor in comparison to the grain-yield of MVs in the plain lands of Burdwan district with all chemical fertilizers, pesticides and irrigation. There were comparisons of the grain-yield but not of the total productivity of the rice fields and the collateral advantages of growing folk varieties. The low-lying areas with deep water paddy spawn fish naturally, along with grain and straw while the dwarf paddy straw of MVs is of little value and there is no question of growing fish and snail in the fertilizer and pesticide-laden rice fields of MVs.

ROLE OF AGRICULTURAL TRAINING CENTRE, FULIA, NADIA, IN POPULARIZING FRVS

The Bio-diversity Conservation Farm under the Agricultural Training Centre (ATC), Fulia, West Bengal, has been conducting studies for the last 15 years. All FRVs were grown through Single Plant Transplanting, SPT, (See Table 1). Apart from grain-yield, FRV gives substantial amounts of palatable straw needed for fodder and for thatching roofs. These are ignored in mainstream agriculture and farmers have never been encouraged to grow high-yielding

FRVs known to exist in a few government farms or in farmers' fields.

Crop diversity, as a distinctive characteristic of organic farming, is adequately emphasized at the Centre. The Centre is the state's only organic farm; it has issued an advisory that folk rice has less nutrient requirement as compared to the modern input responsive varieties.

Often, women leaders expressed their inability to explain to the others adequately about gender, especially when they were cross-questioned. This was made even more difficult because this 'new concept of equality' was immoral for the women

- Soil management through sustained release of organic matter. Green manuring and composting are the basic techniques for this purpose.
- Pyra cropping (in which pulse crops are broadcasted 15 days prior to the harvest of the paddy crop) with Lathyrus is practised after *kharif* and green manuring with Dhaicha in alternate years.
- Studies on soil micro-flora in addition to the NPK content has been undertaken over the years, in collaboration with the State Soil Testing Laboratory, Tollygunj, and Bidhan Chandra Krishi Viswavidyalaya (BCKV) State Agricultural University (SAU).
- Bio-fertilizers and the use of azolla are prioritized, aiming at providing plant nutrition and making the soil biologically active.

The sandy loam farm soil has low phosphate (48 kg) and potassium (90 kg/ha) but the soil microbes (colony-forming units) and saprozoic nematodes are very high. These are essential to organic farming and give good growth and disease and pest-free yield. The soil's organic carbon in some plots are in the range of 0.65–0.8 per cent. The soil's microbial population studies have been undertaken on demonstration plots, in collaboration with Soil Test Crop Response (STCR) of BCKV and the findings are encouraging and supportive of making the soil biologically active.

The Centre used cattle manure, bio-fertilizer, oil cake, ash of rice mill, molasses and rice-flour during the initial years of organic farming. Based on the soil's organic carbon percentage and the colony-forming units of fungus and bacteria, it started reducing organic inputs in a phased manner. The Centre could have stopped using organic inputs much earlier; it stopped using cattle manure, liquid manure, etc., in 2012, and introduced floating azolla in the rice fields with spectacular results. There was profuse growth with tillering as a result of Single Plant Transplanting (SPT). The year-wise input reduction for farmers is given in Table 1.

Farmers need to convert their fields to biologically active ones different from chemically active ones. Gradually, chemical fertilizers are withdrawn and the amount of organic matter increased. At the same time, the appropriate FRVs need to be cultivated because these varieties give good grain and straw (and fish in some cases) yield without the application of chemical fertilizers and pesticides. However, the application of organic matter is only a part of organic farming. After three or four years, farmers may get a substantial yield.

ATC Fulia grows FRVs, using only floating azolla; it gives eight kg Nitrogen and 100 kg of biomass/bight in four-and-a-half months. One to two kilograms of azolla are allowed to float for 25 days after FRVs are transplanted. It covers the field for seven days in half-inch of water and controls weeds also. The year-

Table 1: Grain-yield and Duration of FRVs are Not Inferior to MVs

Varieties	Yield (Tonnes/ha)	Duration (Days)	Remarks
Kerala Sundari	5–6	132	All FRVs are being grown with organic inputs only. The yield can be achieved in biologically active soil. Fifteen-day-old seedlings have been transplanted singly (Single Plant Transplanting). However, yield is dependent on many factors. The weight of some single panicles of Kerala Sundari and Meghana Dambaru was 14 gm. The Kerala Sundari is a selection from Purulia district, West Bengal, and Meghana Dambaru is from Jharkhand. Adansilpa, being scented rice, gives the highest grain-yield and Kalabhat also gives a good yield.
Bahurupi	4.5–5.5	138	
Kabirajsal	4	140	
Asit Kalma	4	140	
Rabansal	5	142	
Agniban	4	138	
Shatia	3.5	85	
Kesabsal	4.5	140	
Meghnadambaru	4.5	145	
Radhatilak (scented)	3		
Adansilpa (scented)	4	142	
Kalabhat (scented)	3.5	142	
Dudheswar (fine, small grain)	3.2	142	
MV- MTU-7029	4.5–5	132	Grown with chemical inputs. The grain-yield data collected from the farmers' fields of Odisha and WB
Hybrid KRH-2	3–5.5	128	

wise application of inputs for a *bigha* of land (one *bigha* is equal to 1/7.5th of a hectare) is in Table 2.

In the 4th year of Folk Rice cultivation, the farmer will have to incur minimal expenses for inputs; and thus, organic farming would make

Table 2: Requirement of Organic Inputs Per Bigha (33 decimals)

Inputs	First Year	Second Year	Third Year	Fourth Year
Cattle manure	1000 kg	1000 kg	1000 kg	500–600 kg
Bio-fertilizers	500 gm	500 gm	500 gm	0 kg
Rock phosphate/Dolomite	25 kg	25 kg	15 kg	0 kg
Rice mill ash	50 kg	50 kg	25 kg	0 kg
Neem cake (if possible)	50kg	50kg	25kg	0kg
Rice flour + Molasses	4+4 kg	4+4 kg	4+4kg	2+2 kg
Liquid manure (panchya gavya)	4 times	4 times	3 times	Once
Azolla (no cost)	2 kg	2kg	2 kg	2kg

some profit. Depending upon the availability, the quantity of organic inputs may be adjusted. Green manuring may be done on the fields, prior to planting or transplanting and a jute crop (organic) may be planted after. Incorporation of the pulse crop is a must. This system of building a biologically active soil is jeopardized if a farmer applies chemical fertilizer in his fields and shifts the standard cropping programme for such a system. When the field is not suitable for the floating azolla, a farmer may opt for up-land paddy such as Shatia, Pari, Para and Zini. However, in many pockets of the Sundarbans, farmers have no scope for using any external inputs, be it chemical fertilizers or organic manure. This particular agro-ecosystem gives sustainable yields for years together.

The data indicate that MVs have already replaced most FRVs in the farmers' fields. Farmers were not made aware of the efficiency of FRVs—its grain-yield, nutrition, straw-yield and fish-cum-paddy culture, especially in marginal lands

The use of azolla as a cover crop to suppress weed growth has been made obligatory and has given amazing results. The Centre also uses liquid manure to control disease and insects. However, FRVs are resistant to pest and disease attack. The main problems of FRVs are rice bugs, the red breasted munia bird and rats. Liquid manure, citronella oil, etc., are effective in controlling rice bugs.

COVERAGE OF FRVS

There is no specific published data on the coverage of FRVs. The figures have been collected from various sources. The data indicate that MVs have already replaced most FRVs in the farmers' fields. Farmers

Table 3: Average Coverage of Rice in West Bengal

Season	Normal Area (Lakh ha)	Remarks
AUS (pre-*kharif*)	2 (approximately)	Earlier with FRVs, now it is mostly with MVs; the area is declining due to inadequate pre-monsoon showers, increase in cultivation of maize, vegetables, etc.
Aman (*kharif*)	40–42 (approximately)	More than 90 per cent area covered by MVs in all the districts. Owing to heavy rain in 2015, many blocks suffered initially.
FRV (non-aromatic fine and bold)	37,000 ha (approximately)	Major areas: South and North 24 Parganas, Purba Medinipur, Howrah, Jalpaiguri, Cooch Behar, Uttar and Dakshin Dinajpur
FRV (aromatic)	91,250 ha (approximately)	Major areas: Burdwan, Birbhum, Bankura, South and North 24 Parganas, Uttar Dinajpur, Jalpaiguri, Cooch Behar, Paschim Medinipur
Boro (summer)	To be covered 14	The department does not encourage use of Boro.

Primary Source: Department of Agriculture, Government of West Bengal

were not made aware of the efficiency of FRVs—its grain-yield, nutrition, straw-yield and fish-cum-paddy culture, especially in marginal lands. MVs with chemical fertilizers, it was propagated, could augment yields with no question of agronomic manipulation to increase the grain-yield such as by single seedling planting, etc. Owing to the disuse of FRVs, these are no longer available in the farmers' fields and the farmers have no choice but to cultivate MVs along with purchased seeds, fertilizers and pesticides. Cornered, farmers have started to raise questions about the efficacy of MVs regarding the grain-yield and the cost of production.

Table 4: Some FRVs So Far Extant in Farmers' Fields of West Bengal

Varieties	Districts	Area (in ha) (Approximately)	Remarks
Kaltura, SM, Jirasari, Sanu-ad-dhee	Hill regions of Darjeeling	80	Scented rice
Kalonunia, Kalojira	Jalpaiguri, Cooch Behar	700	Scented rice
Tulaipanji, Kataribhog	Uttar and Dakshin Dinajpur	6,000	Scented rice
Gobindobhog, Badshabhog (*khas dhan*) and Sitabhog	Burdwan, Birbhum, Bankura, South and North 24 Parganas, Hooghly and other districts	75,000	Popular scented rice, Gobindobhog and Badshabhog are usually called *khas*. Burdwan district has major coverage.
Asanliya, Bhutmuri,	Purulia, Bankura	50	Non-scented, bold rice. Bhutmuri is a red rice.
Kerala Sundari,	Purulia, Burdwan North 24 Parganas, Hooghly	400	Non-scented, bold rice, good yielder: 5–6t/ha. Sagar Island of South 24 Parganas has good coverage.
Bahurupi	North 24 Parganas, Burdwan, Hooghly, Howrah, Nadia	100	Non-scented, bold rice, good yielder: 5 t/ha. Hingalgunj block of North 24 Parganas and Burdwan has good coverage.
Kabirajsal, Chamarmani	Medinipur, Nadia	50	Good for daily cooking
Dudheswar	South 24 Parganas and North 24 Parganas	35,000	Small grain, fine rice
Moulo, Jamainaru	Howrah	35	Daily cooking
Kaminibhog, Kankchur	Sundarbans area of North 24 Parganas	85	Bold scented, used as parboiled rice

Varieties	Districts	Area (in ha) (Approximately)	Remarks
Koijhuri, Gheus, Khejurchari, Marichsal	North and South 24 Parganas	550	Daily cooking, *muri* (puffed rice), *panta* (water soaked rice), etc.
Radhatilak	North 24 Parganas, Hooghly, Nadia, Bankura, Purba Medinipur and Burdwan	50	Scented, gives more yield than Gobindobhog, good adaptability
Total		1,18,100	

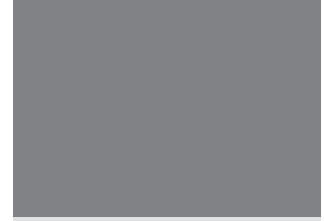
Besides the areas mentioned in Table 4, other FRVs are still sporadically cultivated in West Bengal. These include: Kaloboro in Fulia of Santipur block in Nadia; Dorangi, Sabita, Patnai in South 24 Parganas and North 24 Parganas; Dharial, Malsira, Pakri in Jalpaiguri; Talmugur, Hogla, Hamai, Malabati, Katarangi, Kumragore, Lilabati, Moulo, Lalgetu, Getu, Sadagetu and such like in the Sundarbans area; Kalabhat in Burdwan, Howrah, Bankura, South 24 Parganas, Uttar Dinajpur and others; Kalma, Raniakanda in Howrah; Laghu in Murshidabad; Sungibaran in Birbhum, Bhasamanik, in Murshidabad, Paschim and Purba Medinipur; Sada Chenga, Nagra Patnai and Salkele in Nadia; Kankhri and Kankhuria in Purba Medinipur; Tulsimanjari, Radhunipagal and Laghusal in Birbhum.

SEED AS A COMMODITY

Prior to the Green Revolution, the farmers used to exchange seeds among themselves and thus managed to conserve thousands of region-specific varieties through cultivation. Since the Green Revolution, seeds have become a commodity, like any other marketable product being sold by the agro-input dealers. Farmers will never think of exchanging poor quality seeds with the neighbouring farmers. On the contrary, a section of seed dealers sell non-seeds or spurious seeds to customers—the farmers.

There was no dearth of seeds during the pre-Green Revolution period because farmers knew about seed production and preservation techniques. Moreover, the earlier crop of seeds was not a marketable commodity to be sold in the market. With the externalization of agricultural inputs in the name of the Green Revolution, farmers do not feel like taking the burden of seed production and preservation because everything is available in the market. Therefore, the input-intensive mode of agricultural production has quashed all natural principles of crop and seed production.

West Bengal's rice seed requirement for Aus, Aman and Boro is around 98,000 tonnes and the state produces nearly 70,000 tonnes per year. The remaining 28,000 tonnes come from outside the state. The total cost of seeds is around Rs 245 crores (98,000 tonnes x Rs 25,000 tonnes). There could be savings of Rs 122.5 crores (half of Rs 245) if the area under FRV were to be increased by 50 per cent of the total rice area. Moreover, one will not need to



Farmers often talk about higher yields with MVs but the cost of production remains an untold story

replace seeds every three years like MVs; it can be continued over thousands of years, provided the seed production and conservation techniques are properly maintained. It is worth mentioning that scented varieties such as Kalanamak and Basmati are more than 2,500 years old and still in vogue.

Cost reduction is a major challenge in agriculture, especially for those who resort to chemical farming. Organic farming gives an opportunity to reduce the cost of cultivation and, thereby, enhances the farmer's ecological and financial income.

COST-BENEFIT RATIO OF FRV VS. MV AND THE HYBRID

Farmers often talk about higher yields with MVs but the cost of production remains an untold story. If the cost is compared to the sale price, a farmer can understand the cost-benefit ratio. Often, farmers lament over the rising cost of production and the problems of proper marketing. In many places, other than zero or low input areas, the cultivation of MV rice is not remunerative.

The data for Table 5 were collected by the Development Research Communication and Services Centre, Kolkata, in 2014, from the farmers. The data show that Dudheswar and Kerala Sundari gave the best cost-benefit ratio of 1:77 and 1:44, respectively. The cost of cultivation in the southern part of Bengal is cheaper than in Nadia. On an average, the cost of cultivation in Hingalgunj (Sundarbans) area is around Rs 18,750 per ha because farmers did not have inter-culture or use any input (organic or chemical), thereby, getting economic and biological profit (soil is enriched) whereas the cost of production is minimized.

Table 5: Cultivation Cost of Different Rice Varieties in Different Blocks of Sundarbans (2014)

Variety	Yd t/ha	Cost/ ha (Rs)	Sale (Rs)	Profit (Rs)	Cost-Benefit Ratio	Blocks of South 24 Parganas and *North 24 Parganas, WB	Remarks
Bahurupi	3.9	27570/	43432/	15862/	0.57	Sagar Island	FRV after flood
Kerala Sundari	5.78	23700/	57983/	34283/	1.44	Sagar Island	FRV after flood
Dudheswar	2.78	19840/	55147/	35307/	1.77	Patharpratima	FRV
Gobindobhog	2.0	23850/	50925/	27075/	1.13	Patharpratima	FRV
Kejhurchari	4.0	18750/	40000/	21250/	1.13	Hingalgunj	FRV
CR 1010	4.2	19500	42000/	22500	1.13	Hingalgunj*	MV
IET 4786	4.5	50200/	60925/	10725/	0.21	Falta	MV-Boro
PAC 835	7.56	65112/	108037/	42925	0.65	Mathurapur	Hybrid
Arise 6444	7.5	83175/	105750/	22575/	0.27	Falta	Hybrid

CONSERVATION INITIATIVES FOR FRVS IN WEST BENGAL

The Rice Research Station, Chuchura (Chinsurah), of West Bengal started rice conservation in the 1930s; by the 1960s, it had more than 3,500 FRVs that were donated to International Rice Research Institute (IRRI), Philippines. The Centre selected many improved rice varieties from the folk rice and, at present, has more than 300 FRVs. It also distributes FRVs among farmers. The Rice Research Station published a book on 60 FRVs in 1962 (Recommended varieties of paddy for West Bengal, Directorate of Agriculture, Government of West Bengal) and, after about 46 years, in 2008, the Centre published another book on 467 FRVs, giving some major characteristics of the varieties (The Rice Bio-diversity in West Bengal, Directorate of Agriculture, Government of West Bengal, 2008).

More than 380 farmers have received FRVs from the Centre and, over the years, these have reached more than 600 farmers indirectly

Inspired by the works of Vrihi in Bankura, the Agriculture Training Centre, Fulia, started the conservation of folk rice in 2001. The Centre was declared a Bio-diversity Conservation Farm by the Directorate of Agriculture in 2006. Initially, the Centre collected 22 varieties from VRIHI and other FRVs from different organizations and individuals, namely, Development Research Communication and Services Centre, Kolkata, Swanirvar of Baduria, North 24 Parganas, farmers from across the state, Sambhab of Odisha, Thanal of Kerala, Sahaja Samrudha of Bangalore, Swala (Mr. Soumik Banerjee) of Jharkhand, Nagaland, Assam and Maharashtra.

More than 380 farmers have received FRVs from the Centre and, over the years, these have reached more than 600 farmers indirectly. Many universities are taking the folk varieties for various studies—morphological, DNA finger printing, in estimating vitamin B complex, proteins and minerals. Agricultural universities such as Bidhan Chandra Krishi Viswavidyala, and Viswa Bharati of Santiniketan have taken 30 and 55 varieties, respectively, from the Centre.

Six state government farms have started conserving FRVs by accessing folk rice seeds from the Centre. This year (2016), the Centre, under the directives of the Directorate of Agriculture, West Bengal, has taken up the entire Hanskahli Farm, Nadia district, one of the government'v farms, for growing folk rice on more than five acres of land. Other government farms are coming forward to grow FRVs as well. The Centre has also taken the initiative for proximate analysis of FRVs from leading research institutes of India.

Table 6: Folk Rice Seed Distribution from ATC Fulia from 2010 to 2015

Year of Production	Year of Distribution	No of Varieties Distributed	No of Recipient Farmers
2009	2010	50	56
2010	2011	Year of severe drought	Only panicles were collected
2011	2012	74	121
2012	2013	126	80
2013	2014	100	40
2014	2015	80	66

The Centre has set a record in Indian agriculture in folk seed distribution in a year. The Centre also revaluates the varietal characters and shares the experience of crop growth and the documented results showing the potential with the farmers. It also gives advisory services on organic farming to 26 FRV conservation units across the state.

Of 320 FRVs transplanted during 2015 *kharif*, 51 varieties were scented, 21 were deep water, 25 were short duration, 23 were high yielding (4–6tonnes/ha) and 24 were medium to fine-grained varieties. Additionally, there were some special rice—red and black—tolerant varieties of rice such as Kalavat, double-grained (Jugal), seeds with an extension of empty glumes (Ramigelli), deep water and salt tolerant varieties. The Centre has published leaflets and booklets on folk rice in Bengali, English and Hindi. The Science Monitor programme of the Rajya Sabha Television documented and telecast the FRV conservation work of the Centre. (http://www.youtube.Com/playlist?ListPLVOgwA_DIG2PD3_1z7j

The Department of Agriculture sanctioned a new scheme in 2015 under the Production & Growth of RKVY XIIth Plan called "Folk rice—collection, conservation, multiplication through distribution and on-farm trial for popularization among the farming community of West Bengal." This scheme is the first of its kind in India. The Centre is actively engaged in 11 earmarked districts of the state. The Directorate of Agriculture, WB, has also issued a notice to grow folk rice in organic mode in an acre of land in each government farm.

Kolkata's Bose Institute maintained 150 folk rice varieties at its Madhyamgram farm for DNA finger-printing and other research purposes, of which DNA finger-printing and other biochemical studies have been done for 100 varieties. The Faculty of Agriculture, University of Kolkata, has 150 FRVs and DNA finger-printing has been done for 47 varieties.

OTHER NON-GOVERNMENTAL ORGANIZATIONS WORKING ON FRVS

VRIHI: (www.basudha.org), a farmers' organization, in its true sense, was established in 1998 by ecologist Dr. Debal Deb with Navadanya of New Delhi at Basudha of Bankura district with Arun Ram, Amalendu Mukherjee and Nirmal Mahata. It has characterized 416 FRVs in detail (vide Seeds of Tradition, Seeds of Future, Navdanya, New Delhi, 2005). This book is the first of its kind, with detailed characterization on folk rice in West Bengal and in India. It established the largest non-governmental seed exchange centre in eastern India. At present, it conserves 1050 FRVs at Kerandiguda village, Bissamcuttack block, Roygada district, Odisha.

There are other organizations and individual farmer's efforts too. Farmers or farmers' organizations, which realize the intrinsic value of FRVs, started cultivating them. They generate awareness among the farmers because they cultivate and distribute it among the neighbouring farmers. They are the informal User's group of ATC Fulia

There are many more such farmers, who conserve FRVs.

Such conservation activities have drawn the attention of the authorities in recent times. These could be in terms of pro-active policies or opposing harmful ones like the promulgations at the WTO meets and Indo-American Knowledge Initiative (AKI). Millions of farmers interests have been hit by attractive advertisements by MNCs. There are also those who have stood up to the onslaught of

Table 7: A Representative List of Users group

No.	Name of Farmers, NGOs, Farmers'Clubs	No. of FRVs (Approximately)	Remarks
1	Development Research Communication and Services Centre, (DRCSC) Kolkata, and its different sister organizations—in Purbo Medinipur, Purulia, and South 24 Parganas North 24 Parganas districts.	135	Swanirvar, Kajla Janakalyan Samity Working for 15 years
2	Vivekananda Institute of Biotechnology, Nimpith, South 24 Parganas	20	3 years
3	Paschim Sridhar Kati Jana Kalyan Sangha, Hingalgunj, North 24 Parganas	400	7 years
4	Jagannath Das, Sramajibi Samonoy Committee, Taki N 24 Parganas	22	2 years
5	Pranabendu Das, Mamudpur, N 24 Parganas	36	6 years
6	Avra Chakraborty of the Richharia Conservation Centre and Jionkathi Burdwan	350	10 years
7	Naryan Chandra Bachar, Bajitpur. N 24 Parganas	22 +	18 years
8	Dr Amulya Mitra Farmers Club, Cooch Behar I Block	14	2 years
9	Kartick Chatterjee of Ausgram II Block. Burdwan	50	8 years
10	Syed Arafat Ali, Galsi, Burdwan	26	5 years
11	Bhairab Saini of Panchal, Bankura	124	10 years
12	Sri Sudhansu Dey of Patharpratima, S 24 Parganas	50	4 years
13	Kamal Halder, Falta, S 24 Parganas	25	4 years
14	Tapan Adhikari, Chanditala, Hooghly	14	6 years
15	FIAM of Raigunj, Uttar Dinajpur	42	5 years
16	Himadri Sekhar Maity , Shyampur, Howrah	14	4 years
17	Sadhan Samanta, Panskura, Purba Medinipur	12	4 years

corporate agriculture and have endeavoured to do something for conserving bio-resources and safeguarding the interest of millions of resource poor peasants.

There are conflicts. Conflicts of interest and the rapid spread of MVs or hybrids have underpinned the corporate/MNC interest. This is where public authorities can play a role in conserving India's rich agro-diversity. A synergy of these two pro-farmers' forces can bolster the movement as a movement of the common people.

The Ministry of Law and Justice, Government of India, has enacted the Bio-diversity Act 2002. Most states have Bio-diversity Boards to monitor, document and promote bio-diversity

conservation for India's food security. Even farmers have come forward to conserve the folk crop varieties. Seed festivals are being organized all over India to promote folk crops highlighting the critical role they play with regard to crop bio-diversity, food security, taste and aroma, nutritional qualities, medicinal values, region specificity and eco-friendliness.

The references for this article are available on request from newsreach@pradan.net