Seed Sovereignty: Empowering Farmers

SAYANI BHATTACHARYA

Going back to using indigenous seeds and growing indigenous paddy after realizing the short-term and long-term advantages of these over HYVs, farmers are beginning to reclaim their power to decide what they want to sow and grow because they can better appreciate their own local context and needs

"Control oil and you control nations; control food and you control the people," said US Secretary of State, Henry Kissinger in the 1970s.

Seeds are one of the most critical inputs in farming. Until recently, when they began moving away from the traditional ways of farming, farmers have always saved seeds from their own produce. There has really been no distinction between specialized seed production and regular crop production. With changing times, spurred by an active policy and legal, technological and market-based orchestrations, farmers have, gradually, become dependent on seeds initially supplied by government agencies, and later sold by private companies.

Farmers, who have been traditional seed breeders, selectors and seed keepers, are reaching a stage at which they have, to some extent, lost and are fast losing their skills, knowledge and the habit of saving seeds and making a selection. This is egged on by targets fixed by the state departments of Agriculture, which pursue a 'Seeds Replacement Rate' policy, with an aim to prevent farmers from re-using their own seeds.

This is eroding the rich genetic diversity that India's farmers have evolved over centuries, adapting to the many growing conditions and use. Thousands of varieties of paddy and hundreds of varieties of pulses, which provided diverse nutrient requirements and met diverse growing conditions, have disappeared, and have paved the way for a handful of varieties bred extensively for a 'higher yield'. This has landed the farmers and the consumers in a sad state of perpetual dependency on the seed industry not only for the purchase of seeds but also their food choices. This has had direct implications on the farmers' income security (because the prices of seeds have grown exponentially), food and nutrition security, and their decision-making abilities.

SEED SOVEREIGNTY

The idea of seed sovereignty means that the seed saver(s), or small farmers, have the power to decide the kind of seeds that are appropriate for their growing conditions, and they have the freedom to decide what they want to grow and sow because they are in a better position to appreciate the local context and needs.

Saving and selecting one's own seeds is also about keeping innovation relevant and rooted in the ground

Covered under this are the following aspects related to seeds: time availability, diversity, good quality and suitability, affordability to the point of non-monetization accountability, and open source and communitarian approach. Further, this extends to understanding, appreciating and upholding the various characteristics of specific seed varieties beyond just the 'yield' potential.

Saving and selecting one's own seeds is also about keeping innovation relevant and rooted in the ground. For that, seed saver(s), or farmers who are developing the seed varieties, must have an unrestrained and adequate access to germplasm and planting material from all possible sources in the formal or the informal sectors. It is also about ensuring that the knowledge holders, particularly women, get due recognition and their capabilities as generators of new knowledge are supported and enhanced.

PARASWADA TEAM

The Paraswada team of PRADAN was started in 2008. The team is currently working in two blocks, namely, Paraswada and Lamta, with Scheduled Tribes (STs)—the Gond, the Particularly Vulnerable Tribal Groups (PVTG)—the Baiga, and the Other Backward Castes (OBC)—the Pawar, the Marhar and the Ahir communities. The outreach is 7,435 families in 150 villages. The area has about 52 per cent forest cover with an undulating terrain. Low accessibility and widespread poverty are the characteristic features of the villages with which PRADAN is engaged. The average land-holding of the community is about 1.5 acres.

The team has been exploring and implementing organic practices in patches since 2009. However, traditional chemical practices, especially in paddy-based interventions, were generally promoted. In vegetable intervention, the approach was more in tune with the organic way because it was already being practised in this area. Based on the outcome of these experimentations in different villages, the team made a change in its approach to agriculture, with a complete shift in focus to the organic process and to promoting Non Pesticide Management (NPM) and indigenous seeds.

PROMOTING INDIGENOUS PADDY IN PARASWADA

Indigenous paddy has been a major focus of the PRADAN team for the past three years. In 2014, 19 different paddy varieties were procured from Baihar and Birsa blocks. Indigenous paddy seeds, on the brink of extinction in the area, were reintroduced by farmers. Indigenous seeds are available for every type of land. PRADAN's team members visited and attended several trainings in Phulia, West Bengal, and Sambhav, Orissa, to increase their awareness and understanding of this activity, and managed to collect 52 different seed varieties from different states.

EXPERIMENTING IN DIVERSITY BLOCK

To multiply and save seeds collected from various places, a diversity block was created, wherein all 52 indigenous varieties were grown in a single plot. It was also an experiment

to study the potential of indigenous paddy with various characteristics. This was done in Rajkumar Choudhry's plot, a farmer of Lotmara village in the Paraswada block of Balaghat district. All 52 varieties were grown in this diversity block, of which 23 were local varieties and 29 were arranged from West Bengal, Chhattisgarh and Odisha.

The 52 varieties of seeds were collected from various farmers from different workshops and melas. The seeds were in a melange form, which had to be separated on the basis of minute characteristics such as colour, size and fine lines. These characteristics were so minute that a magnifying glass had to be used to distinguish one variety from another. Some of the panicles were more than a year old and only 3-4 seeds germinated. Of the indigenous varieties, MD, the *safed luchai* and the *pili luchai* were planted in plots of 15, 7 and 20 decimals, respectively whereas the rest of the varieties were planted in single or double rows.

For the nursery, a chart was prepared indicating the number of seeds and the position of each variety in the nursery bed, for ease of marking the varieties during transplantation. Germination of different varieties differed widely due to the quality of the seeds. Although paddy is self-pollinated and has only a one per cent chance of cross-pollination, for maintaining the purity of the seeds it had to be ensured that the varieties with the same flowering dates not be in adjacent lines in SRI.

This being the initial attempt, there was no data of flowering dates; varieties were planted randomly (ideally varieties with flowering dates varying +/- 7 days should be planted adjacent to each other). The plot where the experiment was done was a medium rain-fed land with a pond nearby; the pond had only limited use because it dried up due to extensive drought in the area. After transplanting, the land was totally dry for around 25 days because there was no rain. Later during monsoon, water from the pond was used twice for irrigation.

METHOD OF TRANSPLANTATION IN THE DIVERSITY BLOCK

For transplantation, the SRI method was used with the help of marked ropes. During transplantation, the same chart was maintained as in the nursery, for positioning the seedlings. The age of the indigenous paddy varied from 60 to 140 days. The early varieties such as *sathiya* were sown directly. The age of the seedlings at transplantation was 20 to 25 days; it should ideally have been 10–12 days. Indigenous varieties are photo-sensitive; so they were not much affected by such conditions, unlike hybrid seeds, which have a very low capacity to withstand weather variations such as drought. Each indigenous variety is unique, with specific characteristics: disease-resistant, drought-tolerant, high grain yielder, aroma and such others.

PRACTICES INVOLVED

The demonstration plot was totally organic, with timely doses of *jeevamrit* (compost), *matkakhaad* (organic fertilizer cum pesticide prepared in an earthen pot) being used. For manure, *jeevamrit* and *matkakhaad* were used from time to time. Preventive pest management was carried out by regular spraying of *neemkaada*, *agniastra* and cow urine; neem oil was used for critical attacks. Several other organic pest management techniques were initiated—using the fumes of dried chilli and neem leaves to drive insects away or soaking neem leaves in cow urine fortnightly and spraying the mixture after diluting it with water. Sticky traps (glue-based traps for pest control) were also used by placing them at equal distances. Timely weeding was done with the help of a weeder.

CHARACTERIZATION OF THE SEEDS

The team documented the paddy characteristics, which included crop duration, number of tillers, prominent pest attacks, flowering date, leaf alignment, etc. There were around 28 characteristics to be studied after harvesting. However, owing to the large number of varieties and the lack of time, the study of the sample size varied from 28 to 52 for different characteristics. Table 1 shows the variety-wise characteristic details of indigenous paddy.

Table 1: Characteristics and Details of Indigenous Paddy Seeds

No.	Variety	Duration in Days	Estimated Grain kg/ sq m	Mean No. of Effective Tillers Per Hill (Minimum 3 to 5 Hills)	Pest Attacks	Disease Incidents	Mean Panicle Density
1	Badal phool	100–110	0.4	17	very low	No	180
2	Bhaduchinga	100–110	3.0	12	very low	No	140
3	Pandri	110–120	4.0	15	No	Gallmidge	155
4	Kakedi	100–110	3.2	14	No	No	145
5	Chipra	100–110	3.0	12	No	No	135
6	Uraibhutta	120–130	4.0	15	Shoot borer	Gallmidge	150
7	Gurmuthiya	130–135	4.4	17	Shoot borer	Gallmidge	306
8	Rudrani	140–150	4.0	15	No	Gallmidge, Falsesmut	345
9	Parmal	140–150	4.5	17	No	No	300
10	Suikata	130–135	4.9	20	Shoot borer	Gallmidge	210
11	MD	140–150	5.0	21	No	Gallmidge	250
12	Janki	130–135	4.0	22	No	No	290
13	Safri	140–150	4.4	18	Shoot borer	Gallmidge	275
14	Trishul	130–135	3.6	20	Very low	Gallmidge	300
15	Arebaba	135–145	4.0	14	Shoot borer	Gallmidge	280
16	Khada	135–145	3.5	14	No	No	285
17	Chindikapoor	130–135	3.0	25	Shoot borer	Gallmidge	332
18	Safed Luchai badi	150–160	5.0	20	Shoot borer	Gallmidge	302
19	Padma	135–145	4.8	10	No	No	235

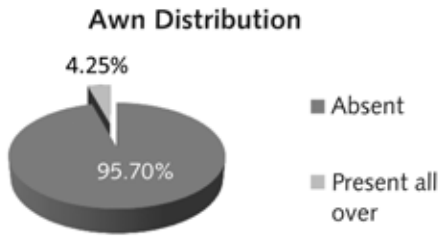
No.	Variety	Duration in Days	Estimated Grain kg/ sq m	Mean No. of Effective Tillers Per Hill (Minimum 3 to 5 Hills)	Pest Attacks	Disease Incidents	Mean Panicle Density
20	Kalbhairav	155–165	4.4	12	No	Gallmidge	240
21	Hathi	155–165	4.2	15	No	Gallmidge	201
22	Bahurupi	155–165	4.2	16	No	Gallmidge	215
23	Ramrekha	120–130	3.5	12	No	No	198
24	Jeerashankar	135–145	2.6	13	Shoot borer	Gallmidge	315
25	Jeera phool	150–160	2.8	15	No	NA	345
26	Bhajna	145–155	4.1	20	Shoot borer	NA	350
27	Asanchuri	145–155	2.9	21	Shoot borer	NA	250
28	Samledubhog	145–155	4.0	17	Shoot borer	NA	315
29	Kalajeera	155–165	2.9	10	No	NA	302
30	Nageshwar	155–165	2.9	12	No	NA	315
31	Safed Luchai Chhoti	110–120	3.9	20	Shoot borer	NA	260
32	Ganesh	100–110	4.2	12	No	NA	210
33	Hariya	155–165	3.5	12	No	NA	185
34	Tulsi Dash	155–165	2.6	11	No	NA	235
35	Sushma	155–165	5.1	18	Shoot borer	NA	325
36	Ramrupi	130–140	5.9	18	No	NA	305
37	Bastabhog		3.5	20	No	NA	348
38	Pandu	130–135	4.9	16	No	NA	248
39	Rajbhog	130–140	5.9	22	No	NA	325
40	Monyakartik	NA	3.5	13	No	NA	237
41	Bhata makdi	NA	3.4	14	No	NA	250
42	Chudi	NA	3.8	16	No	NA	347
43	Baigni churi	NA	3.7	19	No	NA	297
44	Bamleshwari	NA	3.8	18	No	NA	307

No.	Variety	Duration in Days	Estimated Grain kg/ sq m	Mean No. of Effective Tillers Per Hill (Minimum 3 to 5 Hills)	Pest Attacks	Disease Incidents	Mean Panicle Density
45	Pili luchai	135–140	5.1	22	Shoot borer	NA	395
46	Dubraj	145–155	4.9	20	Shoot borer	NA	285
47	Sathiya	60–70	0.5	NA	NA	NA	NA
48	Piso	130–140	4.7	NA	NA	NA	NA
49	Culcher big	NA	4.9	NA	NA	NA	NA
50	Poorva	NA	4.9	NA	NA	NA	NA
51	Orma	NA	2.0	NA	NA	NA	NA

A few important characteristics are:

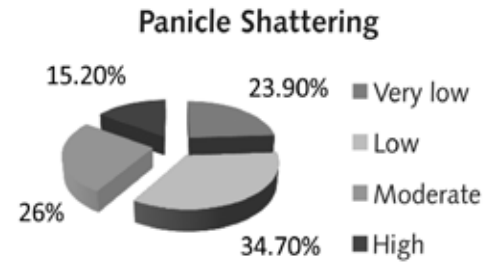
(a) Awn: A stiff bristle, especially one of those growing from flower of grasses (filiform extension of the keel of the lemma). Locally, this is known as *mooch* or *kata*. Birds or monkeys cannot eat this variety because the awns get stuck in the throat. Awns also help in the natural dispersion of seeds

Figure 1: Awn Distribution in Percentage (Sample size: 47)



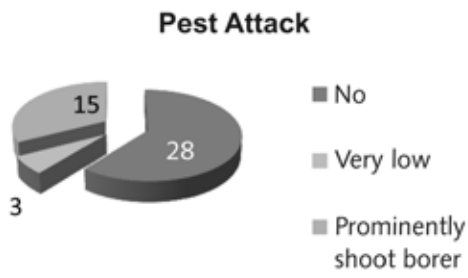
(b) Panicle Shattering: Panicle shattering is the extent to which the grains shatter from the panicle at maturity. Wild paddy shatters very easily. Its purpose is to produce more paddy naturally. Once the plant matures, the grains just scatter. Therefore, the belief is that an indigenous variety shatters easily. The degree of shattering was measured for 46 varieties.

Figure 2: Panicle Shattering in Percentage (Sample size: 46)



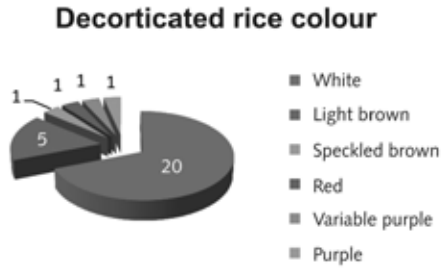
(c) Incidents of disease: Of the 28 varieties studied, nine varieties were disease-resistant, 15 had the gall midge pest and only the rudrani variety showed the appearance of loose smut. To study pest attacks, we kept a regular watch on the plot for diseases and insect attacks. We examined the plot at intervals of two to three days to keep track of plant health.

Figure 3: Pest Attack (Sample size: 46)



(d) Decorticated rice colour: The colour of the rice is also an important characteristic. It indicates the nutritional properties of the grain. Brown rice is rich in fibre and anti-oxidants; black rice is anti-carcinogenic. The colour helps distinguish the nutritional properties of paddy. It is related to anthocyanin, carotenoids and other major elements that determine nutrition.

Figure 4: Decorticated Rice Colour in Numbers (Sample size: 29)



(e) Straw: The straw of the indigenous paddy is more in quantity than that of the hybrid paddy. The productivity of the MDH, *safed luchai* and *pili luchai* varied from 35 to 36 quintals per acre. The straw yield of the other varieties was calculated in kilogrammes per square kilometre because there were single lines and varied from 0.7 to 0.9 kg per sq km. Straw is used for feeding cattle because it is good for cattle health. Unlike hybrid paddy, the straw of the indigenous paddy is very strong and can be used for making ropes and mats, grain storage structures and for thatching the roofs of houses.

PRODUCTIVITY OF INDIGENOUS VARIETIES

The diversity plot recently became completely organic. In the previous years, there was a mixed use of organic manure and fertilizer doses. In spite of the drought year, the productivity of MD, *safed luchai* and *pili luchai* were 20.4, 20.4 and 20.8 quintals per acre, respectively. Of the 52 varieties, these three varieties were planted in a larger area of 15, 7 and 20 decimals of land, respectively, whereas the rest of the varieties were in single lines and the methodology of output was 1x1 sq m for single-line varieties.

STORAGE IN SEED BANK

After harvesting, the seeds were stored in earthen pots and covered with earthen lids, not merely for conservation but also for distribution among farmers.

Figure 5: Seed Bank

FARMERS' PREFERENCE FOR INDIGENOUS PADDY

Individual and group discussions were conducted with the farmers opting for indigenous seeds. Below is a summary of the reasons given during the discussions for choosing indigenous paddy. The questions included: What makes you still use indigenous seeds? What are the advantages of indigenous seeds?

the promotion of indigenous varieties under SRI management will not only bring in food and nutritional security but could also reduce the cost of cultivation, excessive dependency on markets for inputs, and make farming more sustainable and less hazardous

REASONS

Some of the reasons for preferring indigenous paddy were:

- Indigenous seeds are good for the soil, for human consumption as well as for animals.
- Indigenous seeds, especially the piso variety, are the root of the Gond tribe's existence. The seeds have a high cultural value and are used in rituals and marriages.
- Indigenous seeds have a lower cost of cultivation due to less reliance on external inputs (in terms of seeds, fertilizers, pesticides, irrigation and labour).
- Indigenous paddy is more tolerant of weather vagaries such as droughts.
- Indigenous paddy is flexible to varied timings and practices, and is adaptable to changing environments.
- Indigenous paddy has resistance to and has low incidents of pests and diseases.
- There is possibility of re-using the seeds over long periods.
- Indigenous paddy rejuvenates soil and water quality.
- The scented/fine/unpolished rice of the indigenous varieties receives higher price in the market.
- Different varieties can be chosen and can be grown according to the land type and climatic conditions.
- Indigenous varieties are usually more nutritional and have a better flavour, appearance and texture, as well as better cooking (grain elongation) and keeping qualities compared to modern varieties. This is one of the primary reasons given for cultivating indigenous varieties. Some of the rice varieties are also used in rituals and for making food during fasting, etc.

LEARNING

In view of the above points, the promotion of indigenous varieties under SRI management will not only bring in food and nutritional security but could also reduce the cost of cultivation, excessive dependency on markets for inputs, and make farming more sustainable and less hazardous. Indigenous varieties under SRI conditions give excellent results. If planted using improved techniques, there are fewer chances of lodging. Moreover, indigenous seeds are photo-sensitive, can easily adapt to changing weather conditions, and the seedlings can be transplanted after 12–15 days.

In spite of these advantages, our farmers have shifted to HYVs from indigenous because government policy demands so. Every year, Seed Replacement Rate (SRR) is a major target and a higher number in the SRR indicates 'good growth' in agriculture.

Table 2: Seed Replacement Rate (SRR) for principal crops in India

Paddy	33%
Wheat	25%
Maize	50%
Sorghum	26%
Pearl millet	63%
Cotton	100%

CHALLENGES

Some varieties were adulterated; so, after germination, the changes were visible when kulchur large turned out to be kulchur small, which is a short-duration variety; it went into fruiting stage with water still fully lodged in the fields. But this was managed efficiently by the professionals and the farmers.

Some farmers did not keep seeds for subsequent years, probably because of the lack of understanding of the importance of indigenous seeds among the farmers. Further discussions revealed that the provision of seeds meant they were beneficiaries and farmers expected to receive seeds every year.

Seeds were distributed to farmers randomly last year (2015). After harvesting, three or four farmers sold the chindikapur variety to the local shops at a very low rate.

Along with the seed distribution, we realized that knowledge needed to be enhanced; the next year (2016), we changed our strategy. Some farmers were given a fistful of seeds after the training on seeds production, and small amounts of each variety was made available in each village so that in the coming years, farmers have different variety of seeds and can exchange these within the village.

Due to the increase in height, there is lodging. In the visits to other farms and villages and through demonstration, we learned that if the SRI technique is used, there is zero or very limited lodging.

SOME EXPERIENCES OF FARMERS

- Raj Kumari *didi* of Salhe village sowed both hybrid and *pili luchai* seeds. Due to drought, the hybrid seeds nursery dried up whereas the *pili luchai* had good growth in the same land. All the indigenous varieties were grown under organic conditions and these plots had low or minimum pest attack as compared to other adjacent plots, which had varieties such as the 2355, 21P31, and were attacked by shoot borers and gall midge. Indigenous seeds are pest-resistant and disease-tolerant. If preventive measures are taken, disease control is very easy. These diseases are variety specific because preventive measures were applied in all varieties and some showed no incidents of diseases and some had gall midge and shoot borers. Some indigenous varieties, especially the scented ones, are prone to pest attacks and their market value is very high. For example, jeera shankar is a scented variety, very prone to diseases and the market value is Rs 150 per kg.
- Seeing the delayed rainfall, some farmers searched for drought-tolerant, indigenous varieties—something that they had grown earlier. They managed to get some from the interior blocks of Balaghat.
- Some farmers said, *"Deshi dhan uncha hone ke karan khar daba deta hain* (Due to the height of indigenous paddy, it doesn't let the weeds grow)." Years back,

there were weeds such as gangarwa, machliraan, gunjri, shawa, chichwi, etc. (the leaves of which were small and thin and their height varied from half-a-foot to one foot. The height also varied according to the availability of water). At that time, the paddy was planted with gaps of four to six inches. Due to the height of the paddy, which varied from four to five feet, weeds did not grow. Also earlier, the weeds lasted for shorter period, and these automatically got mixed in the soil when the paddy was at the harvesting stage. Today, weeds have broader leaves, are new to the area, spread very easily and are low in height, and the branches spread out and act as roots wherever they meet the soil. These weeds are difficult to be controlled by indigenous paddy.

A seed mela was organized with the objective of creating a platform for farmers, where they could exchange, share or sell the indigenous variety seeds, according to their convenience

SEED *MELA*

A seed *mela* was organized with the objective of creating a platform for farmers, where they could exchange, share or sell the indigenous variety seeds, according to their convenience. The mela was organized in five locations around Paraswada, covering all nearby geographical locations. It was organized in Chandna, Dora, Khurmundi, Boda and Paraswada. Of these, Paraswada had the biggest *mela* because it was a block-level event. Farmers, especially women, brought seeds and sold them at rates that they decided, based on the quality. The participants, in each event, varied from 100 to 1,500. Indigenous seeds, which had been on the verge of extinction, were once again back in high demand so much so that the supply fell short.

A discussion took place among a group of men in the *mela* about why farmers should practice organic farming and why they should use indigenous seeds. Dwarka *didi* led the discussion, not only challenging the idea of chemical and hybrid but also breaking the idea that decision-making and knowledge about agriculture is the domain of men. This was expanded on a large scale in Paraswada when the women farmers shared their experiences on stage, motivating people to move to organic and indigenous farming. Chandravati *didi*, Dwarka *didi*, Vimla *didi*, Chainbati *didi*, Draupati *didi* and Sarita *didi* all spoke about their experiences with organic and indigenous farming and began a discussion to trigger its practice on a large scale. The idea that women should bring their seeds to share them with those, who do not have any, was also introduced during the discussion.

WAY AHEAD

This year, we are planning on creating a diversity block of vegetables and millets. Vegetables undergo cross-pollination so it is slightly more difficult to maintain their purity; however, it is possible by maintaining some strict conditions during pollination. More seed banks are planned in potential Clusters with more diversity blocks to increase the availability of seeds and also increase the number of seed keepers.