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Inside

More Production and Better Livelihoods with Unhealthy, Undernourished and Fatigued Workforce? Rethink.

SABARMATEE

Expecting high productivity and gains without paying attention to or improving the working conditions and health of the women labouring in the rice fields is a foolhardy and narrow perspective of development and social practice; without supporting and nurturing the latter, the former is bound to dwindle.

During 2011–12, I was doing my field work in three villages of Odisha for my doctoral work related to labour issues in SRI. These villages were located in three different districts, with diverse agro-ecological features, (coastal plain, hilly and mountainous areas), ethnicity, labour use practices, and rice-growing practices. PRADAN has been working in one of those villages.

When I went to the villages, I noticed that the agricultural workforce was greying and comprised of more women, especially in the rice-growing areas. In my study, I focussed essentially on women from small and marginal farming households and landless women, who work in their family farms or on leased farms or in others' farms, for wage or exchange.

In this article, I discuss the condition of women rice-field workers in the Odisha villages that I visited and my experiences in Sambhav as a trainer and a practitioner of organic farming, researcher and development worker. I was aware of the condition of women engaged in rice farming earlier; and I gained more insights into their lives during my research work and systematic investigation.

Whether SRI uses more labour or less and how labour is one of the major constraints in the adoption and expansion of SRI has been dominating discussions, both academic and non-academic, related to labour issues. Most farmers and extension workers agree that production can be enhanced by following SRI principles.

As I started interacting with more and more people during the study period, many more aspects attracted my attention. For instance, often women rice-field workers expressed that they experience less drudgery and pain in SRI. And yet, they said that they were not able to follow SRI principles in most of their plots.

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If that is the case, my question is, "Have the extension agencies taken note of this and tried to address the constraints that people face in trying to follow SRI principles in more plots?" 'Weather' was cited as one of the important factors to be reckoned with. Again I questioned, "When they are able to practice SRI successfully in a few plots in the same weather conditions, why not in the others?" These questions prompted me to investigate the reluctance in adopting SRI practices on a large scale from a labourers' perspective, especially women labourers' and the extension workers' perspectives.

I assume that readers of *NewsReach* are already familiar with the idea of SRI because it has been discussed here many times. However, in brief, the basic idea of SRI is that the production potential of rice is enhanced if younger seedlings (preferably at the two-leaf stage) are planted singly with wider spacing (preferably at a distance of 25 cm from plant to plant and from row to row) in non-flooded conditions. The plants too have to be managed differently. The faster growth of weeds in this method needs more frequent management (preferably every 10–15 days for 3–4 times) and preferably mechanically. All these activities, especially the transplanting and the weeding have to be done in time in order to harvest the maximum benefits. Therein lies the biggest challenge of practising SRI, that is, managing the timely mobilization of labour.

In most societies, transplanting and weeding are operations mainly done by women. We must acknowledge that a majority of the women, who work in the rice fields, are malnourished, have more work as well as high diseases burden making them fatigued during that period. This affects their performance and the timeliness of operations, which later will potentially impact the yield. How can we use new technologies to help improve the well-being of our workforce? How can we invest in improving their working conditions? Not much has been thought about this aspect. The fact is that this women's workforce actually invests their bodies to produce our food and other crops. This body capital, instead of getting enriched, degenerates over the years due to natural biological reasons and also because of the nature of their work, their work environment and their living conditions.

WORK AND WORK ENVIRONMENT IN RICE FARMING

Growing rice is physically very demanding. During my research, I learned that, traditionally, women work for around 1,000 to 1500 hours per ha, in activities such as removal, transportation and transplantation of seedlings and weeding. This is in addition to their household work and community work. The work on the farms is mostly done in a bent posture, in wet, hot and humid conditions, primarily in muddy fields, exposing the farmers to agro-chemicals (wherever chemicals are applied). They also have to walk many miles and carry heavy bundles of seedlings and weeds. They do all these work with their bare hands except for, maybe, a small hand hoe

for weeding in non-flooded up-lands. They use a sickle or a knife for harvesting.

Working in typically flooded rice fields is very different from working in non-flooded conditions of other crops. Some up-land/highland rice plots are a little different because there may not be standing water in those fields. No other crop is usually cultivated in such muddy, slushy conditions. The burden of such work and the work environment is borne mostly by women and they remain in such an environment for long periods—six to eight hours or more a day for two to four months. The other work also done by women are taking care of seeds, applying compost in rice fields, removal of weeds in the nursery, harvesting rice and complete post-harvest activities.

Additionally, women's work includes caring for domestic animals and birds, making manure, cleaning sheds and sometimes grazing farm animals. They are involved in economic activities such as the collection and processing of forest produce, managing small businesses, growing other non-rice crops, observing rice-related and other rituals and so on. Adolescent girls contribute by helping their mothers. Besides this, the women carry out many other household activities including child bearing and rearing, and community work, which is often non-negotiable. They spend a lot of energy doing all of this work.

The inconvenient truth is that the women work with a fatigued body to produce food. Unless we calculate every aspect of their work, we will never be able to understand the nature and volume of the work women do on an average, in general, and during the rice season, in particular.

If these women workers fall sick, they cannot work on those days; even if they do go to work, they do not perform optimally

Diseases

In many rice-growing belts, incidents of diseases rise during the wet rice season because of the rise in the population of hematophagous (blood-sucking) vectors and causal organisms that thrive in the wet and humid environment. Many people suffer from diseases such as malaria, intestinal diseases such as worm infestation, typhoid, diarrhoea, jaundice, cold, cough, fever and various types of skin diseases and so on. Sometimes, they also suffer from injuries while working in the fields. Moreover, due to the work pressure and working in a bent posture in flooded fields for many hours for many days, often women suffer from musculo-skeletal disorders (temporary and chronic joint and muscle pain) and gynaecological problems. They work and live with that pain. Delayed or untimely eating, and skipping meals is routine. All such diseases or health problems have their implications on the overall work performance.

If these women workers fall sick, they cannot work on those days; even if they do go to work, they do not perform optimally. When they themselves and their family members do not pay immediate attention to their health problems, such diseases often become complicated and later create multiple problems. If a family member gets sick, the women, as care-givers, often absent themselves from work. Additionally, they spend money on travel to health-care centres and on food, both for the patient and the attendant(s), on medicines and various pathological tests. Often, they spend their savings, sell or mortgage assets or crops, or borrow money to meet all these expenses.

From the pass-books of women SHG members, it is clear that health is the most frequent reason for the women borrowing money and, even more so, during the rice season. Women are found borrowing both from non-institutional sources and from institutional or formal sources.

In some villages, women borrow money for health care but give other reasons, which they mentioned during interviews and in group discussions. The women recognize the fact that absence from work due to health reasons affects the timely operation of activities, which, in turn, impacts plant growth and yield. Absenteeism causes loss of wages when it is needed the most. In many instances, therefore, women continue to work despite ill-health.

MALNOURISHMENT

By the beginning of the rainy season, vegetables become unaffordable or unavailable for many. (The situation of availability and cost of staple foods were worse before the government subsidized staple grains). The main reason for this is that the summer vegetables finish by then and the rainy season vegetables have yet to start yielding. This is called the *sandhi samay*, meaning the fall time or the time between the two main seasons.

In some villages in Odisha, people say that this is a time of *bahare kancha*, *bhitare chuchha*, meaning that the plants outside look green due to rain, but inside the home, there is nothing to eat. So, from kitchen gardens, people do not get much and the vegetable supply decreases and prices go up in the market. Hence, many are not able to buy the vegetables they need. The food basket gets narrower by this time. Diversity in diet also reduces during this period. Many farming families are cash-constrained and the expenditure on purchased food, mainly vegetables, is pushed back, affecting the nutritional status.

Many women, eat rice with some salted dry mango or tamarind pickles, salt, chilli, one or two roasted vegetables such as brinjal, or jackfruit seeds or sometimes with some leafy vegetables, etc. In the past few years, the most commonly used vegetables such as potato and onion become unaffordable. If people are fortunate, they get some mushrooms or leafy vegetables from the wild, and crabs or small fish from the rice fields or streams. All depends upon whether they have forests or streams near their habitat or not. If they do not have such a cushion and depend on their kitchen garden or the market, the situation is worse.

Owing to our cultural practices, often women have their meals after everyone else in the family has eaten; therefore, the quantity and quality of food intake is different for women (often also for girls) than for other family members. With the exhaustion/work pressure/diseases or seasonal morbidity, women seldom have a good appetite and do not feel like eating. Even when disease strikes them and when they are recovering and when they require nutritious food the most, they rarely get it.

Cooking with wet fuel is laborious and harmful for the women due to the excessive smoke. Often, they do not feel like cooking, resulting in fewer dishes or dishes that take very little time to cook. This too has an impact on their food. Sometimes, women manage with left-over or stale food. Hence, seasonal mal-nourishment among women rice-field workers is quite prevalent. Malnourishment increases their weakness and makes them more vulnerable to diseases. The inconvenient truth is that the food growers remain ill-fed.

CASH-CONSTRAINED TIME

Many families are cash-constrained from the beginning of the season till the monsoon recedes around September. For instance, the need for cash increases for:

- health care
- purchase or hiring of agricultural inputs such as seeds/fertilizers/pesticides/irrigation/equipment/labour, etc.
- health care of draught animals and other domestic animals, which often fall sick during this time
- children's education (because this is the school/college-opening time)

By the time weeding begins, most of them are already cash constrained. Families then tend to spend less on purchased food and the women try to work on their family farms for longer (over-exploitation of women family labour) without hiring external labour.

Women work despite these conditions to grow our rice. However, all these experiences vary in degree for women rice-field workers, depending on the age, status in the family, health conditions (including pregnancy and nursing status), types of work that they are engaged in, family size and composition, meal culture, economic status and social status of the family, caste and so on.

Ironical it is that the growers of food go without much food and nutrition when they require it the most, that is, during the rice-growing period. No wonder malnourished mothers give birth to underweight children, adversely affecting the quality of the future human capital. Unless the quality of the workforce, especially women workforce, improves substantially and their drudgery is reduced, it is futile to expect that substantial production and productivity gains will be sustainable.

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AN INCONVENIENT TRUTH

Women work despite their poor physical condition. This is a completely neglected area. If such is the condition of our women rice-field workers, how can they be expected to perform better, even if you give them better technology or modern inputs? Further, we brand them as unskilled labourers and hence, officially and socially, their wages remain lower than that of men, especially in rice farming. This keeps them in poverty. The questions we need to ask are: Will we support them to come out of this condition? If they are unskilled, will we invest in improvement of skills?

We cannot change the nature and extent of the rainy season and we may not be able to change the nature of the rice fields immediately; however, we can take some steps to improve the working conditions of women workers. The workload on women can be reduced by following a different production method such as SRI. We can improve their health conditions by making investments in equipment that reduces drudgery. Efforts also need to be made on social innovations to reduce the workload on the women further. Men need to be encouraged more to share the workload of women and participate in more activities. Whereas alternative production systems such as SRI provide some relief as far as drudgery and body pain is concerned, the basic issue of the women's health and nutrition as a determinant of productivity should receive attention through creation and provisioning

of facilities through changes in policy and alternative research..

It may be an inconvenient truth to accept that the health of the women labourers may be one of the important factors contributing to low yields. But the subject of better health and nutrition status of women rice-field workers could form research and intervention agendas. In addition, issues of skill development and the provision of friendly technologies that make a significant impact on yield could be addressed. If it is significant, why do not we pay attention to it? Why do we not invest in addressing these issues?

Based on my observations of the rice-growing practices and my interactions with the rice-field workers, I propose that we invest in making our workforce healthier. This will help women contribute to the enhancement of the yield, be less indebted and earn more; in short, they would live better lives.

Once we shift our focus from the uni-dimensional thought that productivity and production gains can only be achieved through provisioning of more inputs and subsidies to a more holistic approach of taking care of the health and nutritional aspects of the women workforce, the gains will truly be both substantial and sustainable.

Organic Farming Initiatives in Dantewada: From Subsistence to Sustainability

AKASH BADAVE

Skirting the hazards of chemical farming by a whisker, the tribal farmers in Dantewada district, with the help of a strong and supportive District Collector, set an example to other villages by using traditional seeds cultivated the SRI way, to find that their produce, both in terms of quantity and quality, is comparable to any crop produced with newer techniques. Age-old wisdom prevailing over modern quick-fixes!

Dantewada, situated in southern Chhattisgarh, is among the most backward and remote districts of India. Surrounded by hillocks covered with semi-tropical forest (60 per cent of the area of the district is covered by forests), it is the home of the tribal community of Madiya Gond (71 per cent of the population is tribal) and the population density of the district is merely 83 per sq km.

Like all other tribal communities, the Madiya Gonds of Dantewada are dependent on natural resources for a living, the most prominent sources being agriculture and forest produce. The forest provides them with wood, fodder and minor forest produce and acts as a source of food and medicine in the form of roots, tubers, fruits, wild vegetables and mushrooms. Agriculture, on the other hand, is mainly practised as a means of subsistence. A century back, these sources of livelihood were abundant and the population was very sparse. The tribal way of life—simple, free and in harmonious coexistence with nature—had little interference from the outside world. The description of such tribal life comes in the ethnographic writings of Haimendorf when he travelled through Bastar in the late 70s (Haimendorf 1982, p.202). He writes:

> "In the Muria villages I visited, there was a relaxed atmosphere indicative of well-being and prosperity...I found the same spirit in a remote village of the Abujhmar Hills, where all the people, men, women, and children, had gathered to thrash the newly reaped grain, a task which the setting of the sun and the rise of the full moon did not interrupt. This work, too, was done in a festive mood, with singing and laughing and the inspiration of ample quantities of home-brewed beer."

Such was the life back in those days. However, the excerpt is not presented here to paint a romantic picture of tribal life; it is to help see its contrast to the present situation of tribal communities across Central India.

Much has changed over the past century. Resources, once abundant, have now shrunk. Population has boomed. The extent of poverty and hunger is high. The situation of health and malnutrition is grim

Much has changed over the past century. Resources, once abundant, have now shrunk. Population has boomed. The extent of poverty and hunger is high. The situation of health and malnutrition is grim. For decades, tribal communities have faced exploitation from various sections of society and alienation from resources that are rightfully theirs. Mining has ruined the habitat and displacement has disrupted their lives.

Addiction and idleness have increased due to the prevalence of alcohol and free government hand-outs in the name of development. In such a fertile ground, Naxalism has found its roots, and this has pushed the tribal communities further into a cycle of violence and a level of marginalization never seen before.

Various reasons can be attributed to this predicament. A close look at the issue, some analysis and dissection through the layers, however, reveals that the core causes of this crisis are: alienation of the tribal communities from their natural resources over the years, degradation of these resources and the resulting degradation of the livelihoods of tribal communities, dependent on these resources.

CHANGING LIVELIHOOD PATTERNS: FORESTS

One of the prominent themes in this process of transition is the gradual erosion of forest-based livelihoods. A major reason for this was the loss of the rights of tribal communities over the forests they live in or near. The Indian Forest Act, introduced in 1878, disturbed the harmonious relationship of tribal communities with the forest. It treated them as intruders in the same forest they had been preserving for generations.

The Forest Act, and the Forest Department subsequently formed, has had a great impact on the livelihoods and well-being of the tribes all over the country. Accessing wood from the forest for daily cooking, shelter and other needs has become difficult. The community is harassed by the Forest Department officials. Cattle can no longer be grazed in the Reserve Forest Land.

The Forest Department focussed more on commercial species such as teak and eucalyptus, which have limited use and significance in tribal culture. Block plantations of such species have eroded the diversity of the forest, which has gradually decreased the availability of various minor forest products, medicines, wild fruits, roots and vegetables, important from the perspective of the people (Haimendorf 1982, p. 81).

The increasing population has put more pressure on forest-based livelihoods. Over a period of time, the forest has shrunk due to mining, smuggling of wood or clearing for cultivation. On the other hand, the increasing population has to share this shrinking base of forest for its various needs. And forest-based livelihoods are gradually proving to be insufficient for the increasing population. There is, therefore, a need for diversification and the strengthening of other sources of livelihood.

CHANGING LIVELIHOOD PATTERNS: AGRICULTURE

Similar to the changes in forest-based livelihoods are the changes in agricultural practices in Dantewada. The policies of the state and the Forest Department have greatly impacted the cultivation practices of tribal communities. Slash and burn was traditionally followed in many regions of the district as a primary method of cultivation. Although it was believed to be an ecologically viable method of cultivation by many anthropologists, it was banned under the Forest Act (Guha 2010, p. 128).

The policies of the state and the Forest Department have greatly impacted the cultivation practices of tribal communities

Unlike mainstream agrarian societies, tribal communities shifted their place of cultivation every few years. They would leave the fields barren for the forest to rejuvenate, and move to the next patch of forest to clear and burn, and cultivate there, returning to the previous fields after a few years, thus completing the cycle. These practices had to be abandoned after the Forest Act came into being. The land on which cultivation was going on when forest boundaries were being marked was considered to be agricultural land. The land demarcated as forest was that on which cultivation had been going on for generations in rotation, making it inaccessible to the people.

REPERCUSSIONS

Incidentally, the transition of tribal communities of Dantewada and the regions around it, from the forest-dwelling way of living towards an agrarian way of living was already in process, due to the interaction with other communities and the policies of the Gond Kings (Pallavi, 2014, 'Impacts on Resources and Economy', para. 1). Those who lived in the hills largely continued their original method of cultivation; those who came in contact with other communities, however, gradually started using ploughs, bullocks (Haimendorf 1982, p. 15).

This transition was greatly accelerated and practically forced upon the people by the imposition of the Indian Forest Act, the subsequent activities of the Forest Department and other policies of the State. As a result, instead of evolving with time, this transition has taken place in a very short period and, therefore, has had many long-lasting repercussions on tribal society and has worsened their poverty and marginalization.

Unlike other agrarian societies, the methods of cultivation followed by tribal farmers and the geographical conditions in which farming is done are quite different. The use of ploughs and bullocks is very limited in the tribal way of farming and has been adopted by them only very recently. The bullocks lack training and are small and fragile, perhaps because, historically, they were never selectively bred for intensive cultivation. Apart from the plough, few advanced tools are in use in this region. Sowing is primarily done by broadcasting seeds. Most of the agriculture is rain-fed. There are very few intricate community driven systems of irrigation. Because only a single crop is cultivated during the year, the cattle are released to roam free after the *kharif* season is over.

Traditional methods of cultivation are still practised in Dantewada, demonstrating that even though the tribals have been made to abandon their slash-and-burn agriculture and have begun to practice farming at one place, they are yet to fully adopt the practices of intensive cultivation. Whereas forest-based livelihoods have weakened over time, agriculture or other sources of livelihoods have

not yet advanced to cover the loss.

Agricultural productivity in the area is very low. The grains produced barely cover a family's needs. Dependence on a money-based economy has increased but the earning from minor forest produce (MFP) is shrinking and the earning from agriculture is very low. The changes in the patterns of livelihoods have also had an impact on the nutrition of the people. Traditionally, the forest provided a wide variety of vegetables, roots and mushrooms, the availability of which is now shrinking. The availability of game from the forest has also gone down. On the other hand, the cultivation of vegetables and pulses is very minimal, resulting in serious gaps in the nutritional profile of the daily diet.

The diversity of crops in agriculture is also decreasing because people prefer the cultivation of paddy over minor millets such as finger millet, *kosra* and *kodo* millet. These millets had an important place in the traditional tribal diet, which is now dominated by rice because it is cheap and easily available in the public distribution system (PDS) shops.

AT THE CROSSROADS

The tribal communities of Dantewada are now at a crossroad. Their traditional, forest-dwelling way of life, their harmonious relationship with the forest and their self-sufficiency based on the surrounding natural resources have been disrupted. They have not yet been able to fully embrace the modern agrarian way of life. The realities around them have changed so fast, giving them little time to adapt to the change culturally. Their plight poses several questions. Is this transition inevitable, triggered by the forces of modern world? Should the people embrace it in order to survive? What are the aspirations of the people? which direction do they want to move in as a society? What is the government doing to address these livelihoods crises that tribal communities are facing? How have the interventions helped people to deal with the crisis? What choices has the government given to the people?

The tribal communities of Dantewada are now at a crossroad. Their traditional, forest-dwelling way of life, their harmonious relationship with the forest and their self-sufficiency based on the surrounding natural resources have been disrupted. They have not yet been able to fully embrace the modern agrarian way of life

GOVERNMENT POLICIES

"The old order must change rapidly. Traditional methods must give way to superior technology. Man must harness nature in order to create a better life for himself," narrates a 1971 government documentary *A Village Smiles* about the Nagarjuna Sagar Dam (Dharu & Patwardhan, 1995). Quite similar was the approach of government policies successful in bringing about the Green Revolution in India in the 1970s when the country was facing a serious shortage of grains. People were persuaded to abandon traditional practices of farming and encouraged to adopt the use of high yielding varieties (HYVs) of seeds, chemical fertilizers, pesticides and mono-cropping, resulting in an increase in the production of wheat and paddy in India substantially.

Similar policies, which were started during the Green Revolution, are being implemented in Dantewada by the government, in an attempt to improve agricultural production. Some major schemes driving these policies are National Food Security Mission (NFSM) and Rajya Poshit Yojana.

One of the reasons, it is believed, for the low productivity in agriculture is the use of traditional seeds. Farmers have been persuaded to adopt improved varieties and hybrid seeds by having these distributed to them free and by organizing demonstrations on how to use these seeds on some plots. The use of chemical fertilizers, pesticides and herbicides is also promoted through these schemes. Wanting to provide a good income to the farmers, the cultivation of hybrid maize has been widely promoted. In order to increase irrigation coverage, farmers have been given subsidies to dig bore-wells and buy electric or diesel pumps.

Government policies, based on the promotion of chemical-intensive farming, have been, as of now, showing positive results in Dantewada. But are these results sustainable?

With the efforts of the Agriculture Department, people have gradually started using improved and hybrid seeds, chemical fertilizers and pesticides. The cultivation of hybrid maize is picking up and it provides a good cash income. The production of paddy has been increasing in the district lately. Earlier, the grains produced were hardly sufficient for the needs of a single family. Now many farmers have started selling their produce in the government procurement system.

IMPACT OF GOVERNMENT POLICIES

Government policies, based on the promotion of chemical-intensive farming, have been, as of now, showing positive results in Dantewada. But are these results sustainable? If the tribal farmers of Dantewada adopt the chemical intensive-cash crop and mono-cropping-based farming on a wide scale, will it strengthen their livelihoods in the true sense? What is the long-term experience of the policies of the Green Revolution in other parts of the country, where it saw great success?

A look at the national experience of the Green Revolution and the plight of the farmers in the surrounding regions like Maharashtra, Telangana and the plains of Chhattisgarh will, perhaps, help us understand this. Today, though the production of cereals such as wheat and paddy has increased manifold, and the country has achieved self-sufficiency, it has come at many social and environmental costs. The impact is evident in regions such as the Punjab, Haryana, Tamil Nadu, Maharashtra and Andhra Pradesh in the form of loss of soil fertility, salinity due to excessive irrigation, health hazards due to pesticides and suicides of debt-ridden farmers.

Fortunately, such effects have not yet been observed in regions such as Dantewada because, so far, the use of chemicals has been quite low. However, as the practices of chemical-intensive farming are picking up, various subtle changes can certainly be observed such as the loss of the rich diversity of traditional varieties and crops, compromised seed sovereignty of farmers, increased debt, dependence on the government system and market, impact on soil fertility and the loss of nutrition in the diet.

Famously called the 'Rice Bowl of India', Chhattisgarh is known for its diversity in rice. There were around 19,000 varieties of rice cultivated by the farmers of Chhattisgarh, which are now preserved at the Indira Gandhi Agriculture University (IGAU), Raipur (Singh, 2013, p.17). Many of these varieties are unique in terms of aroma, taste, medicinal properties, nutritional value and climate resistance. Quite contrary to conventional beliefs, many of these traditional varieties have been found to be as productive as HYVs, according to the research of Dr. Richharia (Singh, 2013, p.17).

These traditional varieties of rice were available for free to the people and were exchanged among the farmers through intricate social institutions. Today, not only are these institutions being destroyed but the diversity of seeds also is in danger because people are no longer preserving them. With the promotion of improved seeds and HYVs, and extension work of the Agriculture Department in promoting modern seed varieties, people have gradually started abandoning the traditional varieties. Hybrid seeds are more susceptible to pests, diseases and adverse climatic conditions and need chemical fertilizers to provide a better yield. These costly seeds have to be bought from the market every year because they cannot be reused.

Amid these government policies and schemes, three years ago, the District Administration of Dantewada decided to follow an alternative route, with the support of the then Collector, Mr K. C. Devasenapathi

The adoption of chemical farming, although limited, is already showing its impact in the field. The elders of the community have apprehensions about the use of chemicals in farming. Wherever chemical fertilizers have been adopted, farmers have complained about hardening of the soil and creatures like earthworms and small fish vanishing from the fields. With the hardening of the soil, ploughing with animals becomes difficult, and tractors have to be used. Farmers also complain about reduction in the yield if they are not able to add fertilizers, which was not the case earlier, with traditional farming.

The area under the cultivation of millets such as kodo, kosra and finger millet is decreasing in Dantewada. These millets are crucial for food security of the people. Millets are climate-resistant; the crops can grow in arid land with minimum water; and millets are nutritionally superior compared to rice or wheat. Funnily enough, these crops were termed to be 'unbeneficial' by the Agriculture Department of Chhattisgarh government and farmers were persuaded to abandon them for alternative crops. Although such a replacement programme does not exist anymore, there is dearth of a programme that systematically promotes the cultivation and consumption of millets.

A critical look at the impact of these government policies shows that whereas they may have been able to increase the agricultural production of the farmers in Dantewada, their long-term sustainability and potential to provide a net economic earning for farmers and truly strengthen their livelihood are questionable. Self-reliance, diversity, minimum dependence on money, minimum needs and harmony with nature—these were the key components of the survival strategy of the tribal community.

However, today with government-backed interventions, these values are gradually being eroded. Farmers are losing their seed sovereignty; the diversity of the cultivation is decreasing; and there is increased dependence on a money-based economy and market. Also, traditional tribal institutions and systems of agriculture are getting destroyed in the process.

AN ALTERNATIVE APPROACH

Amid these government policies and schemes, three years ago, the District Administration of Dantewada decided to follow an alternative route, with the support of the then Collector, Mr K. C. Devasenapathi. Aimed at harnessing the surrounding natural resources and the traditional knowledge of the community about strengthening their livelihoods, the route was based on the principles of

environmental, economic and social sustainability.

Tribal communities have a great wealth of traditional knowledge about farming, about the strategies crucial for survival and about genetic treasure, in the form of diversity of traditional seeds. Not only is this knowledge important for battling climate change and ensuring food security and nutrition, but it also has great economic potential. This traditional knowledge, therefore, needs to be understood, preserved and taken forward. It should also be augmented with modern techniques and practices that are sustainable and appropriate.

Various departments joined hands in these efforts and took up activities, mainly in three categories: resource management and infrastructure development; training and capacity building; and building institutions of farmers

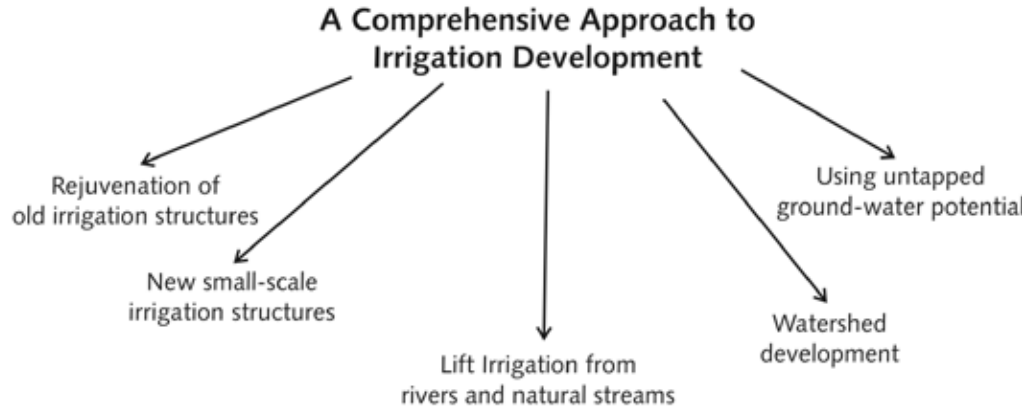
With this thought process, the Administration took up various initiatives to promote the practices of 'Sustainable Agriculture' in the district. Various departments joined hands in these efforts and took up activities, mainly in three categories: resource management and infrastructure development; training and capacity building; and building institutions of farmers.

Even though the district has an annual rainfall of around 1500 mm, irrigation coverage is merely five per cent. A comprehensive policy for the development of irrigation was thus followed, ensuring that all possible options are tapped.

Many irrigation schemes, either under-utilized or dysfunctional, were revived with minimum investment. Repair of the distribution network was carried out so that the water actually reached the fields. Perennial streams and rivers were identified and electricity connections were given to farmers in groups so that they could lift water for irrigation.

Many farmers, however, were not in a financial condition to buy irrigation pumps, in spite of the costs being partially subsidized through schemes of the Agriculture Department. Financial linkages through the Kisan Credit Card (KCC) were provided to such farmers so that they can buy pumps.

The ground-water profile of the district is also under-utilized currently. The Agriculture Department, therefore, has helped farmers to dig bore-wells in limited numbers with a partial subsidy and a bank linkage for two years, initially. In order to ensure water conservation, efforts are being made to dig farm ponds for every farmer, who has joined these efforts.



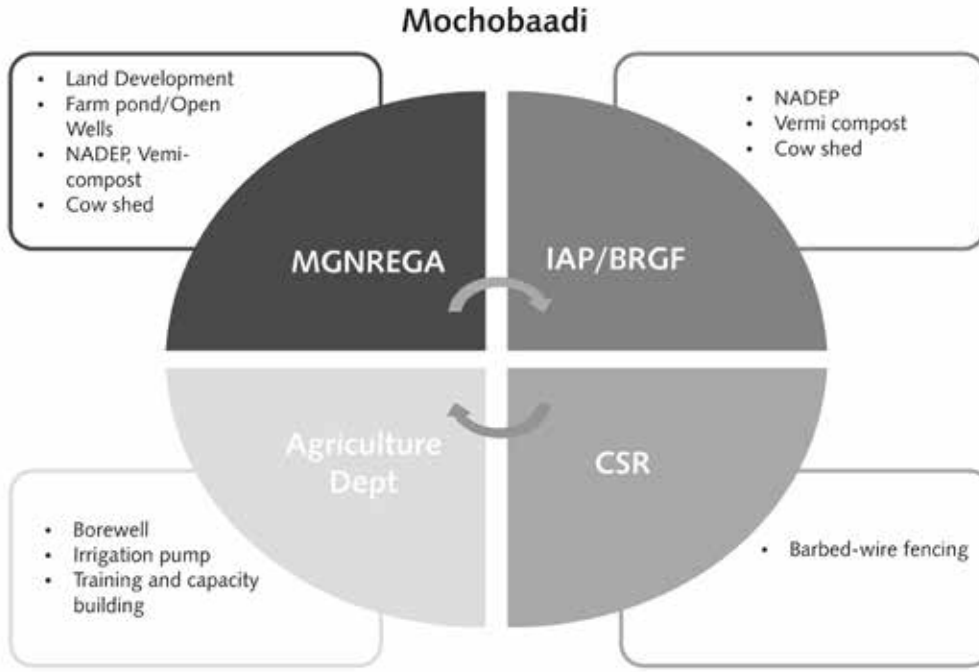
Farm ponds will provide distress irrigation as well as recharge the ground water.

The Administration has also launched a programme called the Mochobaadi, aimed at promoting organic cultivation of vegetables, pulses and millets among community members. As yet, cultivation of these crops is very minimal in the district. Multi-cropping is very rarely followed by farmers because of the lack of irrigation, spaces for open grazing, and know-how, and various other reasons.

The Administration has also launched a programme called the Mochobaadi, aimed at promoting organic cultivation of vegetables, pulses and millets among community members

The intake of vegetables and pulses in the diet of the poor of the community is very low. This results in serious gaps in the nutrition, especially of the women and children. Mochobaadi aims at improving the food security and nutrition of the farmers, and provides them with a source of income through a sustainable way of cultivation. Under this programme, a comprehensive package, including wire fencing, irrigation facility, land development, drip irrigation and facilities for organic farming such as NADEP, vermi-compost pits and a urine tank, are provided to farmers through the convergence of various government schemes and with Corporate Social Responsibility (CSR) funds. It is ensured that the farmer also contributes his share for this package. Today, Mochobaadis have been established in 127 villages of Dantewada, involving more than 1,300 farmers.

Paddy is the most widely cultivated crop in Dantewada. Most farmers follow the broadcasting technique and use traditional seeds. Although this technique is relatively more resistant to the unfavourable climatic conditions, its productivity is low. Besides, it creates an opinion that traditional varieties, in general, are low in productivity.



Attempts have been made to introduce the technique of System of Rice Intensification (SRI) among farmers. This simple technique of paddy cultivation can substantially increase productivity, even with the use of traditional seeds and organic inputs. Similar experiments with SRI have also been carried out to improve the productivity of the finger millet.

Organic farming will not only safeguard the environment and the health of the people, but will also minimize the expenditure of the farmers in the long term

In the three years of implementation, these interventions have shown results that are quite promising. The official government data show that whereas the average productivity of paddy is 11 quintals/ha in the district, the average productivity of organic SRI is estimated to be 34 quintals/ha. After the first year of the intervention, due to these results and the benefits in terms of reduced input costs and labour requirement, farmers came forward in large numbers to adopt SRI. As a result, in the second year, organic SRI was adopted by 775 farmers on 640 acres of land—a 260 per cent rise in the area under SRI cultivation in one year. The year, 2015–16, however, drought in all four blocks of the district has resulted in setbacks.

Most farmers in Dantewada are traditional farmers who do not use much chemical inputs in farming. In 2012, the average consumption of fertilizers in Dantewada was 5.8 kg per ha as compared to the state average of 74.2 kg per ha. It, therefore, made much more sense to promote organic farming among farmers rather than push them to the unsustainable path of chemical-intensive farming.

Organic farming will not only safeguard the environment and the health of the people, but will also minimize the expenditure of the farmers in the long term. Extensive training and capacity-building were carried out to introduce organic farming to farmers of the district. They were taught how to prepare organic inputs such as NADEP compost, green manure, *jeevamrit*, fish tonic and bio-pest repellents. Because cattle urine is a very important ingredient of organic manure, concrete floors and urine tanks have been constructed for more than 1,200 farmers.

NADEP compost, being promoted in Dantewada, is a very easy and effective method of composting. For this, NADEP compost pits have been built in large numbers across the district. Visits to successful organic farms and organizations across the nation doing effective work in organic farming are also arranged regularly for the farmers and staff.

However, the promotion of organic farming has not been free of hurdles. Usually, one can expect some unwillingness on the part of the farmers to adopt organic farming because of the fear of loss of productivity. In Dantewada, the experience was the opposite. The farmers showed a great amount of willingness, perhaps, because their way of living and culture are closely linked to nature; they were able to understand the ill-effects of chemicals in farming quickly.

The challenges, however, were from government programmes and the attitude of government officials. Many Agriculture Department schemes distribute chemical fertilizers and pesticides for free. There is also a pressure from the state to increase the use of the chemicals every year. The field staff of the Agriculture Department, therefore, faced an internal contradiction. Whereas, as part of the district administration, they were supposed to promote organic farming, the departmental schemes required them to distribute chemicals in the villages. This inconsistency confused the

staff, undermined their image in the field, and also hampered the entire programme.

The commitment and unstinting support of Mr K. C. Devasenapathi, the then Collector of Dantewada, for organic farming helped resolve this inconsistency. He advocated the policies of organic farming at various platforms and meetings at the state level strongly and also aligned the staff of various departments in the district to the cause of organic farming.

The important first step is to organize the farmers. As long as they are alone, farmers will always remain at the whims of the market. It is, therefore, important to organize them into groups so that they speak in a collective voice and, thereby, take strength from each other

Permissions were sought and modifications in the rules were made and ways were found to avoid the promotion of chemicals through government schemes. As Dantewada became known for the efforts in organic farming, the pressure from the state to promote chemicals gradually fizzled away. Mr Devasenapathi also showed remarkable openness and willingness to learn and accept suggestions from experts in organic farming such as V. S. Arunachalam and Jacob Nellithanam; this ensured that the efforts were headed in the right direction.

Due to these efforts, in 2015, the consumption of chemical fertilizers in Dantewada dropped to 0.52 kg per ha. Quite strikingly, in the same year, the average consumption of fertilizers of Chhattisgarh rose to 96 kg per ha, a whopping 30 per cent growth in three years from 2012.

FROM SEEDS TO MARKET: DEVELOPING THE ECO SYSTEM

These efforts started with the simple idea of promoting SRI among farmers. Gradually, this has developed and evolved into a comprehensive approach to develop natural resources-based sustainable livelihood for the rural communities of Dantewada. For this, it was not sufficient to make interventions in bits and pieces. It is essential to understand the nature of livelihoods and the various factors involved, and to then make well-coordinated interventions to develop an entire eco-system for the development of sustainable agriculture.

The important first step is to organize the farmers. As long as they are alone, farmers will always remain at the whims of the market. It is, therefore, important to organize them into groups so that they speak in a collective voice and, thereby, take strength from each other. At Dantewada, the organic farmers have been organized into around 100 groups. These groups are serving as the most basic blocks of the organic movement, playing a crucial role in community mobilization, collective decision-making, mutual sharing and learning.

With these groups becoming strong and vibrant, work to identify and develop traditional seeds in the community has started recently. The idea is that select groups will adopt these varieties and carry out the task of seed production of traditional seeds, to be made available to other groups. Work is also going on to provide storage godowns for each group so that they can collectively store their produce in a cool and dry place.

As a next step, these groups are being further organized into a farmers' producer company. Named Bhoomgaadi, after a post-harvest festival celebrated in Dantewada, the producer company will be owned collectively by the farmers. It will collect the organic produce,

process it and market it under the brand name of 'Aadim', distributing back the profits among the shareholder farmers. A processing unit is also being set up in the district and eventually an organic store and cafeteria will be started by the producer company in Dantewada. The idea is to ensure that the intervention is made at every step of the value chain, from seeds to market, to comprehensively develop the eco-system for the farmers.

In order to carry out this work effectively on the ground, Community Resource Persons (CRPs) have been identified from Cluster locations across the district. These CRPs are young and educated youth of the village, who will be given extensive training on various aspects of livelihoods. The CRPs will, in turn, work with farmers for their mobilization, training and forward linkage.

Looking at these efforts of the last three years, the Government of Chhattisgarh has finally decided to extend its support. Efforts such as these, in the field of organic farming, need a favourable policy environment. A paradigm shift needs to take place in attitude, approach, policies and programmes so that the interventions happen in a holistic and comprehensive manner. The Government of Chhattisgarh has declared that efforts will be made to make Dantewada, along with two more adjacent districts, one hundred per cent organic in the coming five years. This announcement has been followed by a special budgetary allocation for the promotion of organic farming. Apart from monetary support, we hope that this decision will ensure consistent policy-level support for initiatives in sustainable agriculture, moving beyond the individual-driven nature.

Whereas these efforts are being facilitated by government officials and other professionals, these will not be sustainable in the long run, unless these initiatives are converted into a mass movement

Whereas these efforts are being facilitated by government officials and other professionals, these will not be sustainable in the long run, unless these initiatives are converted into a mass movement. Farmers need to have a sense of ownership and a feeling of belonging that makes them proud that the change has happened because of their collective efforts.

Conscious efforts have been made in this direction to identify community leadership and engage the early adopters to help in propagating the movement. A set of group-leaders and expert farmers have evolved in this process and they are actively trying to organize more farmers and engage them in organic farming. How far these leaders from the community will succeed in creating a positive and constructive movement of farmers, time alone will tell?

Meanwhile, in the heart of the most affected, remote and backward district, on 6 October 2015, around 2,000 farmers gathered together, hiring vehicles at their own expense, to attend an Organic Farmer's Mela, organized and crowd-funded by the farmers themselves. Farmers from villages across Dantewada gathered and participated in cooking food, making arrangements and taking sessions on organic farming. Seeing their enthusiasm, one can't help but feel very optimistic about the future!

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

Folk Rice Diversity in West Bengal: Conserving this Neglected Treasure

DR. ANUPAM PAL

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

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.

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

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

A Patch of Green in the Forest: Organic Farming in Paraswada

SHACHI SETH AND PANDIT ARJUN

Shifting from agricultural practices that were expensive, unsustainable, harmful to the environment, degenerative to the soil, and biased towards rich farmers, the women of Paraswada, Madhya Pradesh, with PRADAN's support, decide to make the transition to organic methods of farming, which include using indigenous seeds, SRI, crop diversification, bio-manure and a host of other practices, showing positive and promising results

The Green Revolution is well-known for its dramatic effects on the global yield of food grain and other agricultural products. It is often considered an example that defied the Malthusian theory of the end of the fast-growing world population, by introducing technology to expand production and crop-yield. With Dr. Norman Borlaug's creation of high-yielding varieties (HYVs) of seed, the revolution spread all over and was a much-celebrated success. Advertisements and video documentaries showed spreads of lush green and bountiful crops swaying in the wind, representing prosperity.

India too underwent the Green Revolution and aimed to reduce the high number of famines, by which it was characterized. It mainly focussed on the expansion of farming areas, introducing double cropping in existing farmlands, and using HYVs of seeds. The use of chemical fertilizers and pesticides was required alongside. Whereas all these methods were successful in increasing farm yields, these also required specific inputs, preferred mechanization and the introduction of chemicals in the environment.

The Green Revolution in the farms was accompanied by a whole slew of policy and institutional interventions. It included the building of large dams and the setting up of agriculture universities and research stations. It resulted in the setting up of the Public Distribution Systems (PDS) with Food Corporation of India (FCI) storage facilities. There were also several grain procurement protocols—such as Minimum Support Price, nationalization of banks to push rural credit, and last but not the least, fertilizer subsidies.

The Green Revolution is now criticized by some who consider it expensive, unsustainable, harmful to the environment, degenerative to the soil, and biased towards rich farmers. Additionally, the focus on seed replacement and now on genetically modified (GM) seeds has caused many indigenous varieties to get wiped out from farms.

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As the practices of the Green Revolution spread, richer, landed farmers have benefitted tremendously. Endowed with enough income to purchase the additional capital and inputs needed, in order to gain full benefits of the Green Revolution, the richer farmers have seen an exponential increase in farm yields. The poorer farmers, on the other hand, usually, are not able to fully absorb its benefits, especially because most inputs require a higher disposable income than theirs.

Most importantly, the concentration of large irrigation schemes in a few, selected areas created an artificial divide between the haves and have-nots. The lack of proper irrigation infrastructure makes it tougher to sustain crops, which are high in water demand. Usually, the poor farmers end up borrowing money from the local moneylenders, and when the yield is insufficient due to a bad monsoon, they get caught up in a cycle of debt. India has seen high rates of poor farmer suicides in the past decade due to high debts, fed by the lack of proper irrigation, finance and other facilities. Coupled with the factors of soil degeneration (due to extensive chemical use and relentless mono-cropping), the loss of indigenous seeds, the decreasing water table and the increasing water demand, conventional Green Revolution practices may not be the ideal solution to increase agricultural productivity.

BACKGROUND

Noticing the limitations of conventional agriculture practices, PRADAN introduced practice of organic farming in the Paraswada block, Balaghat district in Madhya Pradesh in 2009. The area is marked by a rich forest cover, irregular terrain and low rainwater retention. In 2008, PRADAN practitioners identified certain core problems faced by farmers in the area. Not only were most farmers troubled by poverty but years of chemical use and a heavy dependence on the monsoons for irrigation had also adversely affected the environmental health of the area, resulting in lower productivity.

Soil health in the area was poor due to soil erosion. Paddy productivity was low and irrigation infrastructure limited. Due to the dependence on the rains for water, farmers usually practiced mono-cropping (rice, mainly). Through the rest of the year, the men would usually migrate to urban areas in search of work. The women and men in the villages would work as labourers on bigger and richer farms, which could afford irrigation and other inputs. Most of the family income came from wage labour rather than agriculture. In forest villages, women would collect leaves from trees, make disposable bowls (*pattar dona*) and sell these in the market. Alternatively, they would cut bamboo that would be sold to the forest department or in the market.

Women did not participate much in making decisions related to farming. Whereas they

did a number of jobs from sowing seeds to spraying insecticides, the status of 'farmers' was reserved for the men. Women's participation was low, as was their socio-economic status. None of the market decisions, policy decisions or income-related choices was made by women. The inputs in farming were heavily dependent on the market; women, however, would not be allowed to leave the house to buy seeds, pesticides, fertilizers, etc., and their role, therefore, was limited to a great extent.

Nutrition levels in this area are low due to the limited variety of food grains, vegetables, etc. Smaller farmers are usually unable to negotiate when selling their produce in the market, and pricing decisions are often influenced by the powerful farmer lobbies. As input prices stayed steady (or even increased), the prices received by the farmers for their produce were falling. The poor farmer, hence, usually got caught in a trap of high costs and low price returns. This further affected the nutrition, as purchasing vegetables, grains, fruits, etc. was expensive and often unaffordable.

ORGANIC FARMING IN PARASWADA

The chief objectives of the shift towards organic agriculture were:

- Decreasing farmers' dependence on the market (both in terms of inputs and output)
- Increasing the community's control over the farming and market processes
- Employing practices that are traditionally relevant and based on the community's preferences
- Working towards reversing the soil and environmental damage done by chemical farming

CREATING AWARENESS AND ACCEPTANCE

The programme started by PRADAN was not an all-out organic farming programme initially; rather it was focussed on increasing yield despite the low inputs, thereby making farming sustainable. Initially, therefore, the training largely focussed on System of Rice Intensification (SRI)—a low water, labour-intensive method of paddy cultivation. The programme even promoted certain chemical uses along with organic elements until the health hazards of the chemicals became evident to the practitioners, and they moved towards a more organic approach.

As of now, the programme has multi-fold aspects, chiefly focussing on the following:

- SRI in paddy and vegetation
- Organic soil nutrition management
- Pest and disease control
- Promotion of indigenous seeds

One of the biggest hurdles for practitioners is to motivate women to adopt new practices, as well as train them in the processes. SHGs play a role in mobilizing the women, collectivizing them and setting up a basic ideological start point for the development practitioners to intervene. The PRADAN team in Paraswada used a number of tools to create and spread awareness among the women. Apart from SHG meetings on the topic, discussions were held at various hamlets after showing documentaries such as the talk show, *'Toxic food—Poison on our plate'*, *Satyameva Jayate, and Jaiv vividhtha ki pahel,* a short movie based on various organic farming practices and indigenous seeds.

Films and videos were used to show the women the differences between traditional farming and SRI (also known as SriVidhi), experiences of organic farmers. The films showed the steps, processes, and results in detail and helped spread awareness among the women. Further, a group of women farmers were selected and sent for exposure visits to Center for Sustainable Agriculture (CSA), Hyderabad, and Subash Sharma's plot (a farmer who practices natural farming in Yevatmal district, Maharashtra), where they interacted with and learned from other women farmers, practising organic agriculture.

Chayanwati *didi* fondly recalls memories of her visit to Hyderabad where she met a number of women farmers who have adopted organic practices. After attending seminars, talks and a *krishi mela*, both her knowledge and her confidence increased tremendously and inspired her to work harder. She wishes to go back there again, this time with indigenous seeds from the area that she can sell at the mela. She is proud to have travelled farther than most people in the village, and is also respected by the other women.

Across villages, seeds are preserved and collected in a Seed Bank set up by the women farmers. A number of indigenous seeds and plant varieties that had almost disappeared due to the flooding of hybrid seeds in the market have been re-collected and are stored in the bank. Organic farmers can purchase these seeds cheap, and can later preserve the seeds from the plants that they grow. Even within paddy cultivation, which was the chief crop in the area, farmers have begun a shift to indigenous seeds.

Not only did the practices focus on the preservation of seeds, but the women were also taught correct ways of seed plantation. Seeds are planted systematically and in lines, not haphazardly. Rather than putting numerous seeds, the women have been trained to plant a single seed at a spot and care for it. The trainer used an analogy and compared too many seeds in the same spot as a family where too many children are competing with each other to get access to nutrition. Hence, just as the distribution may not be equal or sufficient in a case where too many people are competing for it, similarly the nutrition needed for a single healthy plant would get divided among a number of seeds. Analogies that the women could relate to their lives, films that showed visual proof and experiences of people—all these acted as mobilizers.

The soil health of the area has undergone heavy degradation due to the use of chemicals, monoculture (causes the soil to be stripped of the same nutrients over and over again without a chance to replenish), deforestation, etc. Maintaining good soil health is an essential objective of organic farming practices in the area. The use of green manure (locally grown plants that act as manure), bio-manure, vermi-compost and *Jeev amrit* (a concoction of neem leaves, cow dung, cow urine, jaggery and soil) replaces the expensive and unhealthy fertilizers in a sustainable, albeit, labour-intensive way. To prevent degradation of crops through pests and insects, *neem kadha* is prepared and sprayed on the crops at regular intervals. Unlike chemical inputs, these organic fertilizers and pesticides are either available naturally or are prepared by the women, using naturally available products.

The yield from organic crops has been heartening. Whereas a majority of the produce is consumed by the family, with time, farms have started producing a surplus. Vegetables are consumed within the family, distributed to relatives, sold in the village, and even sent to markets. This is in contrast with the experience of poor families with conventional farming, in

which the sole crop grown was paddy, farmers were heavily dependent on the monsoon, had to buy rice and seeds from the shops, along with other inputs, and, in the end, there was no assurance of the yield until the rains arrived.

MARKETING STRATEGY

The first step to marketing the produce of those women farmers using organic practices is to help them secure a place in the market. Initially, the yield was just enough for the family's consumption; as yield increased, the involvement with markets became more essential. In the beginning, a few men from the community would go to sell their produce, that too only in the nearby areas. As the women gained agency and control over their produce, it became easier for them to step out of their homes.

Trading in the local Paraswada market, especially with the capacity to make financial negotiations, is a sufficiently big step for these women, who had seldom stepped out of their homes earlier. Women farmers now go to local markets, sell their produce and keep the money for themselves. A small centre has been set up where the vegetables, etc., are packed ready to be sold. Even in the main local market, the women sit together under the banner of the Federation and with clear signs labelling their produce as organic.

In an area where women would rarely go to the market, let alone take financial matters in their own hands, almost 100 women now regularly go to the market to sell organic vegetables. Some of the women have taken up the responsibility of collecting the village supplies and taking them to outside markets in Balaghat and Mhow, even supplying for weddings and large functions.

The women have been meeting with local authorities, including the District Collector, in order to get an assigned place in the market for an organic farming shop.

CHANGES TO WOMEN'S LIVES

Financial independence: Women had little or no access to their family earnings and the income usually stayed in the hands of male members. The formation of SHGs, not only helped women gain some financial support, their small savings went a long way in creating aspirations of financial independence. The training in organic farming acted as a perfect platform for women to realize these aspirations. There has been approximately Rs 20,000–25,000 increase in the annual income for these farmers and the costs of farming have gone down because most inputs are now home-made. This has helped the women gain the respect of their families and the society, both of who were earlier highly skeptical and

Table 1: Yield with Organic and Chemical Farming

No.	Method Adopted for Transplantation	Seeds	Type of Practice	Average Yield (Quintal/Acre)
1	Conventional paddy	Open pollinated	Organic and chemical	8
2	SRI paddy	Hybrid	Chemical	17
3	SRI paddy	Open pollinated	Organic and chemical	16
4	SRI paddy	Indigenous seeds	Organic	18

critical of these adventurous ways. It has also given them spending power for themselves and the ability to invest in their children's lives.

Identity as farmers: Women in the area have long been involved in tasks related to the farm and have been burdened by drudgery, without ever getting the credit for the same. The identity of the farmer usually evokes the image of a man, working and toiling hard. Shanti didi says, "We women do most of the work in the farm but the mere task of ploughing would give all the credit to the man. Often, when we called ourselves 'farmers', the men in the village would ask us to go plough our fields on our own. Without proper machines, it is often tough to do so; however, the women now collect and do shared farming, where we all work together on one of the women's farms and then move on. We have managed to shut up the closed-minded men and women by showing them our successful farms."

Women farmers have managed to create a dent in the thinking of the people and proven that women too can be 'farmers'. They are now more vocal about their identity and their contribution to farming, with a better sense of themselves and their identity

Women farmers have managed to create a dent in the thinking of the people and proven that women too can be 'farmers'. They are now more vocal about their identity and their contribution to farming, with a better sense of themselves and their identity. A pleasant change this, from the time when women's thoughts were dominated by traditions, rules and the voices of the men in their lives.

Nutrition and variety in food: The farming practice of mono-cropping was common in the area, with paddy as the chief crop. The farmers in the area have diversified the grains they produce, with wheat and maize crops lining a few patches of land. Additionally, vegetables and fruit have become a part of their diet, along with homegrown spices. Children are now eating more and better than before and even get to eat a larger variety—this is definitely a step up compared to earlier.

From the women in Sawarjodi: In Sawarjodi village, the three women we talked to gave us a vivid picture of the entire programme. Sawarjodi is a model village in the organic farming programme with a strong Federation, and a growing community of organic farmers. The women have undergone a seminal journey through the Federation and are some of the flagbearers of the programme. Earlier, the women were shy and kept to themselves but they have now found a community and a voice through their respective SHGs. Initially, when during their training in the SHGs, they were asked to start farming not only were they apprehensive because of the social taboos on women stepping out of their homes but also because of the lack of water. Having seen their families and other people in the village struggle to get water, the effort seemed futile and too burdensome; the risks were large.

Around this time, some of the didis went to Jharkhand for a field visit and saw water conservation structures that helped retain rainwater. Meeting the women responsible for these and hearing their stories acted helped the *didis* gain willpower. Upon returning, the women got together and conducted a training for other members, made a micro-plan on farming and decided to construct rain water conservation structures. The women planned and constructed a number of small ponds, *dobas* (farm pond), in the area. Not only has this significantly reduced the drudgery involved in going far to fetch water, it has also helped raise the water table in the area.

Farming is now not entirely monsoon-dependent and these small structures have managed to provide a sustainable amount of water to nearby farms and fields. Subsequently, the women got deeper into organic farming practices and are now confident, profitable farmers.

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The women's lives have changed in multiple ways. Even though, their farms need a lot of personal attention, their work has become smoother on the whole. They proudly comment on how they need not buy any supplies from the market apart from salt and spices (of which, turmeric is grown by the women in their farms). Vegetables are all grown locally, as are rice, wheat and some herbs.

Ladies' finger (*bhindi*), brinjal (the local favorite—*bhaata*), pumpkin, onion and garlic are all grown on the farms, along with local vegetables like barbatti. Chaiti *didi* from Sawarjodi says, "Now we eat more food, better food, larger variety in our meals, and yet we manage to save enough money for our personal needs. We don't have to work as hard to get full meals. Our farms take care of that. We have all started sending our children to new and better schools. Our family assets have increased and now some of us have motorcycles and televisions. At the same time, our health-related troubles have reduced. We fall sick more often earlier, being in the direct presence of toxins from the chemicals. Now, even if we fall sick, we actually have money to go to the doctor."

CHALLENGES TO ORGANIC FARMING

Whereas training in organic farming has been given to a lot of people across various villages in Paraswada, the programme has seen, on the one hand, phenomenal success in certain areas and has had, on the other, relatively low acceptance in others. Many families in the area chiefly relied on agriculture in the past but as farming became more expensive and erratic, farmers in India are undergoing a crisis. The women think that people don't do organic farming in the area because they are still caught in the belief that hybrid seeds will give them more yield without realizing the long-term repercussions and un-sustainability. So much so, nobody keeps indigenous seeds and it is almost impossible to find local plant varieties. Organic farming requires more work at home such as cooking the fertilizers and manure, and most people prefer to have readymade chemicals that they can spray on the crops and get rid of problems. The increased drudgery often discourages women from taking up the practice.

The women assume that richer farmers do not go in for organic farming because they can afford the costs that chemical farming requires, plus they need to compete in the market. The market for organic farming is almost non-existent, and most farmer lobbies cater to richer farmers, and hence introduce policies that promote the use of chemicals. Whereas government support for organic farming has increased over the past few years, it is still relatively negligible.

Organic products also require certification, which is a long and tedious process for most villagers. One of the women pointed out how chemically treated edibles are often sold without a warning or a license, but for an organic farmer to sell his product as organic, she needs a certificate. Better government

alignment may help involve more farmers with organic farming and create a movement towards more sustainable practices of agriculture.

The current market is tough to break through for the new, small farmers, given the level of acceptance and normalization of chemical-fed crops

The current market is tough to break through for the new, small farmers, given the level of acceptance and normalization of chemical-fed crops. With economies of large-scale production, government subsidies, faster growth rate of crops, etc., the prices for conventional agriculture products are often lower. The average consumer prefers to buy cheaper products, especially if they are unaware of the differences.

Organic farming requires greater labour inputs per unit of output initially but the *didis* have to usually price their vegetables close to the market price; hence, they feel as if there is a devaluation of their work. If the produce is certified organic by the government, the selling price is higher and the profits for the farmer are higher, even without an increase in input costs. The lack of certification, thus, acts as an impediment in the *didis* getting their entire producer's surplus.

Nonetheless, the Federation's banner under which the organic products are sold has managed to sell enough to benefit the women farmers it supports. Brinjal sales have, in fact, been very encouraging. Hemlata *didi* from Takabarra village says, "It is tough to attract customers in such a competitive market, but those who have used our vegetables often come back to us. The taste of our organically grown vegetables is sweeter and they are healthier and fresher. *Bhaata* (brinjal) grown by us gets sold out, despite us selling it at a higher price (Rs 40 per kg). We are hoping that other vegetables will also find the same success as more and more people get hooked on to the taste."

Additionally, with time, the government has also increased its support to the organic sector and almost 400 farmers in the area are now certified 'organic farmers'.

The programme for organic farming under PRADAN has done phenomenally well in certain areas. Nonetheless, certain areas have not been able to adopt the practices as well. First, the training is provided to women, who are part of the Federation. This leaves out a large number of women in the area. Because organic farming land has to be isolated from chemical-use land, and most farmers use chemicals in their crops, the availability of clean patches is a problem. Villages such as Sawarjodi and Takabarra have become model villages, often displayed to development practitioners as examples. Nonetheless, a number of other less successful villages remain in the shadows. Not only is there little knowledge of the reasons for their failure, the women from these areas have not yet found enough success to motivate them. More concentrated efforts in the areas lagging behind, better efforts to understand women's challenges, and an active policy of advocacy for organic farmers may help PRADAN achieve its objectives in a more uniform manner.

Sustainable Farming: Building the Identity of Women as Farmers

ANJAN SWAR

Introducing sustainable organic farming and power-operated implements, holding training programmes and exposure visits for women farmers, thereby enhancing their knowledge and decision-making abilities has been a rewarding investment of the PRADAN team in some villages of Odisha, creating the path to self-sufficiency and food sufficiency

"In the last three years, I have been able to harvest more in paddy and vegetable cultivation by using organic fertilizers and nutrients. The duration of fruiting has also become longer. There is high demand for organic vegetables in the market; therefore, the consumers mostly buy from me. I know that recognition for me as a farmer has increased—in the family as well as in the village. I think that this is a big change for me." Manjulata Mohanta says proudly.

Manjulata is a resident of Khireitangiri village, in Patna block (Keonjhar district), and is a member-cum-secretary of the Jhansirani Self Help Group (SHG). Manjulata got married in 1998 into a very poor family. She joined the SHG in 2003 and found a platform where she could share her problems and receive support. She has seven members in her family, including her three daughters and one son. She has about 3.5 acres of agricultural land.

Earlier, the family was only cultivated *kharif* paddy in their land, as per the traditional practice. They grew some vegetables on their homestead for their personal consumption. They also used chemical fertilizers and pesticides. Largely, the family planted paddy and vegetables in the *kharif* season and potatoes, onions in the *rabi* season. Additionally, they cultivated cauliflower in 5 decimals of their land and earned Rs 4,000–5000 per season.

They have a well in their homestead as irrigation support. They used to lift water manually from the well until they installed a pump-set. In 2014, Manjulata did the agricultural planning for the first time and decided to opt for organic farming in her field. She started sustainable practices in half an acre of land where she planted vegetables. She prepared vermi-compost, *handikhaata* (preventive pesticide), *agniastra* (organic insecticide), etc., for organic farming in the up-land and for the homestead creepers (mostly cow-pea, bitter gourd, ridge gourd, cauliflower) during the first year.

For creepers, the interventions introduced were setting up the trellis and using organic fertilizers and pesticides. Yields have increased from 25 quintals per acre to 40 quintals per acre. For cauliflower, in 2013–14, when she applied only organic pesticides (*handikhaata* and *agniastra*), she earned a net profit of Rs 1,05,000 from her half-acre of land, with cropping in *kharif* as well as *rabi*.

Through these sustainable farming methods, not only has her income but her dignity and confidence have also increased. She is one of the many women PRADAN has been able to reach through our interventions

She has now become confident about this sustainable practice. Yields have increased and expenditure has decreased due to the use of organic products and the use of the trellis method for the cultivation of creepers.

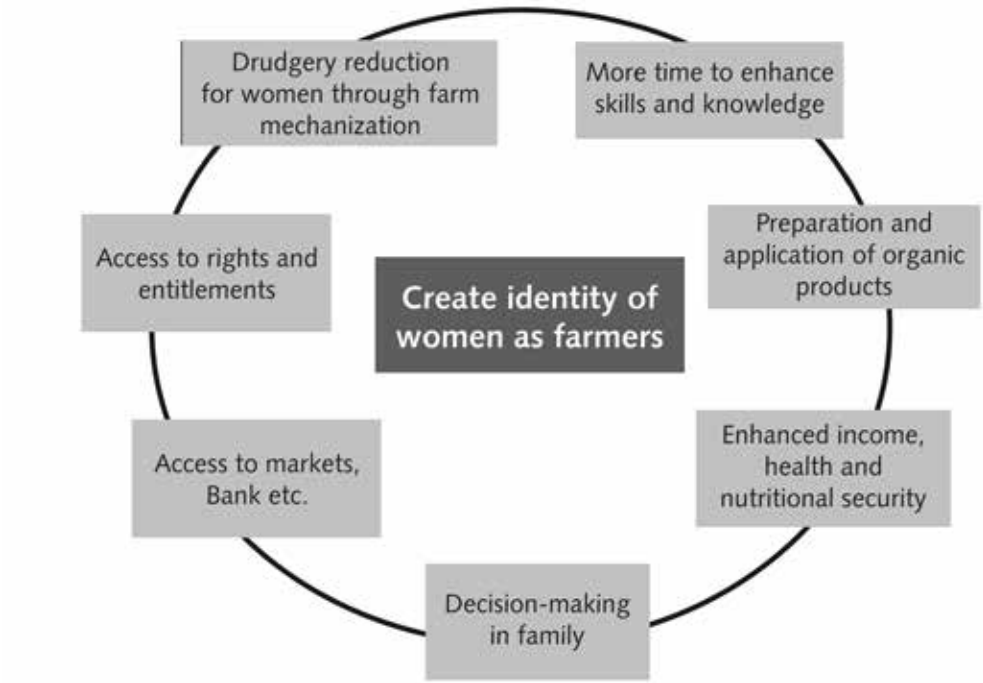
The next year (2014–15), Manjulata invested Rs 1 lakh as an advance to purchase an auto-rickshaw. Her husband is now driving it in the local area and also transports vegetables to be sold in the market. Manjulata adopted SRI for first time that year on 1.4 acres of land, using organic practices. The Mahila Kisan Sashaktikaran Pariyojana (MKSP) Project helped Manjulata get a pump-set for irrigating her land. She increased her vegetable area to 0.75 acres, thanks to the pump-set and manual farm implements such as a vegetable marker, a weeder and a ridger. She sold her paddy and got a profit of Rs 17,000 and the *kharif* vegetables (leafy vegetables, brinjals, potatoes, bitter gourds, etc.) earned a profit of Rs 90,000. That year, she had not planted the *rabi* crop due to her daughter's marriage. She was able to utilize this money she earned for her daughter's marriage.

She cultivated her crops again with a similar plan in 2015–16 and got a profit of Rs 1,10,000. This year, again, she was unable to plant the *rabi* crops due to drought. She is, on the whole, happy with her organic practice although she does sometimes face difficulties in purchasing organic and bio-products such as vermi-compost, bio-fertilizers and neem oil from the market due to their unavailability.

She told us that she gets more respect in her family due to her enhanced knowledge and the income that has come through her practices. She also feels empowered now to participate in decision-making in her family. Since last year, she has invested in four LIC premiums of Rs 17,700 in her name and in the name of her husband and children. Through these sustainable farming methods, not only has her income but her dignity and confidence have also increased. She is one of the many women PRADAN has been able to reach through its interventions.

SUSTAINABLE AGRICULTURE AND WOMEN

Sustainable agriculture is the production of food or animal products, using improved farming techniques that protect the environment, the health of the communities and the animals, and at the same time provides economic benefits. However, merely increasing production and profit may not create the change that we are aiming for. Agriculture is calculated as an occupation of the household, involving both men and women. Although women do most of the work in any cultivation, they do not receive any credit for it. The mention of 'the farmer' usually evokes the image of a man. And consequently, all the programmes, schemes and technical support for agriculture are directed at and are provided to men. Women are completely neglected and have the least access and control while making the highest contribution to the work

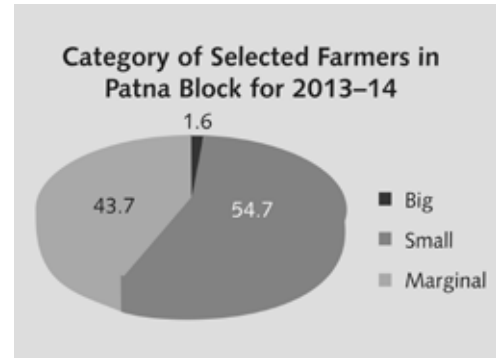


in the fields. Sustainable agriculture is the integration of organic farming with improved practices, optimum utilization of resources, less dependency on the market for seeds and other inputs, reduction of drudgery through women-friendly farm implements and a support system to access their rights.

AREA BACKGROUND

PRADAN, Jashipur team, is working in three blocks, that is, Karanjia, Jashipur and Sukruli, of Mayurbhanj district and one block of Keonjhar district, that is, Patna. These four blocks are tribal-dominated areas, with multiple communities such as Gonds (ST), Bathulis (ST), Kolhos (ST), Mahantas (OBC), Mundas (ST) and others.

The major livelihood activities of these villages are rain-fed agriculture, collection and sale of non-timber forest produce (NTFP) and livestock. Each family has livestock such as goats, pigs and poultry birds, often used as a buffer in a crisis. The sustainable agriculture initiative started in Patna block and gradually expanded to all the other blocks of this team.



BEGINNING

Initially, in 2013–14, the team's main objective was to establish a model around sustainable practices, develop an appreciation of women farmers and make them confident to adopt these practices. This agricultural programme was initiated in 1000 families, with the help of MKSP. The major focus was on introducing and promoting organic practices and giving priority to women farmers. The shifting from inorganic to organic practices was a very intense engagement, and mobilizing the community was difficult. The real concern was to ensure a standard of production and gain the confidence of the community, which had, so far, been using chemical fertilizers and pesticides on the farms.

Initially, in 2013–14, the team's main objective was to establish a model around sustainable practices, develop an appreciation of women farmers and make them confident to adopt these practices

In the organic practices being introduced, farmers were advised to prepare organic manure at home. Sometimes, this was not possible due to paucity of labour, frequent engagement in crop management, etc. In order to reach out to the larger community and to bring a change in the area, therefore, the PRADAN team intervened with women leaders of the *gram panchayat*-level Federation (GPLF).

The team organized a visit of the Federation leaders and the Agriculture Resource Persons in Balaghat, to provide to the farmers a basic understanding of sustainable farming and to encourage the engagement of women. An initial training of all the Agriculture Resource Persons and the village leaders was organized with the support of PRAN (a non-government organization) on how to prepare and apply the organic fertilizers and pesticides such as the *pranamrit, bijamrit, agniastra*, etc.

Another visit was organized to Sambhav (a non-government organization) campus, in Nayagarh district, Odisha, to see an ecologically developed farm. GPLF leaders organized a *Mahila krushak mela* and an awareness rally in their *panchayats*, regarding the mass adoption of organic practices. The main objective of the *mela* was to inform women farmers that they could grow more crops by adopting sustainable farming practices.

Each of the women farmers was advised to come with samples of their best field crops such as cereals, pulses, vegetables and also samples of those that didn't grow well for whatever reason. Women farmers also took along disease- and pest-affected samples. Discussions were held in the group, to understand the basic crop production processes and the importance of sustainable practices.

GPLF leaders showed women farmers how to prepare organic products such as *bijamrit* (a herbal product used for seed treatment), pranamrit (a herbal product prepared by poultry compost, oil cake and ash), agniastra (organic insecticide) and handikhaata (preventive pesticide). They reached out to a large number of women's collectives of the area and were successful in involving women in farming. The major crops adopted for cultivation by women farmers include paddy, cow-pea, brinjal, bitter gourd, ridge gourd, tomato and groundnut; they apply organic products prepared using cow urine, cow-dung and locally available leaves to promote plant growth and get a standard yield. Although the team was apprehensive about the production in the initial stages, the community was fairly confident. In fact, they happily declared that

by using organic products, the yield of all the products has increased.

The major objectives of 2015–16 were to equip women farmers with women-friendly technology and methodologies to improve yields, and make agriculture a major source of income. This is being done through the Production Cluster Approach, which is cultivation in a contiguous patch, comprising one or two *gram panchayats* that engage in agriculture collectively. GPLF, considered a Production Cluster, monitors the plans and progress of the activity.

It was in these groups, these informal associations, that women began talking about themselves for the first time

The main strategies adopted last year were:

- Targeting selective crops at the Producer Group (PG) or the village level for collective practice, production and marketing
- Experiencing the use and benefits of the power-operated implements
- Up-scaling sustainable practices with more women farmers in all four blocks
- Ensuring major interventions and practices for crops such as wheat, for maximum benefit

MAJOR SUSTAINABLE AGRICULTURE INTERVENTIONS

The team (although the professionals are at different levels of proficiency), the trainers pool (Agriculture Resource Persons and some expert farmers, practising best practices) and women farmers are building on their experiences through visits to other villages and farms, knowledge-sharing and practices. All the selected families, interested in practising sustainable farming as women farmers, have started applying for various organic products such as the *jeevamrit* (organic fertilizer), handikhaata, agniastra, neemastra (strong organic insecticide) in their crops and are getting beneficial results. Women farmers have enhanced their confidence in organic agriculture through the following sustainable practices.

1. Seed intervention
   a. Preparation and application of *bijamrit*
   b. Utilization of bio-fertilizer (Rhizobium, Phosphate Solubilizing Bacteria, or PSB, and Azotobacter)
   c. Brine water test of paddy
   d. Local seed selection and preservation
2. Integrated nutrition management (compost and Nitrogen, Phosphorous and Potassium, or NPK)
   a. Preparation and application of pit-compost, vermi-compost, NADEP compost
   b. Application of bio-fertilizer
   c. Use of *pranamrit*
3. Integrated pest management
   a. Preparation and application of *handikhaata* (as preventive), *agniastra* (against the fruit and stem borer), *mahulastra* (against fungal disease), *mathastra* (against bacterial disease), etc.
   b. Using bio-pesticide such as trichoderma viride and multi-neem
4. Adoption of improved practices
   a. Horizontal trellis for creepers and vertical trellis for creeper tomato.
   b. Direct seeded rice (DSR) and SRI
   c. Pit method for solanaceous crops such as brinjal and tomato
   d. Using of farm implements (manual and power-operated)

Table 1: Organic Products, Their Uses and Preparation

Preparation of Organic Products using Local Material			
No.	**Purpose**	**Product**	**Material used**
1	Seed treatment	*Bijamrit*	Cow urine, cow-dung, lime, fertile soil
2	Organic fertilizer	*Pranamrit*	Poultry/goat compost, oil cake and ash
3	Fertilizer (increase bio-agent in soil)	*Jivamrit*	Cow-dung, cow urine, jaggery, gram flour, fertile soil
4	Hormone	*Amrit*	Mung seed, chick-pea seed, wheat, cow-pea seed, arhar seed, til
5	Pesticide (Preventive)	*Handikhaata*	Cow-dung, cow urine, neem leaf, karanja leaf, arka leaf, jaggery
6	Insecticide	*Agniastra*	Cow urine, dry tobacco leaf, chilli, garlic, neem leaf
7	Fungal disease	*Mahulastra*	Mahua, jaggery, cow urine
8	Bacterial disease	*Mathastra*	Curd, water

The PRADAN team organized village/hamlet-level training programmes for SHG members, to ensure organic practices, disease-pest management, etc. The participation of women in agriculture practices of their families has been enhanced through this training process. Organic farming saves approximately Rs 400 per 10 decimals of land in vegetables, which was earlier being spent to apply chemical pesticides. People are clearly articulating that the taste of the organic vegetables is much better and they can be preserved for a longer duration because of the organic inputs. So, the market demand of these vegetables is much higher than the chemically grown ones.

Farmers are increasing vegetable cultivation twice over through mechanization and drudgery-reduction interventions. The drudgery-reduction programme also reduces labour costs by two to five times in each intervention and has also empowered women to be the leaders in agriculture. Due to the increase in production of vegetables, more women have started going to the markets to sell their products.

Women farmers say that organic farming is really low-cost, easy to use, not harmful for health and beneficial for soil health. Women farmers share that they are now getting recognition from family members and villagers for their enhanced knowledge on farming and plant protection measures.

Earlier, the men of the families purchased chemical pesticides and fertilizers from the market, which sometimes had no effect, leading to heavy expenditure. This has gradually reduced through the organic interventions by the women. The number of women farmers using organic products has increased in the last three years (Table 2).

After three years of intervention, the PRADAN team feels confident about designing and consolidating its learning. The intervention has created a good movement among women farmers because earlier farmers were struggling to control disease and pest attacks through expensive chemical fertilizers and pesticides.

Table 2: Women Farmers in Patna Block Using Organic Products

Organic Products and Methods	2013–14	2014–15	2015–16
Use of bio/organic products (Net farmers)	835	1,536	1,724
Seed treatment	638	1,213	1,514
Integrated nutrition management	396	936	1,411
Integrated pest management	735	1,436	1,694
Hormone and other micro-nutrients	88	232	291

THE IDENTITY OF WOMEN FARMERS

The impact of the sustainable farming intervention leads us to an analysis of the identity of women farmers. The intervention has been divided into three segments, that is, a) Service system and stakeholders, b) Governance and c) Federation.

The service and support system has helped to enhance the knowledge and skills of women farmers for better utilization of their resources.

The governance part help them to access their rights and entitlements and to create an identity for themselves within the government and other departments.

The Federation creates a platform for better lives and livelihoods. It helps women negotiate with the government for their rights and entitlements.

The Women's Empowerment in Agriculture Index (WEAI), referred to from the International Food Policy Research Institute (IFPRI) indicators, are the guiding principles for the socio-economic and political transformation of women. The team has been engaged with this indicator since 2015.

The WEAI is a universal indicator, comprising the following guiding principles:

- Participation in decision-making on agricultural production, inputs and marketing as a farmer
- Participation in decision-making and ownership for use of land, assets, credit and investment
- Control over the produce and the use of income
- Participation in institutions or farmers' collectives
- Satisfaction and being able to provide time for self and for leisure activities

DRUDGERY-REDUCTION INTERVENTION FOR WOMEN

Women's drudgery-reduction intervention through farm mechanization has two types of implements: manual and power-operated. The majority of small and marginal farmers prefer to use manual implements for their farms. Sometimes women farmers now collectively demand power-operated implements.

Manual implements are being easily operated by women and are also helping them increase the area for cash crops on their farms. Power-operated machines help reduce their dependency on men and also reduce a major drudgery for women during paddy transplanting and harvesting. The use of farm implements is more economical because they invest Rs 1500 per acre in mechanical transplanting of paddy whereas the expenditure was Rs 4000 earlier in the manual process (20 labour days x Rs 200 per day).

GPLFs have purchased power tillers, paddy trans-planters, reapers, power weeders-cum-ridgers, etc., with the help of MKSP. There are also two agro-service centres set up with the help of MKSP in Jashipur and Karanjia blocks. One woman entrepreneur from each block provides agro-services of tractors, seed drills, rotavators (an equipment/attachment used with a tractor for puddling), etc., to farmers.

There are nine SHGs of women in the village, promoted by PRADAN; all are now part of the Baitarani Mahila Sangh (the Regional All Women's SHG Federation)

BUDHIKAPUDI VILLAGE: SHIFT FROM INORGANIC TO SUSTAINABLE PRACTICE

Budhikapudi village is the *gram panchayat* (GP) headquarters of Budhikapudi GP of Patna block, in Keonjhar district. The village was named after the king of Rajnagar saw an old woman rearing a horse; the name literally means 'an old woman rearing horse': Budhikapudi.

There are nine SHGs of women in the village, promoted by PRADAN; all are now part of the Baitarani Mahila Sangh (the Regional All Women's SHG Federation). The first SHG was formed in 2003 and the last in 2011. All the SHGs have formed a village-level Cluster forum in 2006, which meets once a month, to discuss issues and concerns and share achievements and learning.

Of the 100 agrarian families in the village, 73 are part of the intervention, where women, as farmers, are learning and practising sustainable farming practices in a producer group approach. With sustainable agriculture practices, all the women now have nutritional sufficiency and a cash income of Rs 30,000–60,000. The model for agriculture is to sow around the homestead well, the pond and the paddy lands in the *kharif* season. The major crops adopted by the women are SRI/line transplantation in paddy, creepers such as ivy gourd and cow-pea; solanaceous crops such as brinjals, tomatoes, chillis and potatoes. These women usually have 10 to 20 decimals of homestead land on which they grow vegetables organically in the *kharif* as well as *rabi* seasons. They grow paddy in about an acre of land in the *kharif* season only.

Women of this village used a lot of chemical fertilizers and medicines for their crops earlier. Initially, therefore, organic farming was

Table 3: Commonly Used Implements

Crops	Manually-operated	Power-operated
Paddy	Plough, marker, cono-weeder, wheel hoe	Power tiller, tractor, seed drill, trans-planter, weeder, reaper
Vegetables	Plough, wheel hoe, marker, ridger, seed drill, drum seeder	Power tiller, tractor, pit digger, seed drill, weeder-cum-ridger, sprayer

difficult for them. Now, however, with regular training and by witnessing demonstrations, they have started adopting new practices. They have begun to prepare organic manure and medicines using locally available reduced material and their input cost in agriculture has been by five to six times. Their production has also increased.

Organic farming has become so popular among the women that they are now teaching these techniques to the other families of the village and nearby villages

Organic farming has become so popular among the women that they are now teaching these techniques to the other families of the village and nearby villages. With the introduction of the drudgery-reduction machines such as weeders, reapers and power-operated sprayers and ridgers, women are now able to manage their crops easily with much less labour.

PRADAN and the women's Federation, the Baitarani Mahila Sangh, have jointly prepared a support mechanism and an engagement strategy to create an identity for women farmers as well as a sustainable income for them. The strategy is divided into three parts, that is, institution mechanism, support system, and rights and entitlements for women farmers, as per the experience. Trained Agriculture Resource Persons are engaged in one or two GPs, to ensure the service system on the ground.

Planning also encompassed nutrition of the family. The women were made aware of the nutritional requirement and the importance of providing complete food in the initial stages

Table 4: Sustainable Agriculture Planning for a Sample Family of Five Members

Nutrition and Cash Requirement from Agriculture (Yearly)		Land Details (Average Land-holding 1.2 Acres) and Crop Planning			
Paddy (3 kg rice/6 kg paddy per day) in quintals	22	Land pattern	*Kharif* crops	*Rabi* crops	Yield and Outcomes
Pulses (@ 50 gm on alternate days for a year) in kg	45	Lowland (20 decimals) irrigated with ring-well	Paddy (line sowing)	Vegetables (Tomato/Chillies)	Paddy 4 quintals, Cash Rs 20,000
Vegetables (7.5 kg per week) in quintals	4	Medium-land (60 decimals)	Paddy DSR/ SRI	Green gram (20 decimals only)	Paddy 15 quintals, Pulses 25 kg
Potatoes (3.5 kg per week) in quintals	2	Upland (20 decimals)	Paddy DSR	Horse gram	Paddy 3 quintals, Pulses 20 kg
Cash income	Rs 50,000	Homestead (20 decimals)	Vegetables (3 decimals): Kitchen garden mode		Vegetables for family
			Vegetable (creepers) with *machan* 18 decimals	Vegetables (solanaceous) 15 decimals, potato 2 decimals	Potato 2 quintals, Cash Rs 30,000

Table 5: Broad Strategies for Sustainable Income for Women Farmers

Institution Mechanism	Support Service System		Women's Rights and Entitlements
	Training Designed	Arrangement of Farm Implements	
PG of women farmers at village/hamlet level. Building linkages among women farmers and with the government, banks, private depts. Creating better service systems on knowledge, skill-building, value addition, collective marketing, etc.	Establishing women farmers' identity, introducing organic practices, initiating major intervention of crops, teaching the use of farm implements and drudgery reduction, helping create irrigation infrastructure through government projects on irrigation and agriculture, creating a farmer's institution, improving nutrition, arranging for seed collection and preservation, organizing collective marketing.	Demonstration on the use of implements. Services on power-operated implements from Federations.	Accessing Kisan Credit Card (KCC), getting bank loans, participating in palli sabha, arranging for irrigation through government departments and projects, using MGNREGA

of a child's life. The team is now preparing a strategy to fulfill the nutrition needs as per the Food Consumption Score (FCS): Malnutrition is visible across the area, especially among women and children.

FCS is a measurement of the weekly nutritious food consumption of any person. The PRADAN team has taken FCS as a guiding tool. Although rice is the major food of this area, the consumption of pulses, vegetables and meat are also required to fulfill nutrition needs. People are unable, however, to purchase pulses and vegetables on a regular basis due to poverty. Therefore, while creating awareness among women farmers on the importance of nutritious food, we are also facilitating the cultivation of pulses and vegetables on their land.

COW-PEA CULTIVATION IN SUSTAINABLE PRACTICES

There are different interventions for sustainable practices in cow-pea. These are introducing the use of organic materials, pit method, trellis and power-operated farm implements in 20 decimals for a sample family. The comparison

Table 6: Comparison between Chemical and Organic Practice in 10 decimals of Cow-pea Production

Chemical Practice		Organic Practice	
Required Material	Amount in Rupees	Required Material	Amount in Rupees
Seed: 100 gm	200	Seed: 100 gm	200
Compost: 5 quintals	300	Compost: 5 quintals	300
DAP: 10 kg	300	Cow urine: 50 ml	2
MOP: 10 kg	200	Rhizobium: 50 gm	4
Urea: 5 kg	50	PSB - 50 gm	4

Chemical Practice		Organic Practice	
Required Material	Amount in Rupees	Required Material	Amount in Rupees
Boron: 50 gm	20	Vermi-compost: 10 kg	60
Saaf: 100 gm	75	*Pranamrit*: 20 kg	170
Ektara: 10 gm	50	*Jivamrit*: 6 litrs	60
Savin: 50 gm	25	Neem cake: 10 kg	200
Redomil	10	*Handikhaata*: 2.5 litres	25
Furadon: 2 kg	150	*Agniastra*: 2.5 litres	75
		Neem Oil: 1.5 litres	120
Total Expenditure	Rs 1,380	Total Expenditure	Rs 1,220

between the chemical and organic practice can be measured.

The total benefit of using organic products for 20 decimals of land, therefore, is Rs 320. The expenditure may be less in case of organic practice due to locally available materials, which farmers can easily collect from their area. After calculating the cost of all the

Table 7: Cow-pea Intervention in 20 Decimals with Sustainable Agriculture Process

Expenditure for Trellis in 20 decimals (6 kg Net @ Rs 280 and 5 kg Galvanized Iron (GI) wires @ Rs 80 for 3 years) = (6 x 280 + 5 x 80)/ 3–Round				700 (rounded off)
Drudgery reduction intervention	**Intervention**	**Manual**	**Power instrument**	**Total Benefit**
	Pit (400 no.)	Rs 600 (@ Rs 1.5 per pit and 1.5 ft depth)	Rs 800 (@ Rs 2 per pit and 2 ft depth)	200
	Weeding	Rs 600 (3 labour days)	Rs 200 (@ Rs 10 per decimal)	
Outcomes		**Output and Income Enhanced**		
Approximately 80% production enhanced and investment reduced		Traditional yield: 500 kg; Yield after intervention: 900 kg (400 kg @ Rs 10)		4,000
Proper plant growth and fruiting		Expenditure reduced due to organic farming		320
Easy to collect fruit from plants because the height of trellis is around 6 ft.		Expenditure reduced due to use of farm implements		200
Easy to nurture plant in case of disease pest management		Total benefit for farmers in 20 decimals of land with sustainable practices (Rs 4000 + 320 + 200–700)		3,820

interventions, a farmer can get an additional income of Rs 3,800 from 20 decimals as shown in the table 7.

BANABASI MAHARANA'S EXPERIENCE

"My name is Banabasi Maharana and I am from Dhanurjaypur village of Chemana GP, Keonjhar. I am working as an Agriculture Resource Person in Chemna and Bausuli GP. For the last three years, I have promoted organic farming in paddy, creepers and other vegetable cultivation. The fungal diseases of the crops are checked because seeds are treated with *bijamrit*. *Pranamrit*, which is prepared with poultry droppings, mustard oil cake and ash, is a good nutrient for the plants. We had to standardize the required doses, however. *Pranamrit* is given as a basal dose and again during the first inter-cultural operation. It improves soil health also.

Because of the use of *jivamrit*, we get more seedlings now, the plants are becoming healthier and growing better, and giving a better yield. *Agneyastra*, prepared by mixing cow urine, neem leaves and a paste of garlic, chilli and tobacco leaves, is effective in checking fruit borer, stem borer and leaf cutting pests. Disease and pest attacks are rare because *handikhaata* is being applied as a preventive at a seven-day interval.

The focussed training and field-based demonstration by the *Mahila Krushak* on organic agriculture, organic seed treatment, and preparation and application of organic products for plant growth and pest control has been helpful for the women and has motivated them. I feel happy when I see the smile on the *didis*, faces as they share their success stories."

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

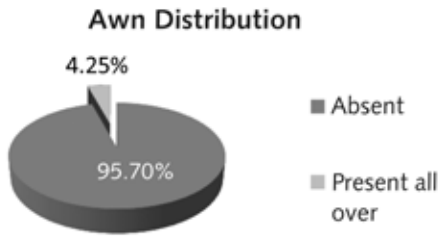
No.	Variety	Duration in Days	Estimated Grain kg/ sq m	Mean No. of Effective Tillers Per Hill (Minimum 3 to 5 Hills)	Pest Attacks	Disease Incidents	Mean Panicle Density
20	Kalbhairav	155–165	4.4	12	No	Gallmidge	240
21	Hathi	155–165	4.2	15	No	Gallmidge	201
22	Bahurupi	155–165	4.2	16	No	Gallmidge	215
23	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:

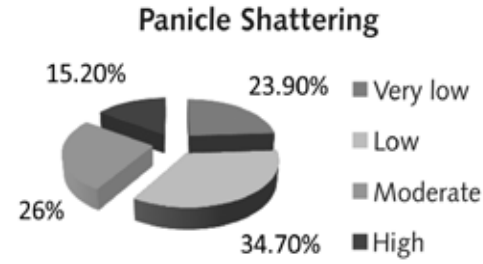
(a) Awn: A stiff bristle, especially one of those growing from flower of grasses (filiform extension of the keel of the lemma). Locally, this is known as *mooch* or *kata*. Birds or monkeys cannot eat this variety because the awns get stuck in the throat. Awns also help in the natural dispersion of seeds

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



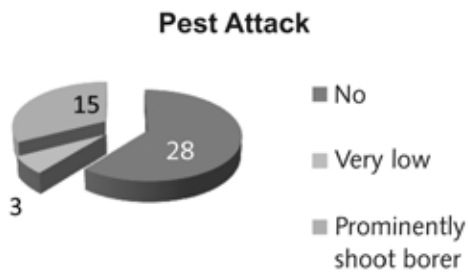
(b) Panicle Shattering: Panicle shattering is the extent to which the grains shatter from the panicle at maturity. Wild paddy shatters very easily. Its purpose is to produce more paddy naturally. Once the plant matures, the grains just scatter. Therefore, the belief is that an indigenous variety shatters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

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



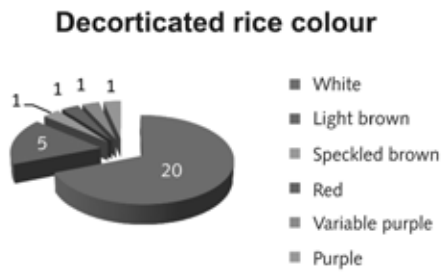
(c) Incidents of disease: Of the 28 varieties studied, nine varieties were disease-resistant, 15 had the gall midge pest and only the rudrani variety showed the appearance of loose smut. To study pest attacks, we kept a regular watch on the plot for diseases and insect attacks. We examined the plot at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

Diversity block in farmer Rajkumar Choudhry's plot, Lotmara village, Paraswada block, district Balaghat

To multiply and save seeds collected from various places, a diversity block was created in Lotmara village in Paraswada block, wherein all 52 indigenous varieties were grown in a single plot. This was also an experiment to study the potential of indigenous paddy with various characteristics.

PRADAN is a voluntary organization registered in Delhi under the Societies Registration Act. PRADAN works through small teams of professionals in selected villages across eight states. The focus of PRADAN's work is to promote and strengthen livelihoods for the rural poor. It involves organizing the poor, enhancing their capabilities, introducing ways to improve their income and linking them to banks, markets and other economic services. The professionals work directly with the poor, using their knowledge and skills to help remove poverty. *NewsReach,* PRADAN's bimonthly journal, is a forum for sharing the thoughts and experiences of these professionals working in remote and far-flung areas in the field. *NewsReach* helps them to reach out and connect with each other, the development fraternity and the outside world.

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