
Custodians
of Seeds
IRRI




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## **Custodians of Seeds:** Stories of Rice Varietal Adoption in India

Women have traditionally been the key custodians of seeds and other plant genetic resources. Their seed-seedling tasks involve screening, cleaning, germinating, nursery raising, sowing, and postharvest drying, cleaning, and storage. With critical roles to play at every stage of seed production and the value chain, it is important that women have sustained access, knowledge, and control over this very important input in agriculture. This is also an opportunity to capitalize on women's traditional interest, experiences, and skills in a context where timely and adequate availability as well as selection of quality seeds remain a major constraint in the existing seed systems. There is also an immediate opportunity to allow and nurture women-led enterprises in the seed system for their better economic gains and to establish their leadership and identity in agriculture. Institutional innovations involving women have great potential for strengthening the seed system through better knowledge, information, and market linkages established for quality seed production, multiplication, and dissemination.

IRRI celebrates the opportunity that women farmers bring forth, by way of the Stress-tolerant Rice for Asia and South Africa program, supported by the Bill & Melinda Gates Foundation, that has been promoting a seed delivery, production, and dissemination program that is gender-responsive. A key component of the project has been encouraging the role of women and women-led institutions in agriculture, with reference to stress-tolerant rice varieties (STRVs), seed varietal selection, adoption, and replacement.

This publication compiles a few stories from the field that highlight women's engagement in the efforts to strengthen seed systems. These stories illustrate the potential to bridge the gaps and enhance varietal selection, create distribution pathways, and improve varietal adoption and replacement, with a focus on stress-tolerant rice varieties (STRVs). Equipped with the broader objective of enhancing the resilience of farmers and the production system to climate change, these initiatives are replicable for new important varieties and their seeds.

## From homemaker to agricultural entrepreneur

### Strengthening women-led enterprises through seed production of stress-tolerant rice varieties

Neeraj Devi from Janesara Village, Raebareli, Uttar Pradesh

Neeraj Devi's journey from being a housewife to becoming an agricultural entrepreneur in the seed system is truly motivational. This mother of two hails from Janesara village of Rahi Block in Uttar Pradesh, India. Her husband, being a migrant non-farm labourer, works outside the state and sends money for covering at least some household expenses and needs. Neeraj has been left behind to take care of the family's home, the children, and livestock. She has been a member and treasurer of the Jai Amba Women Self-Help Group (SHG) for several years. However, 2016 brought her opportunities to explore her entrepreneurial side and transform her identity in a positive way.

In 2016, Savita Didi, the community mobilizer for the village, started to mobilize the SHGs into a federated village organization (VO) and linked them to larger block federations. By organizing women into stronger collectives, Savita aimed to provide better market and knowledge opportunities. One of the key activities for the newly formed VO, 'Saraswati Mahila Gram Sangathan' was directed towards engaging women in agriculture. This included a program specifically around women-led seed production and informal marketing by forming women's seed groups. Several rounds of training on crop and quality seed production and management for cereals such as rice, wheat, and pulses were organized for the SHG members. Having already established herself as a treasurer of her SHG, Neeraj was selected to be the president of the new VO. As such, she had to organize and coordinate all knowledge building and sensitization activities while ensuring her own participation. These activities opened new avenues and opportunities for

Neeraj. Equipped with scientific know-how and hand-holding support from the facilitators, Neeraj decided to develop her own enterprise around seed production. What made an astounding and significant change in shifting Neeraj's role was that she turned herself into an able farmer after being a homemaker of a landless household. So, instead of completely relying on the non-farm remittances of her husband, she had found new ways to enhance the family's income by making herself an independent income-earning member. Through the money saved from her husband's income and household spending, she managed to lease 0.5 acre of land on contract from another farmer. She now cultivates, manages, and produces rice from a land on her own since the 2016 rabi season.

> "I have already saved on my irrigation cost by growing short-duration, drought-tolerant Sahbhagi dhan."

In the 2017 kharif season, Neeraj, along with some other women farmers, received quality seeds of an STRV (Sahbhagi dhan) through their VO, with a return-back agreement ratio of 1:3. After being trained in quality-seed production practices, Neeraj planted 3 kg of Sahbhagi dhan seeds on 0.33 acre of her leased land. Being in the drought-prone uplands, the field needed constant irrigation to cultivate any crop, so she had to pay Rs 150 per hour for irrigation to the water supplier. However, she immediately noticed significant water savings by growing the short-duration STRV. While she enhanced food security for her family by growing her own rice for the first time, she also produced a large amount of quality rice seeds by following the seed production practices she had learned. After returning the agreed amount of seeds to the VO, Neeraj was able to sell the rest at a significantly higher price (Rs 22-25/kg) than she would have gotten in previous years. "In our village, we sell paddy to local millers and traders with a rate of Rs 1,400–1,500/quintal whereas selling it as seeds gave us an additional profit of Rs 800-1,000/quintal," she said. "I have already saved on my irrigation cost by growing short-duration, drought-tolerant Sahbhagi dhan. I feel confident that I will also get a good profit next season."

A landless housewife who has moved on to manage her own enterprise around seed production illustrates the immense opportunities that women have in the seed sector. Persons like Neeraj not only bring out the potential of women in accelerating quality seed production and supply, but also the scope to develop an enterprise that results in gainful employment.

## Evidence-based varietal selection

### Innovation thriving through a women-led collective

Innovation is thriving, thanks to a women-led collective in Gananathpur, a small village located in Kalahandi district of the eastern Indian state of Odisha. A 17-member women's self-help group called 'Maa Thakurani Group' has initiated a new approach of evidence-based learning to strengthen the local rice variety selection process. These women established and managed an evidence hub in the form of a so-called 'crop cafeteria.'

During the 2017 kharif (wet season), these women transplanted a collection of 19 old varieties and new STRVs on a large tract of land for observation by local farmers. Potentially, the end result could increase farmer resilience and stabilize local food grain production. The women maintained every replication plot and followed similar management practices for every variety. Following a staggered pattern of sowing, they synchronized flowering of all the varieties to compare their important yield traits. When the crop stand reached maturity, the group, with the support of local agriculture officials, organized an EXPO and invited various key stakeholders from the seed value chain, e.g., local dealers, government extension functionaries, agriculture researchers, scientists, representatives from NGOs and farmers from surrounding villages. Everyone participated in a detailed process of evaluation and scoring for different traits of each variety. The women groups observed the varieties over the entire cropping season, shared their experiences and opinions among each other, and thoroughly discussed what they observed before arriving at a collective consensus for the selection of appropriate traits and varieties for the area.

Maa Thakurani Group awarded by the Deputy Director of Agriculture, Jan 2018

The striking feature of this intensive and season-long exercise was the women's collective management, scientific learning, and information and knowledge sharing that was

truly participatory. The sanguinity of the evaluation and varietal selection, and the collective voice, scientific understanding, and bargaining for consensus led by the women were remarkable.

> "This evidence hub has helped us learn new things, to observe and compare benefits between different varieties of rice"

Through actively participating, stimulating brain storming, observing varieties, and making accurate measurements, the group confidently selected five STRVs (Bina-11, DRR-42, DRR-44, BRRI-71, and BRRI-75), over the older local varieties. These STRVs gave an average yield advantage of 5 quintals per acre over the others. The women were unanimously happy about the performance of two particular STRVs, DRR-44 and Bina-11, which gave a very good yield irrespective of the low rainfall and frequent dry spells that farmers faced during the 2017 kharif season.

Hemalata Sabar, the Secretary for the Maa Thakurani Group says, "This evidence hub has helped us learn new things, to observe and compare benefits between different varieties of rice. We witnessed the results firsthand, so we can be confident in deciding the type of seed we want to cultivate. Our interactions have allowed us to exchange ideas and provide feedback. We have built a rapport with some key people in the system who can further empower and support this change. I feel it's a good start and will bring more prosperity to us."

With their confidence reaching an unprecedented high, triggered by continuous evidence-based learning, the women picked their top three STRVs (Bina-11, DRR-44, and BRRI-75) for cultivation and seed production in the upcoming seasons.

To encourage more such innovative activity by similar women's groups, the Government of Odisha has awarded the Maa Thakurani collective for its contribution to promoting new climate-resilient rice varieties through the activities just described.

Women sowing to establish the evidence hub at Gannathpur, Kalahandi, Odisha

## Women in seed market and delivery systems

### Enhancing access to market & business opportunities

The ultimate aim for introducing and promoting stress-tolerant rice varieties (STRVs) among farmers is developing a systemic resilience against climate change. This is only sustainable if the seeds of the new STRVs are available and supplied in the mainstream seed market and delivery channels. In order to achieve this, it is very important to engage seed dealers associated with either private or public seed-producing agencies. Engaging dealers in extension programs to create awareness, demand, and supply of seeds is more relatable because of the direct incentives available for the dealers in the form of created demands turning into business profits.

In line with this vision, IRRI's strategy focuses on promoting varieties among the dealers using demonstration plots for their potential customers—the farmers. In this way, the farmers, who are also their regular customers, directly provide feedback on the demonstrated varieties, which is reflected in their ultimate seed demand. However, it is important to make these emerging opportunities in the form of entrepreneurial ventures more inclusive by also engaging potential women dealers. By engaging this group in market-oriented extension programs, IRRI is ensuring that the access to knowledge, opportunities, and information about the STRVs becomes gender-inclusive. Runibala Choudhary's story is a humble beginning in keeping with this endeavour.

Dealer Orientation Training at Nayagarh, Odisha

Mrs. Runibala Choudhary, 52, is a registered seed dealer under the Odisha State Seed Corporation (OSSC). Determined and dynamic, she hails from Sunamuhin village in Odisha's Nayagarh district. Her husband, Mr. Ramachandra Choudhary, also works as a seed dealer in a cooperative group. Runibala is well-recognized in her village and is also the secretary in one of the women self-help groups. She decided to support her family financially, and in order to make their livelihood more secure and provide her family with a better standard of living, Runibala decided to become a seed dealer after getting inspired by her husband. Her desire and decision to become an entrepreneur herself were fuelled from her experience in handling seeds and related transactions while helping her husband in his

seed business. When she expressed her willingness to start a seed dealership, her husband gave her immense support in this new endeavour. Runibala's experiences of seed handling within the domestic boundaries had given her substantial avenues to build her knowledge, skills, and capacity to start her own enterprise. She then needed an opportunity to connect to the value chain. With much support coming from her family, she finally got registered as a dealer under OSSC in the Odagaon block of Nayagarh. Since then, she has been a seed dealer for the last 8 years.

Having realized the potential of women entrepreneurs, IRRI, through a conscious effort towards providing opportunities around seed enterprises, included Runibala in a dealer-led STRV demonstration and delivery program. Under IRRI's dealer demonstration intervention, Runibala showed interest and joined a team of several male dealers to take the lead in her area. After going through detailed orientation and training about the new STRVs and their potential, she procured 32 mini-kits of three STRVs, Sahbhagi dhan, Bina-11, and DRR-44. Through meticulous planning and enthusiasm, she distributed the mini-kits among her 30 current and potential customers to test these varieties on their own farms. Interestingly, the chain reaction and spill-over effect of empowerment were visible when Runibala included 17 women farmers in the region for the evaluation process. Through her evaluation and detailed discussion with client farmers (both men and women), Runibala also provided detailed feedback to facilitating scientists, local seed officers, and many farmers about DRR-44's performance being the best variety with a good yield advantage under drought conditions. She helped to create sensitization and demand for this newly released STRV in her locality.

> "Demand has been created among the farmers and many of them have already contacted her for seed purchases"

When exploring more, she mentioned that, due to the performance of the STRVs, demand has been created among the farmers and many of them have already contacted her for seed purchases. With this approach, she was able to enhance her knowledge about the STRVs and also improve the network building with her farmer-customers to bring resilience to rice farming in her area. In 2018, she is also keen to get involved in her own seed production through a women self-help group and is looking forward to being a part of new opportunities and events promoted by IRRI to create awareness and develop capacity-building.

Runibala Choudhary, a registered seed dealer from Nayagarh

## Women's network for accelerating varietal adoption

### Women leading evaluation methods for varietal performance and genetic gain

Pragmatic learning has always been regarded as one of the most effective tools used to ensure an informed decision on what technology to adopt. The same applies to the new stress-tolerant rice varieties (STRVs), which can directly provide farmers with major improvements in rice yield, income, and food security. It must be the responsibility and priority of the scientific community to equip farmers with enough opportunities to make intelligent decisions on what rice varieties to adopt. Unless extension and delivery systems provide learning-based approaches, it's unlikely that there will be rapid and sustainable adoption of the new STRVs.

IRRI is promoting Head-to-Head (H2H) variety trials laid out in farmers' fields through different partnerships. This comparative learning and evaluation will be critical to increasing the rate of adoption of the new STRVs by farmers. Around 50% of the diffusion of new varieties happens through informal seed systems (i.e., farmer-to-farmer networks). This approach will become more effective when all members of the farming community—men and women—can see, compare, and discuss before making adoption decisions.

Women and their role as custodians of seed in agriculture, makes for their intense engagement in informal networks in the village community. Through their strong linkages with community institutions and word-of-mouth discussions, women are key influencers for decision-making, both at the household level as well as the village community platform. Nearly half of all diffusion of new varieties of seed takes place via informal seed systems, i.e. farmer-to-farmer networks. Therefore, IRRI's adoption strategy for new varieties focuses on engaging women and their networks in the scientific evaluation of varieties for their traits, performance, and genetic gain through the H2H trials that IRRI is promoting. Women are encouraged to actively evaluate the new varieties in comparison to the old ones--all in the same plot. They are also encouraged to follow the same management practices for all the varieties under evaluation and to record the multiple crop growth and performance indicators at all crop stages. This helps them to observe varietal performance under their own management conditions. Witnessing the results based on available evidence enhances women farmers' comparative and analytical skills to select the best varieties for their respective farms' conditions. It also builds their self-confidence and risk-bearing capacities so that they can also be a part of the decision making processes right along the side of their male counterparts.

During 2016–18, IRRI conducted more than 6,000 H2H trials of STRVs. In the 2017 kharif alone, women farmers successfully organized more than 1,000 trials in eastern India using multiple combinations of the new STRVs and other existing popular varieties.

Purnima Sabar of Kanabira Village in Kalahandi, who tried head to head evaluation for DRR44 vs Lalat, standing with her harvests from two plots.

"Through their strong linkages with community institutions and word-of-mouth discussions, women are key influencers for decision-making"


A head to head trial laid out in Jajpur, Odisha for comparision between Puja, a popular local variety, and Swarna sub1, the flood tolerant variety introduced.

## An STRV overcomes the challenge of climate change

### Enhancing a woman farmer's ability to work an agricultural miracle

Sohabati standing in her field, content to see BINA 11 recovered and ready to yield.

Sohabati Devi, 35, a farmer from Dodhghat village in Maharajganj district of Uttar Pradesh, has been running a large household comprising of her eight children and an aging father-in-law. Her husband, being a seasonal migrant worker, often is away from home. In order to support her family, Sohabati looks after the farming operations with some support from her father- in-law and older children. Her eldest son is 18 years old and youngest child is a 1 year-old boy. Instead of hiring labor for the farm operations, Sohabati herself works in the fields. She grows rice, wheat, potatoes, peas, pulses, and vegetables during the Kharif and Rabi seasons for both family consumption and sale.

Sohabati was approached by a local NGO to participate in the drought-tolerant rice variety promotion initiative facilitated by IRRI with the support of the state government. After being oriented about the new STRVs, Sohabati decided to plant Bina-11, which is a medium-duration, high-yielding variety that is tolerant of flooding. The farmers in the region have been used to growing medium-duration varieties (110–135 days) under rainfed conditions where intermittent dry spells due to scanty rainfall is a common phenomenon. In recent times, Bina-11 has been generally selected for its medium duration and higher yield potential.

The selection of Bina-11 proved to be a prudent choice when, during the 2017 kharif, the farms of Sohabati and her neighbors were deluged with raging floodwaters at midnight on 16 August, which brought along unforeseen calamity and sorrow for all. The sudden flooding swamped the entire low-

lying areas of Maharajganj and adjoining Gorakhpur. This was due to the excess water flowing down from high-altitude areas of neighboring Nepal, which had experienced heavy rains. The farmers were completely unaware and unprepared for this disaster. The sudden inundation severely damaged the region's entire transplanted rice crop. According to Sohabati, this kind of high-intensity flooding (water 5–6 feet deep standing in the fields and inside the village) had never been experienced for at least the last two decades. The rice crop planted only 5–6 weeks earlier would probably have a slim chance to survive under such high levels of flood water. Sohabati had transplanted her Bina-11 timely in spite of the somewhat late arrival of the monsoon. However, she never anticipated the climate change-induced flooding that was to completely submerge her crop a month and half later.

"The Bina-11 seeds were a true blessing for Sohabati"

Bitterly disappointed like many of her neighbours, Sohabati had lost all hope of adequately providing for her family in 2017. She and her father-in-law visited the family's flooded field the following morning to assess the flood damage to both the rice and vegetable crops. It didn't look good, definitely for the vegetables, but what about the rice? After 12 days, when the water had receded, Sohabati along with a local NGO representative went to survey her fields and assess the damage. Upon visiting her rice field, despair suddenly changed to hope since she discovered that 40–50% of the rice plants were still green although the rest still appeared to be damaged. Local experts recommended that Sohabati immediately apply fertilizer on the surviving plants. "With Rs 140 worth of fertilizer applied to my field, I noticed within a few days that my crop was gradually recovering," she said. In the end, it was more like an astounding miracle that she was able to harvest her crop with a yield of 3.7 t/ha on 26 October. With the crop surviving nearly 2 weeks of submergence and recovering from such an intense flood, the Bina-11 seeds were a true blessing for Sohabati. Looking at the bright-colored grains of her harvest, Sohabati had every reason to smile and be proud of her decision to plant the STRV. She invited other farmers to visit her plot to see first-hand Bina-11's incredible performance under the flooded conditions.

For Sohabati, the few kilograms of seeds supplied through the local NGO were more than just a handful of seeds. They had provided the means for her to cope with climate change. She now has an alternate mode to supplement the remittances of her husband, hopefully for many more growing seasons to come.

## Women's Self-Help Groups: Championing varietal replacement and adoption of STRVs

### Community seed reinvestment and informal delivery led by women

Jhalkiani, Saranggarh, Durgapur, Badasialnai, Deogan, Manada, Ulidihi, Suhagpur, Palasa, and Kashipal are the names of just a few villages among hundreds in the hilly tribal district of Mayurbhanj in the eastern Indian state of Odisha. Just a short while ago, no one, including IRRI scientists and their partners, would have guessed that farmers from these villages would adopt the new STRVs so quickly. Now, community leaders and farmers as local agents of change consider the stress-tolerant variety Sahbhagi dhan to be one of the biggest technological innovations that they have ever seen to impact their lives so significantly. One of the farmers, Malati Didi from Jhalkiani village, pointed out her success, "In 2014, with much apprehension and criticism, I introduced Sahbhagi dhan in my village. However, today, if you go to any random household in my village, the woman there will show you at least one basket of the variety in her household storage. This has now become a permanent part of our food system."

> "In 2014, with much apprehension and criticism, I introduced Sahbhagi dhan in my village"

The accelerated dissemination and massive popularization of Sahbhagi dhan were made possible by a promising institutional innovation model that was led by women farmers. The story from Mayurbhanj documents the women's success.

Malati Didi along with other members of the Sampurna Federation explaining their story to a team of independent researchers.

Several women self-help groups (SHGs) in the region provided a strong platform to produce and adopt quality seeds. With the district's drought-prone ecology, the STRVs were found to be effective against climate-induced stresses. Added to this, these varieties were found to be very palatable based on their associated traits evaluated by the women and their

families. With a membership of thousands of women farmers, two federations, 'Sampurna' and 'Swayamsiddha', promoted, for example, drought-tolerant Sahbhagi dhan for adoption. Through interactive planning, the women devised a systematic network-based seed dissemination model. Capitalizing on their existing community networks, they created a community reinvestment model for seeds. Without being engaged in any cash-based transactions, their model relied on their networks to ensure that seeds of Sahbhagi dhan reached every member.

Having received seeds for the first time through IRRI, these women decided to create their own sustainable model of informal seed production and sharing. A meager 1–3 kilograms of seeds were distributed per farmer in a participatory approach, based on priority of needs and prevailing abiotic stresses in the fields. The community agreed on a give-back policy for the seeds. Each recipient farmer was asked to return double the amount of seeds received, to the distributing SHG. A pool of community resource persons (CRPs), comprising of local young people (men and women), was assigned the duty of ensuring accountability regarding distribution and give-back. In collaboration with the National Rice Research Institute at Cuttack, IRRI organized training for quality seed production for the pool of CRPs. Now a pool of skilled grassroot para-professionals, the CRPs ensured that knowledge reached each woman farmer who had received the new seeds by organizing village-level training programs.

The SHGs collected and pooled the committed amount of quality seeds from each member farmer and the aggregate procurement was supervised by the SHG federation. Through federation-level seasonal planning, seed stocks for new participating farmers for every subsequent season were prepared. After screening for good-quality seeds, the fresh seeds were distributed to the farmers in a growing number of villages, including those not included in the previous round of distribution. This approach was very effective for faster diffusion and adoption of Sahbhagi dhan. With established institutions overseeing the accountability commitment, the SHG federations were able to establish a sustainable model of local seed governance.

Having been exposed to new knowledge, the federation leaders have taken steps forward by liaising with government and other public seed agencies to support them for obtaining fresh seeds. They are also taking care of seed replacement by arranging fresh seeds at regular intervals.

Malati Didi and Kalpana Didi, the leaders of the Sampurna Federation at Mayurbhanj, Odisha

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