

Advancing direct-seeded rice technology in northern Bangladesh through mechanized clustered demonstration

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Agriculture is the backbone of rural communities in Bangladesh, where farming employs more than 60% of the population. Farmers have been cultivating their lands using plenty of work, water, and expense. As rice is the staple food of Bangladesh, rice farming has a distinct place among the numerous forms of agriculture, including fish farming, raising livestock, and cultivating crops. Given that rice farming provides food for millions of people, its contribution to reducing the country's food shortfall cannot be overstated. However, several socioeconomic and environmental issues are working together to undermine this lifeline more and more.

Groundwater depletion: The erosion of vital resources in the northern regions

Although rivers encircle the country, Bangladesh has experienced a consistent decline in groundwater levels over time. There are several reasons for this loss, but two of the most important ones are natural disasters like droughts and floods and the detrimental impacts of climate change on the ecosystem in the area. The highlands of northern Bangladesh, especially the divisions of Rangpur, are where the problem is most noticeable. Water, the most important resource for growing rice, is becoming more difficult to obtain and more expensive, putting farmers in these areas—who are already struggling with resource constraints—at a crossroads.

The promise of direct-seeded rice (DSR) technology

DSR technology is an innovative approach that can potentially transform the rice farming industry. DSR reduces the requirement for fields to be continuously flooded, unlike the transplanting method. It reduces labor and water usage by up to 50%, conserving resources (Marasini et al., 2016). This technical breakthrough offers promise for farmers who are increasingly battling resource depletion and climate change. DSR eliminates the need to transplant seedlings from a nursery and streamlines the process while preserving or increasing the potential yield (Bista, 2018).

The revolutionary farming strategy is benefiting one group of farmers in northern Bangladesh. During the 2024 aus season, 45 farmers, including three women, assembled in the village of Kutipara, which is situated in the Kishoreganj Upazila of the Nilphamari District, to implement DSR. These farmers used DSR on 16 hectares of land with assistance from the International Rice Research Institute (IRRI).

The group used the transplanting method in 2023 dealt with the usual problems of labor shortage and high water use. The launch of DSR started a sea change. Head-to-head rice varietal adaptation experiments were carried out under the IRRI's auspices to evaluate yield, disease resistance, and environmental adaptability of BRRI dhan-48, BRRI dhan-75, BRRI dhan-82, BRRI dhan-85, BRRI dhan-98 in uniform settings using DSR. According to the experiments, BRRI dhan-98 and BRRI

dhan-75 exhibited the best qualities suited for the Nilphamari Region in Rangpur. To demonstrate their performance in broader regions using mechanized DSR, the rice varieties were included in the cluster demonstration during the aus season.

IRRI researchers were instrumental in persuading the farmers to change their rice cultivation practices. The IRRI Team conducted courtyard sessions over several days, showcasing the benefits of DSR with field visits and posters, pictures, and documentary videos. To make the sowing procedure easier, IRRI additionally acquired a power-tiller operated seeder (PTOS) machine and made arrangements for irrigation with the help of Local Service Providers (LSP). The team visited the farmers daily for ten consecutive days, offering informal training sessions and answering their questions.



Photo 1: IRRI representatives with the farmers during the courtyard sessions

The farmers were doubtful at first. They had relied on the method of transplanting rice seedlings for many generations, and altering their way of life seemed like taking a big risk. But through IRRI's perseverance and the Nilphamari Upazila Agriculture Office's encouragement finally persuaded the farmers to take a leap of faith.

The success story of the empowered farmers of Kutipara Village

A record number of 45 farmers, including three women, became interested in cultivating 16 hectares of land using DSR. Subsequently, under IRRI's supervision, the farmers were provided seeds of BRRRI dhan-98 and BRRRI dhan-75 and the knowledge for their cultivation. Driven by the prospect of lower expenses and water savings, the farmers pledged to cultivate their land using DSR technology.

After the rice was sown with the PTOS machine, the IRRI Team monitored the fields and recorded the crops' development. The outcomes were quite impressive.



Photo 2: Farmers with the IRRI representatives in the field

"When we first decided to cultivate rice using the DSR method, the farmers from nearby villages mocked us, saying the crop would fail and most of the grains would turn into husks," said Mr. Raju Mia, one of the participating farmers. "They said we would lose a great deal of money. But those same farmers came to us for guidance after noticing how nicely our rice had grown. To reduce expenses and boost yields, several of them now intend to use the DSR in the following season."

Zahedul Mia, another participating farmer, described how DSR changed their point of view.

"On our land, we could only grow potatoes and maize for years," Mr. Mia said. "However, we can now raise three crops after becoming aware of and putting the DSR approach into practice. This has entirely altered our perspective on farming and we are optimistic that previously underutilized area will yield substantial financial gains for us the next season."

DSR-suited variety information under the direct seeded, early duration, long slender-rainfed market segment

BRRRI dhan-75 is a long-slender, short-maturing, high-yielding variety released in 2016. It has an average maturity of 115 days and an average yield of 5.5 tons per hectare. This variety is drought-tolerant and has a mild aroma when cooked.

BRRRI dhan-98 is a high-yielding variety with long slender grain type released in 2020. It is a short-maturing variety that can be harvested within an average of 112 days. It has an average yield of 5.1 tons per hectare but can produce up to 5.9 tons per hectare in favorable environments with proper management.

The enhanced cropping intensity and environmental sustainability of DSR

Beyond individual success stories, DSR has numerous advantages. Farmers can enhance their cropping intensity—the number of crops they can cultivate on the same plot of land in a year—using DSR. It also lowers labor and water requirements. Previously limited to growing two crops, farmers in Nilphamari and other similar areas can now plant potatoes, maize, and rice crops in the same year. The region's total agricultural output could be significantly boosted as a result of this higher planting intensity and assist in the sustainable solution to the nation's food security issues.

Furthermore, DSR has a significant positive environmental impact. This technology is an environmentally benign substitute for traditional rice growing since it reduces the need for flooded fields and the resulting greenhouse gas emissions. Farmers gain from this transition to sustainable agriculture while also contributing to global efforts to combat climate change.

The Nilphamari farmers showed great enthusiasm in adopting DSR technology. After seeing the cluster demonstration, many neighboring farmers also expressed interest in adopting DSR.

The long-term implications of DSR on Bangladesh's agronomic framework

The adoption of DSR technology improved the quality of life of the Nilphamari farmers and portends better times for Bangladesh's agriculture sector. DSR provides a practical solution to the problems of contemporary farming by lowering labor costs, conserving water resources, and intensifying cropping systems. The accomplishment of this endeavour demonstrates the value of ongoing innovation, learning, and cooperation in the field of agriculture that open doors for Bangladesh's farming communities to a more promising and resilient future.

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About the project

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