

An improved way of planting rice  
is increasing farmers' incomes  
and strengthening communities  
in Bangladesh

# Drumming up success

Story and photography by  
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Almost 90% of the 11 million hectares of rice that are planted each season in Bangladesh is transplanted — seedlings are grown in nurseries then moved to the field. It is a heavily labor-intensive process, requiring nearly half-a-billion person-days across the country. In the past, rural laborers abounded, but increasing labor out-migration to city areas and a shift towards alternative rural employment has seen a severe shortage of hands available for transplanting rice.

This scarcity of farm workers is hurting Bangladeshi rice farmers on several fronts. The most obvious impact is an increase in labor costs. Also, the optimal planting periods for the *boro* (dry) and *aman* (wet) seasons are relatively short.

A lack of workers means not all farmers can plant their rice on time. Delayed planting leads to late-maturing rice, increasing the risk of crop losses at the tail end of both seasons — due to hailstorms or flooding from rain during the *boro* season and due to drought



A PLASTIC DRUM SEEDER holds six or eight perforated cylindrical drums housing pregerminated seeds that are dropped in rows as the seeder is easily pushed or pulled along by a single person — like Filipino farmer Jimmy Gonzales — at walking pace. M. Zainul Abedin (below left), who led the drum-seeding trial, is interviewed about the technology by Bangladesh TV Channel *i* during a field day in Pabna. The media has played a crucial role in raising awareness of drum seeding throughout Bangladesh.

during the *aman* season. These factors, combined with increasing costs of other inputs and a falling or stagnant market price for rice, are diminishing the economic viability of rice production in Bangladesh.

But a simple, inexpensive piece of equipment has the potential to change the face of rice farming across the country. The drum seeder (see photo, *opposite*) is a lightweight device made from high-density plastic with a cost of around US\$40 and a life of

6-8 years. Originally designed by the International Rice Research Institute (IRRI), improvements by researchers and manufacturers in Vietnam have substantially reduced the weight, cost and usability of the device. It consists of six to eight cylindrical drums along a central axis. Each drum is studded with holes through which pre-germinated seeds drop neatly in rows on puddled soils as the drum seeder is pulled along. The drums are supported by a large plastic wheel at each end, allowing the whole system to be easily pulled along by a single user at walking pace. Drum seeding has already had success in Vietnam as a seed-saving strategy, but its capacity to save labor is profound: while it may take up to 50 person-days to transplant 1 hectare of rice, direct wet seeding with a drum seeder takes barely 2 person-days.

Bangladesh's first drum-seeding trial, conducted during the 2003 *aman* season — a collaboration between IRRI and the Bangladesh Rice Research Institute (BRRI), funded by the International Fund for Agricultural Development (IFAD) — was a comprehensive success. In the trial, led by M. Zainul Abedin, Farming Systems Specialist in





IRRI's Social Sciences Division, and implemented by BRRI Chief Scientific Officer Musherraf Husain and participating farmers, drum seeding resulted in an average 18% higher yields and 6% reduced costs compared with transplanting, and drum-seeded crops matured an average 10 days earlier. What's more, drum-seeded rice gave an average gross return 21% higher than for transplanted rice. This translates to more than double the average profit — a boost of around \$120-150 per hectare per crop.

All those involved saw the technology as cheaper, requiring less labor, producing higher yields and resulting in better plant growth. The only areas of concern were the potential cost of acquiring a drum seeder, uncertainty over availability, and weed management. More recently, though, a follow-up IFAD-funded project, aiming to accelerate the adoption of the technology, has given IRRI and BRRI, with the assistance of

the Bangladesh Department of Agricultural Extension (DAE), the chance to solve some inherent problems and lead the spread of drum seeding in Bangladesh.

Dr. Abedin developed guidelines for technology adoption using a community participatory approach to research and extension. One key to the approach is a pre-adoption analysis that takes into consideration institutional, technical, policy, social and economic factors that may help or hinder adoption. This means understanding an entire farming community, not just individual farmers. Many farmers grow other crops in addition to rice, so the approach must consider how drum seeding will affect their whole farming system. The product of a Bangladeshi farm family himself, Dr. Abedin emphasizes the value of allowing farming communities to make their own decisions, and to recognize they have the ability to experiment, take calculated risks and innovate.

Fifty-six groups across the country decided to try drum seeding during the 2004 *boro* season, in the hope the technology would spread out from these points. Establishing a drum-seeded crop requires earlier irrigation than does transplanting, so owners of tube wells — each of which usually irrigates several rice farms — were the first people contacted in each location.

"It's useless," says Dr. Abedin, "to get the farmers involved if they can't irrigate their crop at the right time, so it was crucial that we included the well owners. Understanding, and working within, the existing community structures is essential."

#### Extraordinary pace

Now, after just three growing seasons, the popularity of drum seeding is spreading at an extraordinary pace. Some 4,000 Bangladeshi farmers in more than 300 groups are already using the technology, with hundreds more seeking access to drum seeders.

Dr. Abedin attributes the successful adoption of drum seeding in large part to the project's community participatory approach and, critically, the early

establishment of research linkages with development and policy makers, entrepreneurs and the media. Ultimately, though, it comes down to the farmers themselves.

"It was the farmers who experimented with the technology and were confident of success, even in the face of skepticism," he says. "The researchers were continuously learning from farmers and integrating these lessons into the work plan. Farmers also trained other farmers. Working with groups of farmers helps establish ongoing, community-level monitoring and evaluation, and ensures that drum-seeding success stories spread rapidly to neighbors."

The project abounds with stories about farmers like Abdul Aziz, from Gazipur district northeast of the capital, Dhaka. Aziz soldiered on even while neighboring farmers scoffed, believing he wouldn't harvest any rice from his drum-seeded crop. At 55 bigha, or just under 8 hectares (7

bighas equal 1 hectare), Aziz's farm is large by Bangladeshi standards. He started growing drum-seeded rice during the 2004-05 *boro* season. Previously, his entire crop was transplanted, requiring 25 laborers per 5 bigha. For the same area, drum seeding required just a single laborer.

Aziz explains that on top of the labor savings, he increased his yield by 0.5-0.8 tons per hectare, and he harvested 10 days earlier than previously with transplanted rice. He has more money in his pocket and he intends to invest it outside of rice farming, to increase his earning capacity and diversify his income. Many of Aziz's fellow Gazipur farmers are now eager to

try drum seeding for themselves, and he is only too happy to share his knowledge and experience — and his drum seeder — with them.

It's a common theme: skeptical neighbors become true believers. Mohammad Ghasiuddin, who owns a very small farm in Mymensingh district north of Dhaka, has already harvested three drum-seeded crops. After just one season, both he and his neighbors, who had originally thought him mad, were convinced of the virtues of drum seeding, and he too has shared the technology with them.

In this way, from farmer to farmer, the technology is spreading.



FARMER Jamal Sheikh (*opposite*) discusses his drum-seeding experiences with Channel *i* director Shykh Seraj during the Pabna field day. Looking on are State Minister Mirza Fakhru Islam Alamgir (*in white*), BARRI Director of Research Niloofar Karim (*right of minister*) and Dr. Abedin (*left of Seraj*).





TOWEL BUSINESSMAN Haji Shahabuddin (above) approached BRRI, eager to try drum seeding on his land, after seeing the technology showcased on the local television program *Soil and man*. Farmer Mohammad Ghiasuddin (above right) stands in front of his drum-seeded crop. Filling drum seeders is easy for Filipino farmer Hernando Bambo (below) — simply open the hatch in each drum and pour in the pregerminated seeds.

Field days, often attended by hundreds of farmers, give drum-seeding converts the chance to inspire others to try the technology. At a field day in April 2005, three farmers shared their experiences of drum seeding with a crowd of nearly 400 farmers and extension workers from around Pabna, 240 km west of Dhaka. One of the speakers, Jamal Sheikh, described the experiment he and some fellow farmers performed to try and reduce both the need for irrigation and the cost of land preparation by adopting a zero-tillage technique that made use of residual moisture in his field from receding floodwaters — and which, in concert with drum seeding, gained them yields at least 20% higher than for transplanted rice. It is this spirit of innovation and determination that has stirred pride in those already drum seeding and inspired their counterparts.

Involving Bangladeshi policy makers in the adoption process provided a major boost. From an early stage, Dr. Abedin realized government support would be critical (see *Grain of truth* on page 38). The team fostered relations with the Bangladesh Ministry of Agriculture and subsequently secured government funding of 10 million Bangladeshi taka (US\$156,000), which was mainly used to buy an extra 2,500 drum seeders. The government also pledged to subsidize the cost of drum seeders for farmers. The media have also been instrumental in increasing awareness of drum seeding. Many people — not only rice farmers — approached BRRI and DAE for information on trying drum seeding after seeing stories about the technology on television or in the newspapers.

But there is still work to be done. Research is still identifying the varieties and areas most suited to drum seeding, particularly taking into account land, soil and existing cropping systems. Weed management is also an issue, as is the availability of the drum seeders, and the possible need for adaptations. And although scarcity of labor is the primary basis for using drum

seeding, in some areas the technology has the potential to displace jobs.

“Researchers need to be aware of their social responsibility to see that there is no serious effect on rural employment,” cautions Dr. Abedin. “However, the economic boost caused by drum seeding should create jobs elsewhere to absorb displaced labor.”

IRRI, BRRI and the DAE are currently in discussions with Bangladeshi entrepreneurs interested in manufacturing drum seeders locally, and two companies have already manufactured prototypes. This sort of enterprise can help the availability of drum seeders meet the rising demand.

### Major shift

Drum seeding represents a major shift from transplanting, and there is a need to manage the change and create an environment that allows change nationally. Training farmers and both government and nongovernment extension workers is of paramount importance. An IRRI-led meeting in June 2005, attended by senior government officials and high-level research, extension, nongovernmental, media and business personnel, established a 5-year plan for transferring drum-seeding technology. Following this, the government has given the go ahead





**RICE FARMER Abdul Ahad** stands beside a shallow tube well, which irrigates crops on several farms during the *boro* (dry) season. Because they control irrigation, tube well owners are crucial to the success of drum seeding, which requires earlier irrigation than does transplanting.

## The father of farmers

In his own words, Ayub Husain is a “father of farmers.” Husain was part of the first group of farmers to receive drum-seeding training from BIRRI. He then trained others, beginning with five farmers in two locations during the 2003-04 *boro* (dry) season. In the following *aman* (monsoon) season, just two farmers used the drum seeder. The next *boro* season, though, more than 60 farmers sowed 15 hectares by drum seeding, including almost a hectare of Husain’s own land. Wanting to spread the word, he joined forces with IRRI and BIRRI to hold a farmer field day, which was attended by the State Minister for Agriculture.

Inspired by the results in his own area, Husain set out 500 km across Bangladesh, where he led trials in the hometown of the Finance Minister to raise government awareness of the technology. The trials were not as successful as hoped because of unsuitable conditions, but neither he nor the farmers were discouraged; these same farmers are now testing the seeder in the *aus* (pre-monsoon) season.

What motivates a farmer to go to such lengths? Husain claims his mission is simply to help his fellow Bangladeshi farmers, as most grow enough rice merely to feed themselves and their families, and many struggle to produce even that. By instilling farmers with a spirit of innovation, he believes Bangladeshi society as a whole can move forward. Husain has seen that partnerships between farmers, scientists and researchers can increase productivity, and he wants scientists to help farmers realize that they can take a technological approach to solving problems and improving their farming.

While Husain travels around the country spreading the news about drum seeding and other technologies, his family looks after the farm. It is more important, he feels, to dedicate his time to benefit the entire country. This self-professed father of farmers doesn’t expect any payment for his work: parents don’t expect to be paid for being parents, he says. For Husain, it is a reward in itself to watch his children — the farmers he has mentored — “growing up.”

to the project team for an additional investment of around 100 million taka (\$1.56 million) to continue the work to spread drum-seeding technology across Bangladesh.

Originally, the only planned benefit of drum seeding was the cost saving from reduced labor requirements. It was expected, however, that this would be offset slightly by an increased need for weed management. As it turns out, farmers have also experienced improved plant growth, increased yields and earlier plant maturity, and they have used fewer seeds.

The latest results of drum seeding across the country show yield increases of up to 20% in both *boro* and *aman* seasons, and up to double the net profit, translating to additional income, over transplanted rice, of 7,000-10,000 taka (\$110-160) per hectare per season, a significant boost for most Bangladeshi rice farmers. Drum seeding also frees family labor, which has wide-ranging social benefits.

Even with modest projections, Dr. Abedin believes drum seeding can have a profound impact. “If drum seeding works on only 4

million hectares,” he explains, “a 15% yield increase equates to 3 million tons of extra rice with very little extra investment. I believe drum seeding has the potential to change the landscape of rice farming in Bangladesh.”

Rangpur Dinajpur Rural Service, a participating nongovernmental organization, sees early harvest and increased yield as more than just a way to reduce *monga* (starvation) during the pre-harvest period in October and November. First, early harvesting generates employment for landless laborers, providing them income to buy food. Second, the early harvest and increased production make food available to vulnerable farmers during the *monga* period.

The farmers themselves are overjoyed by the results and are eagerly sharing the technology with other farmers. Dr. Abedin has also witnessed benefits of the technology that run deeper than this — the spirit of innovation and entrepreneurship among farmers and the strengthening of communities through working together are just as significant.

Drum seeding is helping to advance rice farming in Bangladesh.

Its success so far confirms that simple and relatively inexpensive technologies can be effective. It goes much further, too. The drum-seeding experience is proving that working with communities in the testing, adaptation and adoption of appropriate technologies, and linking policy makers, entrepreneurs and other stakeholders early on — in other words, engaging from the beginning those who stand to benefit and those who have the power to help — can have a profound and lasting impact. 🌾