

Just having a good technology isn't enough

In order to help rice farmers to reduce water requirements and cost for irrigation, the “Alternate Wetting and Drying” technology was introduced in Bangladesh in 2004. However, in spite of its obvious advantages, the system’s dissemination is making only slow progress. Why this is the case and how acceptance can be raised among the farmers has been examined by a team of the Centre for Advanced Training in Rural Development at Germany’s Humboldt University.

Among the many issues threatening future food security in Asia, water scarcity is becoming increasingly urgent. This is also true for Bangladesh, where rice is the prevailing staple food, providing 70 percent of the calorie intake of 164 million people. Irrigated dry-season rice amounts to some 60 percent of national rice production. This emerged largely as a result of an impressive intensification and expansion of the so-called Boro rice during the past two decades, triggered by the government’s liberalisation policy for small-scale irrigation equipment in the late 1980s. The dry-season crop largely depends on groundwater irrigation by shallow and deep tube wells, which leads to a massive extraction and regional overexploitation of groundwater. Today, production of dry-season Boro rice, which made up 90 percent of the overall production increases in rice in Bangladesh since 1988, faces two sorts of constraints:

1. The profitability of the rice crop, which depends on affordable sources

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of energy to pump irrigation water, is increasingly challenged by high energy cost.

2. Producing irrigated rice is increasingly becoming a risky business for farmers due to unreliable water supply, either physically unavailable or interrupted due to insufficient electricity and/or fuel supply.

These problems are particularly evident in the north-west and north of the country, the Rajshahi and Rangpur Divisions, which were identified for in-depth study of the dissemination and adoption of the Alternate Wetting and Drying (AWD) technology which had been introduced in 2004 (see Box on page 34). Here, agricultural land use changed significantly due to the spread of the dry season Boro rice along with an expansion of small-scale irrigation.

■ The challenge

Today, agricultural production is constrained by declining or low groundwater tables, in addition to the increasingly variable rainfall, which amounts to some 1,500 mm in the Barind Tract (Rajshahi Division). Further north (Rangpur division), people traditionally experience

seasonal hunger during the dry season due to a lack of seasonal employment after planting during dry season. This is known as Monga.

With the intensifying water and energy scarcity, there is a great need to better manage irrigation in Boro rice. In Rajshahi, where irrigation largely depends on electrically-powered deep tube wells, 59 percent and 39 percent of farmers respectively identified shortage of electricity and underground water as major constraints. In Rangpur, where shallow tube wells are used mostly, the major constraint is the high cost of irrigation (of fuel in particular), identified by 36 percent of farmers. Tests conducted in Bangladesh confirmed the clear benefits and potential

Channels of an irrigation scheme served by a deep tube well.



Photo: C. Paul

Farmers assess Boro rice results of AWD-based irrigation during a field day.

economic impacts of using AWD in the dry season crop in Bangladesh as the technology decreases irrigation up to 30 percent, while also lowering energy requirements for irrigation compared to conventional practices.

Despite the apparent need for better targeted and more efficient irrigation, dissemination and adoption of the AWD technology are still in their early stages, even six years after introducing the idea of disseminating AWD in Bangladesh. Following initial validation and awareness raising, encouraged by the



Photo: E. Kürschner

The “AWD” technology

“Alternate Wetting and Drying” (AWD) is a technology developed by the International Rice Research Institute (IRRI) for improving the management of irrigation. It consists of a perforated tube to monitor the water-level in the field. Fields are alternately irrigated and left dry, based on the knowledge that letting the water level drop to 15 cm below soil surface allows the farmers to significantly reduce irrigation frequency without harming the rice crop. The system was introduced in Bangladesh in 2004 and has been promoted since among extension and development workers as well as farmers.



Photo: E. Jillich

Perforated AWD-tube (left); locally adapted “pani pipe” (right).

International Rice Research Institute (IRRI), a number of organisations started to pilot dissemination of the technology in 2007. This included training of trainers, demonstrations and trainings of farmers in the field, involving the national rice research institute BRRI, the Department of Agricultural Extension and several other governmental and non-governmental actors as well as the private sector.

■ Farmers’ reaction to water scarcity

About one third of the farmers practicing water-saving measures actually have adopted AWD with the knowledge related to it, i.e. letting the water table drop to 15 cm below the soil surface. Some farmers have developed their own system, deviating from the tradition of a lowland rice crop standing in water. Another 56 percent of the farmers have developed a “mild” form of AWD (letting the water table drop to less than 15 cm below surface), while another twelve percent of farmers are practising “forced” AWD, i.e. shortage of water and energy forces them to significantly prolong the irrigation interval. Strikingly, the farmers who experience greater pressures of water scarcity, such as in Rajshahi, practise a greater number of different methods, irrespective of whether they have been trained on AWD or not (see Box on page 35).

Why are farmers and pump-owners not adopting AWD on a much wider

scale and at a faster pace? Three issues are affecting farmers’ decisions to adopt AWD:

- Unreliable supply of water and/or energy is discouraging farmers to adopt the technology, as it requires well-tuned irrigation intervals and measures.
- Payments for irrigation services are mostly based on fixed rates, traditionally often agreed prior to a season. Thus farmers do not receive any benefits from cost savings.
- Block or schemes of minor irrigation systems are organised in groups, where decision making is often dominated by pump owners or operators or bigger farmers.

■ Fields of action

What can extensionists and development workers do to more effectively promote AWD? Currently, AWD is being mainly connected to water savings, whereas its use directly leads to energy savings by reducing the frequency and hours for pumping irrigation water. A shift in arguments in promoting AWD is needed, also to change the awareness of farmers about the energy-saving benefits of AWD. Currently, 76 percent of AWD adopters recognise water saving as the primary benefit of AWD, while less than 25 percent connect it with energy savings.

In order to develop a more dynamic adoption process, farmer trainings

should be geared much more towards overall irrigation schemes, involving a number of individuals from within the same irrigation scheme, both farmers and pump-owners or operators. Such a training of irrigation blocks will allow to effectively address the issues of how to better organising irrigation within a scheme. This is essential, since existing irrigation schedules and arrangements cannot be changed or decided upon by individual farmers. Extension staff has to be encouraged and equipped with the necessary resources to adapt farmer trainings and to facilitate local processes according to the needs in the context of local irrigation schemes.

How can organisations draw lessons on the spread of AWD? Up to now, organisations involved in extension and in disseminating AWD have put a lot of emphasis on monitoring the performance and validation of the technology. Considering the substantial limitations in the adoption process, much greater attention has to be given to monitoring the issues and experiences related to the actual dissemination and adoption processes. To establish a self-supporting dissemination on a large scale, organisations such as the Department of Agricultural Extension and other actors for developing the agricultural sector need to assume a much greater ownership of AWD dis-

Farmers' strategies to address water and energy problems*

- Repairing drains to keep water transmission losses low
- Changing the cropping pattern: discontinuing Boro rice cultivation and shifting to crops with lower water requirements (pulses, wheat)
- Irrigating at night when electricity is available
- Reduced irrigation frequency and shorter individual irrigations
- Closed irrigation tubes instead of open canals
- Water storage: pumping groundwater into ponds when electricity is available, then irrigating by low-lift pumps
- Using diesel pumps instead of electric pumps

* statements arranged according to frequency of responses; Rajshahi Division

semination. The BRRI as well as IRRI can only provide backstopping support for such a process.

What are the perspectives for the future utilisation of "Alternate Wetting and Drying" in Bangladesh? Farmers will definitely require an adequate and reliable supply of energy to be able to target and manage irrigation more efficiently. Otherwise, a minimised irrigation practice will substantially increase their risk in production. Also, it will depend a lot on the ability of user groups to agree on jointly practising irrigation based on the knowledge of the AWD technology and to negotiate irrigation schedules. Whether the establishment of local irrigation committees, which is envisioned by the currently developed first national irrigation policy, could give farmers a

stronger voice in local decision-making processes on irrigation and on current payment schemes remains to be seen. Ultimately, farmers will only adopt the technology on a large scale if they actually benefit from the use of the technology and if pump-owners are willing to share the economic benefits from cost savings with the farmers as well.

For further reading:

Ekkehard Kürschner et al.: Water Saving in Rice Production – Dissemination, Adoption and Short Term Impacts of Alternate Wetting and Drying (AWD) in Bangladesh. Berlin: SLE, 2010. Download: <http://www.sle-berlin.de> → Publikationen

Zusammenfassung

Wassermangel und Bewässerungskosten werden zunehmend zu einer Herausforderung für Reisbauern, die auf Bewässerung angewiesen sind. AWD oder „Alternate Wetting and Drying“ („abwechselndes Wässern und Trocknen“) ist eine Technologie, die vom International Rice Research Institute (IRRI) auf den Philippinen entwickelt wurde. Sie kann den Bauern helfen, den Wasserbedarf und die Bewässerungskosten für die Reiserzeugung deutlich zu verringern. AWD wird in Asien über das International Rice Research Consortium verbreitet. Die Technologie wurde 2004 in Bangladesh eingeführt und durch landwirtschaftliche Forschungsträger und Beratungsdienste sowie Entwicklungsträger, Privatwirtschaft und Nicht-

Regierungsorganisationen gefördert. Das Seminar für ländliche Entwicklung – SLE – der Humboldt-Universität Berlin hat im Auftrag von IRRI und GIZ im Rahmen einer unabhängigen Untersuchung die Verbreitung, Akzeptanz und Auswirkungen dieser Technologie analysiert.

Resumen

La escasez de agua y los costos de la irrigación representan crecientemente una dificultad para los agricultores que producen arroz por irrigación. La tecnología de inundación y secado alternos (Alternate Wetting and Drying – AWD) fue desarrollada por el Instituto Internacional de Investigación del Arroz (IRRI) en las Filipinas. Puede ayudar a los agricultores a reducir significativamente los requeri-

mientos de agua y el costo de la irrigación para la producción de arroz. El método AWD ha sido divulgado en Asia a través del Consorcio Internacional para la Investigación del Arroz. Fue introducido en Bangladesh en 2004 y promovido a través de la investigación y la extensión agrícola, así como por organizaciones de desarrollo, del sector privado y no gubernamentales. Un estudio independiente por el centro SLE de capacitación avanzada en desarrollo rural (SLE Centre for Advanced Training in Rural Development) de la Universidad Humboldt de Berlín, comisionado por el IRRI y la GIZ, ha analizado el estado actual de la divulgación, la adopción y los impactos de la tecnología. El presente artículo se centra en importantes resultados de dicho estudio.