

# Dry fallow rice paddies make beds of opportunity

PHOTO: RICHARD BELL



The farming potential of Bangladesh's rice paddies during the dry, fallow season is being tapped to grow wheat and chickpeas and raise the prosperity of poor farmers

Sowing lentils with a new zero-till planter for a two-wheel tractor at Dinajpur, northern Bangladesh.

BY JULIAN CRIBB

**H**heavy soil erosion on the slopes of the Himalayas is turning the Ganges delta into one of the fastest-growing arable regions in the world. As fertile silt from the uplands piles up, new expanses of rich, dry soil are appearing on land once located beneath the waters of the Bay of Bengal.

The farmers of southern Bangladesh traditionally grow rice in the rainy season, but for several months a year during Rabi (the dry season) the land lies largely fallow, producing little more than weeds or thin grasses. Because much of the land is under water during the

rainy season, livestock are few.

In 2003, when Australian agronomist Howard Rawson started looking into extending opportunities for wheat production in a joint project with ACIAR, the UN's Food and Agriculture Organization (FAO) and the Bangladesh Wheat Research Centre, the situation was becoming urgent. Each year Bangladeshis consume four million tonnes of wheat, but local production has steadily fallen from two million to less than a million tonnes, driving up the country's import bills. Recent world grain price hikes have redoubled the pain.

## UNTAPPED FARMING POTENTIAL

It became clear that southern Bangladesh had untapped farming potential in all the land that was lying fallow from November to March, a time many regarded as too hot, dry and risky to grow wheat or other crops. At the same time, Mr Rawson and his colleagues from the Bangladesh Agricultural Research Institute (BARI) could not help noticing that there was still plenty of water lying around after the wet—in canals, drainage channels and ditches. Not enough to grow an irrigated crop of boro rice, but sufficient to grow wheat. The big question was: how much wheat?

Their preliminary on-farm trials, over two seasons, indicated 2.5 tonnes per hectare was assured, using three irrigations and high input of fertilisers. But it was not clear whether these were two unusually good seasons and whether fewer inputs—within the means of poor farmers—could realise the potential of the land, Mr Rawson says.

BARI and a unique Australian farming model called APSIM (Agricultural Production Systems sIMulator) supplied the answers: there were an estimated 800,000 hectares of potentially suitable, but unused, agricultural land at this time of the year and long-term weather data indicated the climate was also possibly suitable. Exploring this, using on-farm trials managed by Mr Rawson and an ACIAR research project led by Dr Peter Carberry of CSIRO, revealed that yields of 2 to 2.5 tonnes a hectare were achievable without irrigation, and 3 to 4 t/ha with as little as a single watering.

Working with farmers in the southern regions of Noakhali and Barisal and on Bhola Island in the delta, BARI project leader Dr M. Saifuzzaman, Dr Carberry and Mr Rawson together demonstrated the scope for a dry-season wheat industry capable, conservatively, of producing a million tonnes of wheat a year on the fallow lands. Potentially, this could generate import savings worth several hundred million dollars a year for the Bangladesh Government, as well as giving a major economic boost to an otherwise poor region.

“All the ingredients are there for wheat production to take off,” Dr Carberry says. “The soils are fantastic. There is good soil moisture left over from the wet season, so a wheat crop only requires one or two irrigations, compared

with up to 30 for boro rice. And, at the moment, there is nothing being grown on much of this land in the dry season.”

In fact, he says, there is even a possibility of growing two dry-season crops in some years, wheat followed by mungbeans, before returning to wet-season rice.

A puzzle is why wheat is not more widely grown, when the needs of Bangladesh's 150 million citizens are great, import costs are soaring and there is vacant land available, Dr Carberry says. Reasons may lie in a traditional dietary preference for rice, in perceptions that dry season wheat is ‘risky’ and in the fact that many farmers are accustomed to working off-farm at that time of year. Standing water is also used by locals for fish production.

#### WHOLE-OF-FARM APPROACH

In a vital part of the project partnership the non-government organisation PROSHIKA is exploring the reasons behind this and talking to farmers about the opportunities offered by a year-round farming system.

PROSHIKA takes a ‘whole-of-family’ approach, dealing with both men and women, as well as the needs of children, and also plays a role in helping to develop markets for the new crops. Its staff are devising simple farm-management packages to help farmers switch to the new system, and training both farmers and extension workers. In particular it is finding that women are enthusiastic advocates for the new cropping opportunities, and are eager to spread the word in nearby communities.

Growing wheat on the delta flats poses technical challenges. Often the land is saline, from having recently been the seabed of the



PARTNER COUNTRY: Bangladesh

PROJECT DESCRIPTIONS: LWR/2005/146 and LWRE/2005/001: Expanding the area of dry-season cropping in southern and north-western Bangladesh

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Bay of Bengal, but successive wet seasons are gradually flushing this and salt can be managed, as Australian farmers have found. Second there is a delicate balance to be struck between the timing of the single irrigation and the needs of the growing wheat plant for nitrogen, Dr Carberry says. The team is working to establish the optimal time for both.

The impressive yields on participating farmers' land have sparked interest among neighbouring farmers in all three trial areas, he says. “Farmers in nearby villages have started planting wheat and, without advice, have achieved yields of 3 t/ha. While this has been happening, wheat prices have more than doubled, making it much more attractive.”

The project encourages farmers growing wheat to sell their seed locally, becoming mini seed suppliers to their neighbours in order to accelerate uptake.

#### ALTERNATIVE CROP OPTIONS

Even greater success is reported from another ACIAR project in the High Barind Tract (HBT) in north-west Bangladesh under somewhat different conditions, where chickpeas, lentil, mustard, mungbeans and maize are being trialled as alternative dry-season crops to boro rice. The rice crop relies on water from tube wells, which are often contaminated by arsenic and are in any case diminishing as demand on groundwater increases in both Bangladesh and neighbouring India. As in the south, this means a growing area is left fallow during Rabi.

“These crops are far less thirsty than rice, and fetch good prices in the market, so the farmers are very interested in them,” says project leader Professor Richard Bell of Murdoch University in Western Australia.

The key to successful Rabi cropping in the HBT lies in being able to get the new crop in the minute the rice harvest is off, to



Neil Dalgliesh and farmers at Barisal in southern Bangladesh inspecting wheat root depth in soil core.



Neil Dalgliesh and PROSHIKA field officer discussing wheat trial on Bhola Island.

make optimum use of precious soil moisture. However, with most farmers flat out harvesting and threshing rice, labour to plant the new crop is scarce.

### MINIMUM-TILL ADVANTAGES

The answer, Professor Bell says, lies in mechanisation, using local contractors with the increasingly ubiquitous, small, two-wheeled Chinese cultivators to get the crop in as quickly as possible. These normally use a rotary hoe for tillage, which churns up the soil causing loss of moisture, so the team has adapted the Australian water-conserving technique of minimum till, inserting the seed into a narrow slot in the rice stubble without prior tillage.

“Our aim is to grow the Rabi crop purely on stored soil moisture and rainfall—without any irrigation,” Professor Bell says. “We’re also optimistic that, with the good weed control resulting from the flooded rice crop, there will be little or no need for the herbicides used in other minimum-till systems.”

Chickpea yields vary from 0.5 to 1.5 t/ha and, with market prices twice what they were a year or so ago, there is no lack of farmer enthusiasm. The new approach is spreading rapidly from neighbour to neighbour.

### ENCOURAGING ADOPTION

Like the delta wheat project, the HBT project places a high priority on understanding what encourages and discourages farmers in adopting new systems, which are often more complex than they are used to, Professor Bell says. Here too, NGOs PROVA (People’s Resources Oriented Voluntary Association) and RDRS (Rangpur Dinajpur Rural Service) are providing the critical insights and links into the farming community and helping the extension workers in the Bangladesh Department of Agricultural Extension in the task of packaging and delivering the new methods.

Both projects exemplify the new style of aid emerging worldwide, engaging both international and national research and funding agencies, national agricultural research and extension services, and NGOs working directly with local farmers and including women as the spearhead of technology delivery. This ‘family focus’, in particular, is an innovation on the traditional modes of farm technology delivery, Professor Bell and Dr Carberry agree.

The projects will also benefit Australian and other farmers facing hot, dry and saline

environments. The main tool used to identify the huge promise of dry season grains is APSIM, an Australian farm-modelling package widely hailed as the finest of its kind. Its use in Bangladesh is giving scientists the opportunity to fine-tune the model so it can deliver further benefits to farmers in all countries, including the Australian wheatbelt, where cropping options are coming under close scrutiny as the climate changes.

“In these southern areas of Bangladesh

wheat used to be regarded by many locals as unsuited to the region or a low status crop,” Mr Rawson says. “But faced with the evidence of good yields, with prices that have trebled in recent years and with new disease-resistant varieties, they are starting to take it more seriously. The most encouraging thing is that there are large areas of Bangladesh where we can take this dry-season cropping, if we can persuade them it works. It could make a very great difference.” ■

PHOTOS: NEIL DALGLISH



Dr Howard Rawson discussing wheat plant development as part of a training program conducted at the Bangladesh Agricultural Research Institute (BARI) field station at Joydebpur, near Dhaka. Staff employed by the project were trained in a range of field-monitoring techniques before taking up their regional roles in Bhola, Barisal and Noakhali.

Proud farmer and son standing in the family’s high-yielding wheat crop near Jessore. The family’s plot formed part of a village trial in which 12 individual farmers grew their wheat under a range of treatments.

