The introduction of shorter-season semidwarf wheat varieties and the development of appropriate agronomic practices underlie the take-off of wheat production in Bangladesh.

CIMMYT TODAY No. 15

Bangladesh's Wheat Research and Production Program

wheat in bangladesh

The Bangladeshi wheat revolution has had a positive psychological effect upon the nation. The success in wheat production is heralded as an example of what can be achieved for the multitude of other development projects so ambitiously planned by the nation's leaders to improve the welfare of the Bangladeshi people.
Most Bangladeshi wheat producers are small landholders, producing wheat on less than 0.5 hectares during the relatively short winter growing season, the coolest period of the year.

Enterprising Bangladesh. During the decade since independence, this nation of 90 million people is making headway in becoming self-sufficient in food production, once widely labelled an impossible dream.*

Wheat, the topic of this report, has become an important new commodity in national efforts to achieve food self-sufficiency. This non-traditional wheat-producing country has achieved a 10-fold increase in national production in less than a decade, from 89,000 tons in 1973 to 1.1 million tons in 1981. This spectacular growth in wheat production has provided large numbers of Bangladeshi farmers with a new source of income and food from land which previously often lay fallow in the winter season.

Hundreds of thousands of individuals have played a role in this exciting agricultural development story. This report focuses on the roles played by agricultural researchers and production specialists in catalyzing farmers to continue with the remarkable and continuing leaps achieved in Bangladeshi wheat production in recent years.

Bangladesh, a country dominated by rivers

Bangladesh, with an average of 546 people per square kilometer, is one of the most densely populated countries in the world. Its southern coastline borders the Bay of Bengal; India borders the country to the west, north and east; and Burma is to the southeast. Agriculture is the dominant economic sector, accounting for 56 percent of the gross national product and providing employment for 84 percent of the economically active population.

Jute is the major agricultural export, producing 80 percent of all foreign exchange earnings. Rice, the main staple and second largest food import, accounts for over 90 percent of total cereal production. Wheat, the major food import, today accounts for about 8 percent of total cereal production, up from 1 percent only a decade ago.

Eighty percent of the land area of Bangladesh is a huge delta formed by three major river systems—the Ganges, the Brahmaputra, and the Meghna. These fertile, well-watered delta lands are intensively cropped.

* Bangladesh was part of the province of British India until 1947 and a province of Pakistan during 1947-71. It has been an independent country since 1971.
Although the Bangladeshi people depend on rice as their major staple, they are acquiring a taste for wheat, eaten in the form of chapatis and bread loaves.

The climate is tropical monsoon with heavy seasonal rainfall, from 1,250 mm in the extreme west to more than 4,000 mm in the extreme northeast. There are three marked seasons in the country. The warmest season, from March to May, is often characterized by violent thunderstorms and strong winds. About 15 percent of the annual rainfall occurs during the latter part of this season. The next season is the monsoon season from June to September/October. Eighty percent of total rainfall is recorded during this period. The wheat-growing winter season, the driest and coolest period of the year, starts in November and stretches to the middle of February.

Take-off of wheat production

Since independence in 1971, persistent and serious food-deficits have forced the Bangladeshi government to import large quantities of food. Given the greater wheat availability in the world market through concessionary food aid sales and the higher price of rice relative to wheat, government officials increasingly have looked to wheat to make up food deficits. As a result, the Bangladeshi people have acquired a taste for wheat, consumed primarily as chapatis (hand-made flat bread), bread loaves, and confectionary products.

With a growing dependence on wheat imports during the 1970s, and the fact that a dietary change was taking place among the people so that wheat was becoming a desired food supplement to rice, Bangladeshi planners became increasingly interested by the mid-1970s in expanding national wheat production. Information gathered under the auspices of a joint Bangladesh-FAO soil survey interpretation project, indicated that 2.3 million hectares of land were physically suitable for wheat under rainfed conditions, and an additional 0.8 million hectares were suitable, if provided with irrigation. Leaving land for other winter (rabi) crops, the net area available for wheat was estimated about 1.1 million hectares under rainfed conditions, increasing to 1.5 million hectares with irrigation.

Due to the energetic efforts of a small cadre of wheat researchers and production specialists, and hundreds of thousands of eager new wheat growers, Bangladesh's wheat area, total production, and yield levels have increased at dramatic rates since 1975-76, when large quantities of seed of high-yielding varieties were first made available to farmers (see Figures 1 and 2). The
major wheat areas are located in the northwestern, north central, and western portions of the country, above 23° latitude.

Of the 600,000 ha planted to wheat in 1980-81, it is estimated that about 96 percent was seeded to high-yielding varieties. The variety Sonalika, from India, was dominant, covering roughly 68 percent of the high-yielding variety (HYV) area. Next in importance was the Mexican variety Inia 66, seeded to 10 percent of the HYV area, followed by the varieties Pavon 76 (50/o), Jupateco 73 (50/o), Tanori 71 (40/o), and an assortment of others (80/o).

A Profile of Bangladeshi Wheat Producers

During the 1978/79 wheat season, economists from the Agro-Economic Research Section of the Ministry of Agriculture and Forests surveyed 400 wheat farmers in the Faridpur, Rangpur, and Kushtia districts, areas which collectively accounted for about one third of the national wheat area and 36 percent of total production.

Considerable differences in the production environments existed in these districts. Faridpur was almost totally a rainfed production area and average wheat yields were relatively low. In Rangpur and Kushtia more than 85 percent of the respondents reported use of some irrigation.

Fifty percent of the wheat farmers owned less than 1 ha of land in total, and the average size of their wheat area was about 0.38 ha. Of those interviewed, 29 percent owned the land they cultivated with wheat and 35 percent were in an "owner-tenant" tenure status.

About 75 percent of the wheat farmers surveyed cultivated either local broadcast aus rice, local broadcast aman rice or local transplanted aman rice in the summer season (kharif) previous to the season (rabi) in which wheat is grown. A considerable amount of the land now planted during the winter season to wheat had been left fallow previously during this season. Some displacement of pulses, oilseeds, and rice had occurred in some winter season areas as the result of the introduction of wheat.

Average wheat yields varied among three districts, ranging between 926 and 2408 kg/ha. Average yields of respondents with supplemental and full irrigation were nearly three times higher than were the yields of farmers in solely rainfed areas. Input levels, yields and net income were highest in the irrigated areas, and for the owner-cultivators.

Of the respondents surveyed in the three districts 60 percent indicated that they kept all of the wheat they produced for home use; only
Wheat cultivation in Bangladesh forms part of a complex mixed cropping system, which includes rice and/or other winter pulses.

22 percent said that they sold 50 to 100 percent of their total wheat harvest. Thus, the “food security” objective among the wheat producers that were surveyed was very high.

Development of the national wheat research program
Interest in expanded wheat production in Bangladesh dates back to the late 1960s when the first high-yielding semidwarf varieties were introduced into India and Pakistan. The varieties being grown in Bangladesh at the time were tall, late-maturing, and disease-susceptible. Average yields were about 650 kg/ha and most of the national production was found in the areas immediately adjacent to West Bengal, India.

In 1968, a CIMMYT-Ford Foundation wheat scientist working in what was then West Pakistan visited Bangladesh (then East Pakistan). Here, he met a handful of Bangladeshi scientists who were convinced that wheat production in the country could expand significantly. The consultant concurred with this assessment and filed a report stating that wheat did have the potential of becoming an important winter crop under Bangladeshi ecological conditions, providing that disease-resistant, early-maturing, high-yielding varieties could be developed and/or introduced.

The consultant’s report generated little enthusiasm among most government officials and research administrators at the time, since the Bangladeshi people ate rice, not wheat. Further, most of the attention of CIMMYT wheat researchers and those in the Pakistani and Indian wheat improvement programs was on developing high-yielding, semidwarf varieties with intermediate or late maturity characteristics for the vast Punjabi plains.

Still, CIMMYT agreed to provide modest support to the few Bangladeshis interested in wheat research. The first scientist to come to Mexico was Dr. Sufi M. Ahmed, who arrived in 1968 and ended up staying 13 months. Next to follow were Mr. M.A. Razzaque in 1970-71 and Mr. S.B.S. Hossain in 1972-73. These three scientists became the nucleus of today’s highly respected Bangladesh wheat research team.

With these three scientists as the core manpower, the first systematic national research program was launched in 1971, shortly after independence, with the initiation of the “Accelerated Wheat Research Program.” Since resources for new areas of agricultural research were very limited in Bangladesh at the time, this program continued for five years with extremely modest resources.
By 1973-74, considerably more interest in wheat cultivation existed among Bangladeshi decision-makers. In particular, Dr. Kazi M. Badruddoza, the new leader of agricultural research in Bangladesh, saw the potential benefits that wheat production could have for his country. Each year, when the late Dr. Glenn Anderson, then associate director of the CIMMYT wheat program, and Dr. Eugene Saari, CIMMYT Asian regional wheat representative, visited Bangladesh in February to see the wheat crop, Dr. Badruddoza would arrange meetings with key officials in the Ministries of Agriculture and Planning to discuss the potential for wheat production in Bangladesh.

By 1974-75, research data confirmed the potential for wheat production in Bangladesh, and the stage was set for the take-off in wheat production. Key officials in the Ministry of Agriculture, convinced by the research results of the BARI scientists, gave expanded wheat production a high priority in their agricultural development schemes for the late 1970s and early 1980s.

In July, 1975, shortly before the official founding of BARI, a new multi-crop Bangladesh Agricultural Research Institute (see Box), the "Expanded Wheat Research Program" was launched. Armed with a number of varieties of proven value for Bangladeshi production conditions, soil survey information on the suitable areas for wheat production, and high-level political backing, the BARI scientists set out to introduce wheat cultivation into Bangladesh in a major way. During the 1975-80 period, BARI administrators and scientists developed and launched an effective national wheat improvement and production research program.

CIMMYT, through its provision of germplasm, training of Bangladeshi wheat workers and its continuing program of consultation, has been an active participant in this exciting agricultural development effort. Since 1968, forty-six Bangladeshi researchers and production specialists have spent at least one full crop cycle in Mexico participating in one of six practical wheat-related in-service training courses offered by CIMMYT each year. During 1968-76, most of the Bangladeshi trainees who came to CIMMYT participated in the breeding course. Since then, course participation has broadened to also include rainfed and irrigated production technology, pathology, cereal technology, economics, and very importantly, experiment station management.

Of the 15 who have attended the Experiment Station Management course, 12 have been Bangladesh Agricultural Development Corporation (BADC) officers responsible for supervising seed production on the various BADC seed farms (and by private contract growers) located around the country.

Following is the distribution of CIMMYT trainees by course offering during the period 1968-82.
research and extension education unit, and (c) a college of agriculture offering university degrees.

The Institute’s research complex at Joydebpur is located on a 176 ha farm with 125 ha of experimental fields. In addition, BARI has 4 major regional stations and 15 sub-stations located around the country that support the various research projects of the Institute.

On-farm experimentation to develop technological recommendations that will give maximum productivity under farmers’ conditions is carried out in over 200 of the country’s 450 Thanas (administrative units).

The College of Agriculture, with an enrollment of approximately 500 students, offers B.Sc. and M.Sc. degrees. About 80 students graduate each year.

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<th>Course</th>
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<tr>
<td>Breeding</td>
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<td>Pathology</td>
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<tr>
<td>Cereal Technology</td>
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<tr>
<td>Irrigated Production Agronomy</td>
<td>6</td>
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<td>Rainfed Production Agronomy</td>
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<tr>
<td>Experiment Station Management</td>
<td>15</td>
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<td>Economics</td>
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CIMMYT continues to extend training fellowships to 1-2 Bangladesh wheat workers each year. Visiting scientist travel fellowships are also offered.

Wheat improvement

Most of the wheat varietal development research during the first half of the 1970s involved making direct selections of suitable cultivars from internationally distributed yield trials, such as those from CIMMYT, India, and other wheat research organizations. These materials were evaluated for disease resistance, environmental adaptation, and agronomic characteristics.

Several factors led to this initial strategy. First, Bangladesh had few trained wheat breeders, and national funds were limited to launch an extensive breeding and crossing program. Second, to develop varieties from early-generation segregating materials takes time, and there was a strong desire to expand national wheat production as fast as possible. Third, some of the early-maturing, high-yielding commercial varieties supplied from India and Mexico proved to be highly suitable for Bangladeshi production conditions without further improvement. Consequently, almost immediate commercial release of improved varieties was possible.

Since most of the expansion in wheat area was occurring in essentially rainfed areas characterized by relatively short growing seasons, emphasis was put on finding suitable early-maturing rainfed varieties (100-105 days). For these conditions, the varieties Sonalika and Inia 66 were recommended.

For cultivation in irrigated areas with a longer growing season, the varieties Tanori 71, Jupateco 73, and Norteno 67 were recommended as medium-maturing varieties (110-120 days).

By the end of the 1970s, the BARI wheat improvement team, while still modest in number, had assembled a critical mass of researchers of sufficient experience to expand their national wheat breeding efforts. Using the experimental lines distributed through CIMMYT’s international germplasm testing programs and from other organizations, they began to make more and more “reselections” from within the broad array of genetically diverse materials included in these nurseries.

Within the best advanced lines of the international nurseries grown at different sites around
Forty-six Bangladeshi wheat researchers have received in-service training at CIMMYT. In addition, special in-country workshops have been given, such as one on the methods and techniques needed for wheat pathology research.

In the country, the BARI researchers selected individual plants that were better suited than their bulk parental populations for Bangladeshi production environments. This technique allowed for the initiation of a more extensive improvement program at minimal time and expense. They also drew on various germplasm collections, crossing blocks, and early-generation F₂ populations for materials which could be used in the national crossing program. Some of the advanced lines now emerging from this crossing program will become the replacement varieties needed for the 1980s.

Several early-maturing, high-yielding varieties have now been developed locally and released. Of the BARI varieties, the cultivar Balaka shows considerable promise. It is similar to the variety Sonalika in terms of grain type, days-to-maturity, and yield potential, but has different genes for resistance to leaf rust. Other advanced lines have also been identified with improved agronomic characters as well as good levels of resistance to therusts and other foliar diseases.

**On-farm research activities**

Within the BARI organizational structure, production-oriented wheat research—related to cropping systems, socio-economic circumstances, on-farm agronomy and post-harvest technology—are conducted by different research programs and divisions of the Institute. Up to now, effective leadership and personal relationships have provided sufficient coordination and collaboration in these different BARI research activities.

Dozens of on-farm research trials have been conducted throughout the wheat-growing areas by BARI scientists to work out seeding practices, tillage methods, fertilizer use, and irrigation applications. Socio-economic studies have been carried out to evaluate the profitability of different sets of recommendations in the context of farmer resources and alternative uses for those resources. The results of these various research activities show that properly cultivated wheat with one or two supplemental irrigations and adequate fertilization can produce yields up to, and sometimes exceeding, 3 t/ha.

Areas with irrigation offer the highest net returns to the farmer. But even in the more marginal areas—those with less suitable soil and less certain moisture availability—wheat has offered positive incentives for production. In areas formerly left fallow in winter, wheat offers an option to capitalize on unemployed family labor during the previously slack months of November to March.
On-farm experimentation is an important part of the Bangladeshi wheat research program. Farm-level trials seek to identify and verify economic production practices for the major areas. Consequently, even in rainfed areas where wheat yields with HYV varieties are not very high, expansions in wheat area have continued, often at dramatic rates of growth.

Wheat seed production and distribution in Bangladesh

The production and procurement of certified wheat seed in Bangladesh is the responsibility of the Bangladesh Agricultural Development Corporation established in 1961 as a public sector organization and assigned the task of introducing modern technological inputs in a basically traditional agricultural sector. BADC was also given the specific responsibility for procurement and supply of chemical fertilizers, pesticides, and irrigation equipment.

Based in Dacca, BADC has a nationwide network of input distribution centers, warehouses, and seed multiplication and processing facilities. It is the largest organization in the public agricultural sector. It’s goal is to ensure the timely delivery of needed inputs and services down to the village level.

BADC is organized into six wings (divisions): Administration, Finance, Planning, Field, Irrigation, and Supply. The Field Wing is in charge of production, procurement, processing and marketing of improved seed. This wing manages BADC seed multiplication farms, private sector contract growers, and the country's agricultural development estates. In 1973/74, with assistance of the World Bank, BADC launched a new “Comprehensive Cereal Seed Project” in which wheat seed production and procurement formed a part. The aim of this project was to allow Bangladesh to become basically self-sufficient in certified seed production. The new project provided funding to build eight modern seed conditioning facilities for the processing and packaging of quality seed.

Under the national seed production plan, foundation seed as well as some commercial seed are produced on BADC seed multiplication farms, ranging from 40 to 1,200 ha in size. The BADC-produced seed is used as foundation seed by thousands of private growers, who grow commercial seed under contract to BADC and play the major role in the Bangladeshi national seed production system.

To provide adequate technical assistance and supervisory support, contract growers are concentrated in 13 production zones, each located near a seed conditioning plant (and usually near a BADC seed multiplication farm). Within the zones,
The BARI wheat research team is responsible for breeder (basic) seed production on the BARI experiment stations, which is then used by BADC in their commercial seed production programs.

Contract growers are organized into “blocks,” forming contract growers’ “seed units,” which enter into contracts with BADC to produce specific varieties. BADC supplies the contract growers with the necessary inputs to produce quality seed, provides technical advice, and supervises the growers’ seed production efforts. In return for good quality seed, contract growers are paid a premium price set at 20 percent above the prevailing official market price for grain. BADC assumes responsibility for the seed conditioning and marketing.

Since 1973, national sales of wheat seed have increased from 1,446 tons to 14,249 tons in 1980, nearly a 10-fold increase. At first, almost a complete reliance on seed importation was required to meet farmer demand for seed of the dominant variety Sonalika. This seed importation continues to decline considerably as the national seed production capacity increases.

Most of the farmers who grow wheat also save seed from year-to-year. Farmer-to-farmer sales have also been an important form of seed distribution in Bangladesh in recent years. It is estimated that up to 80 percent of the total national wheat seed requirement is being met through farmer seed stocks and sales among themselves.

Seed Storage at the Farm Level

Farm-level storage of wheat seed in Bangladesh requires special care during the hot and humid months. Without good seed storage at the farm level, considerable deterioration in the quality of stored seed will occur, primarily through moisture absorption, insect damage, and fungal growth.

The BARI wheat research team initiated studies to identify low-cost and effective methods for farm-level seed storage to assure at least 80 percent germination viability in stored seed. A number of farm-level seed storage methods were identified (see photo, page 13):

1) Fifty gallon metallic drums formerly used for fuel or insecticides. After thorough cleaning, about 400-450 kg of seed can be stored in each drum, with only an occasional drying in the sun.

2) Kerosene or biscuit tins. These metal containers, although not airtight, can be used to store 15 to 20 kg of seed, if the seed is redried in the sun once a month.

3) Earthen containers made in rural areas. These containers are made of clay and fired under low heat. They often have a
The short-season variety Balaka is the first Bangladeshi variety to be developed and released by the BARI research team.

tar-like coating on the outside. Smaller size pitchers can hold about 15 kg of seed, and the larger vessels can effectively preserve 80 to 120 kg of seed, if the seed is redried in the sun once a month.

4) Polyethylene or jute bags. Polyethylene fertilizer bags, covered with jute sacks are extensively used by farmers for storing wheat. Prior to use, the polyethylene bags are washed and dried. Seed stored in these bags must be redried in the sun once a month.

Simple education bulletins were prepared on how to preserve seed using these different methods. This information was then actively disseminated by extension officers throughout the wheat-growing areas.

Extension education for wheat production

A number of different extension efforts have supported national targets for expanded wheat production in Bangladesh. Perhaps the most pervasive extension activities have been by the farmers themselves. The activities of BARI scientists in on-farm research, their cooperation with extension agents in the planning and management of demonstration plots, and their collective contacts with farmers through these on-farm research and demonstration activities also have helped in the transfer of improved wheat technology.

The Directorate of Agricultural Extension and Management (DAEM) also has played a key role. It is the largest of the country's extension organizations, numbering some 6,000 extension agents located throughout the country. Extension agents in wheat-growing areas are given targets to try to meet for their areas in terms of total wheat area, yields, and production. They cooperate with local farmers in the planting and management of demonstration trials to promote various wheat varieties and combinations of cultural practices.

Although the technology transfer and feedback linkages between the research level and the extension level need further strengthening, the BARI wheat research-extension connection has been relatively good. BARI wheat scientists are increasingly engaged in in-service training programs for extension officers. Field-level cooperation in trials and demonstrations also serves to provide an effective link between these two vitally important agricultural organizations.

Even further, the introduction of the extension training and visits (T & V) system, with its growing cadre of extension specialists to work
The Extension Service is actively engaged in education programs to improve the profitability of Bangladeshi wheat production. Pictured on the left are various containers available in rural areas that are recommended for farm-level seed storage. Pictured on the right is an innovative game that helps to teach farm youth good production practices.

closely with BARI scientists in adaptive research programs designed to produce appropriate farmer recommendations, stands to strengthen further the transfer of wheat technology in Bangladesh.

Future wheat research directions

As the wheat area continues to expand towards the 1.5 million ha target area, and more marginal land is involved, the efforts of the BARI wheat research team must also expand.

Improved disease resistance and early-maturing varieties are the overriding improvement goals. Although diseases have not been a major problem to date, they loom large over future research considerations, particularly since nearly 70 percent of the HYV wheat area is planted to the increasingly rust-susceptible variety Sonalika. Varieties similar to Sonalika in agronomic and grain-type characteristics, but with resistance to leaf rust, are urgently needed to diversify varietal patterns. Such varieties must equal or closely approach Sonalika in days-to-maturity if farmers are to accept the new cultivars. Even then, varietal diversification will be difficult with farmers who have never seen the destruction a rust epidemic can cause. Other diseases, particularly a leaf blotch caused by the fungus, Helminthosporium, and various smuts, also are becoming increasingly important disease problems.

In addition, added heat tolerance could improve the tillering ability of varieties planted in the still-warm early November period. Promising lines with the desired earliness characteristics and with resistance to the potentially serious diseases found in Bangladesh have been identified by the BARI scientists.

Efforts are also under way at the Bangladesh Rice Research Institute (BRRI) to develop earlier-maturing rice varieties for the aman rice crop. Added earliness in aman rice varieties would allow farmers to harvest in October-November, thus permitting them to plant their wheat at a more timely date.

More agronomy research is also needed. With wheat poised to occupy the status of one of the major winter crops, mixed-cropping of wheat with legume pulses offers an excellent opportunity for reducing shortage of food legumes in the face of dwindling land areas under these crops. Preliminary trials have yielded encouraging results.

Up to now, most of the successful production practices have been worked out by the farmers themselves. Seeding rates and methods are a good example. The first year in wheat production, a
CIMMYT’s wheat staff has a close and collegial relationship with the Bangladeshi wheat staff. A continuing program of in-country visits and visiting scientist travel fellowships to Mexico is being maintained.

A farmer invariably seeds at 60-70 percent of the optimum density rate, using the same broadcast method used for broadcast rice production. Over the next several cycles, he adjusts his seeding rates upwards. However, research is needed to evaluate new techniques such as line-sowing. A number of soil and water management issues must also be addressed to improve the productivity of wheat cultivation.

In 1981, the Canadian International Development Agency (CIDA) granted special funding for five years to BARI to strengthen its wheat research program. Through this grant, CIMMYT is deputing a wheat pathologist/breeder and an agronomist to Bangladesh to assist the wheat program while several of the BARI wheat research team members go abroad for advanced degrees at the M.S. and Ph.D. level. Funds for needed laboratory and field research equipment have also been provided.

Wheat: part of a complex cropping system

The rapid increase during 1975-80 in wheat area and production led to over-optimism on the part of many, and an unrealistic expectation that the area planted to wheat would continue to expand at almost an exponential rate. In the 1981-82 season, wheat suffered a set-back with a reduction of 15 percent in the area planted and in production compared to the previous year. Due to the poor 1981 aman rice harvest, many farmers preferred to grow boro paddy rice in the 1981-82 winter season instead of wheat. Other factors causing the first set-back in wheat production included the competition of other dryland crops, especially pulses, some shortages of wheat seed, fertilizers and power (for irrigation), and difficulties experienced in 1980-81 in harvesting and threshing wheat. Moreover, an estimated two-thirds of the 1981-82 area planted to wheat was sown late due to a prolonged drought in October-December 1981 and a late harvest of the aman rice crop. These factors resulted in depressed yields.

This set-back brings back into perspective that wheat is part of a complex cropping system, highly dependent on the events in rice production, as well as on changing market opportunities for other winter crops that compete directly with wheat. The events in 1981-82 also underscore that wheat in Bangladesh is close to its current ecological limits, with only a very limited period of cool winter weather suitable to produce high yields with presently available varieties.
Sustaining the momentum of wheat production

Considerably more development in the national wheat production infrastructure is still required to support current and projected national wheat production levels. Threshing equipment is in very short supply, as are milling, procurement, and storage facilities. At the farm level, threshing capabilities could become a major obstacle to increased production in future years. At present, wheat is generally threshed by the trampling of bullocks or with a stick. With area expansions in the winter (rabi) season crops likely to continue during the 1980s, (due to expanded irrigation development and improved crop technology), labor for wheat threshing during March-April may become a serious bottleneck. Since very little time exists between the harvest of wheat and the onset of the monsoon (which destroys unprotected grain), a strong case exists for greater mechanization in the threshing operation. Research is under way at BARI and at the Bangladesh Rural Development Academy at Comilla to develop relatively inexpensive small-scale threshing equipment.

To date, Bangladesh has been able to maintain its guaranteed prices set for wheat close to the target levels. Although some drop in price does occur at harvest time, these declines have been short-lived and prices have returned quickly to the minimum floor level. In 1981, The Bangladesh Ministry of Food procured enough wheat to defend the government’s support price. This intervention captured roughly 16 percent of total national production and severely pressured the Food Ministry’s already “tight” grain storage capacity. As additional grain warehouses are constructed around the country, the storage situation should improve. Nevertheless, inadequate storage facilities for wheat grain could become an obstacle to attaining the target of 1.5 million ha of wheat land.

Over the last five years, government policies have strongly favored expanded wheat production. Added resources have been devoted to wheat research and to expanded national production of quality wheat seed. Further, the government has been willing to devote scarce foreign exchange to import thousands of tons of seed of improved varieties to assure that sufficient seed was available to continue spurring the expansion in the national wheat area. Cost: price ratios between recommended inputs and the price of wheat have been favorable and must remain stimulatory if national production targets are to be achieved.

Bangladesh wheat story: what are the lessons

In response to the availability of appropriate wheat technology, Bangladeshi farmers have repainted their country’s winter agricultural
Dr. R. Glenn Anderson

Dr. R. Glenn Anderson, former director of the CIMMYT wheat program, died suddenly in February, 1981, en route to his ninth visit to Bangladesh. At the inauguration of BARI's new headquarters at Joydebpur on March 3, 1981, the Institute's director, Dr. Kazi M. Badruduza, led the staff in a dedication of the new facility:

"In fond memory of our beloved friend Dr. Robert Glenn Anderson (1924-81) for his dedication and outstanding contribution to research and development of wheat in Bangladesh."

Dr. Anderson's visits to the research and demonstration plots of Bangladeshi wheat landscape with wheat. How did this all happen so fast? What were the reasons? What are the lessons?

The profitability of wheat production using the short-season, high-yielding varieties and improved production practices was obviously a necessary condition. The efforts of BADC to procure sufficient seed and of the extension service which set out hundreds of demonstration trials and provided technical information were catalytic factors that helped to spur production. Greater availability of fertilizers, more shallow and deep tube-wells for irrigation, and government policies to support a minimum floor price for wheat also were critical factors.

A less tangible part of the explanation is found in the character of Bangladeshi farmers. Enterprising and innovative, thousands of Bangladeshi farmers moved quickly to adopt wheat production. They showed their ability to adapt to new production practices and to find solutions for problems of tillage, farm-level seed storage, and threshing in a very short time. This enthusiasm for agricultural development was exemplified by the country's late President, who travelled extensively throughout the rural areas congratulating those who were achieving progress and listening to ways that the government could be more effective in its development efforts.

The determination and talent of the national wheat researchers and extension workers also have been driving forces. These public servants, with strong support from the agricultural leaders of Bangladesh, have devoted themselves tirelessly to the introduction of wheat cultivation in Bangladesh. Into this fabric of personal and institutional relationships must be entered some of CIMMYT's own wheat program staff as well as representatives of other international agricultural organizations.

The success of wheat production has created new pressures and challenges on the organizations concerned with wheat production. Fundamental to meeting these challenges will be a growing cadre of trained and dedicated agricultural scientists and production specialists to carry out the needed research, extension, and seed production programs for wheat cultivation in Bangladesh to achieve its 1.5 million hectare potential.