

Part V: Pro-poor seed systems



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Innovations in Seed Systems

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INTRODUCTION

Seed is an important vehicle for technological innovations. And good seed is one of the first and foremost prerequisites for a healthy and vigorous crop. However, seed is more than an agricultural input and a source of new technologies. A range of developmental, socio-economic, environmental and political issues are also covered by seed: food security, natural resource management, agrobiodiversity, intellectual property rights, social dynamics, gender, cultural and religious dimensions, policies and regulations.

A strong and resilient rice seed sector that addresses the specific needs of poor farmers for timely access to seed of appropriate genetic, physiological and phytosanitary quality plays a crucial role in ensuring food security and rural economic development for the ever growing population of Bangladesh. Seed security is particularly important in Bangladesh, where natural disasters occur frequently, resulting in total loss of farmer seed stocks in some areas.

The complex of problems that farmers face in their livelihoods calls for a holistic approach to delivery of rice seed that builds on the comparative strengths and advantages of stakeholders involved in generation, delivery and uptake of rice technologies.

Two factors have been pivotal for the emergence of innovative pro-poor rice seed systems in this country: 1) the new seed policies that seek to promote diversification and decentralisation of seed production and 2) the poverty-orientation of the PETRRA project and its strong focus on creating innovative mechanisms such as strategic networks for effective delivery and uptake of rice technologies.



Although 65% of Bangladesh's rice area is planted in improved high-yielding varieties, resource-poor farmers have limited access to external sources to renew their seed. Renewing seed is important because rice yields often decline after 4-5 years of recycling. The seed gets 'tired'.

The challenge

In farmer consultations under PETRRA, limited access to good seed came up again and again as a key constraint. However, formal rice seed supply to resource-poor farmers is particularly challenging. Rice is a low-value self-pollinated staple crop, and rice seed can be produced relatively easily and stored on-farm over a number of cycles without genetic degeneration. In such a system it is difficult to create a stable demand for external seed supply; private companies in Bangladesh have so far been uninterested in this area because the profit margin is low and the demand unstable.

Rice yields often decline after 4-5 years of recycling, in part due to accumulation of seed borne diseases, weeds and genetic impurities. The seed gets 'tired' and needs renewal. The sporadic demand from farmers for new seed, the lack of private rice seed suppliers and the limited ability of government institutions to ensure timely delivery of affordable seed to the poorest farmers mitigate against sustainable external supply systems. Consequently, farmers do not have timely access to quality seed and do not benefit from technological innovations that may improve their livelihoods.

Evidence from around the world shows that different ways can be designed to support local seed systems (Louwaars, 1994; Tripp and Pal, 2001). Sustainable, small-scale seed enterprises that address the needs of small-scale farmers are hard to establish (Kugbei et al., 2000) and once external support to such systems stops, they tend to collapse (Tripp, 2001; Almekinders and Thiele, 2004). One of the arguments is that it is almost impossible to combine development goals with profitability of the supply systems.

A number of sub-projects under PETRRA have taken up the challenge to develop innovative, poverty-oriented rice seed supply systems. Five of these will feature as case studies.

Historical context

Because of the importance of rice to the nation and to the poor, there has always been a strong government role in rearing and distributing rice seed. This has been centralised through the Bangladesh Agricultural Development Corporation (BADC) under the Ministry of Agriculture, mandated to ensure the effective delivery of good seed to farmers. Until recently, BADC only worked with the public research

sector such as the Bangladesh Rice Research Institute (BRRI), and the Seed Certification Agency (SCA), to produce rice seed according to guidelines and policies of the National Seed Board. BADC only supplies around 5-6% of the total rice seed demand and the poorest are seldom reached. Most farmers save their own seed or acquire it through informal trade and exchange.

In recent years, questions also arose as to the sustainability and efficiency of government-supported rice seed delivery and control systems. Complaints about the inadequate supply and quality of seed through the subsidised and centralised system were common. Various NGOs and private companies sought licence to produce and sell seed themselves, often as part of credit and input supply systems (Huda and Smolders, 2001).

Discussions around these themes in the early 1990s led to the formulation and approval of the national seed policy in 1993, and signing of the national seed act in 1997. The policy was established to: "make the best quality seed of improved varieties of crops conveniently and efficiently available to farmers, with a view to increasing crop production, farmers' productivity, per capita farm income and export earnings"

Significant changes in the seed policy included: the reorientation of BADC to operate on a commercial basis to the extent possible; the ability of other organisations to register as seed dealers; and the introduction of voluntary certification and the category of truthfully labelled seed. The certification of breeder seed and foundation seed remained compulsory and the SCA was recognised as the only mandated agency to do so. Rice varieties remain notified, such that new varieties have to undergo extensive testing to obtain approval for release.

Certified seed needs approval of the SCA. Without certification, seed may be labelled and sold as truthfully labelled seed at one's own responsibility. If a customer is not satisfied with the seed, the actor who labelled the seed can be legally prosecuted. If sold by farmer seed producers, as with the Farmseed method described in Chapter 18, it is termed quality seed. So these three types relate more to legal accountability than actual quality levels.

These changes in policies and regulations have not always been straightforward and reservations have been expressed about the quality assurance systems and public accountability of a private-sector supply system. Converting the SCA from a controlling to a service-oriented institution is a major change as well.

PETRRRA case studies

Given the new legal framework for seed supply in Bangladesh, PETRRRA took up the challenge to stimulate innovations in seed systems, as described in the case studies in this part of the book.

The first two cases (Chapters 16 and 17) describe a new approach to technology

identification and the development of a rice seed network to ensure effective communication and coordination between the diverse actors in the system. The next three cases (Chapters 18 - 20) examine new models for improving farmers' access to quality seed. These are hereafter referred to as Farmseed, developed by AAS (Agricultural Advisory Society); Grameen Seed, developed by GKF (Grameen Krishi Foundation); and the federation model by RDRS (Rangpur Dinajpur Rural Service). Common to all three systems is that poor farmers were selected to receive training as seed producers and seed provision was uncoupled from credit (Table 15.1).

Table 15.1 Seed innovation systems under PETRRA

SYSTEM VARIABLES	FARMSEED	GRAMEEN SEED	RDRS FEDERATION MODEL
Variety selection	18 varieties demonstrated; 3 were selected by farmers	Varieties selected by GKF based on knowledge of local preferences	Local market survey; federation seed committee gathers information from its members
Amount and price of foundation seed supplied to producer	3 kg per farmer Tk 18 (US\$ 0.32) per kg	At least 2 kg per farmerTk 18 per kg	10 kg per farmerTk 20 (US\$ 0.35) per kg
Type of seed produced	Quality seed	Truthfully labelled seed	Truthfully labelled seed
Value addition	On-farm drying and storage	Drying, cleaning, storage and packaging at the GKF processing unit	Drying, storage and packaging at the federation processing unit
Quality control	Germination test on-farm; no label	Seed testing (germination, moisture, purity) done at the GKF processing unit; labelling	Federation seed committee conducts field inspection and seed testing (purity, germination, moisture); labelling
Marketing strategy	Seed producers sell and exchange their own seed	Seed producers are given first priority to buy back truthfully labelled seed from GKF for resale in the community; retailers sell remaining seed at local markets	The federation seed committee buys truthfully labelled seed from seed producers for sale from its premises and local markets; promotion with banners at bazaars, banks etc.
Client groups	Farmers in the community; local markets at up to 20 km	Farmers in the community; local markets	Federation members; local markets
Selling price*	Tk 10-15 (US\$ 0.18-0.26) per kg	Tk 16 (US\$ 0.28) per kg	Double grain price, ~ Tk 16 per kg

* Grain price is Tk 8-9 (\$0.14-0.16) per kg. Price of truthfully labelled seed from the governmental BADC varied from a minimum of Tk 14.5-16 and Tk 18 (data 2003-2004).

In this chapter we will bring out some generic lessons from the case studies, on how they aim to improve production and deliver quality rice seed to the poor. Keys for success and the challenges of institutionalising and sustaining new approaches will be emphasised and the Bangladeshi experiences compared to those from other countries.

VARIETIES AND SEED-BASED TECHNOLOGIES

Around 65% of Bangladesh's rice area is planted in improved high-yielding varieties (HYV) (Hossain, 2002). Most of these are developed for irrigated systems. Over the last decade, around 15 new varieties have been released. BR 11 for aman (July - November) and BRRI dhan 28 and BRRI dhan 29 for boro season (November - May) have become popular with farmers. The lengthy variety release procedures, the inadequate participation of farmers in variety testing and selection, and the lack of improved varieties with biotic and abiotic stress tolerances are some of the major constraints to expanding the rice seed markets (Hossain, 2002).

Rice biodiversity

The widespread adoption of high-yielding varieties has led to the replacement and erosion of indigenous rice genetic resources in Bangladesh (Bashar and Sarkar, 1997). Local varieties have considerable importance in self-sufficiency and as a source of desirable agronomic, nutritional and culinary traits; some of them even give comparable yields to modern varieties. Local varieties are adapted to specific local conditions, e.g. saline or deep-water areas. Sometimes no improved varieties are available for such conditions and farmers rely entirely on their own varieties. Some RDRS federation members, for instance, grow local deep-water varieties beto and darash as there are no improved varieties for these conditions. Some indigenous varieties are being exploited as high-value aromatic rice (see Chapter 14).

Bangladesh, being close to the centre of origin of rice, has a national rice gene bank that contains around 5,500 partially characterised accessions. Forty improved varieties have been released by BRRI since 1970 and of these only eight are widely adopted (Hossain et al., 2002), suggesting that there may be a large under-exploited pool of rice genetic diversity in Bangladesh. There is an increasing awareness among BRRI researchers and others about the potential value of this national heritage. The involvement of BRRI in collecting and characterising local rice biodiversity is described in Chapter 17 and by Bashar et al. (2004).

Local varieties are not addressed in the case studies. In another PETRRA sub-project on rice diversity in southwest Bangladesh, around 200 local landraces were collected from four districts, ranked and further selected according to people's criteria and preferences. These could potentially feed into the rice seed network, and give farmers more options to choose from.

Identifying appropriate technologies

Farmers require varieties and seed technologies that fulfil their needs and are appropriate to their conditions. Research and development of varieties and seed technologies in the past was top-down. Government extension systems often offered pre-selected varieties and technologies to farmers via demonstration plots, and training and visit (T&V) extension.

While developing new seed systems under PETRRA, scientists have increasingly recognised that an integrated effort by scientists, extension workers and farmers in technology development and evaluation is an important precondition for successful adoption and feedback. Following up on participatory variety selection work by breeders at BRRI (Salam et al., 2002), its Adaptive Research Department established action research groups with poor farmers, NGOs and government extension workers to select and validate a broader range of technologies, not just varieties. Adoption rates increased, feedback mechanisms were established and farmers gained self-confidence as decision-makers. This model has not yet influenced the new seed models addressed here, but in the future it probably will. RDRS has been a keen participant in the action research groups and the positive experiences are now being taken to the federations to enhance uptake of new technologies. Collaboration between NGOs, community-based organisations, private sector, and government research and extension has been institutionalised in the focal area forums, endorsed by the state minister for agriculture (see Box 21.1). This is just one example to illustrate the value of cross-fertilisation of ideas between different PETRRA sub-projects.

These participatory principles of stream-lining variety selection, breeding and approval processes by early engagement with communities have been used successfully in participatory wheat variety selection by CIMMYT and their partners in India, Bangladesh and Nepal, and on various other crops elsewhere (Elings et al., 2001; Ortiz-Ferrara et al., 2001; Bellon and Reeves, 2002).

Farmseed worked with farmer groups to ensure the best match to local needs and likes, and from 18 varieties, three were chosen for multiplication. The selection of varieties by GKF and RDRS was based on thorough knowledge of local preferences and local market surveys, respectively. Local demand and preferences are more easily captured by local organisations than by large seed companies and BADC.

DEMAND AND FARMER AWARENESS

The driving force behind sustainable seed supply systems is stable demand for seed and access to outlet markets. When farmers produce entirely for their own household, as is the case of most Bangladeshi rice farmers, access to grain markets is unimportant. The PETRRA stakeholder consultations confirmed this: farmers gave

lowest priority to harvest prices. However, in the long-term, given the increasing urbanisation of Bangladesh, there is likely to be a shift towards market-oriented agriculture. Profitability, rather than subsistence will increasingly become more important for stimulating production (Hossain, 2002). Once food security is ensured, access to stable outlet markets will be an important incentive for farmers to invest in quality rice seed. The government deliberately keeps prices of paddy low since the landless and urban poor depend on cheap rice. This could potentially discourage rice seed and grain producers.

Even Bangladeshi rice farmers who sell little rice have many incentives to take up new, appropriate rice technologies. An increase in productivity leads to: less dependence on purchased rice, greater disposable income, more efficient land use, release of labour for other purposes, and improved diet, health and children's education.

Recognising the value of good seed

The basis of demand for quality seed is recognition of its value, whether purchased or produced on-farm. Farmers' perception of improved seed and varieties is highly variable, ranging from specialised knowledge based on the experiences of generations to lack of attention to even the basic features of seed quality. Generally, farmers have a notion that seed needs to be renewed periodically and that improved varieties give a number of benefits, but they often undervalue maintaining good seed to enable expression of its genetic potential. "First you have to raise value in peoples mind," says A. K. M. Zakaria from the Rural Development Academy in Bogra. For the last five years he has been training farmers, men and women, in improving the quality of their farm-saved rice seed under the PETRRA Seed Health Improvement sub-project (SHIP).

Farmers who realise that good seed gives vigorous plants and good yield are in a position to judge whether his or her scarce capital should be invested in improved seed. Today most farmers do not have a real choice, since many have no place to buy quality rice seed.

Assuring timely supply of affordable seed

All PETRRA seed case studies mention two consistent keys for success: timely delivery of good seed and affordable price. The main problem with seed supply through BADC is that seed of the right variety is often not available at the right time or that the poor have no access to them at all. The new seed production models have a built-in distribution system through local seed producers or community institutions. This lowers transaction costs for poor farmers and helps ensure timely delivery.

In the Farmseed model, production and distribution are totally integrated. The seed producer undertakes production, processing, quality control and sales in the local community (Table 15.1). The client and the supplier are neighbours, making it easy to

gauge demand, sell at competitive prices and enjoy trust in the quality.

In the Grameen Seed model, farmers also act as producers and distributors, buying back processed and packaged truthfully labelled seed from GKF in any desired amount for resale in the community. Retailers sell the rest on local markets. Its price equals market prices, Tk 16 (US\$ 0.28) per kg. GKF strives to stimulate exchange of information and experiences at union level in order to establish trust and transparency.

In the RDRS model, federation members have first priority to buy seed from the federation seed store at market price, about Tk 16 per kg. Federation members say that the new supply model has changed seed acquisition strategies for some. Recognising that RDRS seeds yield better than their own, federation farmers are willing to buy seed more frequently because the price is acceptable and availability is high. A common strategy is to purchase one 10 kg bag of rice seed, the maximum affordable amount for many, and supplement with their own if needed.

Demand and trust is partially established by multiplying seed and training seed growers; other farmers from the community are invited to come and see variety performance, impact of seed quality etc. Seed is brought to the doorstep of the farmers on time, fulfilling one of the ambitions of the rice seed network. Resource-poor farmers are seed producers, retailers and the principal client group.

Farm-saved seed: scope for improvements

The advantages of attention to seed quality in farmer-saved rice seed are often neglected and there is scope for increasing farmer awareness of the value of good seed. SHIP has paid particular attention to this, using participatory learning and action research to improve farmers' awareness of good seed and the ways of producing it with low levels of inputs. The SHIP experience shows that, when aware of its potential, farmers value good seed and are willing to pay a premium price for it from a reliable source. Besides having a 5-15% yield increase, seed producers sell their own-processed seed to other farmers in the village at Tk 10-12 (US\$ 0.18-0.21) per kg, up to 50% higher than the grain price.

Participatory learning improves farmers' awareness of good seed. Trained farmers demarcated their seed plots to increase community awareness, engaged in farmer-to-farmer extension and Going Public (Chapter 9), and in the production of videos for further scaling-up (Chapter 5).



Stimulating formal seed supply for farmers while enabling them to produce better seed themselves gives farmers the option to select whatever source of seed is best for them at a given time. Under unfavourable conditions, poor farmers may have to

eat rice seed saved for the next season, forcing them to acquire seed from whatever source is available. For them, enhanced capacity to produce and store quality seed is of particular importance (Almekinders and Louwaars, 1999).

Matching seed and outlet markets - the long-term perspective

PETRRRA seed sub-projects do not specifically address the potential of seed and grain markets. Currently, in Bangladesh the demand for quality seed is so high that once it is available at the right time at an affordable price "the seed almost sells itself" as one BRRI researcher said. Statistics from the rice seed network indeed confirm that there is a large demand for quality seed and that decentralisation is a promising way forward. The estimated increase from 5 to 15% in formal sector seed supply in five years is impressive. As many farmers, even in fully developed markets such as Europe, continue to save seed for some years, formal sector supply of rice seed in Bangladesh may have a maximum potential of around 30% by 2020, based on a projected decrease from 5 to 3 in average number of years over which seed is recycled (Talukder et al., 2004). Once the formal rice seed market becomes saturated, market analyses and planning will become more important to ensure an even, regional and national distribution of seed. Market assessment through the rice seed network (Chapter 17) and focal area forums (see Box 21.1) will enable organisations to coordinate production and distribution.

QUALITY ASSURANCE

Bangladesh is a good example of how new directions in seed policies and regulations can stimulate the formal seed system by allowing new players to produce and distribute seed. In most countries, the regulatory system is a 'policeman' imposing quality standards and control measures that the government system cannot comply with itself.

The seed systems introduced by PETRRRA help ensure the supply of truthfully labelled seed of improved varieties to poor farmers. The quality assurance lies in the continuous supply of breeder and foundation seed from trustworthy sources (BRRI and BADC), in the processing and in the technical training and backup that seed producers and others receive through the projects. Quality assurance and trust is the responsibility of all players in the seed chain.

Local organisations are important for assuring quality. NGOs and community-based organisations (CBOs) often have their own well-defined clientele group, which they are mandated to support and to whom they are accountable. A big part of the trust in the system lies in the confidence between the local organisations and their members. Community-based quality control is powerful where producers and supplier can be readily identified. In South America, this has also been called

'neighbourhood certification' (Iriarte et al., 2000). Increasing distance from the seed source makes other forms of quality assurance necessary. In the Farmseed and Grameen Seed models where production and marketing is integrated, the social pressure on the seed producers ensures quality control: once their colleague farmers lose trust in the quality of the seed, they will be out of business. Under the RDRS federation model, the distance between seed producer and client is slightly increased, as seed is sold by a federation seed committee.

If there is only one local seed supplier, there is no competition and the market cannot ensure quality. The case studies illustrate how three leading NGOs diversified farmers' sources of seed. Farmseed opted for groups of 20 small-scale seed producers per village; GKF has groups of 10 seed producers/sellers per ward (1-3 villages), while RDRS sells through their federations seed committees.

While seed can be tested locally for germination, moisture and purity by NGOs or community-based organisation or on-farm with simple equipment, seed health testing requires more advanced facilities. The lack of routine testing of breeder and foundation seed by the national seed certification authorities is a weakness in the system. Seed health testing is only done at the Bangladesh Agricultural University and only upon request. The lack of systematic surveys for seed-borne diseases may hamper seed quality and lead to epidemics. In Tanzania, official seed certification authorities perform spot-checks of the decentralised seed production (Box 15.1).

Box 15.1
Quality
Declared Seed
in Tanzania

The government of Tanzania promotes on-farm production of quality declared seed (QDS) to improve smallholder farmers' access to quality seed through decentralised production (FAO, 1993). QDS farmers receive government training in seed production and management: roughing, variety maintenance, disease management, harvest, seed processing and storage etc.

Quality control is done on-farm by the farmers, while the official seed certification authority performs spot-checking of about 10% of the seed and occasional field supervision. QDS farmers receive fresh foundation seed every second year. Since the system started in 1998 many poor farmers in remote villages have been enabled to produce good seed and supply neighbouring farmers, using an approach similar to the Farmseed model in Bangladesh.

Success depends on the crop, location, the farmers' ability to produce good seed, and the certification authority's ability to maintain the service. QDS has upgraded the quality of farm-saved seed and the trust in QDS seed is higher than in other purchased seed. QDS farmers are accountable to their neighbours/ clients for the quality of their seed. Among the problems that still remain to be solved is how to make the system sustainable in a large country like Tanzania with many remote villages.

COMMUNICATION AND PARTNERSHIPS

The PETRRA case studies show the importance of fruitful partnerships between public, private and community-based organisations. Technical support from BRR

contributed much to the success, and the NGOs acted to complement, rather than substitute for state institutions. Farmers valued the seed grown by trusted neighbours. In Brazil, successful cases represent a mix of local government initiative, civil society and a supportive central government (Tendler, 1997).

Farmseed emphasised networking of skills and resources among NGOs and community-based organisations. The network partners consider training their staff on rice and seed production as incentives for participation. Farmer trust and confidence in the system is strong in Farmseed. AAS built a vast network with local NGOs and community-based organisations, with hardly any communication gap between the partner organisations and the farmers. AAS has shown an extraordinary ability to mobilise and enthuse these organisations. AAS staff have been inspired by their own work and this spreads to their partners. All the positive achievements of Farmseed come back to their ability to engage pro-actively with other organisations and institutions, capitalise on their local network and experiences and stimulate collaboration. This mentality is also reflected in the flexible and lean structure of AAS (Chapter 18).

GKF established a network of local leaders, field staff or block supervisors of the Department of Agricultural Extension (DAE) and NGOs to bring in new customers and provide information about seed and varieties. These actors, along with other farmers from the village, are invited to field days. This creates demand and announces which persons are the sources of trustworthy seed. Visits to the GKF seed processing centre also help raise awareness about the added-value of seed processing. The long-term objective of this new GKF approach is to reach all farmers in any union where the model is introduced (Chapter 19).

A RDRS in Rangpur worked with federations to revolve inputs from participating farmers and to link with BRRI and DAE block supervisors for technical support and training. RDRS became a partner with BRRI to conduct action research in farmers' fields to validate new varieties and to experiment with other rice-related topics involving students from the Bangladesh Agricultural University. The federations now serve as a forum to gather feedback, narrowing the gap between research and adoption of new technologies. The RDRS federation model allows for efficient exchange of information and seed between federations, and creates the opportunity to establish a business (Chapter 20).

Relationships between government research, government extension and NGOs are not

"The kitchen is our school now. We learn from other women (extension agents) when they train us in our homes."



always clear and there can be competition in roles. Establishing true partnerships, building on complementary strengths, takes time and effort. Transparency is crucial.

The studies presented illustrate the importance of communication and transparency for networks and partnerships. Success is rooted in the clarity of purpose in each organisation, and in enthusiastic staff. The importance of individual fiery souls as major driving forces cannot be over-emphasised. The rice seed network provides a loose umbrella for diverse institutions, and allows several seed supply models and partnerships to be applied. This is the beauty of the system: how communication, coordination and flexibility can be ensured, is addressed in Chapter 17.

MAINTAINING THE INCENTIVES

For the system to work and expand, all links in the seed chain must be operational. The strengths and weaknesses of the seed chain as experienced by the PETRRA sub-projects are summarised in Table 15.2. These mainly deal with the technical aspects of institutionalising the seed system.

Fundamental to these innovations have been the changes in mentality and ensuring that all actors maintain their benefits, shared responsibility and accountability. PETRRA has been instrumental in shifting mindsets, with the initial stakeholder consultations as a first step and eye-opener.

Farmers

As the beneficiaries of the new seed systems, poor farmers have an incentive for commitment once they recognise the benefits. The needs of the clients must be considered, as local demand for quality seed will be the first incentive for seed producers. The emotional value of farmers towards their own rice seed and the growing feeling of ownership also help guarantee that the innovations will last. The case studies describe this in various ways:

'Resource-poor seed producers are freelancers, not contractual labourers. They are directly reaping the economic benefits from their work and the social benefits from becoming respected community members' (Farmseed).

'The training provided to seed producers does not only benefit seed production, but also their crop production overall. Higher yields and better seeds help raise incomes. Also, women feel recognised for their important role in rice production' (GKF).

'Building on community institutions, farmer seed producers and farmer trainers has increased efficiency of human, social and physical capital. Ownership is ensured by giving the civil society a voice in project decision-making. Creating a conducive learning environment for women has given them more voice in rice seed cultivation and agriculture' (RDRS).

NGOs

The advantage of NGOs and community-based organisations in a seed system is that they are not driven entirely by profit, the way seed companies are. Most of them

Table 15.2 Strengths and weaknesses of rice seed supply systems in Bangladesh, 2004

SYSTEM VARIABLES	STRENGTHS	WEAKNESSES
Conservation and use of germplasm	BRR1 ¹ holds the national rice gene bank of ~5500 accessions of Bangladesh origin; BRR1 ensures ready access to germplasm	BRR1's collection and evaluation of local germplasm is outside the mandate of the rice seed network
Breeding/variety selection	BRR1 increasingly involves NGOs to identify technology identification with farmer groups	Most partners do not select varieties, but use 2-3 varieties already widely available in the area; farmer participatory variety selection still limited; delay in variety release
Production of breeder seed	BRR1 researchers are highly skilled and motivated; BRR1 can multiply any variety or accession in small quantities on request; current level of production can be sustained by BRR1 after PETRRA	The rice seed network depends on breeder seed supply from BRR1, which relies on government support and commitment; BRR1 not allowed to recover costs from breeder seed production, may hamper motivation; limited buffering from natural disasters
Multiplication of foundation seed	More producers since policy reform, more coverage and flexibility; production by NGOs is incentive-based; BADC supports development of new pathways	Supply system needs improvement and strengthening; vulnerable to natural disasters, potentially reduces buffer capacity of BADC
Multiplication of truthfully labelled seed	Many organisations involved at various levels; strong local anchoring, feedback and interaction; low transaction costs	Risk of fake seed producers accessing the market; potentially unequal competition from BADC due to government subsidies
Processing/storage	High capacity of BADC; NGOs pay service fee to BADC and other organisations for seed processing; constructive interaction among service suppliers improves national coverage	Capital costs constrain alternative service providers; processing and storage capacity may hinder increase in seed production; risk of losing trust and transparency if seed is processed in a centralised unit
Quality assurance	Rice seed network partners receive training in seed production and management; social capital of local NGOs, CBOs or small private seed producers ensures trust; some NGOs have a long record of seed production and quality control, so their seed quality is much better than farm-saved, esp. in the dry season	No seed health testing in the official seed certification scheme; staff turnover at SCA due to structural problems; capacity of SCA to assess all requirements for breeder and foundation seed; quality assurance system for truthfully labelled seed depend on market forces and self-regulation
Distribution/marketing	Positive effect of selling less foundation seed to seed farmers; production and distribution networks close to the client, seed farmers participate in marketing; rice seed network is framework for assessing seed markets	Limited business and organisational skills of many organisations; limited market analyses and coordination within and among organisations
Outlet markets	Potential for linking seed networks to grain markets	Not addressed in rice seed network. Currently beyond its scope

¹The Bangladesh Rice Research Institute (BRR1), Bangladesh Agricultural Development Corporation (BADC) and Seed Certification Agency (SCA) are governmental institutions.

such as through microfinance. PETRRA gave partner organisations free training, which helped motivate NGOs to consider agriculture as a tool of social have a broader mandate and are committed to their clients, allowing them to concentrate on the needs of the poor.

In spite of the importance of agriculture to Bangladesh, few NGOs in Bangladesh have much agricultural expertise; they developed from a basis of social improvement, development. Continued commitment to seed supply will rely on the ability of the NGOs to recover their costs.

Under Farmseed, AAS did not recover costs, but they currently explore the production and sales of foundation seed as a way of maintaining income once donor support ends.

The business plan of GKF includes full recovery of costs for training by slightly increasing seed prices. Mr. Jabbar foresees that within two years seed producers will no longer need special training. They could still get technical advice through the union office.

Federation members, seed committees and RDRS share the profit from seed sales on a 20:40:40 basis. All agree on this split, which will continue after the project ends. The RDRS share goes to a revolving fund and has already allowed RDRS to expand its model to other federations.

Private sector

One of the reasons for the dramatic increase in private sector participation in the rice seed network (Chapter 17, Figure 17.3) could be that they received free training in seed production from BRRI, which provided these small-scale seed entrepreneurs a business opportunity. Once the advantages of the training become more widely recognised, it may be feasible to charge for it, which could help sustain BRRI's capacity building role in the seed system.

Government institutions

Government institutions have a number of specific roles to play in seed supply (see Box 15.2).

BRRI is a good example of how an institution can change from the bottom-up by getting involved in community-oriented research and capacity building. Researchers engaged in PETRRA say that they changed their views on many things. BRRI now receives a lot of credit for the PETRRA successes and such recognition is bound to bring in more new ideas. Science has its own value system, which is not always in tune with communities and the poor. Research institutions need to listen to real demands from the people, with mutual respect for the knowledge of other partners. Dr. Musherraf Husain, head of the Adaptive Research Department at BRRI, confesses that PETRRA has opened his eyes and revolutionised his views of his own role as a scientist:

'I have worked in research for 22 years, but now I realise that I have been working for the rich farmers all these years. I have seen with my own eyes that resource-poor farmers can be highly innovative and working with them has been very enriching for me. There is no way we can improve the livelihoods of poor farmers without involving them as active partners in the search for appropriate solutions.'

- Ensure capacity to meet increasing demand for breeder seed and for emergencies
- Maintain the national gene bank
- Strengthen the Seed Certification Agency and include seed health testing in certification of breeder and foundation seed
- Ensure capacity and involvement of DAE and BADC
- Support technical training of NGO staff
- Guarantee fair competition between public and private institutions
- Quick and smooth variety release
- Establish intellectual property rights and plant breeder rights
- Stimulate grain markets

Box 15.2
Government
Responsibilities
in Seed Supply

This is where it all starts. The ground for development of new institutions has been prepared.

Maintaining the incentives for BRRI is crucial to meet the increasing demand for breeder seed. Without this, the rice seed network will collapse. Since BRRI, as a public sector institution, is not allowed to recover the costs from selling breeder seed, it needs different incentives, e.g. sufficient funding and stimulating working conditions.

Government institutions are difficult to move. There is a lot of suspicion in the system towards the new roles of institutions in seed supply. For instance, some wonder if the private sector and NGOs can guarantee seed quality. This reflects the difficulties many government employees have in keeping motivated, as they are caught in a bureaucratic, inflexible system with limited resources or rewards to accept new responsibilities. Involving public institutions like DAE, BADC and local governments is important for scaling up, given their long experience, established agricultural programmes, communication links and nation-wide coverage.

CONCLUSION

The seed ordinance in 1997 provided a legal framework to develop new approaches. Through PETRA, new kinds of actors successfully rose to the challenge of helping smallholders grow and sell quality rice seed to other poor farmers by making best use of existing institutional systems. Improved technical, business and

organisational skills, with effective public-private partnerships allowed enthusiastic, open-minded people to build sustainable, demand-driven seed supply systems.

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