

Chapter 6

The BRAC Approach to Small Farmer Innovations

Md. Abdul Mazid, Mohammad Abdul Malek, and Mahabub Hossain

Abstract BRAC is a global leader in creating large-scale opportunities for the poor. This chapter describes how small farmer innovations are being developed by BRAC Agriculture and Food Security program. In collaboration with the Government and the International Agricultural Research Centers, the program aims to achieve food security and reduce hunger and malnutrition through increased environmentally sustainable agricultural production systems. The research focus is on cereal crops (rice and maize), vegetables and oilseeds. The program is currently implementing several innovative projects targeted at small farmers. BRAC is the largest market player, especially in hybrid seed (rice and maize) production and distribution in Bangladesh, and is gradually expanding to other countries, including Liberia, Sierra Leone, Uganda, Tanzania, South Sudan, Pakistan, Afghanistan, Myanmar, Nepal and Haiti.

Keywords Innovations • Smallholder farmers • Hybrid seeds • Community-based technology • Agro-credit • Gender

Introduction

BRAC is the world's largest development organization, with more than 115000 employees, roughly 70 per cent of whom are women, reaching an estimated 138 million people (BRAC 2013). Established by Sir Fazle Hasan Abed in 1972, following the independence of Bangladesh, BRAC is a developmental success story, spreading and implementing antipoverty solutions conceived in Bangladesh to 11 other developing

Md.A. Mazid (✉)
BRAC International, Dhaka, Bangladesh
e-mail: ma.mazid@brac.net

M.A. Malek
BRAC Research and Evaluation Division (RED), Dhaka, Bangladesh

University of Bonn-Center for Development Research (ZEF), Bonn, Germany
e-mail: malek.a@brac.net

M. Hossain
BRAC Research and Evaluation Division (RED), Dhaka, Bangladesh
e-mail: hossain.mahabub@brac.net

countries in Asia, Africa and the Caribbean, making it a global leader in providing opportunities for the world's poor. BRAC's approach is holistic, utilizing a wide array of tools in the areas of education, health care, social and economic empowerment, finance and enterprise development, human rights and legal aid, agriculture and food security, as well as environmental sustainability and disaster preparedness. BRAC invests in respective community-owned human and material resources, catalyzing lasting changes and creating an ecosystem in which the poor have the chance to seize control of their own lives, making their interventions sustainable. Being the world's top development and humanitarian relief organization, BRAC is one of the few organizations which has originated in the global South. The organization is 70–80 per cent self-funded through a number of commercial enterprises that include a dairy and food project and a chain of retail handicraft stores called *Aarong*. BRAC maintains offices in 14 countries all over the world, including BRAC USA and BRAC UK.

BRAC AFSP is working in all agricultural sectors, while playing an important role in attaining self-sufficiency in the areas of food production in Bangladesh. The AFSP's goal is to contribute to achieving food security, as well as the reduction of hunger and malnutrition through increased environmentally-sustainable and diversified agricultural production. The program is working on research for development (R4D), technology validations and agricultural credit and marketing services, in line with its partnership with the Government and IARCs (International Agriculture Research Centers). This chapter focuses on small farmer innovations as a product of AFSP. The AFSP is pushing for R4D on cereal crops (rice and maize), vegetables and oilseeds (sunflower). To date, it has released ten hybrid rice, two hybrid maize, one quality protein maize (QPM) and nine vegetable varieties (hybrid and OPM). Other innovations from AFSP include short duration modern rice varieties that can be fitted into the rice cropping system, targeting four crops in a year, transforming traditional single-cropping systems to double/triple-cropping, etc.

The secondary sources used in writing this chapter have been gathered from the review of different documents, including the BRAC Annual Reports (various issues), the Program/Donor Submission Report, web-based information on the specific topic, the compilations of the BRAC AFSP, findings, and future potential works, etc., as well as in-person communication with relevant experts. The next section of this chapter describes the strategies and approaches that contribute to the BRAC Small Farmer innovations in Bangladesh and other partnering countries. The third section elaborates all existing innovations for SHs, and the final section will be a summary of the future of BRAC's innovations for small farmers.

BRAC Agriculture and Food Security Program: Partnership Is the Key

BRAC AFSP is working through research for development (AR4D), technology validations, and agricultural credit and marketing services. The main strength of the program is partnership with the Government, International Agriculture Research

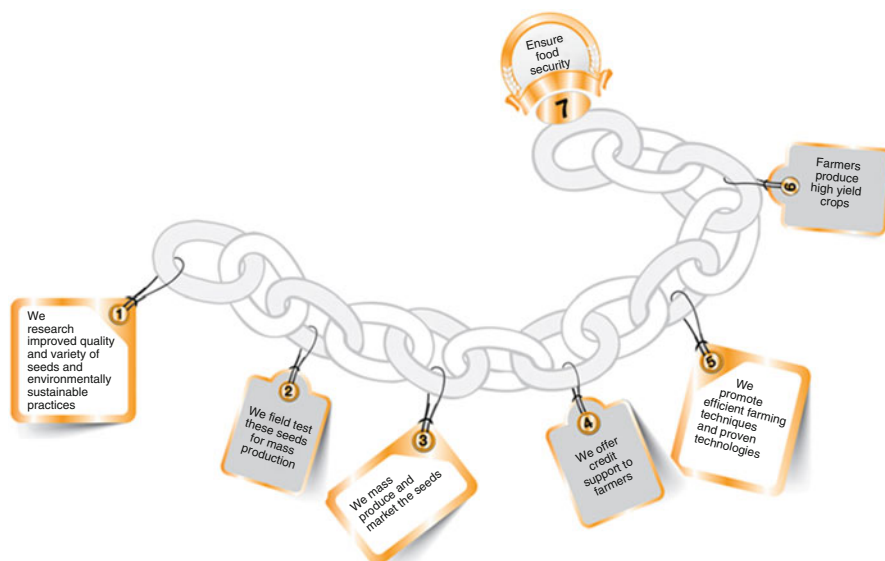


Fig. 6.1 BRAC's approach to achieving food security

Centers IARCs, Private Companies and NGOs. AFSP began its activities in Bangladesh, and is now expanding into other partnering countries, because of a strong belief in the philosophy, “every country should have its own food and nutrition security” (Fig. 6.1). As of this writing, apart from Bangladesh, the organization has already initiated activities in Liberia, Sierra Leone, Uganda, Tanzania, South Sudan, Pakistan, Haiti and Afghanistan,

Sustainable development is a key issue for any institution, as well as for a country. BRAC has established partnerships with different stakeholders to ensure the following:

1. Funding support
2. Implementing different projects
3. Collaborating with partners
4. Ensuring more coverage both in country and out of country
5. Consideration of cost effectiveness and sustainability.

Partnerships with numerous local NGOs and INGOs gives BRAC an opportunity to operate cost effectively. About 120,000 employees of BRAC, for instance, can join with millions of employees of other NGOs to expand its program at reduced cost and without incurring any reduction in quality. More recently, an MoU (see next paragraph) has been signed between BRAC and African Rice, which allows BRAC to get seeds for varieties of stress-tolerant rice and an advanced breeding line for testing validation at the seed farm run by BRAC Liberia. African Rice provides BRAC Liberia with a rice variety that is tolerant of iron. Similarly, NaCRRRI of Uganda provides vines of bio-fortified Orange Flesh Sweet Potato

(OFSP), which contains high beta carotene, a precursor of vitamin “A”, for seed multiplication and dissemination to small farmers through the BRAC technology delivery model. The Bangladesh Rice Research Institute (BRRI) has developed stress-tolerant (flash flood, submergence, drought, salinity) rice varieties that have been disseminated to farmers through BRAC Bangladesh.

BRAC, through direct delivery, seeks partnership with donors belonging to international communities. Donors usually respond to calls for proposals. Then, a Memorandum of Understanding (MoU) or Letter of Agreement (LoA) is signed among partners through discussion of achieving a common goal. For instance, BRAC has an MoU with CIMMYT/Africa Rice/AVRDC. This organization also has some local partners, such as local NGOs, private sectors (PS), and corporate partners, to act as sharing parents of hybrid maize/rice/vegetables for validation and development at the BRAC seed farm.

Farmers’ needs, preference, market value, nutritional value, food security and BRAC strategies are the main issues in prioritizing which crops need to be improved.

In Bangladesh, BRAC initiated a facility called Agricultural Research for Development (AR4D), with two research centres, one for rice and vegetables in Gazipur and one for maize in Sherpur, Bogra. Other initiatives include a one-plant tissue culture lab for potato, banana, and ornamental plants, one soil testing lab, nine seed production farms, two seed processing centres for rice, vegetables and maize, and eight seed storage facilities with a capacity of 2400 MT. BRAC’s experience expanded overseas to countries which include Uganda, Liberia, Sierra Leone and South Sudan, establishing seed production farms and collective demonstration farms (CDF). Moreover, BRAC has established a one-plant tissue culture lab and a seed processing centre on a farm in Nakaseke, BRAC Uganda. BRAC has created linkages with different National Agricultural Research Systems (NARS) and Consultative Group on International Agricultural Research (CGIAR) organisations, and made partnership collaborations for R4D, technology validation and dissemination and agricultural credit and marketing. Such linkages have been established with the International Rice Research Institute (IRRI, Philippines), the International Maize and Wheat Improvement Center (CYMMIT, Mexico), the International Potato Center (CIP), the Asian Vegetables Research and Development Center (AVRDC, Taiwan), AfricaRice, the International Institute of Tropical Agriculture (IITA), the National Crop Resources and Research Institutes (NaCRRI) in Uganda, the Central Agricultural Research Institute (CARI) in Liberia, the Sierra Leone Agricultural Research Institute (SLARI) in Sierra Leone etc. BRAC’s Agriculture program is also working with a number of multinational seed companies, having established agreements for sharing technology and marketing agro-products. At present, partnerships with multinational seed companies include: the Yuan Long Ping High Tech Agriculture Co. Ltd. (China), the Pacific Seed Company (Australia), the Mahyco Seed Company (India), the Druk Seed Company (Bhutan), and the Seminis Vegetable Seed Company (India) Ltd. (India).

BRAC Agricultural Credit activities intervene through customized credit with improved agricultural technology and knowledge support. As a result, it is strongly

collaborating with the public sector and donor bodies. BRAC began seed production in 1996 with the assistance of the Bangladesh Agriculture Development Corporation (BADC), under a project of the Ministry of Agriculture for rice, maize, potato, and vegetables carried out at its own farms in different Agro Ecological Zones (AEZ), and also through contact with farmers and markets through dealers.

While BRAC expands to other countries, it studies different scenarios which are prevalent in different countries on agricultural practice, seed systems, crop varieties, input situations, technology dissemination, extension services, agricultural tools, capacity building training for farmers, post-harvest loss, storing facilities, commodity marketing, private and public sector engagement in agriculture, etc. It also takes lessons concerning the major constraints for technology adoption which are listed below: low productivity, lack of stress-tolerant varieties (maize, rice, vegetables, cassava), seed admixture, soil acidity (upland), iron toxicity (lowland), imbalanced fertilizers and poor fertilizer management, water logging (maize), drought (rain fed rice), knowledge gaps (lack of modern cultivation practices, diseases, pests) and credit for inputs. The BRAC international agricultural program has also identified certain issues, for example, seed quality, seed storage at branch levels, preservation of vaccines due to poor electricity supply and inadequate transportation facilities, storage, low quality chicks, feed, and climate change, especially drought, excess rain which causes flash floods, soil erosion, water logging, poor growth of maize and vegetables, lack of communication, poor infrastructure, isolated transport facilities and inadequate market analysis, market system development and linkage with markets.

Based on these experiences, BRAC has been implementing relevant projects in those partnering countries to improve the above-mentioned agricultural constraints through the GPFA (Global Poverty Fund Association Project funded by DFID) in Tanzania, Liberia, and Sierra Leone, the JSDF (Japan Social Development Fund Project) through the World Bank in Uganda, LEAD (Livelihood Enhancement through Agricultural Development, funded by the UK Government) in Tanzania, the Agriculture & Livestock Extension Program funded by the Omidyar Foundation, the Agriculture & Livestock Extension Program funded by the Mastercard Foundation, the Livestock Project funded by EC in Liberia, the Demonstration Farm projects funded by OXFAM Novib and TUP (Targeting the Ultra Poor) in South Sudan, and Seed Production funded by AGRA in Liberia and Sierra Leone, among others. BRAC International has been improving agricultural situations through these programmes in such areas as availability of quality seed for farmers through the establishment of BRAC seed farms and seed processing centres, establishing tissue culture labs, seed distribution, identifying suitable crops and varieties, other input supports, organizing capacity building training for farmers, distributing agricultural tools, management practice, best suitable cropping patterns, technology dissemination through demonstration, meetings, farmer field days (FFD), providing extension services, post-harvest management training and linking farmers with markets.

BRAC Innovations for Small Farmer Agriculture

Technology Innovation

In the case of technological innovation processes for agriculture, BRAC proceeds in both ways: Agricultural Research for Development (AR4D) and Action research. For AR4D, this organization has its own agricultural research centers and a demonstration plot called the BRAC Agricultural Research Center (BARDC) located in Gazipur and Sherpur, Bogra in Bangladesh. In these centers, laboratory research and field trials are normally conducted with the help of an agronomist, plant breeder, horticulturist, etc. For action research, BRAC uses its contract farmers in different districts of Bangladesh. When BRAC wants to disseminate new technology, varieties or methods into any localities to verify their performance at the farm level, it first disposes its experiment to contract farmers and teaches them to apply those varieties or methods at the field level. Secondly, each farmer is directed to adopt it differently. Then, having used the same method but with different directions, each farmer is asked to identify any distinguishing features, for example, what time is best for particular rice varieties, in the output of their respective fields. Finally, the best process or varieties are identified based on agro products yield, growth duration, quality taste, appearance and market value etc.

Since 2001, BRAC has initiated hybrid rice research and development activities. BRAC introduced different exotic hybrid rice varieties from China and India and conducted adaptive trials in different regions of Bangladesh, registering seven exotic hybrid rice varieties with the National Seed Board (NSB). Subsequently, three hybrid rice have been developed by BRAC scientists and duly released by the NSB under the names Sakti, Sakti-2 and Sakti-3. Development of MV rice in a short duration was given priority against cold-tolerant and/or escape cold and/or escaped terminal drought conditions at Panicle Initiation (PI) to the flowering stage, so that it can be added to rice-based cropping systems and could be grown for three-four non-rice, rice and/or four rice crop systems during 2012–2013, obtaining 18 MT per ha per year with judicious fertilizer management.

Maize is now considered to be the third most important cereal crop after rice and wheat. It can be grown in winter (rabi or dry season) or alone after rice, and in the summer season (kharif I/pre-wet season) after potato. Maize was introduced into Bangladesh in 1975, having mostly composite varieties (OPV). Farmers did not accept maize widely because of low yield and lack of market facility. Since 1993, the maize crop's popularity has risen due to the introduction of hybrid varieties by BRAC. This was due to higher grain yield and increased market demand for maize as a poultry feed. BRAC initially popularized hybrid maize varieties through introduction of Pacific-11 in 1993, and later on, Pacific-984, Pacific-747, and Pacific-759. BRAC engaged farmers by providing quality seeds along with buy-back guarantees lasting 2–3 years to promote hybrid maize and the use of the maize grain as an ingredient in poultry feed. BRAC also introduced stress-tolerant

crops and fish varieties to the cropping systems to combat the adverse effect of climate change due to flash flood submergence, drought, salt, and high and/or low temperatures. BRAC also accommodated high value non-rice crops like maize, sunflower and sesame in the rice-based cropping systems through the use of short maturing crop varieties (two-four crops/year), converting single cropping areas to double or triple cropping areas to enhance food security and land productivity. Other than that, BRAC introduced oil crops (sunflower) into the rabi (winter) season and sesame into the kharif I season in a saline environment and introduced vegetable cultivation through the pyramid technique in tidal wet lands.

BRAC also collects breeder and/or foundation rice seeds from Bangladesh Rice Research (BIRRI) and the Bangladesh Institute of Nuclear Agriculture (BINA), maize and vegetables from the Bangladesh Agricultural Research Institute (BARI) and from international companies (hybrid and OP), testing and validating these at the BRAC Agricultural Development Centers (BARDC), and then multiplying, processing, and distributing the seeds through a market dealer. BRAC also validates and disseminates stress-tolerant varieties of rice for use against drought, salinity and submergence, and short duration rice varieties that could increase yield and land productivity, and, consequently, the income of farmers.

Thus, BRAC has been developing, introducing and promoting different technologies, which include practice, method, and crop varieties encompassing hybrid, open pollinated (OP), stress-tolerant, short duration, early/ late varieties, etc., all of which affect greater yield, production and price. These BRAC innovations are listed below:

Hybrid and OP seed varieties

1. Rice hybrid seed: HB-09, Jagoran, Alloran, Shakti, Shakti-2, Shakti-3 and Sathi
2. Maize hybrid seed: Pacific-984, Pacific-747, Pacific-759, Uttaran, Uttaran-2 & Uttaran-3
3. Vegetables seed:
 - (i) Bitter gourd variety: Bulbuli (Hybrid)
 - (ii) Ridge gourd: Green Star (Hybrid)
 - (iii) Tomato variety: Tripti-1 and Tripti-2 (Hybrid)
 - (iv) Sponge gourd: Green Star (Hybrid)
 - (v) Sweet gourd: Beauty (Hybrid)
 - (vi) Eggplant varieties: Super Singnath, Giant Green, Shruvi (Hybrid)
 - (vii) Okra variety: Evergreen (Hybrid)
 - (viii) Red Okra (hybrid)
 - (ix) Cabbage variety: KzE-739 (Hybrid)
 - (x) Cucumber variety: Shufalla-1(OP)
 - (xi) Radish variety: Shufalla-40 (OP)
 - (xii) Indian spinach variety: Shufalla Palang-1(OP)
 - (xiii) Bottle gourd: Green Supper (OP)
 - (xiv) Vitamin A rich varieties: Red Spinach (OP), Red LYB (OP) and orange flesh sweet potato (OFSP)

4. Seasonal change varieties developed targeting a high price in market

- (a) Usha and Asha summer country bean varieties (country bean normally grown in the winter season in Bangladesh)

5. Stress-tolerant varieties

Flood (50 per cent), drought (20 per cent) and salinity (30 per cent) are the main stress environment in Bangladesh, where rice frequently suffers from considerable shock in attempting to maintain its full yield potential. The nature and extent of these environments vary with season, topography and location.

(a) Saline-tolerant variety

30 per cent of the lands of Bangladesh are affected by varying degrees of salinity. About 1.02 million hectares in the coastal areas are affected by various degrees of salinity, varying with the season. In the dry season, soil and river water salinity increases, while during the monsoon season, it goes down. Therefore, land use has temporal and spatial variations with the season. BRAC introduced and promoted saline-tolerant rice varieties, such as BRRI dhan47, BRRI dhan60 BINA 8, and BINA10, in the rabi season (dry season), and BRRI dhan41, BRRI dhan53, and BRRI dhan54 in the aman or monsoon (wet season) along the coastal belt, allowing farmers to get crops from fallow land and affecting their food security.

(b) Drought-tolerant variety

Irrigation facility has not been equally available in and around Bangladesh due to high and low ground water. As a result, 20 per cent of the land suffers from drought. Drought occurs mainly due to uneven distribution of rainfall. The northwestern part of Bangladesh is treated as a drought-prone area due to poor rainfall. It is one of the major abiotic constraints for rice grown (5.7 m ha) under rain-fed conditions in Bangladesh and causes a substantial reduction of yield. In this case, BRAC introduced and disseminated a short duration (115–118-day) rice variety, e.g., BRRI dhan33, BRRI dhan39, and BINADHAN 7, which will escape the terminal drought if they are transplanted by July 15th in the drought prone area. Some of the Aman (wet season) varieties, like BRRI dhan56 (110 d), BRRI dhan57 (105 d), and BRRI dhan62 (100 d), being high zinc rice, can be grown within 100–110 days in order to avoid drought and provide room for a second crop, perhaps a non-rice variety, such as an early potato, vegetable, or mustard, in profitable rice-based cropping systems.

(c) Submergence-tolerant variety

50 per cent of the land in Bangladesh is affected by flash floods. Crop submergence due to flash floods is a significant risk to the agriculture sector of Bangladesh threatened by climate change. Bangladesh has a total area of 14.8 million hectares. Out of this area, 50 % is affected by different types of flash floods. In those cases, BRAC introduced and promoted a flash flood tolerant Swarna *Sub1* (NSB released as BRRI dhan51), a BR11 *Sub1* (NSB released as

BRR1 dhan52), a BINA rice variety such as IR64 *Sub1* (NSB released as BINADHAN11) and a Samba masuri *Sub1* (NSB released as BINADHAN12) in flash flood prone areas. The farmers in this case get crops from flash flood and/or drought-affected areas, which helps in establishing food security.

6. Short duration varieties

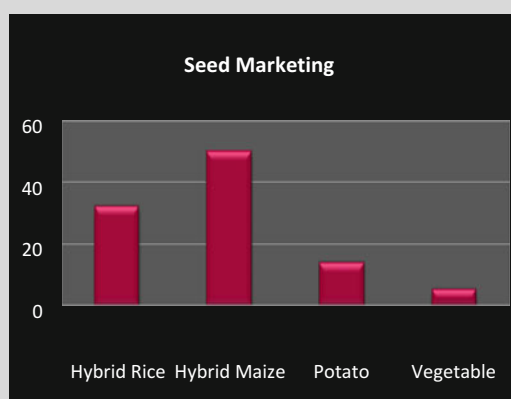
BRAC introduced and promoted the short duration rice varieties, such as BRR1 dhan33, BINA7, BRR1 dhan56, BRR1 dhan57, and BRR1 dhan62, into Bangladesh so that one crop (like the short duration mustard varieties BARI sarisa 14, Bari sarisa15, and Bari sarisa 16) can be grown in a year in addition to the Boro and Aman cropping patterns, as a result of which total annual production is increased by increasing cropping intensity and improving crop diversification.

G-1: Market Share of BRAC Seed in Bangladesh

BRAC Seed and Market Size

- (a) BRAC markets seeds through two different sales channels, which includes the following-appointing new dealers and using existing seed dealers: BRAC appoints new local dealers to market the products. Along with the new dealers, BRAC is also using its extensive seed dealer network to distribute in rural Bangladesh. BRAC is currently linked with over 4000 seed retailers across Bangladesh. The market share (%) in Bangladesh is shown in Fig. 6.2.
- (b) BRAC is also working with seed markets through Community Agriculture Promoters (CAPs) in other countries.

Fig. 6.2 Market share of BRAC seed in Bangladesh



7. BRAC's innovation in cropping patterns changes and converts a single cropping area to a double or triple cropping area by promoting the short duration rice crops, depending on land types and profitable cropping patterns. These are:
- (a) Sunflower in Rice based cropping system Rice-Sunflower-Fallow
 - (b) Rice-No rice: Rice-Potato-Mungbean/Jute, Rice-wheat-Mungbean/Jute
 - (c) Rice-Maize-mungbean, Rice-Potato-Maize
 - (d) Rice-Vegetables

8. Innovative potato storage for smallholder farmer households in Bangladesh

The construction of small "Ambient Type Potato Storage" used local materials such as bamboo, straw, and locally made concrete, essentially becoming a construction project carried out by local carpenters. BRAC provided technical support to farmers on to how prepare a special type of cold storage for potatoes at minimum cost. These ambient type spaces are used to store 6–8 t of table potato for 3–4 months, allowing farmers to get a roughly 50 per cent increase in the price of potatoes compared to the price during harvest.

9. Sunflower cultivation in the coastal/saline belt in Bangladesh

Sunflower cultivation is easier, cheaper and more profitable, and it is possible to cultivate in the salinity-induced soil of the coastal belt during the fallow season. It requires very little irrigation and small amounts of fertilizer and pesticide. One kg of sunflower seeds brings 500–600 ml of oil, a greater amount than that of any of the other oil seeds, and it is very good for human health

Technology with Financial Support

BRAC has been providing financial support along with technology in the field of farming through the Borgachasi/Sharecropper Union Programme (BCU) Project. Tenant farmers are very vulnerable in terms of not having easy access to formal financial institutions for credit or loans, aggravating their credit needs. Since BCUP farmers are tenant farmers, they don't have enough wealth which they can present to formal financial institutions as collateral. Therefore, to purchase inputs (seeds, pesticides, fertilizers, tillage implements, etc.), they need financial support. Sometimes these farmers require loans to meet immediate needs, or during the time of harvesting, marketing, and storing what they are producing. Newly innovative technologies and machineries also require financial support. Under the BCUP project scheme, BRAC provides credit to farmers as per the demand for purchasing inputs, tools and irrigation equipment, and continues to provide technical support to farmers and to address their ongoing production and post-harvest problems.

BRAC also offers Agriculture Credit + (Borgachasi/Sharecropper Union Programme) with the NCDP Northwest Crop Diversification Programme (NCDP), the SCDP Second Crop Diversification Program (SCDP) and partial grants for quality inputs and tillage for AFSP. The Central Bank of Bangladesh

(Bangladesh Bank) offered BRAC BDT 5 billion (\$75 million US) to provide loans to tenant farmers/sharecroppers. BRAC took this challenge and has been experimenting since October 2009, working in 210 Upazilas in 46 districts (twenty working regions in five working divisions) in 2013. BRAC's target is to reach 300,000 sharecropper/tenant farmers in the next 3 years with credit and proven agricultural technologies. BRAC started seed production in 1996 with the assistance of BADC, producing rice, maize, potato, and vegetables on their own nine farms in different AEZ (agro-ecological zones) and creating around 4000+ contract farmers.

Agriculture Commodities Marketing Support

Rural markets for farm produce are not generally developed on the basis of which farmers suffer from losses while they are selling their products in season. BRAC realizes this, and has worked to establish a value chain between farmers and BRAC social enterprises, such as maize which will be used as food for the farmers and feed for their livestock, giving scope and future direction to farming techniques. It provides marketing support to farmers through the following techniques and methods:

- The purchase of seed through contract farmers
- Two poultry feed mills which purchase maize through contract farmers
- Established community collection centres (CCC) so that farmers can easily bring their products to the CCC and sell them at a proper price
- Established links with farmers and value chain actors as a result of which farmers are ensured that their products will be sold.

Extension Innovation

The public sector extension program usually has very limited coverage in terms of access and providing information to the marginal and poor farmers. Thus, BRAC's approach is to disseminate agricultural technologies through large scale block demonstrations (D4D) in which farmers participate; this can create a larger impact amongst the participating farmers and lead to a spillover effect amongst the neighbouring farmers in the village. Therefore, BRAC, under its extension approach, will organize a group of 40–100 marginal farmers for block demonstration, giving a partial grant for quality inputs (quality seed, fertilizers, tillage) in order that they will be able to cultivate and use modern varieties of crops, fishes, production technologies and practices. The beneficiaries will also receive sectorwise adequate training and the latest information for getting better production from their fields. BRAC is currently targeting the disbursement of crops and/or

sectorwise partial grants, providing technical support/follow up for crop production and integrating rice-fish-vegetable cultivation in dykes, while organizing farmer field days for the dissemination of learning, aiming to reach 60,000 farmers in 50 sub districts (Upazilla) belonging to 12 districts by the year 2015.

BRAC Innovations and the Future Outlook for Agriculture and Food Security Programs

Bangladesh

BRAC plans to introduce agro-consumer products to the market, including sunflower oil and spices. It will be marketing sunflower oil by pursuing BRAC's unique value-chain approach to procuring inputs for sunflower seeds from the salinity-affected southern parts of Bangladesh. This is to ensure increased cropping intensity in the seasonally fallow line plant in the coastal areas and guaranteed fair price for the farmers who cultivate this new crop. It also aims to adopt a unique door-to-door marketing approach with vegetable seeds to promote home-gardening amongst women from marginalized rural households. By 2015, the research and development wing of our agriculture programme is expected to release up to three new types of short duration maize varieties, an inbred rice variety, two hybrid rice varieties and two vegetable varieties. They are also currently in the advanced stage of developing a cold-tolerant shorter-maturity rice variety.

BRAC International

- Promotion of bio-fortified crop varieties such as high beta carotene (provitamin A) yellow cassava, orange fleshed sweet potato (OFSP), colorful red maize, red color okra, iron rich beans (IRB), enriched zinc rice etc., for reducing hidden hunger, meeting the micro nutrients and vitamins needs of the poor and improving food security
- Focus on climate change resilient agriculture adoption through location-specific technology, like raising pyramids in swampy land for pit method vegetable cultivation, or rice-fish cultivation with dyke vegetables in water logged conditions, iron toxicity tolerance rice, salt tolerant rice and flash flood submergence tolerance rice etc
- Commercial farming, from subsistent farming practices to selling of surplus in Africa through Agriculture value chain development, small scale mechanization, post harvest processing and storing
- Increasing cropping intensity through the use of short-duration varieties of rice and high value non-rice crops such as maize, sunflower, vegetables etc. in rice/non-rice cropping systems in farm fields

- Quality seed/seedling production of disease-free bananas, micronutrient-rich and provitamin A rich vines of OFSP, stem cuttings from yellow cassava through in vitro tissue culture
- Technology accompanied by financial access for farmers through Agri-financing/credit +
- Post-harvest management, especially the harvesting and threshing of rice and maize, drying, packaging, storing and travelling
- Market linkage between farmers and traders/private sectors for commodity marketing, especially getting yellow cassava to millers, maize to poultry feed producers, OFSP to value-adding biscuit and bread factories, and leaves and young vines for cultivating vegetables.

Conclusions

BRAC Agriculture and Food Security Programs have been achieving food security and reducing hunger and malnutrition through increased environmentally sustainable agricultural production systems which work through Agriculture research for development (AR4D), technology validation and dissemination of special quality seeds, bio-fortified crop introduction and promotion, extension services, irrigation, and the building of farmer capacity, agricultural credit and marketing services through partnership with development agencies, government, the private sector and International Agricultural Research Centers (IARCs). BRAC's approach is to disseminate agricultural technology through participatory demonstrations with farmers, large-scale block demonstrations, and group and sub-group approaches with lead farmers, as well as organizing farmer field day (FFD) workshops and assorted fairs. BRAC has introduced and promoted diversified crops in farm fields for improving cropping pattern and intensity. It has facilitated market linkage between farmers' agricultural commodities and the private sector in value chains and has introduced collection points and contract farming. BRAC encourages female farmers' involvement in the program. 70 per cent of female farmers in African countries have become involved.

Open Access This chapter is distributed under the terms of the Creative Commons Attribution-Noncommercial 2.5 License (<http://creativecommons.org/licenses/by-nc/2.5/>) which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.

The images or other third party material in this chapter are included in the work's Creative Commons license, unless indicated otherwise in the credit line; if such material is not included in the work's Creative Commons license and the respective action is not permitted by statutory regulation, users will need to obtain permission from the license holder to duplicate, adapt or reproduce the material.

References

- BRAC (2012) Agriculture and Food Security Program (AFSP). BRAC, Dhaka
- BRAC (2013) Brac annual report 2013. BRAC, Dhaka
- BRRRI annual internal review meeting 2012–2013 held in 2013. BRRRI, Gazipur
- Malek MA, Ahasan A, Hossain MA, Ahmed MS, Hossain M, Reza MH (2015) Impact assessment of credit programme for the tenant farmers in Bangladesh, 3ie Grantee Final Report. International Initiative for Impact Evaluation (3ie), New Delhi, http://www.3ieimpact.org/media/filer_public/2015/09/18/gfr-ow31222-credit_programme_for_the_tenant_farmers_in_bangladesh.pdf