

Agriculture biodiversity and food security: two sides of a coin

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The research paper on ‘Agriculture biodiversity and food security: two sides of a coin’ provides an alternative view to the problems of recent food crisis, where advantages and opportunities of biodiversity based agriculture is measured through a food security lens. The research paper is an output of Climate Change, Biodiversity and Disaster Risk Reduction Unit of Unnayan Onneshan, a multidisciplinary Policy Research Centre. The research paper is prepared by Mohammed Abdul Baten with the guidance of Rashed Al Mahmud Titumir.



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Executive Summary

Biodiversity underpins the agriculture productivity. Agricultural biodiversity includes all components of biodiversity – at genetic, species and ecosystem levels – that are relevant to food and agriculture and that support the ecosystems in which agriculture occurs. Therefore, its maintenance is essential for the production of food and other agricultural goods and the benefits these provide to humanity, including food security, nutrition and livelihoods. Recent worldwide food crisis has raised the issue of food security to an urgent basis. Many are arguing that worldwide economic meltdown might cause the crisis. However, some other finds a causal relationship between agriculture biodiversity loss and food shortage. The current study anchors on the issue of indiscriminate agriculture biodiversity loss and its impacts on food security. Bangladesh is considered as one of the fertile deltas in the world. Along with favourable climatic condition the country is also endowed with highly productive native crop varieties. Nevertheless, the study has shown that lack of proper use of agriculture biodiversity and practice of so called modern agriculture systems that are based on hybrid seeds, chemical fertilizers, and pesticides without paying much attention to the native varieties are responsible for recent food crisis in agrarian Bangladesh. Finally, the study suggests that replacing current mechanised agriculture production systems to sustainable production methods such as mixed farming systems, organic agriculture, integrated pest management, use of organic fertilisers, crop rotation, recycling crop and animal wastes, no-till or minimum tillage agriculture, inter or multi-cropping, use of cover crops would be viable options to attain food security for all.

Introduction

Food is a basic right affirmed by the National constitution of Bangladesh [Article 15 (a)]. Despite agrarian entity, Bangladesh has faced with food crisis in recent times. Why has there been food shortage in agrarian Bangladesh? In response to this question, some people have argued that cyclone Sidr and Aila damaged huge crops (More than 10 per cent of total production) and it is beyond our capacity to recoup such a disastrous loss. Many find link with stiff decline in rice production in Vietnam, third largest rice-exporting country; hence, food shortage has struck in many rice-importing countries (USDA, 2005). A few are blaming bio-fuel surges thus arguing that it is consuming huge staple food while putting innocent millions into starvation (David Ignatius and Fareed Zakaria in the Washington Post, 2008). However, many scientists' thought are unlike others. To them, present situation is the consequence of our bad practice in agriculture over a long period. It seems a negative feedback of the continuous loss of agricultural biodiversity (Islam, 2004).

Biodiversity underpins agricultural production (Roe and Elliot, 2004). Agricultural biodiversity includes all components of biodiversity – at genetic, species and ecosystem levels – that are relevant to food and agriculture and that support the ecosystems in which agriculture occurs (agro-ecosystems) (FAO, 2008). Therefore, its maintenance is essential for the production of food and other agricultural goods and the benefits these provide to humanity, including food security, nutrition and livelihoods.

The concept of 'Food Security' is not just a situation of achieving production target of one or two crops; rather it expresses a holistic view where all people within a territory have equal and sufficient access to food. According to the Food and Agriculture Organisation (FAO, 1996) of the United Nations, food security is a situation in which all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Bangladesh is considered one of the fertile deltas in the world. The country has favourable climatic condition and highly productive native crop varieties. However, failure of using such resources efficiently has led to a situation where every year food shortage stuck the country. Therefore, the current study has tried to explore the link between agriculture biodiversity and food security. Finally, the study suggests how to promote the biodiversity based agriculture to attain food security.

Impacts of Mono Crop Based Agriculture on Food Production

John Jeavons (2009) argues that mono-crops deplete soil key nutrients and billions of micro-organisms that help keep plants diseases-free, reducing soil productivity 18 times faster than natural processes can rebuild it on average in the US (cited in www.straight.com, accessed on 1st November, 2009) . The increased use of fertilisers, pesticides and herbicides caused deterioration of our natural environment, particularly loss of many green, leafy vegetables that had been important sources of vitamin A, calcium and iron grew at the edge of paddy field or roadside naturally in rural Bangladesh. Moreover, these chemical agents are responsible for stiff decline in native fish production. Therefore, fish that was once available in paddy field, protein supplier to the poor farmer, now becomes nightmare.

If we consider the cost of fertilisers, pesticides, herbicides and environmental affects local varieties would be more profitable than hybrid. In 2004, farmers of Nayakrishi Andolon (new agricultural movement) cultivated 1,561 local varieties of rice by ecologically friendly farming systems and got higher return in production compared to High Yielding Varieties (HYV) (UBINIG, 2008).

Hybrid varieties do not produce seed. So to continue production, farmers have to buy seed every year from some hybrid seed producing companies which they produced earlier in their field. In this way, the legal right of farmer over seed, which they practised from ancient time, now rests with the companies; hence, the producer (farmer) is becoming consumer of some multinational companies like Aventis, Dupont, Monsanto, Syngenta.

In a report Greenpeace (2005) calculated that an adult would have to eat at least 3.7 kilograms of hybrid rice to get recommended amount of pro-vitamin A, which he can get from only 300 grams of local reddish rice (dhekhi chhata chal). Even though the world's total food production increased to a significant level, 854 million people were recorded undernourished in 2000-2003, including 820 million in developing countries, 25 million in countries in transition and 9 million in industrialised countries (FAO, 2006). Likewise, in Bangladesh 43 million people is suffering from malnutrition (Unnayan Onneshan, 2009)

Current Agriculture Practices in Bangladesh

Rice is the staple food of Bangladesh, accounting for 76% of the cultivated area, 78% of the irrigated area, 52% of agricultural GDP, and 71% of caloric intake (BBS, 2008). Regrettably, to increase production, many so-called high-yielding varieties have been introduced without testing and considering their impact on local ecosystems. With the pressure of such hybrid varieties most of our local varieties have already become extinct and many are endangered.

After the green revolution, with introduction of modern technologies in the agro-sector, food production has increased 160 per cent since 1970 (FAO, 2008). Instead of mixed culture, farmers were aligned to monoculture. They intensified production of a few selected demandable crops on their land leaving crop rotation that they had practised for centuries. Likewise, Bangladeshi farmers were not away from worldwide boom of monoculture. Under the auspices of the government, they soon adopted new farming system and abandoned their age-old practice.

These so-called high-yielding varieties consume more nutrients and thus more fertiliser is needed to make the land arable for further production. Moreover, to keep them productive, use of more herbicide and insecticide becomes unavoidable. In this reality, the demand for fertiliser, insecticide and herbicide grow significantly and particularly beyond national capacity. Now, to maintain such modern agriculture farming system it is seen that farmers often face problem with fertiliser shortage and make agitation for sufficient supply to their demand. To control farmers' movement, the government more often than not resorts to cruel means of police action, which sometimes results in loss of life. A few years ago, some farmers were killed in this connection and some defined it as the most brutal murder of farmers in post-colonial regime.

Traditional Agriculture Practices in Bangladesh

Traditionally, our farmers are used to maintain a sequence in crop rotation. They grew pulses after rice. Leguminous pulses recover nutrients consumed by rice earlier. Thus, the land remains productive naturally without using any artificial fertiliser (leguminous pulses fix atmospheric nitrogen into soil and thus reduce the demand of nitrogen-based urea fertilisers). Moreover, they used cow-dung or compost that provides essential nutrients to the land without causing any damage to environment. These traditional farming systems also control pest and diseases biologically.

Once, in the low-lying areas of Brahmaputra-Jamuna and Meghna floodplains, which cover middle and northern parts of Bangladesh, farmers would grow mustard abundantly after the Aus season. The mustard field is habitat for bees and bee is considered as the keystone species (absence of which the whole process will be terminated) in pollination. Moreover, flowers of pulses and cereals attract many pollinating agents like birds, butterfly, moths and help to sustain productivity. In a report, Losey and Vaughan (2006) state that the value of bee pollination services in the US alone range up to \$16 billion annually.

Unfortunately, due to lack of government support and some external drivers like market demands, inadequate returns, the farmers are replacing their traditional crop rotation system with hybrid monoculture.

Government Initiatives in the Agriculture Sector

Political decisions regulate the agro-sector in Bangladesh. After independence, most of the governments took attempts to gain self-sufficiency in food production. However, their short-sighted planning or narrow political interests hastened the loss of biodiversity. Often, the political government declares ‘we are now self-sufficient’ or ‘our food security has been achieved’ and they make it a weapon to win the elections. In reality, they never reached the target.

As one of the signatories to the Convention on Biological Diversity, Bangladesh is committed to conserving its biological diversity. Disappointingly, though biodiversity underpins the agriculture productivity, no special attention has so far been given in the budgetary allocation to conserve and use of its unique agricultural biodiversity. Even though agri-sector receives a substantial priority in the budget, however most of the resources allocated to short term measures such as subsidy in fertilizer and irrigation rather than long term production factor like improved seed verity, wise use of local high yielding variety, promoting ecological agriculture etc.

In the current fiscal year (2009-10) 7.9% and 7.5% of total resources have been allocated in Annual budget and ADP (Annual Development Programme) respectively. Only 2 % of existing agri-budget has been allocated for agriculture research which corresponds to 1850 million taka. Unfortunately, no long term strategy has been proposed to conserve agriculture biodiversity or effective use of agriculture biodiversity for improving food production. Moreover, recently government announced an increased allocation of subsidy in non urea fertilizer to 55% than previously proposed 15%. Therefore, this year’s total subsidy in agriculture will be earmarked to 30,000 million taka. However, the subsidy mainly targets fertilizer, irrigation and other mechanized agriculture inputs rather promoting biodiversity based ecological agriculture.

Status of Agriculture Biodiversity in Bangladesh

Naturally, Bangladesh is endowed with high crop diversity. Until now, 10000 varieties of rice have been identified. Moreover, this area is also enriched with leguminous pulses (3,463 plant genetic resources of local origin from 8 species have been identified). Besides, this region is home to more than 80 fruit species with high number of PGR (including both domesticated and wild fruits). In case

of vegetables, 39 species (11 species of tubers, 8 of leaves, and 20 of fruits) with more than 10,000 PGR again bear testimony to this region's species richness (Banglapedia, 2004).

Potentiality of Biodiversity Based Organic Agriculture in Bangladesh

Despite pessimistic scenarios in the agro-sector of Bangladesh, we have also some heartening examples. A farmer of Jhenaidah, Hraicharan Das, has introduced the high-yielding variety of indigenous paddy, locally known as hari dhan, through selection process. The farmers of Pairabandha of Mithapukur upazila in Rangpur use compost, crop residue, water hyacinths and other perishable items instead of chemical fertilisers and pesticide in their field. Some farmers of Kaunia are producing vermi-compost (contains high quantities of nitrogen, phosphorous and potassium) by cultivating earthworm at their home (Nazrul Islam, The Daily Star, 16th May, 2008). In a recent research Dasgupta et al. (2008) showed that Integrated Pest Management (IPM) rice farming is more profitable than conventional mechanised rice farming.

Conclusion

Obviously, to feed 150 million people is a great challenge. But, so-called modern agriculture systems that pay no attention to biodiversity are not a solution, which we have learnt from the recent food crisis. Standing in front of such reality, the government should think about sustainable agriculture. The government and NGOs should influence people to adopt techniques of sustainable agriculture system like mixed farming systems, organic agriculture, integrated pest management, organic fertilisers such as legumes, crop rotation, recycling crop and animal wastes, no-till or minimum tillage agriculture, inter or multi-cropping, cover crops. We have resources, techniques, and good examples, but need integration and patronisation of good practices otherwise achieving self-sufficiency in food production will remain a dream.

References

Bangladesh Bureau of Statistics (BBS). 2008.

Bangladesh Constitution. 1972.

Dasgupta, S., C. Meisner, and D. Wheeler. 2008. Is environmentally friendly agriculture less profitable for farmers? Evidence on Integrated Pest Management in Bangladesh. *Review of Agricultural Economics*. **29** (1): 103–118

Food and Agriculture Organisation (FAO). 2009. The state of food insecurity in the world.

-----, 1996. Policy brief on Food Security.

-----, 2008. Agriculture biodiversity.

Greenpeace. 2005. Genmanipulierter Reis: Nicht wirksam und überflüssig. Online
<http://de.einkaufsnetz.org/presse/16102.html?PHPSESSID=43000e1dc9f08ba97f1d53c624f16299>).

Losey JE, Vaughan M. 2006. The economic value of ecological services provided by insects. *Bio-Science* 56: 311–323.

Nazrul-Islam, A.K.M. 2004. Biodiversity for sustainable food security in Bangladesh. Paper presented at World Food day seminar, Bangladesh Agriculture Research Council.

Nielsen, C.P. 2002. Vietnam in the international rice market. A review and evaluation of domestic and foreign rice policies.

Roe, D. and J. Elliott. 2004. Poverty reduction and biodiversity conservation: rebuilding the bridges. *Oryx* 38 (2).

Shahiduzzaman, E. M., and M. S. Hussain. 2000. Bangladesh. In *Dynamics of vegetable production, distribution and consumption in Asia*. M. Ali (Ed.), Bangladesh.

The Daily Star, 16th May, 2008.

The Encyclopedia of Bangladesh (Banglapedia). 2004.

The Washington Post, 16th April, 2008.

UBINIG. 2008. Hybrid Boro Rice: Profit versus yield and ecological concerns.

United States Department of Agriculture (USDA). 2005. Making strides in achieving food security: The cases of Ghana, Peru, and Vietnam.

Unnayan Onneshan. 2009. IFI Watch. Dhaka, Bangladesh.

www.straight.com, accessed on 1st November, 2009.

Zug, S. 2006. Monga- seasonal food insecurity in Bangladesh. Understanding the problem and strategies to combat it. Research monograph.