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GATEKEEPER SERIES
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GETTING THE MESSAGE ACROSS: PROMOTING ECOLOGICAL AGRICULTURE IN BANGLADESH

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2006

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EXECUTIVE SUMMARY

Amid mounting concern over increasing reliance on high-yielding varieties, chemical fertilisers and pesticides among Bangladesh's smallholder farmers, many NGOs have been training farmers in more sustainable farming methods. Despite this, the numbers of farmers adopting ecological agriculture have not been great. In this paper we explore why this is so, drawing on action research we conducted in 16 Bangladeshi villages. We found that although many trained farmers realise the importance of ecological agriculture, they are not always able to put the training into practice, especially on their major farming land which provides them with most of their livelihood security. However, farmers have adopted this approach more on their homestead land, which is less controlled by market forces and is free from other external factors. This perhaps reflects farmers' belief in the need for such an approach.

We identified several reasons why farmers aren't able to easily make the switch to ecological agriculture. These include lack of organic manure/fertilisers; lower yields and lack of premiums for organic produce; contradictory approaches and messages from NGOs; widespread promotion of and government support for high-yielding varieties and high-external input farming; lack of evidence for the value of ecological agriculture and insufficient demonstration plots.

A key roadblock to the wider adoption of ecological agriculture was the lack of organic fertilisers. Two suggestions to overcome this are to (1) establish commercial units to produce organic fertilisers and (2) promote crop diversification to improve the nutritional status of the soil, as well as improve food security and nutrition for their families.

Other steps could include increasing the use of participatory and farmer-led approaches for introducing ecological agriculture; improving coordination among NGOs for more coherent training and joint marketing activities; widening target groups and increasing evidence-based advocacy for ecological agriculture at the policy level.

GETTING THE MESSAGE ACROSS: PROMOTING ECOLOGICAL AGRICULTURE IN BANGLADESH

Dipankar Datta and Kamal Kar[1]

INTRODUCTION

Many NGOs in Bangladesh have been concerned about the growing use of chemical fertilisers and pesticides in agriculture over the last two decades. They have been popularising an alternative agricultural method, ecological agriculture, which is sustainable, productive, equitable and conducive to biodiversity. Ecological agriculture embraces natural practices and seeks friendly coexistence with the environment and wildlife; through it, farmers are encouraged to use organic fertilisers and pesticides. However, instead of working in a coordinated way, concerned NGOs are each pursuing this goal in isolation, sometimes through contradictory practices and messages.

Bangladesh's total land area is about 14.4 million hectares, of which about 50% is cultivable. Rice is grown on 74% of the total cropped area (Ahsan and Beuter, 2001). Over the last two decades traditional farming systems have tended to shift from subsistence farming to market-oriented agriculture, which involves the use of high yielding varieties of seeds which respond well to big doses of chemical fertilisers and pesticides. In this transition, Bangladesh has already lost about 7,000 diverse indigenous varieties of paddy (ENCNGO/ADB, 1992). Yet, the government remains committed towards promoting inorganic farming in its latest Interim Poverty Reduction Strategy Paper:

"The Government would continue its pro-active role in key public goods in agriculture particularly in improving the ability of the farmers to adopt new technology. … The reforms led to faster growth in minor irrigation, increased the supply of fertiliser and seeds, helped in wider adoption of HYVs,..." (IPRSP, 2002, 36-37).

1. We greatly acknowledge all the members of the communities from 16 villages in 12 districts of Bangladesh who attended participatory field exercises and contributed spontaneously to the collective learning process. We would also like to record our sincere thanks to the field researchers who contributed in various ways at different stages of the study.

ARE WE CHANGING FARMERS' BEHAVIOUR?

About 60 national and international NGOs[2] are actively promoting ecological agriculture in Bangladesh. These NGOs began by encouraging their women group members[3] to use homestead land (or kitchen gardens) to grow varieties of seasonal vegetables on their homestead land using organic fertilisers and pesticides to improve their socioeconomic wellbeing. Gradually, the practice was extended to crop production and seed production. Though women are mainly responsible for the homestead land, they depend on their husbands or other male members of the family to buy seeds and sell the produce. In contrast, men control the farm or cropland, where they are responsible for preparing the land, harvesting and selling the crops which include paddy, wheat, maize, sugarcane, pulses, etc. Under the programme, group members receive environmental education and training along with financial and technical support.

Some recent site reports have argued that while the programme has raised farmers' awareness of environmental issues it has failed to change their behaviour (Nabi et al., 1999, Narayan et al., 2000; and Nabi et al., 2002). As few research reports looked critically at the effectiveness of the NGO programmes, we designed an action research project to investigate this further.

MEASURING BEHAVIOURAL CHANGE

Our study was guided by the following queries:

- What major changes have farmers noticed in overall farming practice and their impact on nature over the last two decades? To explore this we needed to look at, with farmers, the changes and trends in the consumption of organic and inorganic fertilisers, production costs, land productivity and land use patterns under modern and traditional agriculture.
- How has environmental education/training influenced the behaviour of the trained farmers compared to untrained farmers in terms of their choice of organic and inorganic farming inputs, both on homestead and crop land?
- What obstacles do farmers perceive to adopting ecological agriculture?

2. The leading NGO in this sector is Proshika, which has been spreading ecological practices since 1978. Proshika has already trained about 700,000 group members (Proshika, 2000). The other very active NGOs in this sector are UBINIG (Unnayan Bikalper Nitinirdharoni Gobeshona), GUP (Gono Unnayan Prochesta), Bangladesh POUSH, Prism Bangladesh, CARE Bangladesh, World Vision and Oxfam. UBINIG has already reached fifty thousand farmers across Bangladesh through its *Nayakrishi Andolon* (New Agricultural Movement), the purpose of which is to make a social, political and cultural movement of farmers towards ecological agriculture.

3. NGOs have pursued a process of group formation and training among landless labourers, peasants, rural workers of different trades, and women from households of these socio-economic groups.

- What suggestions do farmers have for NGOs and other outside agencies trying to promote ecological agriculture?

Through close collaboration with and support from Concern Bangladesh's 14 local partner NGOs[4] we chose 16 villages in 14 sub-districts (Table 1) for our action research. In our selection we looked for areas which received at least five years of intensive training support for ecological agriculture with wider coverage on environmental education; have also been targeted by private sector enterprises for marketing chemical fertilisers and pesticides; and which contain a typical mix of poor and rich farmers, reflecting the social milieu of rural Bangladesh.

A PARTICIPATORY PROCESS

We carried out our investigation in four participatory stages:

1. NGO member households and other households in the same village with similar socio-economic characteristics were identified by villagers using social mapping and cards. This exercise showed that the NGO members of six study villages had not received any training on ecological agriculture (see Table 1).

2. Trend analysis: identifying and discussing key changes and trends that have occurred in the farming life of the villages, including the availability and use of organic and chemical fertilisers and pesticides. This was done with both trained and untrained farmers. The villagers produced their trend analysis chart using cards. They used seeds and stones to measure the relative increase or decrease in fertiliser/pesticide use on their land (see Tables 3 and 4). They also used seeds to depict changes in the cattle or poultry population over the last 25 years.

3. A focus group discussion to understand and analyse the various aspects of farming. During this discussion farmers identified sources and availability of organic manure and fertiliser using *chapati* diagrams (pie charts).

4. Trained and untrained farmers jointly developed a matrix to understand the comparative differences of use of organic and chemical fertilisers and pesticides in homestead and crop land. This was followed by a focus group discussion about perceived obstacles to adopting ecological farming.

4. These NGOs were previously involved in the 'Voices of the Poor' study (Narayan et al., 2000) which was designed as an input into the World Development Report 2000/01 Poverty and Development and conducted in 23 countries.

Table 1. List of study locations

Name of district	Name of sub-district	Name of the selected village	Characteristics of the village	Did villagers receive training in ecological agriculture?
Dhaka	Dhamrai	Hiranadi Kulla	Peri urban, near industrial zone, triple cropped	Yes
Kishoregonj	Pakundia	Agarpatta	High land rural area, mainly produce rice, triple cropped	Yes
	Bajitpur	Shibpur	Partially haor area*, double cropped, high rate of rice production, fishing opportunity	No
Manikgonj	Harirampur	Agrail	Flood plain, double cropped, highly vulnerable to river erosion	Yes
		Jattrapur	Flood plain, double cropped, highly vulnerable to river erosion	Yes
	Singair	Vakum	Near Dhaka, flood plain area, triple cropped, mainly vegetables	Yes
Sirajgonj	Sirajgonj Sadar	Ekdala	Flood plain, double cropped, highly vulnerable to river erosion	Yes
Barisal	Mehendigonj	Durgapur	River shore, triple cropped, mainly rice, fishing opportunities	Yes
Bogra	Shibgonj	Bihar	Flood plain, triple cropped, mainly vegetables	Yes
Tangail	Shakhipur	Shakhipur	Forest belt, triple cropped, mainly fruit and vegetables	Yes
Bramhan-baria	Akhaura	Adilpur	Border area and high land, triple cropped, mainly rice and cash crops, cattle population is very low	Yes
		Bhatamatha	Border area and high land, triple cropped, mainly cash crops, cattle population is very low	No
Jamalpur	Dewangonj	Halkarchar	Flood plain, double cropped, highly vulnerable to river erosion	No
Faridpur	Bhanga	Khutibari-charkanda	Low lying land, double cropped, mainly rice and jute	No
Netrokona	Khaliajuri	Nurali Pur	Deep haor area, single cropped, high productivity of rice, cattle population is high, highly vulnerable to flash floods	No
Sylhet	Gowainghat	Fadli Pur	Flood plain, single cropped, produce vegetables commercially, availability of stones as natural resources, vulnerable to flash floods	No

*A haor is a large bowl-shaped tectonic depression which becomes a very extensive water body in the monsoon but dries up mostly in the past-monsoon period. The haor area remains flooded for about six months of the year. In the dry season, the area is a vast plain of rice fields.

It is important to mention here that in most of the study villages there was a large number of women's groups. We organised special group discussions to include these women.

FINDINGS

Our main finding was that although many trained farmers realise the importance of ecological agriculture, it was not always possible for them to put the training into practice, especially on their major farming land which provides them with most of their livelihood security. However, farmers have adopted this technique to a greater extent on their homestead land, which is less controlled by market forces and is free from other external factors. This perhaps reflects their belief in the need for such an approach. In this section we analyse the forces behind adoption or rejection emerging from our various participatory exercises in the 16 villages.

Changing trends in the agricultural sector

Data we compiled from the Fertiliser Advisory, Development and Information Network for Asia and the Pacific (2003) illustrate general changes occurring at the national level (Table 2), many of which are reflected in our study villages. The table indicates a sharp increase in land shifting to high-yielding varieties (HYV) of paddy accompanied by a rapid increase in use of chemical fertilisers and pesticides over the last two decades. It also clearly shows that percentage increase in fertiliser consumption is higher than the area under HYV paddy cultivation, indicating that fertiliser consumption has had to increase significantly to maintain yields from the same area

Table 2. Changes in area under HYV paddy and input consumption between 1980-81 and 2001-2

Year	Area under HYV paddy		Fertiliser consumption		Pesticide consumption		Yield of HYV paddy	
	Area ('000 hectare)	% increase	Amount (m. tons per '000 hectare)	% increase	Amount (m. tons per '000 hectare)	% increase	Yield (m. tons per '000 hectare)	% increase
1980-81	2194	-	85	-	N/A	N/A	7020	-
1985-86	2871	31%	111	31%	N/A	N/A	6630	-6%
1990-91	4596	110%	202	138%	0.7	-	6070	-14%
1995-96	5193	137%	304	258%	1.2	71%	6470	-8%
2000-01	6826	211%	277	226%	1.4	100%	7720	10%
2001-02	6884	214%	308	263%	1.8	275%	7590	8%

Source: FADINAP, 2003

of land. This is the result of the government's promotion of the 'green revolution' model as a strategy for poverty alleviation and food security, based on the assumption that this model will improve smallholder productivity (PANUK, 2002).

We investigated the various dimensions of this change further using changes and trends diagrams with the villagers in all the study villages (see Table 3 for examples from two villages).

We found that following recent mass-media campaigns and NGO awareness-raising programmes fallow homestead land has been brought under intensive vegetable and fruit cultivation by both trained and untrained farmers in all the study villages. The produce is used for domestic consumption as well as for marketing, providing people with additional income. The intensity of use of homestead land has increased the demand for both organic and chemical fertilisers.

A radical shift from traditional local varieties of paddy to HYV paddy cultivation on cropland with high complementary inputs of chemical fertilisers and pesticides was evident in all the study villages. The rate of application of chemical fertilisers in HYV paddy cultivation was found to be increasing over time. Because of the high consumption rate of chemical fertilisers and the sharp decline in the use of organic manure, water-holding capacity of the soil is decreasing, resulting in increasing demand of water to irrigate the fields. This phenomenon was noted by farmers and is also recorded in the wider literature (eg. Brook and Davila, 2000; Sanchez and Swaminathan, 2005). In addition, pest attacks were becoming increasingly severe, leading to increasing applications of pesticides. The pesticides sprayed in the rice and vegetable fields had killed/poisoned some cattle and poultry in most of the study villages. Though the price of chemical fertilisers and pesticides had increased 4 and 10 times respectively in the last 20 years (Barua, 2002), production per unit of land has been declining, resulting in increasing production costs. Even the latest Interim Poverty Reduction Strategy Paper (IPRSP, 2002) has accepted this fact:

"The slow progress in rural poverty reduction is especially intriguing in the backdrop of higher agricultural growth witnessed during the second half of the nineties. One possible explanation is that much of the agricultural growth came from the expansion of HYV rice production, especially during the winter season. The increase in productivity in rice cultivation has, however, not been translated into higher farm incomes due to slower increase in paddy prices compared to the wage rate and fertiliser prices" (IPRSP, 2002, 10).

Table 3. Changes and trends in inputs in Durgapur and Shakhipur villages

Durgapur village

Changes in various factors	1980	1985	1990	Today
Use of organic manure on 1 decimal* homestead land	100**	150	250	325
Use of chemical fertilisers on 1 decimal cropland for HYV paddy production	100	150	200	250
Use of chemical pesticides on 1 decimal cropland for HYV paddy production	100	150	200	300
HYV paddy production on 1 decimal cropland	80 kg	70 kg	50 kg	40 kg
Local variety paddy production on 1 decimal cropland	25 kg	25 kg	20 kg	20 kg
Cattle population in the village	100	90	60	50
Poultry population in the village	100	130	150	200

Shakhipur village

Changes in various factors	1977	1987	Today
Use of organic manure on 1 decimal homestead land	100	75	35***
Use of chemical fertilisers on 1 decimal cropland for HYV paddy production	400gm urea	600gm urea + 200gm TSP + 100gm potash	1000gm urea + 1000gm TSP + 500gm potash
Use of chemical pesticides on 1 decimal cropland for HYV paddy production	1 kg	1.5 kg	2.25 kg
HYV paddy production on 1 decimal cropland	10-15 kg	40 kg	20-30 kg
Local variety paddy production on 1 decimal cropland	10-15 kg	8-12 kg	12-15 kg
Average cattle population per house	15-16 cows	8-10 cows	2-4 cows
Average poultry population per house	2-5	7-20	20-30

* 247 decimal = 1 hectare

** When a farmer had trouble calculating the exact amount, we used 100 as a base value to illustrate relative values.

*** The participants argue that they are using more and more organic fertiliser on the homestead land but the amount of available organic fertiliser is not sufficient for the intensity with which they farm this land for various kinds of vegetables. Scarcity of organic fertiliser forces them to use chemical fertilisers on homestead land. This explains why they show the use of organic fertiliser decreasing on homestead land.

Thus, high production with high complementary inputs of chemical fertilisers and pesticides do not necessarily lead to better incomes for land-poor farmers.

Influence of training

As shown in Table 1, the farmers of Shibpur, Nurali Pur, Fadli Pur, Bhatamatha, Khutibari-Charkanda and Halkarchar did not receive any training from NGOs on ecological agriculture, and as expected they did not practise ecological agriculture on either their homestead or crop lands.

Table 4 shows how trained and untrained farmers perceived the difference between their use of organic and chemical fertilisers on homestead land.[5]

Table 4. Comparison of organic and chemical fertiliser use on homestead land by trained and untrained farmers in programme villages

Name of village (sub-district)	Ratio of organic:chemical fertiliser use, trained farmers	Ratio of organic:chemical fertiliser use, untrained farmers
Jattrapur (Harirampur)	100:00*	100:00
Agrail (Harirampur)	100:00	100:00
Bihar (Shibgonj)	100:60	00:100
Adilpur (Akhaura)	100:70	10:100
Agarpatta (Pakundia)	100:45	25:100
Shakhipur (Shakhipur)	100:55	15:100
Ekdala (Sirajgonj)	100:65	25:100
Vakum (Singair)	100:40	00:100
Hiranadi Kulla (Dhamrai)	100:60	35:100
Durgapur (Mehendigonj)	100:90	20:100

*Participants used '100' as base value to show the relative proportions of organic and chemical fertiliser use on homestead land.

Our findings can be summarised as follows:

- In Jattrapur and Agrail villages, training had a substantial impact on women, who were increasingly using organic fertiliser on homestead land. These women were also reportedly doing some extension work by motivating others in the same and

5. We do not use a similar table for cropland farming as there was not much difference between trained and untrained farmers.

adjoining villages to use organic fertiliser on homestead land. This would explain why untrained farmers in these villages are also using only organic fertiliser.

- In the other villages we found a mixed picture with both trained and untrained farmers using both chemical fertiliser and organic manure on homestead land. However, there was a strong tendency on the part of trained farmers to switch to organic manure wherever possible and this trend was much stronger among the trained farmers than the untrained farmers.

- While trained farmers rarely produced any organic pesticides, they always tried to avoid using chemical pesticides on homestead land, mainly to avoid poisoning their poultry.

- In all the study villages we found that trained farmers applied chemical fertiliser and pesticides to croplands in much the same amounts as their untrained neighbours. Nitrogen, phosphorous and potash were being applied mostly in the forms of urea, mutate of potash and triple super phosphate (TSP). However, trained farmers do think about the long-term productivity of their own piece of land. So, along with chemical fertilisers they always try to use organic manure whenever possible. The rate of organic manure use varied among trained farmers based on availability. Usually homestead land gets priority for organic manure and little remains for the cropland.

The above findings clearly indicate that the level of awareness among farmers has been rising significantly, though there is still a long way to go to achieve a total shift from inorganic to organic farming. Despite this fact, the behavioural changes are very encouraging. It is mainly women who are bringing about this change. NGO training programmes encourage women to bring fallow homestead land under vegetable/fruit cultivation, which is now an alternative income source for the family. In most cases, women are solely responsible for collecting ingredients, preparing organic manure and applying it. While women are not involved in cropland management, they always encourage their husbands to use organic manure on their croplands.

Roadblocks to change

Study participants identified the following interrelated reasons why intensive environmental education and training has failed to fully change behaviours among trained farmers:

- Insufficient sources and declining availability of organic manure, combined with rapid intensification on homestead and crop lands.

- Low yields per unit of land from organic farming compared to modern farming. However it is accepted that the quality of the organically grown crops and vegetables is much better than inorganic farm products. But without premiums for quality many farmers felt that more production means more money.

- Mass media campaigns encouraging farmers to use chemical fertilisers and pesticides for high yields undermine the organic farming message. In addition, farmers' untrained neighbours often discourage them from practising organic farming.

- HYV seeds, chemical fertilisers and pesticides are easily available in the local market and can be purchased on credit.

- Many landless, marginal and small farmers depend on sharecropping to ensure their livelihood security. As sharecroppers lose a large part of their income to landowners, they must maximise the short-term benefits from the sharecropped land; thus readily available chemical fertilisers and pesticides appear more attractive. Even if a sharecropper decided to shift to organic farming for the long term benefit of improving soil fertility, landowners would not tolerate the initial low production and the sharecropping agreement would be withdrawn the following season.

- HYV seeds are more easily available than traditional varieties of seeds. Most farmers felt that it was not possible to farm HYV seeds organically and HYV of paddy and vegetables responded well to chemical fertilisers.

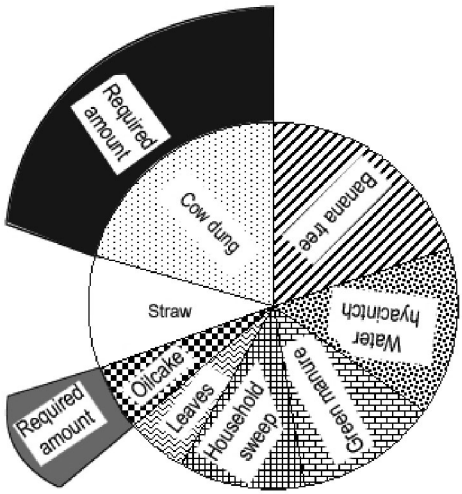
- Farmers felt that the various NGOs send out contradictory messages and demonstrate contradictory approaches to ecological agriculture, which ultimately confuses them. There are also too few demonstration plots.

We now explore one of the key obstacles to organic farming, availability of organic fertiliser, in more detail.

Availability of organic fertiliser

During one participatory exercise we asked farmers to indicate the different sources of organic fertiliser. Farmers used a *chapati* diagram (pie chart) to show the relative availability of these sources (Figure 1).

Figure 1. Sources and availability of organic fertiliser, land-poor farmers in Vakum village



Note that the biggest piece of pie does not indicate that this particular source is easily available and abundant to these poor villagers. It simply shows comparative availability. Thus, although cow dung is more readily available than oilcake, farmers only have half the amount of cow dung needed for their homestead lands.

Of all these types of organic fertiliser, cow dung and poultry are the most common. Many smallholders who do not have cows or bullocks either collect cow dung from grazing cattle or buy it from better-off farmers.[6] Farmers explained that the number of cattle was rapidly declining because of shrinkage of grazing land, increasing roadside plantations, declining availability of feed and fodder from crop residues, mechanisation of agriculture, poor veterinary health coverage and frequent cattle epidemics, etc. In addition, loss of traditional paddy varieties has dramatically reduced the amount of dry fodder available from paddy straw. Similarly, a reduction in cultivation of diversified *robi*[7] crops like *khesari, kalai, gram*, mustard and many other pulses has lessened the availability of cheap, nutritious food for poor families and decreased the availability of a wide variety of crop residues once used as livestock feed and to maintain soil fertility.

In contrast, poultry have increased over the past few years. Both the indigenous methods of poultry keeping and deep litter poultry farming have become popular in villages. This increase in poultry is attributable to a rising demand and profits for eggs and meat, availability of credit for poultry enterprises, increasing involvement of women in poultry and duck farming, comparatively shorter gestation

6. Though ecological agriculture training teaches that it is possible to make organic fertiliser without cow dung, farmers find it very difficult to break out from their traditional perception that cow dung is the key ingredient of organic manure.
7. The cropping seasons in Bangladesh are generally classified by the period from sowing to harvest of the three rice crops: *Aus* (March-April to July-August), *Aman* (July-August to November-December), and *Boro* (December-January to April-May). The *Aus* season is also termed *Kharif I*, The *Aman* season *Kharif II*, and the *Boro* season the *Robi* season.

period in poultry investments, and comparatively better vaccination coverage for poultry than for cattle.

Apart from the two sources of organic manure of animal origin, eight key sources of organic manure of plant origin were reported. Household sweepings were only mentioned in those villages reached by the ecological agriculture programme; farmers had not previously known that household sweepings could be used as an ingredient of organic fertiliser. Decomposed water hyacinth is another useful fertiliser where it is abundantly available.

Farmers are willing to use *dhanicha* (a green manure), oilcakes of mustard and other oil seeds, which can be another effective organic fertiliser. According to Bhuyian (2001), *dhaincha* can play a very important role as a valuable source of nitrogen. However, high cost and irregular availability prevents many from using it. Another constraint is that such organic fertilisers are not sold on credit, unlike chemical fertilisers.

To sum up, while farmers have experimented with a whole variety of organic manures from plants and animals, the pace of growth in the availability of organic fertiliser in villages has not kept up with the increases in cropped area and cropping intensity. Even crop residues are now widely used as fuel and fodder instead of being returned to the soil.

Farmers' perceptions of other obstacles

Trained farmers appreciated the 'changes and trends' exercise we used in this study. They felt that this exercise was particularly effective for demonstrating the dangers of chemical fertilisers and pesticides and suggested that such tools could be included in the NGO training sessions. This indicates that there is scope to improve the quality of training, despite the fact that NGOs claim to use many interesting participatory techniques to explain ecological agriculture. The quality of trainers also needs special attention. Furthermore, on-farm trials and farmers' participatory research and extension could be increased.

Some contradictory practices by NGOs also came out strongly in some study locations. For example, Concern Bangladesh encouraged its group members to use organic manure in homestead gardening, while distributing free chemical fertilisers for plantations. After the devastating flood of 1998, Concern distributed huge amounts of HYV seeds as a part of its rehabilitation programme. Many other

NGOs work closely with the Bangladesh Agriculture Development Corporation (BADC) and distribute HYV seeds, chemical fertilisers and pesticides to their beneficiaries.

In many study villages several different NGOs are involved, all giving out contradictory messages about ecological agriculture. Many group members have multiple memberships with NGOs and receive training from different NGOs at different times. For example, some NGOs, such as Proshika, take an extreme stand on ecological agriculture and they only promote organic farming with traditional varieties of seeds. Others, such as UBINIG, combine traditional knowledge and wisdom with newer ideas and 'scientific' innovations that are suitable for farmers and the environment. Still others promote 'no-pesticides' but do not discourage group members from using chemical fertilisers. Finally, in some villages there are no NGOs working on ecological agriculture, yet in a neighbouring village there might be more than two NGOs involved. This indicates that NGOs are working in a very isolated and poorly coordinated way.

KEY LESSONS AND RECOMMENDATIONS

Despite many limitations of the ecological agriculture programme, our findings clearly show that training has had significant impacts on awareness and on the use of organic fertiliser in homestead and crop land. The rapid pace of change in the agricultural sector in Bangladesh and the push for high-input agriculture clearly reinforce the need for NGOs to promote organic farming for environmental sustainability. Whilst we want to avoid perpetuating a black and white view of modern agriculture being bad and alternative agriculture being good, we would like to draw NGOs' attention towards the many factors influencing farmers' decisions about adopting ecological agriculture. While some policy-level factors cannot be tackled by NGOs alone, they do underscore the need for policy reforms at the national level. A few NGOs are advocating for this but there is no sign of any success at present. In this context we make the following recommendations for enhancing the effectiveness of the NGOs' ecological agriculture programme and of their wider, policy-level advocacy work.

Increase availability of organic fertilisers

A key limiting factor to the wider adoption of ecological agriculture is the availability of organic fertilisers. We suggest two complementary responses: (1) establish commercial units to produce organic fertilisers and (2) promote crop diversification. For example, in India the National Bank for Agriculture and Rural

Development (http://www.nabard.org) has successfully supported (through both financial and technical support) a number of model schemes for setting up low cost commercial composting units by estimating clearly the organic resources available in India. These commercial units use a diverse range of on- and off-farm waste, including leftover fruit and vegetables, sewage sludge, etc. Unfortunately, no-one has calculated the quantity of organic resources needed in Bangladesh to produce sufficient plant nutrients. This estimate is important to determine the viability of the commercial production of organic fertilisers. Neither do we know how adding solid waste generated in cities would affect the equation. NGOs in Bangladesh should think about using other sources of wastes and help set up model commercial compost production units. They could work together to develop marketing avenues for organic fertilisers. NGOs could also mobilise farmers' groups to apply for loans from banks, such as Bangladesh Krishi Bank, to set up commercial compost production units.

Greater awareness is needed among farmers that crop diversification can improve the soil fertility as well as improve food security and nutrition for their families. The adoption of HYVs of paddy along with the decline in minor food crops has exacerbated the soil fertility problem. There is much scope to increase the production of minor crops and to use crop rotation to enrich/maintain soil fertility (Hoque, 2002). Farmers could cultivate some of the minor crops after harvesting their major crops. To encourage crop diversification, some prospective cropping patterns and improved practices could be demonstrated by NGOs.

Introduce learning by doing

Though NGOs are using many interesting techniques to expose farmers to ecological agriculture, the quality and effectiveness of both training and trainers needs further attention. The environmental education and training needs to be supported by more participatory trials, and participatory research and extension for organic farming are needed to keep pace with the rapidly changing scenario of agriculture in rural Bangladesh.

Widen target group

The NGOs' ecological agriculture programme is not open to all villagers because NGOs' micro-credit and social programmes are highly interrelated and often inseparable. But the programme needs to reach all the villagers to increase awareness of ecological agriculture. At village level, cooperation needs to be sought from influential figures like religious leaders, such as *Imams* of *Masjids*, and other grassroots

social leaders. Traditional cultural activities like *Jatra, Jaree-gan, Saree-gan*, etc,. could also be used in the campaign. At the sub-district level, an effort is needed to raise awareness among local government and political leaders, as well as other officials of government and semi-government organisations.

Improve coordination among NGOs

Better coordination is required among the NGOs to avoid duplication and confusion and to increase the cost-effectiveness of the programme.

Farmers repeatedly mentioned the lack of traditional varieties of seeds. Better coordination among NGOs could help farmers establish community-based seed banks to revive and promote the use of traditional varieties. They could also support seed exchange amongst farmers, and the improvement of seed varieties using appropriate traditional breeding methods. Coordination would also allow NGOs to develop a community-based Pesticides Action Monitoring programme to monitor, report and take action against the use and abuse of pesticides.

Develop marketing avenues

Trained farmers suggested the need for developing marketing channels for organically produced fruit and vegetables to secure higher prices. This would encourage the adoption of organic farming practices on a wider scale. Land-poor farmers put a special focus on developing a collective marketing plan with support from NGOs. In this way, group members could market their products collectively by hiring trucks. Some of the profits from such a strategy could also allow a few young people to be employed to help the farmers market their products (Kar and Datta, 1998).

Improve policy advocacy

A few NGOs are currently engaging with the government and donors to influence policies that negatively affect the environment. However, greater scientific understanding of sustainable agriculture will be needed by all involved before a paradigm shift in policy can take place. Today the evidence for the value of sustainable agriculture in Bangladesh only comes from anecdotes and case studies. Many NGOs are not even aware of its importance. The biases against it are deep-seated, so that policy-makers are still chasing after new technological miracles to feed Bangladesh, whereas the essential elements for both sustainability and productivity are already present and need to be rediscovered: the indigenous knowledge of farming communities and broad diversity of nature's resources. Better coordination amongst NGOs at the national level and extensive scientific research into

ecological agriculture will create a sounder basis from which to advocate. National level seminars are also needed, not only to exchange knowledge, but also to create a wider forum for advocacy.

One of Bangladesh's most significant paradoxes is that while it is the third poorest country in the world, it contains some of the most fertile land and vastest and most productive water-bodies. The problem lies in the ownership of these resources, with a large proportion of the population being landless and/or sharecroppers. Any significant changes in farming practices depend largely on the handful of landowners, not 'the person behind the plough'. This demands urgent debate and policy reform of the land ceiling and land distribution laws at a national level.

Finally, total success in the adoption of ecological agriculture is not possible unless all citizens are committed to improving quality of life and maintaining a sustainable environment for all. The long-term impact of environmental degradation on productivity and health has to be made explicit in the educational process and knowledge and skills taught to give people the tools to forge a better future.

REFERENCES

Ahsan, E. and Beuter, T. 2001. *Changes in Crop Scenario*. Technical Note. RESAL, Bangladesh.

Barua, BP. 2002. *Participatory Research, Education and Rural farmers: A case study from Bangladesh*. Ontario Institute for Studies in Education/ University of Toronto. http://www.oise. utoronto.ca/CASAE/ cnf2002/2002_Papers/barua2002w.pdf. (accessed 30 October 2003).

Barua, BP. 1999. *Non-Formal Education and Grassroots Development: A case study from rural Bangladesh*. Unpublished Master's Thesis. Montreal: Concordia University.

Bhuyian, NI. 2001. Application of Integrated Plant Nutrition System (IPNS) in agriculture – Bangladesh experiences. Country paper presented in *ESCAP Organized Regional Workshop on "Integrated Plant Nutrition System (IPNS) Development and Rural Poverty Alleviation"* held on 18-20 September, 2001, Bangkok, Thailand. http://www.fadinap.org/ipns/workshop2001/Bangladesh. PDF. (accessed 30 October 2003).

Brook, R. and Davila, JD. (eds.) 2000. The peri-urban interface: a tale of two cities. In: *Chapter 5: Land, Water and Waste Management:* 119-167. School of Agricultural and Forest Sciences, University of Wales and the Development Planning Unit, University College London.

ENCNGO/ADAB. 1992. *Environment and Development: Bangladesh NGOs' Perspectives on Policy and Action.* A position paper for UNCED, Rio, June. United Nations Conference on Environment and Development.

FADINAP. 2003. *Market Monitoring and Information System (MMIS)*. Fertiliser Advisory, Development and Information Network for Asia and the Pacific. Ministry of Agriculture, Bangladesh.

Hoque, EM. 2002. *Crop Diversification in Bangladesh*. Department of Agriculture Extension. Ministry of Agriculture, Dhaka, Bangladesh.

IPRSP. 2002. *A National Strategy for Economic Growth and Poverty Reduction*. Bangladesh. Economic Relations Division, Ministry of Finance, Bangladesh.

Kar, K. and Datta, D. 1998. Understanding market mobility: perceptions of smallholder farmers in Bangladesh. *PLA Notes 33:* 54-58. International Institute for Environment and Development, London.

Nabi, R., Datta, D. and Chakraborty, S. 2002. Waves of disasters. In Naryan, D. and Petesch, P. (eds). *Voices of the Poor: From Many Lands*. Oxford University Press: New York, USA.

Nabi, R., Datta, D., Chakraborty, S., Begum, M. and Chaudhury, NJ. 1999. *Participatory Poverty Assessment in Bangladesh*. Washington: Poverty Reduction and Economic Management (PREM), World Bank.

Narayan, D., Chambers, R., Shah, MK. and Petesch, P. 2000. *Voices of the Poor: Crying out for change*. World Bank, Oxford University Press: New York

PANUK. 2002. *Pesticides, Poverty and Food Security.* Briefing Paper June 2002. UK: Pesticide Action Network.

Proshika. 2000. *A New Millennium: A New Challenge*. Activity Report (July 1999-June 2000). Dhaka: Proshika – A Centre for Human Development.

Sanchez, PA. and Swaminathan, MS. 2005. Hunger in Africa: the link between unhealthy people and unhealthy soils. *The Lancet* 365: 442-445. Millennium Project, Columbia University Earth Institute.

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The NR group receives funding from the Swedish International Development Cooperation Agency.

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