小農家計に占める有機農業の影響

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Impact of Organic Farming on Household Income of the Smallholders: A Case Study from Bangladesh

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小農家計に占める有機農業の影響 —バングラデシュの事例研究—

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本研究目的は，有機農業がバングラデシュの小農の家計を改善するか否かを検証することにある．調査は3つの地域で行い，400戸の有機農家からNGO（90戸），非—NGO（60戸）の有機農家をランダムに150戸抽出し，アンケートを行った．

結果は，どのグループの有機農家も収入のほぼ40%を有機農業から得ている．ステップワイス回帰分析によれば，有機農業が有機農家の家計に占める割合の強さは，他の収入源である送金，畜産，慣行農業，水産業等に比べて自由度調整済み決定係数97.4%のうちの42.8%を占めており，有機農業が農家家計の改善に大きな比重を占めている様子が窺われる．

また，有機農家の所得改善には土地面積，有機農業の継続年限，訓練，市場へのアクセスが意味を持つが，NGOの有機農家では特に有機農業の継続期間が，非—NGO農家の場合には土地面積の広狭が所得改善に大きな意味をもっている様子が示された．

1. Introduction

The role of organic farming (referred to as OF hereafter) on the household income of the smallholders in developing countries has been a topic of interest and some controversy since the launching of OF in the developing world. Meisner (2007) reported that OF is suitable only for the farmers who are rich and have larger land holdings and animals but not for the small farmers of Bangladesh. On the other hand, researchers like Kilcher 2002, McNeely and Scherr 2002, and Willer and Yussefi 2007 recommended that organic agriculture is not just a resolution for more affluent countries but useful even in poorer countries as it can give purposeful socio-economic and ecologically sustainable development. A study in India by Partap, 2006 stated that OF is emerging as a promising option for small and marginal farmers of India. Due to increasing consumer awareness of health and environmental issues, the demand for safe organic food has been growing significantly all over the world for the past several years and this offers producers and exporters in developing countries opportunities to improve their incomes and living conditions (FiBL, 2006). The statistics showed that global sales of organic food and drinks have increased by 43 %, reaching 33 billion US$ (25.5 billion Euros) in 2005 from 23 billion US$ (17.8 billion Euros) in 2002 (Willer & Yussefi, 2007). The market for organic foods is anticipated to generate sales of 133.7 billion US$ by 2012 (ITC, 2006). According to IFOAM (2007), of the 120 countries producing certified organic foods commercially, 15 are Least Developed Countries. Unfortunately, the share of the less developed countries like Bangladesh is very little in this large organic market. Meanwhile, the small farmers of Bangladesh across 30 agro-ecological zones are today searching for farming alternatives to diversify and improve their income (Sarker and Itohara, 2008). Many researchers advocate that OF is likely to benefit the poor farmers (both marginal and small) in improving productivity and income and promoting environmental sustainability. However, Non-certified OF (default organic) is being practiced by the Bangladeshi farmers since the early 1980s by the

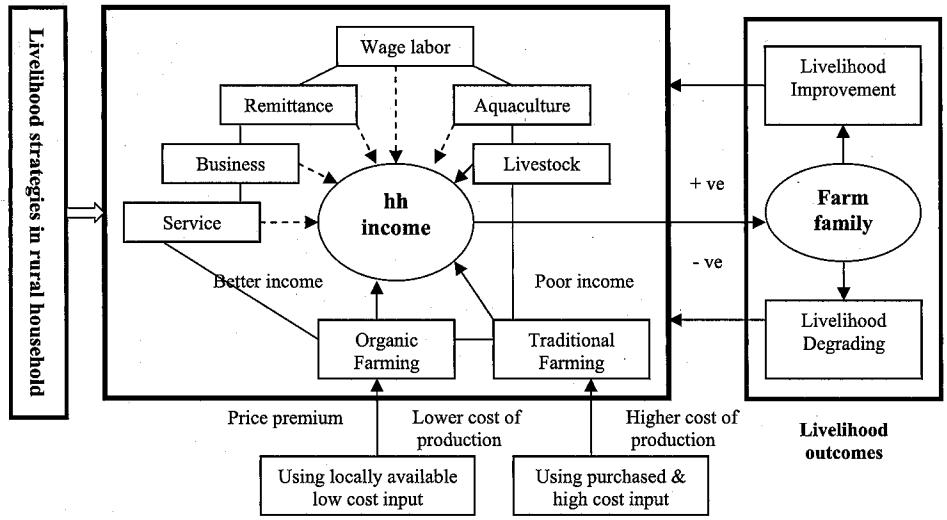

Fig. 1. Conceptual framework of the study

guidelines of a few NGOs. Despite the nonstop efforts from the NGO sector for past two decades it could not expand adequately in the country. Thus, this study provides an empirical analysis of the impact of OF on the household income of the small farmers in Tangail district of Bangladesh.

The issue is relevant to policy decisions because if OF has a pro-poor impact, then policies and programs to support OF could be justified on equity grounds. If not, policy makers would do better to allocate of resources to conventional agricultural development strategies. This study has also implications for the debate over whether small farmers will be able to adopt organic farming and get the benefit from the era of globalization. More specifically, this paper addresses two related questions. First, does organic farming raise the household income of the participating small farmers? Second, if organic farming raises household income, what factors can influence the income from OF?

2. Methodology

Study area and sample: The study was conducted in Madhupur sub-district under Tangail district of Bangladesh. PROSHIKA (a famous NGO in Bangladesh) is the pioneer of organic agriculture in Bangladesh that is promoting OF in this area. Their project on OF promotion is carried out in three such villages (Pirojepur, Kuragacha and Lokdeo) of Madhupur sub-district. All of these 3 villages were selected for this study. Farm families participating in OF were the target population of the study. A total of 400 organic farmers of the three villages were identified as the population of the study, among which some of them were the contract organic farmers of the NGO PROSHIKA and the others were individual organic farmers. From these two groups of organic farmers a sample of 150 organic farmers was randomly selected for the present study. Before data collection, a pilot survey for pre-test of the questionnaire was conducted on 10 organic farmers who were not on the interview list.

Definition of organic farmers: In this study organic farmers are defined as the farmers who are involved in farming activities truly following the organic methods of cultivation in some portions of their cultureable land and have been doing so at least one year. In actuality there is no strict demarcation between organic and traditional farmers in the study area. The same farmer in the study has devoted some portions of their land for organic cultivation and at the same time they are continuing the traditional cultivation on the rest of their cultivable land.

Data collection: A structured survey questionnaire was used to collect data related to the research objectives. The survey was conducted between 10 December 2007 and 10 January 2008. Data was collected from the targeted organic farmers by means of personal interviews by the researchers and three trained data collectors.

Statistical analysis: Besides the common statistical measures such as mean, standard deviation and percentage, a number of tests were performed. An unequal

individual sample t-test was used to test the differences between the socio-economic profile of the contract organic farmers and individual organic farmers. Stepwise multiple regression analysis was used to make sure the rate of contributions of various sources of income on household income. Multiple regression analysis was used to identify the most significant variables that explain the variation of the dependent variable.

3. Results and Discussion

(1) Comparison between NGO and individual organic farmers

The sample of the 150 organic farmers consists of 90 NGO organic farmers and 60 individual organic farmers. Among the total 150 organic farmers 48 farmers were taken from both Pirojepur and Lokdeo villages and 54 organic farmers were taken from Kuragacha village. The characteristics of NGO farmers and individual organic farmers are shown in Table 1. The average household has 5.19 members and the average age of the heads of households is 40 years. The farms in both groups are quite small, with less than one (01) hectare of cultivated land. About half of their cultivated land is dedicated to organic production systems. The average active members (within 15–60 years old) in the households are 3.44 persons while average dependent members (bellow 15 years old and above 60 years old) in the households are 1.75 persons. Whereas, the average number of family labors is 1.88 persons per family and the average farming experience of the head of the households is 22.37 years. None of these variables differs between NGO and individual organic farmers at the 5% level of statistical significance. There are some differences between NGO and individual organic farmers that are significant at the 1% level: NGO organic farmers have relatively better backgrounds than their counterpart individual organic farmers. More importantly, NGO farmers have more experiences of growing crops using an organic method that is also statistically a significant difference. However, the overall socio-economic condition of both groups of organic farmers is found to be roughly alike in the three study villages.

(2) Household income scenario of the organic farmers

The important focus of the study was to get a picture of the household's income of the respondent organic farmers. Thus, in further steps it was assessed that the amount of household's income earned personally by the household heads and other family members from various economic activities and the data are presented in Table 2. The table below shows that organic farmers in Bangladesh not only earn income from organic farming activities but they have many other sources (i.e., traditional farming, aquaculture, livestock farming, wage labors, services, business and remittance) to boost their household income. It is evident from the table that major income (43.56%) of both groups of organic farmers, comes from OF. The next highest share (24.39%) comes from traditional farming. Consequently,

Table 1. Socio-economic status of the organic farmers in the study area

Variables	Pirojepur village (n=48)		Kuragacha village (n=54)		Lokdeo village (n=48)		All villages (N=150)			t-statistics
	NF	IF	NF	IF	NF	IF	NF	IF	All	
Household (hh) size (persons)	4.5	5.33	4.93	5.79	5.4	5.44	4.94	5.55	5.19	−0.76
Age of hh head (years)	42.53	45.05	35.6	41.13	41.6	37.78	39.91	41.30	40.47	−1.74
Education of hh head (years)	4.62	2.78	5.2	1.95	3.96	3.61	4.65	2.7	3.87	3.16**
Hh members between 15 & 60 (persons)	2.99	3.44	3.4	3.92	3.57	3.56	3.29	3.67	3.44	−1.15
Hh members bellow 15 & above 60 (persons)	1.6	1.89	1.53	1.88	1.83	1.89	1.66	1.88	1.75	−1.05
Total land holdings (ha)	0.45	0.62	0.46	0.45	0.50	0.47	0.47	0.50	0.49	−0.75
Land under OF (ha)	0.26	0.31	0.22	0.20	0.24	0.19	0.24	0.23	0.24	0.5
Family labor size (persons)	1.33	2.06	1.97	2.21	1.73	1.78	1.78	2.03	1.88	−1.61
Farming experience (years)	23.77	30.44	16.5	23.75	22.37	19.94	20.88	24.62	22.37	−2.01
Duration of organic adoption (years)	4.37	3.94	4.57	3.92	4.57	3.78	4.55	3.88	4.25	2.82**

Note: NF—NGO organic farmers; IF—Individual organic farmers; All—All farmers; Source: Authors' survey

Table 2. Organic farmers' household income from various sources (unit in '000' BDT)

Farmers type	Sources of income								Household income
	Traditional farming	Organic farming	Livestock	Aquaculture	Wage labor	Business	Service	Remittance	
NGO farmers	1896 (24.16)	3482 (44.37)	1014 (12.87)	80 (1.02)	95 (1.21)	887 (11.30)	268 (3.42)	125 (1.59)	7847
Individual farmers	1365 (24.71)	2342 (42.40)	665 (12.04)	90 (1.63)	80 (1.45)	345 (6.25)	36 (0.65)	600 (10.86)	5523
All farmers	3261 (24.39)	5824 (43.56)	1679 (12.56)	170 (1.27)	175 (1.31)	1232 (9.21)	304 (2.27)	725 (5.42)	13370

**Values in the parenthesis indicates percentage of household income*
Source: Authors' analysis

Table 3. Summary of the stepwise multiple regression analysis showing contribution of the various income sources on household income of the regarding organic farming

Model	R	R^2	Adjusted R^2	Change in adjusted R^2	t-Value	F-value
1. Organic farming	0.654	0.428	0.424	42.4	10.52	110.63**
2. Organic farming+remittance	0.869	0.756	0.752	32.8	14.05	227.45**
3. Organic income+remittance+business	0.924	0.854	0.851	9.9	9.92	284.78**
4. Organic farming+remittance+business+traditional farming	0.947	0.896	0.893	4.2	7.64	312.05**
5. Organic income+remittance+business+traditional farming+livestock	0.961	0.923	0.920	2.7	7.09	344.56**
6. Organic farming+remittance+business+traditional farming+livestock+service	0.977	0.954	0.952	3.2	9.73	489.78**
7. Organic farming+remittance+business+traditional farming+livestock+service+aquaculture	0.985	0.970	0.969	1.7	8.87	658.90**
8. Organic farming+remittance+business+traditional farming+livestock+service+aquaculture +wage income	0.988	0.976	0.974	0.5	5.59	703.70**

Note: **—significant at 1% level
Source: Authors' analysis

livestock, business, remittance, service, wage labor and aquaculture activities contribute to the household income of the respondent organic farmers. On the other hand, respondent organic farmers earn the least amount (1.27%) from aquaculture activities.

However, the above table shows that there are some differences between household income earning of the NGO organic farmers and individual group of organic farmers.

(3) Impact of organic farming on household income of the organic farmers

One of the important objectives of the study was to assess the contribution of OF in the household income of the respondent organic farmers. The results of the study showed that organic agriculture is contributing in a range of 13.79% to 87.72 % on household income of the organic farmers, and the average contribution of OF is 45.98 %. The result of the stepwise multiple regression analysis showed that all of the income sources combinedly can explain 97.4% variation on household income where OF alone can contribute the highest (42 %) on household income of the respondent farmers (Table 3).

Next to organic farming, remittance earning, business and traditional farming income contribute on household income of the respondent farmers.

(4) Factors that can influence organic farming income

The main motive of the farmers is income improve-

Table 4. Results of the multiple regression analysis showing the coefficients of the explanatory variables

Model	Constant		Land under OF		OF adoption period		Training on OF		Access to extension service		Access to market with premium prices		Family labor size		Adjusted R^2
	b	*t*	*b*	*t*	*b*	*t*	*b*	*t*	*b*	*t*	*b*	*t*	*b*	*t*	
NGO farmers	−9.497	−1.84	.211**	2.74	.316**	4.39	.352**	4.06	.089	1.23	.269**	3.74	.047	.654	.629
Non-NGO farmers	3.481	.663	.564**	6.49	.190**	2.37	.119*	1.77	.038	.570	.291**	3.40	−.120	−1.59	.780
All farmers	0.510	.150	.463**	7.96	.254**	4.22	.208**	3.77	−0.185*	−2.62	.190**	2.54	.104	1.83	.601

Note: Dependent variable—OF Income; **Significant at 1%level; *Significant at 5% level
Source: Authors' analysis

ment. Thus, an important objective of the study was to discover the factors that can influence the income from OF. With this regard, multiple regression analysis was done and results are shown in Table 4. The result of the study also showed that the amount of income from OF is combinedly influenced 60% by a combination of the factors (like, land under OF, duration of OF adoption, training on OF, access to extension services, access to market with premium prices and family labor forces).

From the above table it is clear that the factors like land under organic cultivation, duration of organic farming adoption, family labor size and access to market with premium prices and training on OF can significantly influence farmers' income from OF. It is very natural that if a farmer dedicates more land to organic cultivation then his/her earning from organic farming will be obviously be higher. However, next to land under organic farming, the duration of OF is the next most important factor. The result of regression curve estimation also showed that year of OF adoption has a quadratic relationship with average household income of the practicing farmers (Figure 2). The final regression equation is $Y=148.88-42.125T+5.93\ T^2$ (where, T=OF adoption year).

The result of the regression curve estimation showed that OF adoption year can explain 95.2% (Adjusted $R^2=0.952$; $F=50.06^{**}$) of the variation in the average household income of the respondent farmers. The above figure evidently shows that after adoption of OF, average household income declines to some extent in the first three years and from the fourth year it starts to increase repeatedly. This is due to the fact that after a long time using of chemicals when a farmer starts to manage their farms only using organic manures then the soil cannot respond properly and hampers crop yields to some extent

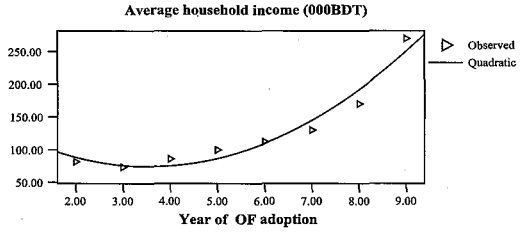

Fig. 2. Relationships between year of adoption of organic farming and average household income of the farmers

which ultimately affects the farmers' household income. However, by treating the same soil with organic manures for several years it adapts with the organic methods of cultivation and gives expected yields which eventually increase the farmers' household's income. A study of Partap, 2006 also supports the same theory that due to declining of yield farmers' income also reduces in the initial turning years of organic adoption. Similarly, training offered by the NGOs has also sufficient influences on income from OF. This is due to the reason that through participating in training program on OF farmers can learn more knowledge and skills that enable them to run their organic farm more successfully and ultimately provides them income remuneration. Table 4 also makes it clear that training on OF is significant at 1% level for the NGO organic farmers while it is significant at 5% level in the case of individual organic farmers. This is due to the reason that NGO farmers have better access in various training programmes on OF as compared to individual farmers. Another significant factor revealed by the regression analysis is farmers' access to market with premium prices. This finding is sustained by the findings of the study of Rajeev, 2007 which noticed that better pricing of

organic products supersedes its losses due to lower yield and make it as a better choice to the framers of India. On the other hand, the results of the study showed that access to extension services has significant negative influence on the income earning from OF. Probably this is due to the reason that there are no special extension services for OF from the public extension organizations and only NGOs provide extension services among the organic farmers of the study area which is not sufficient enough as compared to their extension need. In addition extension workers who are promoting OF do not have sufficient educational background that is also noticed by a study of Sarker and Itohara, 2008.

4. Conclusions

The study provides enough evidence to counter the argument that OF cannot be productive and bring increased income among the organic farmers. Results of the study revealed that respondent farmers are earning a significant income from OF. It was also observed by the researchers that due to better price premium and lower cost of production, respondent farmers are enjoying a better income security than the conventional (chemical based) farming. The earning from OF is also contributing significantly in the household income of the farmers which is ultimately improving the lives of the poor farmers. Thus, the farmers in the study area are increasingly adopting OF as a better choice for their livelihoods. The findings of the study also identified the significant factors (i.e., land under OF, duration of OF adoption, training on OF, access to extension services, access to market with premium prices, and family labor size) that can influence the income from OF greatly. These factors should be addressed properly to make OF more profitable. Thus, it can be concluded that through adopting organic farming, small and marginal farmers can improve agricultural production in their small lands in a sustainable manner and if they have the access to market with premium prices they may efficiently increase their income and that might be the key to mass reduction of poverty among the smallholders in rural Bangladesh. The study also investigated that NGO, PROSHIKA is giving the market access with premium prices and some extension services and training facilities for their contract farmers as well as a part of the individual farmers in the study villages. So, like the NGO's if the public sector extension organizations give proper attention on OF promotion it might benefits the farmers in terms of income generation and livelihoods improvement as well as in environmental protection that are the major mandates adopted in the New Agricultural Extension Policy (NAEP) by the Government of Bangladesh.

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