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Sweet gourd production under sandbar cropping practices: a case study in Sundorganj of Gaibandha District in Bangladesh

SL Nahar, M Akteruzzaman, AKMA Al-Amin

Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

Abstract

The present study analyzed the profitability of sweet gourd production under Sandbar Cropping Practice (SCP) and its impact on livelihood improvement of the farmers in Sundorgonj of Gaibandha district in Bangladesh. A total of 60 sweet gourd farmers were selected using stratified random sampling technique. Evidence showed that sweet gourd production under SCP was highly profitable and had a positive impact on livelihood improvement of farmers. Per hectare gross return of sweet gourd production for all sampled farmers was BDT 230506 and the net return was BDT 136391. The net return was the highest for small farmers and this was the lowest for large farmers. It was found that all kinds of livelihood assets of sampled farmers increased due to sweet gourd production under SCP. The availability of high quality HYV seeds was required to sustain sweet gourd production. The labour saving technology affordable by the farmers is suggested in addition to appropriate training facilities and sufficient extension services for the betterment of farmers.

Key words: Gross and net return, livelihood, profitability, sweet gourd, sandbar cropping practice

***Corresponding Author:** alaminaers@gmail.com

Introduction

The growth and stability of the economy of Bangladesh largely depends on the growth of agriculture. The growth rate is 1.37 percent per annum. Per capita income is about US $1520 and people have a life expectancy of 69 years (BER, 2012). There is no alternative but to develop agricultural sector for alleviation of poverty by attaining accelerated economic growth. Since provision of food security, improvement of living standard and employment opportunity of the huge population of the country are directly linked to the development of agriculture. The agriculture sector contributed 12.64 percent to the Gross Domestic Product (GDP) of which approximately 9.11 percent of the GDP was derived from crops and vegetables (BER, 2013). In Bangladesh, a good number of vegetables are grown throughout the year both in winter and summer seasons. In view of increase in income, population and nutritional consideration, there is a great need for vegetables cultivation. More than 60 different types of vegetables are grown in Bangladesh, covering 253036 hectares of lands of which 40.0 percent are cultivated during in summer season (Hossain, 2004). Climatic condition of Bangladesh is congenial for vegetables and possibilities of cultivating a wide variety of vegetables are also found in this area. Among different types of vegetables, sweet gourd is appreciated by consumers as because of its fruits, tender stems, leaves and even flowers could be used as vegetables both at green and ripe stages. It is relatively richer source of energy, carbohydrates and vitamins, especially that of high carotinoid contents and minerals. This crop is

therefore thought to have potentiality to solve malnutrition problem of Bangladesh to certain extent particularly of the vulnerable groups in respect of vitamin A requirement. Production of sweet gourd in Bangladesh is increasing day by day. Commercial farming of sweet gourd is popularizing throughout the country. Both the production area and production is increasing frequently throughout the recent years (BBS, 2013). A large number of farmers in Gaibandha district are now engaged in sweet gourd cultivation as the profitable farming has changed the lives of many people in the region. In the remote area of Gaibandha, in north east Bangladesh, a new technique - Sandbar Cropping Practice is introduced at present time. Sandbars are large, temporary, barren lands made of the sand and silt deposited as the rivers flood and subsides as well as when they change their course. By simply digging holes in these sandy residues and filling them with manure, compost and sweet gourd seeds, crops have thrived.

Bangladesh is desperately in shortage of arable lands and struggles to feed the growing population. The sandbar cropping technology would seem to have a much wider application in other dry areas and could even become an important cropping strategy in some areas adversely affected by climate change in particular flooding and siltation. The technology appears to be low risk yet shows an impressive financial return. In addition, it allows poor households who do not have enough rice, to 'spare' rice for consumption through mixing with sweet gourd during lean season or in crisis period. Most of the sandbars in Bangladesh remain unused and barren because of their unfertile sandy characteristics. In our agriculture; sandbar cropping is an innovative practice, which was first introduced in Gaibandha district by some farmers in 2005. Since 2009, a NGO named Practical Action Bangladesh (PAB) has been introducing sandbar cropping technology suitable for use in unfertile sandbars and supporting extreme poor to cultivate sweet gourds and they are guiding to extreme poor farmers' living in the river embankment to cultivate sweet gourd in sandbar.

A few studies tenuously focused on vegetable production and analyze the impact of that production on the livelihood of char people in Bangladesh who are always struggling for their survival. Amin (2013) conducted an economic analysis on impact of commercial bean farming on livelihood improvement of farmers in Ishwardi upazila of Pabna district. Hassan (2013) conducted an economic analysis of okra and snake gourd production in selected char areas of Mymensingh district. Saha (2012) conducted a research on an economic analysis of homestead vegetables production in some selected areas of Netrokona District. Akter *et al.* (2011) conducted a research on economic analysis of winter vegetables production in some selected areas of Narsingdi district. Studies related to vegetables production were neglected in the past, as research and extension work mostly concentrated on cereals. The reviews reveal that for becoming a new practice, no substantial research had done on sweet gourd production under Sandbar Cropping Practices for improving livelihood of char people. For that reason, the present study aims to examine the profitability of sweet gourd production under this new practice and its effects on the livelihood of the farmers at Sundargonj Upazilla of Gaibandha district in Bangladesh.

Materials and Methods

Two villages namely Dokkhin Dhumaitari and Machbari of Sundorgonj upazila in Gaibandha district were selected for the present study. To satisfy the objectives of the study a list of 320 sweet gourd farmers was prepared, and then categorized according to their farm size. Based on this criterion in the study area among total 320 farmers; 212, 87, 21 are the small, medium, and large farmers respectively. Total 60 sweet gourd farmers were selected from 320 farmers by using proportionate stratified sampling method. Data were collected by using a pre-tested interview schedule during the month of December 2014 to February 2015. After collection of data, each interview schedule was verified for the sake of

consistency and completeness. The collected data were edited and coded. Tabular analysis was used mainly based on ratio, averages, percentages, etc. Necessary graphs have also been used and presented.

Table 1. Distribution of sample farmers

Category of the farmers	Farm size (Hectares)	Sample farmers	
		No.	Percentage
Small	0.50-1	40	66.67
Medium	1.02-1.78	15	25.00
Large	3.04-3.19	5	8.33
Total		**60**	**100**

Source: Field survey, 2015

Results and Discussion

Profitability of Sweet Gourd Production

Costs of sweet gourd production under SCP

Production cost plays an authoritative role in farmer's decision making. Farmer's decision about production is mainly influenced by the cost of inputs. Input used in the study area was both purchased and family supplied. Thus the total production costs consisted of cash and non-cash expenses. Farmers had to pay cash for the purchased inputs like hired labour, seeds, fertilizers, insecticides, irrigation water charge, etc. On the other hand, for the home supplied inputs i.e., family labour, seeds etc., costs were estimated by applying the opportunity cost principle. For the competence of analysis, the costs items were classified into two groups: variable cost and fixed cost. Table 2, 3, 4, and 5 show the per hectare costs and return of sweet gourd production under SCP for small, medium, large and all sampled farmers. The costs items are described as follows:

Two types of human labour were used in sweet gourd production such as family labour and hired labour. Family labour included the operator himself plus other male and female members of his family and hired labour included casually and/or the permanently hired labour. The study reveals that, total number of human labour required per hectare in producing sweet gourd under SCP for small, medium, large and all sampled farmers were 99, 125, 181 and 135 man-days, respectively and their respective cost were BDT 19816, 24921, 36200 and 26979 which shared 23.37%, 27.07%, 34.31%and 28.25% of gross cost of production. Urea, Triple Super Phosphate (TSP) and Muriate of Potash (MoP) were used by the farmers for sweet gourd production under SCP. The costs of fertilizer were charged at the prevailing farm gate prices during the study period. The average cost of Urea per hectare in producing sweet gourd under SCP for small, medium, large and all sampled farmers were BDT 5361, 5476, 5614 and 5484, respectively. The average cost of TSP per hectare for small, medium, large and all sampled farmers accounted for 6.26, 5.89, 5.23 and 5.79 percent of gross costs of production. The costs of MoP for small, medium, large and all sampled farmers were BDT 2978, 3108, 3219 and 3101. In the study area, farmers used both purchased and home supplied cow dung with a price of BDT 1.50 per kg. The manure cost was relatively higher for large farmers and lower for small farmers.

In the study area, all farmers used purchased seeds. The total amount of seeds required per hectare in producing sweet gourd under SCP for small, medium, large and all sampled farmers were about 5.51 kg, 5.55 kg, 5.58 kg and 5.55 kg, respectively and their respective costs were BDT 15218, 15301, 15384 and 15301. The average cost of insecticides per hectare in producing sweet gourd under SCP for small, medium, large and all sampled farmers were BDT 20142, 20925, 21660 and 20909, respectively. The large farmers were paid relatively higher amount of cost for insecticides and small farmers paid lower amount. For the production of sweet gourd, farmers needed about 2 times of irrigation. The number of irrigation depends on soil type and economic condition of the farmers. The first irrigation was applied within one month after germination. The cost of water was charged as cash payment on the basis of number of irrigation and the distance of land plot from water source. The average

water charges per hectare in producing sweet gourd for small, medium, large and all sampled farmers were BDT 4212, 4369, 4585 and 4388, respectively which shared 4.97, 4.75, 4.35 and 4.69 percent of gross cost of production. The irrigation cost was relatively higher for large farmers. The interest was charged at the rate of 14 percent per annum. The period considered for an enterprise ranged from the time of land preparation to the harvesting of the crop, i.e., 4 months of sweet gourd production. In the study area, most of the farmers had own land for producing sweet gourd under SCP. The seasonal rental cost of land in char areas was treated as land use cost for the farmers. Land use cost was fixed cost for the producers. Table 2 shows that per hectare land use cost amounted to BDT 1556 for small, medium, large and all sampled farmers, respectively.

Table 2. Per hectare costs, returns and comparative profitability of sweet gourd production under SCP of small, medium, large and all farmers

Items	Price BDT/ kg	Small farmers		Medium farmers		Large farmers		All farmers	
		Quantity	Total value (BDT)	Quantity	Total value (BDT)	Quantity	Total value (BDT)	Quantity	Total value (BDT)
Gross return (Kg)	8	28783	230264 (100)	28800	230400 (100)	28813	230856 (100)	28813	230506 (100)
Human labour (Man-days)	200	99	19816 (23.37)	125	24921 (27.07)	135	36200 (34.31)	135	26979 (28.25)
Urea (Kg)	22	243.7	5361 (6.32)	248.9	5476 (5.95)	249.3	5614 (5.32)	249.3	5484 (5.86)
TSP (Kg)	34	156.2	5310 (6.26)	159.5	5423 (5.89)	159.4	5518 (5.23)	159.4	5417 (5.79)
MoP (Kg)	21	141.8	2978 (3.51)	148	3108 (3.38)	147.7	3219 (3.05)	147.7	3101 (3.31)
Manure (Kg)	1.5	5529	8293 (9.78)	5940	8910 (9.68)	5913	9405 (8.91)	5913	8869 (9.46)
Seed (Kg)	2757	5.51	15218 (17.95)	5.55	15301 (16.62)	5.55	15384 (14.58)	5.55	15301 (16.38)
Insecticides (BDT)	-	-	20142 (23.76)	-	20925 (22.73)	-	21660 (20.53)	-	20909 (22.34)
Irrigation (BDT)	-	-	4212 (4.97)	-	4369 (4.75)	-	4585 (4.35)	-	4388 (4.69)
Interest on operating capital (BDT)	-	-	1897 (2.24)	-	2063 (2.24)	-	2370 (2.25)	-	2110 (2.24)
Land use cost (BDT)	-	-	1556 (1.84)	-	1556 (1.69)	-	1556 (1.47)	-	1556 (1.67)
Gross Cost (BDT)	-	-	84783	-	92052	-	105511	-	94115
Net Return (BDT)	-	-	145481	-	138348	-	125345	-	136391
Undiscounted BCR			2.72		2.50		2.19		

Source: Field Survey, 2015, Figures in the brackets indicate percentage of the total costs

Gross cost was calculated by adding all the cost of variable and fixed inputs. In the present study the gross cost for small, medium, large and all sampled farmers in producing sweet gourd under SCP were BDT 84783, 92052, 105511 and 94115, respectively. Gross cost was relatively higher for large farmers and lower for small farmers because they used relatively higher amount of hired labour in per hectare sweet gourd production.

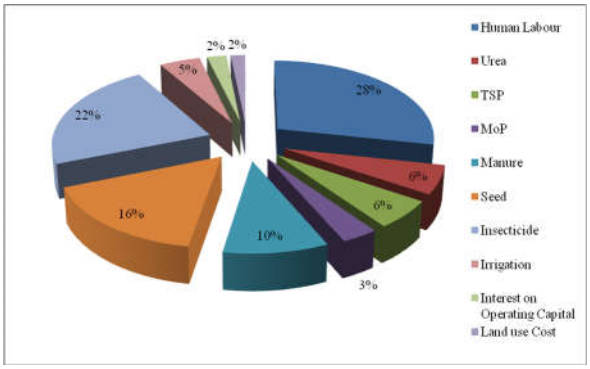

Figure 1. Share of cost items of all sampled farmers

Yield and gross return

Yield per hectare of sweet gourd under SCP for small, medium, large and all sampled farmers were 28783 kg, 28800 kg, 28857 kg and 28813 kg, respectively. Per hectare gross return for small, medium, large and all sampled farmers were BDT 230264, 230400, 230856 and 230506, respectively (Tables 2). Both the yield and gross return were the highest for large farmers and lowest for small farmers.

Net return

The per hectare net return of sweet gourd production under SCP for small, medium, large and all sampled farmers were BDT 145481, 138348, 125345 and 136391, respectively. Small farmers earned the highest amount of net return than medium and large farmers because they spent more time, supervised farm activities more intensively and efficiently. On the other hand, large farmers had very little time to manage sweet gourd production efficiently. As a consequence, they used relatively higher amount of hired laborer in per hectare sweet gourd production. Small farmer spent more time, supervised farm activities more intensively and efficiently. Large farmers have had very little time to manage sweet gourd production efficiently. As a consequence, they used relatively higher amount of hired labourer in per hectare sweet gourd farming. For that reason, gross cost was relatively higher and net return was lower for large farmers.

Benefit Cost Ratio (BCR)

In the study, BCR (undiscounted) of sweet gourd under SCP was calculated as a ratio of gross return and gross cost. Per hectare BCRs were estimated at 2.72, 2.50 and 2.19 for small, medium and large farmers respectively.

In terms of profitability per kg, it was found that for all farms, average cost of production of sweet guard (per kg) was BDT 3.27 compared to its sale price of BDT 8.00 per kg. That means, per kg net return of the farmers from sweet guard production was BDT 4.73 which is high enough to continue its production profitably (Figure 2).

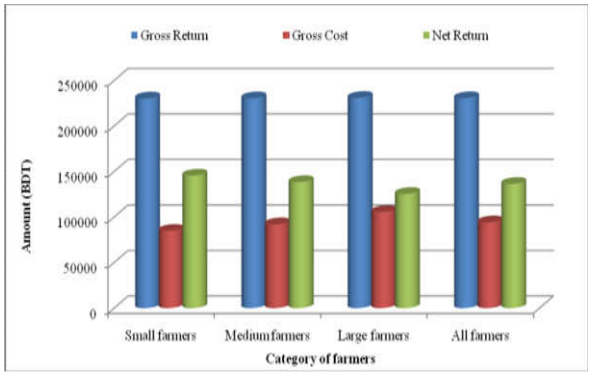

Figure 2. Profitability of small, medium, large and all sampled farmers

Impact of Sweet Gourd Production under SCP on Livelihood

A livelihood comprises the capabilities, assets and activities required for means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future,

while not undermining the natural resource base (DFID, 2000). The concept of sustainable livelihoods is a reference point for a wide range of people involved in different aspects of development policy formulation and planning. The sustainable livelihood framework includes the asset pentagon, which composed of five types of capital, social capital, natural capital, physical capital. The livelihood framework identifies five core assets or capital upon which livelihoods are built.

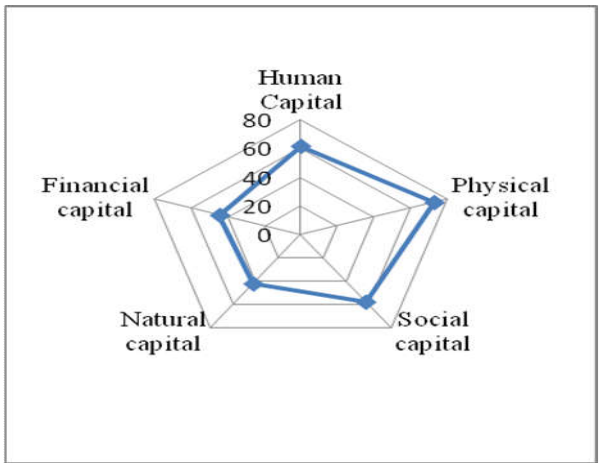

Figure 3(a). Improvements of livelihoods of small farmers

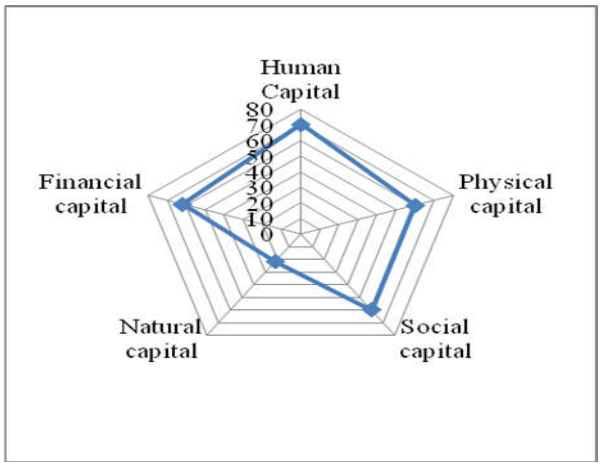

Figure 3(b). Improvements of livelihoods of medium farmers

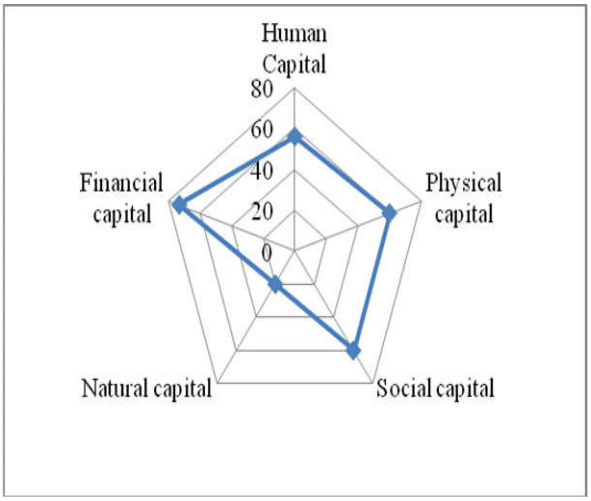

Figure 3(c). Improvements of livelihoods of large farmers

Overall livelihood improvement of farmers

Table 3 shows the comparative improvement of livelihood assets for all sampled farmers. It reveals that 55.59, 54.91, 53.87 and 54.79 percent small, medium, large and all sampled farmers' all kinds of livelihood assets increased due to sweet gourd production under SCP in Gaibandha District.

Table 3. Overall improvements of livelihood assets

Livelihood Assets	Small Farmers (%)	Medium Farmers (%)	Large Farmers (%)	All Farmers (%)
Human Capital	61.5	70.67	56	62.72
Physical capital	72.92	60	60	64.31
Social capital	57.5	60	60	59.17
Natural capital	41.88	21.67	20	27.85
Financial capital	44.17	62.22	73.33	59.91
Overall Improvement	55.59	54.91	53.87	54.79

It is evident from the study that there had a significant improvement for all the livelihood assets of all sampled

farmers. About 54 percent of the sampled farmers' all kinds of livelihood assets increased after introducing sweet gourd production under SCP which was highly profitable and contributed largely to improve the livelihood status of the farmer's in the study area.

Conclusion

It can be concluded that sweet gourd production under SCP was highly profitable. Socioeconomic wellbeing of sweet gourd growers was amazing, found to be very well and satisfactory. A considerable scope apparently exists to increase the productivity of sweet gourd, income, employment, nutritional status and overall livelihood status of farmers as well as other potential areas of Bangladesh. It can also help to ameliorate the problem of gender issue by enabling the women to participate in income generating activities and household decision making process in rural areas. There is further scope to increase per hectare yield of such potential crop by introducing scientific methods and high yielding variety. Efficient and planned management training in accordance with their problems, needs, goals and resource base can lead to viable production practices and sustainable income and livelihood improvement from sweet gourd production under SCP.

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