

Economic Profitability of Soyabean (*Glycine max.L*) Cultivation in Mahaweli System H

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ABSTRACT

A study was carried out to assess the profitability, to identify the factors influencing the profitability, and to find out the problems hindering the performance of soyabean cultivation of the farmers in Mahaweli system H. The primary data were collected using a questionnaire-based survey with a sample of 50 soyabean farmers in selected areas under Mahaweli system H. Benefit Cost Ratio (BCR) was calculated to identify the profitability of soyabean cultivation. Sensitivity Analysis was carried out to evaluate sensitivity of profit at different risk levels. The potential factors influencing the profitability of soyabean cultivation were estimated in a multiple regression frame work.

Results showed that the soyabean cultivation is profitable even at 25 percent simultaneous increase of cost and decrease of benefit scenario. Farmer's experience, land extent and family expenditure are the factors that significantly influence the profitability of soyabean cultivation. It was observed that the major problems that are faced by soyabean farmers are pod borer attack, water scarcity and high price of seeds.

KEYWORDS : Benefit Cost Ratio, Forward Sales Contract System, Profitability, Sensitivity Analysis

INTRODUCTION

Soyabean (*Glycine max.L*) a native of East Asia, ranks high among the leguminous crops of the world in terms of its content of protein as well as its nutritional quality. It occupies an intermediate position between legumes and oilseeds, containing more protein (about 40 percent) than most of the legumes do, but less fat (about 18 percent) than most of the oilseeds contained (De, 1971).

A range of soya-based products has been popular among Sri Lankans. The consumption of soyabean in Sri Lanka is around 4.04 million kilograms per year (Anon, 2005b). Soyabean is used for making ice cream, yoghurt, cheese, milk, meat, flour, oil, sauce and other processed foods. Further it is used as a cover crop and as a green manure (Gunasena, 1994).

United States is the largest Soyabean producing country in the world. The other major producing countries are Brazil, Argentina, China, India, Paraguay and Canada (Anon, 2002). The major market for soyabean is Indonesia. The percentage change of imported volume in Indonesia in 2004 over 2003 is 302.40. The other major markets are Bangladesh, Vietnam, Thailand, Japan, Korea, Sri Lanka, and Malaysia (Anon, 2003a).

Soyabean production costs are much less and returns are higher when compared with paddy. Soyabean is easier to farm than paddy and it needs less field attention as long as the ground is wet and the seed is good (Samath, 1999). The country is fortunate to have a bimodal rainfall pattern and two growing seasons. The yala season (April-September) is the drier season, when paddy fields are irrigated and soyabeans are grown. They yields as high as 2470 to 2805 kg/ha. In the maha season (October-February), when crops were rainfed, it gives slightly lower yields depending on the rainfall distribution pattern ranging from 841 to 1683 kg/ha. The main reason to cultivate soyabean in maha season is to get

seeds for the next yala season. Therefore the yield in maha season is so low when compared with yala season.

Soyabean has a particularly high potentials in the country's dry zone, such as Anuradhapura district which is the major production area. Present land extent of soyabean cultivation in Mahaweli system H in Anuradhapura district during the yala season in 2005 was 2612 ha and average yield was recorded as 2566 kg/ha (Anon, 2004). Other areas that suitable for soyabean cultivation are Polonnaruwa, Trincomalee, Puttlam, Jaffna, Mannar, Ampara, Monaragala, Hambanthota, Bibila, Matale, Kurunegala and Badulla.

As a result of increment of productivity and land extent the production of soyabean in 2003 has doubled with compared to the previous year (Anon, 2003).

The land extent under soyabean cultivation during maha and yala season in 2005 is 360 ha and 1120 ha respectively. The land extent under soyabean cultivation in maha season is low, in case of the paddy fields are utilized for rice, but not for soyabean in maha season. The production of soyabean during yala season is higher (1650mt) than the maha season (610mt) in 2005. The total import of soyabean is 1607 metric tons in 2005. Sri Lanka imports 46% of soyabean of the consumption and spends Rs. 47.1 million for total importation (Anon, 2005b). The foregoing implies that production of soyabean in the country needs to be increased. By increasing production of soyabean within the country, can reduce dependence on flour imports from the United States.

The objectives of this study are to identify the profitability of soyabean cultivation, financial viability of the industry and factors influencing the profitability of this cultivation to motivate the soyabean farmers in Mahaweli system H. There are

many problems with soyabean cultivation in Anuradhapura district. Pod borer attack, water scarcity and high price of seeds are the main problems that are faced by the farmers who cultivate soyabean. Therefore this study makes efforts to identify the problems hindering the performance of the soyabean cultivation in Mahaweli system H of the Anuradhapura district.

METHODOLOGY

Sample selection

The sample survey was carried out in Talawa, Thambuttegama, and Galnewa area under Mahaweli system H in Anuradhapura district, which contributes 74% to the total land extent under soyabean cultivation in the country. Talawa, Thambuttegama, and Galnewa are the areas with higher production in soyabean when compared with other areas under Mahaweli system H and these are the places where different farmer settlements have been taken place.

Data collection

Data were collected through a pre-tested questionnaire during the period from January to June 2006. A random sample of 50 farmers who are the members of farmer organizations in those areas was selected. Primary data were included Farmer's personal information, income and cost information of soyabean and other agricultural activities including livestock, off farm income and family expenditure.

Analysis

Benefit cost analysis was carried out for soyabean cultivation and Benefit Cost Ratio (BCR) was calculated as follows,

$$BCR = \frac{\text{Present Value of Benefits}}{\text{Present Value of Costs}}$$

Grains is the only benefit from soyabean cultivation. Cost items were recognized as cost of land preparation, labour cost, transport cost, costs for seeds, fertilizer, weedicides, and pesticides.

The calculated BCR values were used to determine the profitability of the soyabean cultivation.

Financial viability was tested to examine the economic sustainability of the soyabean cultivation by carrying out sensitivity analysis at 10%, 15% and 25% increased cost levels and at 10%, 15%, 25% decreased benefit levels.

The profitability of the soyabean cultivation depends on the factors such as farming type, farmer's experience, land extent, profitability of other agricultural activities including livestock and family expenditure. Based on these factors a multiple regression function for the profitability of soyabean cultivation was constructed as follows,

$$y = f(x_1, x_2, x_3, x_4, x_5)$$

Where,

- y = BCR (Soyabean cultivation)
- x₁ = Farming type as dummy variable
- x₂ = Farmer's experience in years
- x₃ = Land extent in acres
- x₄ = BCR of other agricultural activities including livestock
- x₅ = Family expenditure in Rupees

Factors that influenced the profitability of the soyabean cultivation were tested by different types of models such as linear, log-log, linear-log, log-linear forms. The stability of the models were judged based on coefficient of determination (R²), sign of the parameter estimates, consistent to the theoretical expectations and by the significance of variables.

Problems faced by the soyabean producing farmers were identified during the survey and they were listed according to their relative importance.

RESULTS AND DISCUSSION

a) Financial viability of the soyabean cultivation

The BCR should be greater than one for a project to be profitable. The study revealed that the BCR is 3.96 (Table 1), and therefore the soyabean cultivation is profitable for farmers. Reason for that is all soyabean farmers enter into Forward Sales Contract System (Govi sahanaya). Therefore they were able to get an assured market for their produce with a reasonable price.

Table 1 - Benefit cost ratio of soyabean cultivation per acre for one year:

Present value Benefits (Rs)	49325.58
Present value Costs (Rs)	13669.07
BCR	3.60

b) Sensitivity Analysis

The study revealed that BCR for soyabean cultivation at 10%, 15%, and 25% increased cost levels and decreased benefit levels were 2.95, 2.67, and 2.16 respectively (Table 2). These values explain the profitability at different risk levels and it further explains the financial viability of the industry under adverse market conditions. Therefore the soyabean cultivation is profitable even at 25% simultaneous increased cost and decreased benefit scenario.

Table 2 - Sensitivity of benefit cost ratio for increased cost and reduced benefits:

Benefit /Cost(PV)		
Cost + 10%	Cost + 15%	Cost + 25%
Benefit - 10%	Benefit - 15%	Benefit - 25%
2.95	2.67	2.16

c) Regression analysis of soyabean cultivation

The log-log model showed a better statistical insight (Table3). The regression model for profitability of soyabean cultivation explained 94% of the variation in the profitability by the specified explanatory variables in the model. It further

indicated that the farmer's experience, land extent and family expenditure were significant at the 5% probability level and showed a positive relationship.

Table 3 - Estimation of the profitability of soyabean cultivation:

Variable	Estimated Coefficient	t - value	P - value
Constant	-1.58	-2.00	0.053
Farming type	0.03	0.78	0.442
Farmer's Experience	0.36	5.45	0.000*
Land extent	0.09	2.27	0.029*
BCR(Other agricultural Activities)	-0.02	-1.07	0.291
Family expenditure	0.24	2.71	0.010*

R²=94.0% Adjusted R²= 93.2%

*Significant at 5%

d) Problems of soyabean cultivation -

Among the identified, pod borer attack is the major problem for soyabean cultivation in Mahaweli system H (Table4).

Water scarcity problem was also significant in soyabean cultivation. Further, high price of seeds and lack of quality seeds were also the problem faced by the soyabean farmers. Most of the farmers had not practiced recommended agricultural practices. None of the soyabean farmers had received any input subsidy. There was not any marketing problem with soyabean farmers.

Table 4 - Problems hindering the performance of soyabean cultivation:

Problems	Farmers reporting %
Pod borer attack	76%
Water scarcity	74%
High price of seeds	52%
Lack of quality seeds	48%
High labour cost	32%
Lack of agriculture extension service	24%
Lack of subsidy schemes	10%

CONCLUSION

The results of the study revealed that the soyabean cultivation is profitable. It further shows the financial viability of the soyabean cultivation even under adverse market conditions. The farmer's experience, land extent and family expenditure are the significant variables that influence the profitability of soyabean cultivation. Problems hindering the performance of the cultivation are pod borer attack, water scarcity and high price of seeds.

The demand for soyabean in Sri Lanka is high. Therefore soyabean is imported to fulfil the country's

requirement. By increasing land extent and by motivating farmers through giving input subsidies, and providing loan facilities, the production of soyabean can be increased.

Soyabean farmers should be motivated to enter in to forward sales contracts, because it assures market for their produce with a reasonable price. With assurance of a good price, farmers are motivated to increase the quality of their produce, and buyers are also benefited from an uninterrupted supply of good quality produce at an agreed price.

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