Ann. Bangladesh Agric. (2021) 25 (2) : 97-104 *ISSN 1025-482X (Print)*
www.doi.org/10.3329/aba.v25i2.62416 *2521-5477 (Online)*

Short note

PROBLEMS AND PROSPECTS OF SOYBEAN PRODUCTION IN BANGLADESH

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Abstract

A study was conducted to assess the challenges and prospects of soybean production in Bangladesh. Data were collected from 55 soybean-growing farmers of 5 districts through interview and focus group discussions (FGDs). The data indicated that there are great opportunities to expand soybean production areas due to high profitability, availability of suitable land, mechanized management practices, the comparative advantage and interest of farmers in soybean cultivation. The challenges of soybean production include better suited soybean varieties between boro and amon rice, the incidence of insects, climatic variability, publicity for soybean production, unwillingness of industrialists, soybean oil extraction facilities, attack of diseases, instable market price and network, fund and technical knowledge. Ultimately, result indicated that the opportunities of soybean production outweigh than challenges in Bangladesh. Such results could also contribute to increase soybean production in Bangladesh.

Keywords: Challenges, opportunities, profitability, soybean, farmer.

Soybean is a dominant oil-producing crop in Bangladesh. It is an exceptional source of oil, protein, vitamins, minerals, and some functional elements of the human body for instance isoflavones, lecithin and polysaccharide (Islam, 2019). In Bangladesh, soybean occupies 0.041 million ha of land and its production is 0.064 million tones (BBS, 2020). The supply of soybean is very low compared to the demand and needs to spend a huge amount of foreign exchange by importing soybean meal and oil. Year wise imports amount of soybean meal and oil is mentioned in Fig. 1.

Regarding the demand of soybean meal and oil in our country, it is necessary to increase soybean production. However, seed yield is extremely low in Bangladesh (1.64 t/ha) compared to Argentina (3.27 t/ha), Brazil (3.1 t/ha) and USA (3.09 t/ha) (FAO, 2016). A better knowledge about the of major challenges to soybean production will be a key breakthrough in overcoming the yield-limiting problems in Bangladesh.

Bangladesh is facing different problems due to high climatic variability, the incidence of pests and diseases, lack of technical knowledge and technology. Furthermore, the cultivable land

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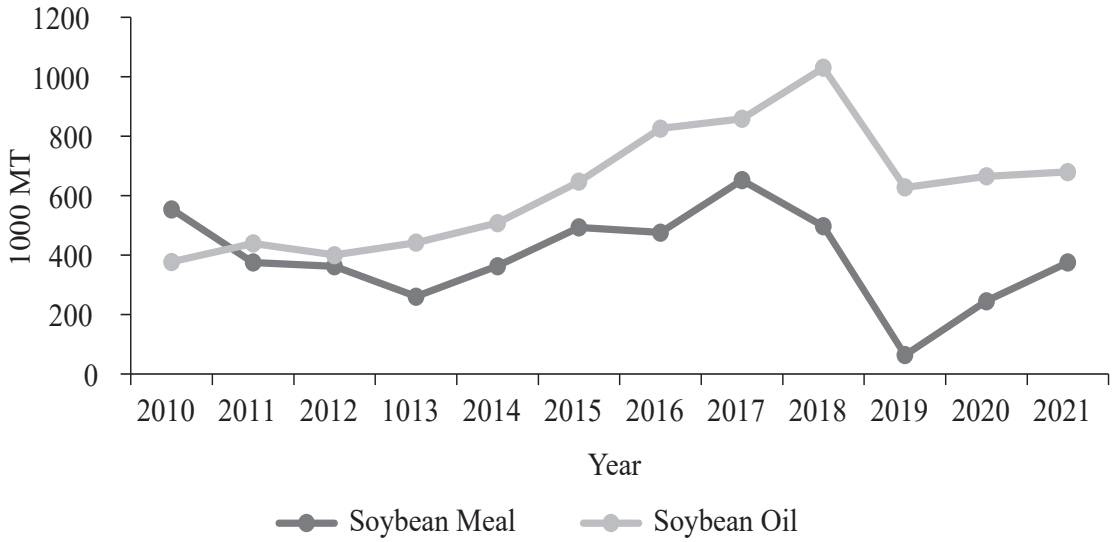

Fig. 1. Year wise imports of soybean meal and oil in Bangladesh. Source: USDA, 2021.

is decreasing every year due to the increasing number of industries, factories, houses, and roads. In these circumstances, priority should be given to increase the yield per unit area of land. The estimated average yields of soybean in USA, Brazil and China were significantly increased (Sakurai *et al.,* 2014). Therefore, soybean is an important option to increase yield per unit area in Bangladesh. Additionally, in recent years soybean has shown high demand in Bangladesh (Abate *et al.,* 2012; Rahman *et al.,* 2021). To meet this demand, the country will require special attention to increase soybean production areas. As reported facts, this study was undertaken to provide crucial information for the enhancement of soybean production areas and yield in Bangladesh. To achieve this purpose, we have discussed the main constraints and opportunities of soybean production in Bangladesh.

A multi-stages sampling procedure was considered in this study. Fifty-five soybean-growing farmers (25: Laxmipur; 10: Noakhal; 10: Feni; 5: Mymensingh; 5: Tangail) were selected for interview to collect data.

Both qualitative and quantitative data collection techniques were applied in this study. Data and information were collected during October to December in 2021. Quantitative data and information were collected through personal interviews. Qualitative data were collected following Focus Group Discussion (FGD). In total 5 FGD's were conducted at five respective districts with the ten Sub-Assistant Agricultural Officers.

An attempt was made to estimate the Benefit Cost Ratio (BCR) based on the average value of collected data from the farmers. The BCR of soybean was calculated using simple accounting procedures. The total cost was estimated considering the family-supplied labor and cultivated land. Land use cost was calculated regarding the lease value of the land.

The following formula was used to calculate the percentage:

$$\text{Percentage} = \frac{\text{Number of farmers for each parameter} + \text{Number of FGD each parameter}}{\text{Total number of farmers} + \text{Total FGD}} \times 100$$

Survey indicated that the challenges involved in the soybean production in Bangladesh are mainly related to better suited soybean varieties in the gap between boro rice and amon rice, the incidence of insects, climatic variability, lack of government interest and publicity, unwillingness of industrialists, lack of soybean oil extraction facilities, attack of diseases, lack of short duration rice variety, instable market price and network, lack of fund, and lack of technical knowledge (Fig. 2). These matters are briefly discussed below-

Most of the soybean farmers want to cultivate soybean in the gap between boro and amon rice (80-90 days). Therefore, farmers need short-duration soybean varieties that can be grown in the gap between boro and amon rice. Most of the popular soybean varieties are long durated that cannot be matched with this cropping pattern. It can be stated that the lack of short-duration soybean is a big constraint to expand production and most of the cultivable soybean varieties are BARI soybean 5, Sohag, BARI soybean 6 and Davis in Bangladesh. The life cycle of the above-mentioned varieties is longer than the desired ones.

The insect is a serious problem for soybean production all over the world. The important insects are leafhopper, caterpillar, aphid and borer, which were found in all districts. Joe *et al.* (1999) reported leafhopper, borer and sting bug are the most dangerous insect in soybean. Besides, the present study also showed that green cloverworm, sting bug and

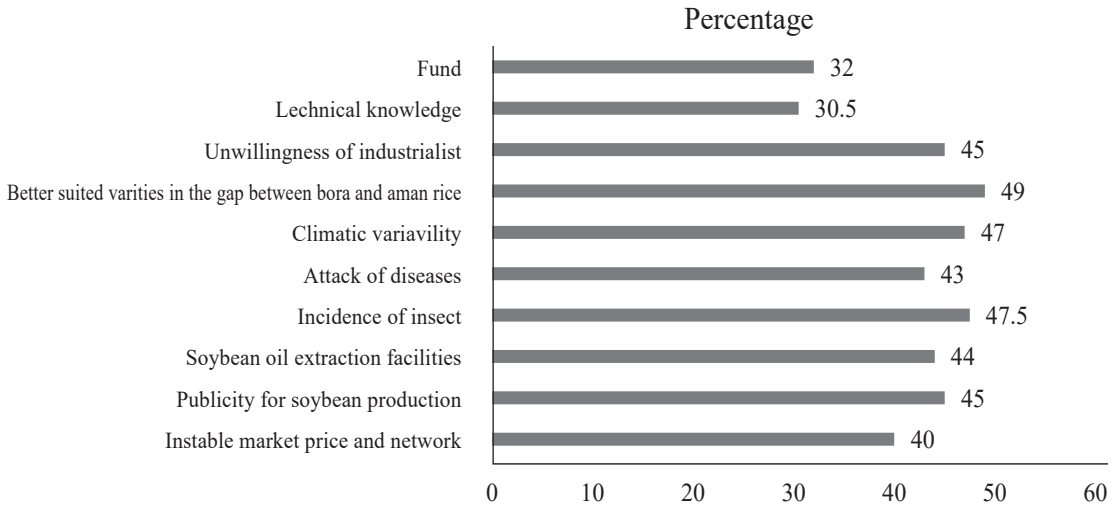

Fig. 2. Constraints of soybean production in the present study.

hoq moth were highly responsible to damage the soybean in Laxmipur, Noakhal and Feni districts based on FGD. It could be considered that the leafhopper, caterpillar, aphid and borer and green cloverworm are the main serious insects for soybean production in Bangladesh.

Farmer-level information revealed that 47% of soybean farmers faced unsuitable weather problems during cultivation (Fig. 2). In Bangladesh, precipitation pattern, temperature and rainfall are changing rapidly due to industrialization. Morshed (2020) reported that the transformation of land for industrialization resulted in environmental degradation, rise in temperature, entropy, change of precipitation, humidity and eco-system. Therefore, it can be stated that the growth, development, yield, and quality of soybean are negatively affecting by these climatic conditions.

The land-use policy of the government is supposed to be updated regularly to reduce the loss of crop production. Although the government has many positive steps for the major crops in Bangladesh, still soybean did not get priority. Publicity is important because it helps increase awareness among the farmers for production. It is a way to expand more production through positive publicity. The survey showed that there is a lack of publicity about the enhancement of soybean production in Bangladesh.

In the USA, $41 billion industry was produced based on soybean, and farmers across the country are switching to growing soybean from other less profitable crops (USDA, 2013). The USA (117.2 million tons), Brazil (96.3 million tons) and Argentina (58.8 million tons) are the world's largest soybean producers and represent more than 80% of global soybean production (FAO, 2016). These countries produce a huge amount of soybean due to the facilities of processing industries. Industrialists invest a lot of money to process soybean-based food, such as soymilk, tofu, soymeal, soymeat, bakery items. However, the present study showed that there is a lack of enthusiastic to build up the soybean industry in Bangladesh, resulting in farmers do not get fair prices. To get the fair price, it is supposed to focus on the development of protein-rich soya products and increase the number of processing industry.

Bangladesh imports 13.23 lakh metric tonnes soybean oil in the year 2020-21 (USDA, 2022). There exists the opportunity to save foreign currency by increasing soybean production and oil extraction facilities. City Group, Meghna Group of Industries and Globe Pharma Group of Companies, Kaderia group are mainly engaged in crushing soybean oil in Bangladesh. These companies have the ability to fulfill the demand only 40% from local production in Bangladesh (Islam, 2019).

For soybean cultivation, disease management gets prime priority. Forty-three percent of soybean farmers mentioned about this problem (Fig. 2). The important diseases are yellow mosaic virus, stem rot, foliar disease, cyst in the nematode, alternaria leaf spot, bacterial wilt, damping off and rust based on FGD data. Therefore, it can be stated that soybean diseases are the significant economic factors in Bangladesh. It is very essential to control soybean diseases to have potential soybean production. The FGD also indicated that Anthracnose occurs in Bangladesh and reduces plant stand, seed quality and yield,

but most of the farmers do not know about this disease.

This study examines the market factors influencing soybean price instability and networking problem in Bangladesh. The respondents 40% farmers reported that the soybean market price and network are unstable in Bangladesh (Fig. 2). Therefore, price stabilization will be one of the top priorities of the Bangladesh government to explore soybean production. It was also found that the farmers sell their soybean at farm gates and at the local market at a low price and they cannot go to the distant markets for the higher prices of goods due to lack of transportation and the higher cost of transports. Besides, quick selling of soybean after harvest is often a cause, which reduces the flexibility of farmers to sell later when prices may be higher. Instability of market price and network may be improved by proper marketing channel and increasing storage capacity.

The fund is the main crisis for small and marginal farmers in soybean production. Therefore, a lack of cash to finance leads to inferior input purchases and improper post-harvest management resulting in low income. Thirty-two percent of the farmers reported the lack of fund problem in soybean production (Fig. 2). Generally, they borrow money from moneylenders at a very high-interest rate causes the person to further accumulate more debt. They pay this debt by selling soybean and they become losers. Government can solve this problem by providing agriculture loan without interest.

Technical knowledge, including planting time, seed rate, plant spacing, fertilization, irrigation, diseases and insect management are important for higher yield in soybean. Besides, to date, many farmers are not cautious about the improved methods of soybean cultivation. Even BARI developed technologies for soybean cultivation, it could not well reach to farmers level due to lack of extension activities. Our survey showed that 30.5% of farmers are not aware about the technical knowledge of soybean. FGD also showed similar result. They need formal training for potential soybean cultivation. This result is supported by Miah and Mondal (2017). In the case of soybean, government should make attempt to provide training about the production technology of soybean.

Soybean cultivation is highly profitable to farmers. Total cost analysis showed that the variable cost, fixed cost and total cost for per ha of soybean production were Tk. 46500, 31500 and 67500 respectively (Table 1). Most of the farmers opined that the profitability of soybean is much higher compared to other oilseed crops like mustard, groundnut and sesame. The result was expected to deliver a positive net present value to the farmers. The BCR analysis showed profitability of soybean production indicated through estimated average net return and BCR as Tk. 33300 /ha and 1.5, respectively (Table 2), indicating soybean cultivation in Bangladesh is profitable. Salam and Kamruzzaman, (2015) analyzed the net return of soybean and three crops (groundnut, cowpea, grasspea) at Noakhali and Laxmipur district and stated that the net return of soybean, groundnut, cowpea and grasspea were 22776.92, 16460.8, 11804.8 and 8824.6 Tk./ha, respectively. The BCR of groundnut, cowpea and grasspea were 1.43, 1.26, 1.28 and 1.29 over full cost, respectively, which indicated that the cultivation of

Table 1. Cost of soybean cultivation (Tk./ha) at Noakhali and Laxmipur district

Cost items	Amount (Tk)
Land preparation	5000
Hired labour for all activities (sowing, weeding, harvesting)	15800
Seed	8800
Manure or cow dung	3000
Urea	900
TSP	1500
MOP	650
Gypsum	350
Pesticide	2500
Irrigation	3000
Interest of operating capital	2000
Miscellaneous (transportation, carrage in, out)	3000
Total Variable cost	46500
Family labour	23500
Rental value of land for 4 months	8000
Total fixed cost	31500
Total cost	67500

Table 2. Cost benefit analysis of soybean cultivation at Noakhali and Laxmipur district

Items	Amount (Tk)
Total cost (TC)	67500
Total Variable cost (TVC)	46500
Total fixed cost (TFC)	31500
Yield (Kg/ha)	2100
Unit price (Tk/Kg)	48
Total return (TR)	100800
Gross margin (TR-TVC)	54300
Net return (TR-TC)	33300
Benefit cost ratio (BCR)	
BCR based on variable cost (TR/TVC)	2.2
BCR based on total cost (TR/TC)	1.5

soybean was more profitable than those of other competitive crops. Furthermore, FGD again indicated that soybean cultivation is not only profitable but also help maintaining the fertility status of the soil.

Bangladeshi land is a gift of nature for growing crops including soybean. Soybean is a warm-season crop, but some varieties can grow in the winter season. Well-drained fertile and loamy soil is good for soybean

cultivation. It can grow well with sandy loam soil (Soni, 2020). It is possible to grow soybean in most of the areas of Bangladesh (FGD, 2013). Salt tolerant soybean varieties can be grown in coastal areas successfully. However, so many robi crops (rice, wheat, maize, mustard, groundnut, cowpea, linseed) are grown, which is posing high pressure on land use. If we cover potential soybean areas with proper management, we may keep pace with the growing demand in Bangladesh.

Most of the smart farmers reported about the mechanized management practices in our study. In Bangladesh, mechanized seeder and bed planter has already been introduced which are very much useful to reduce labor cost in soybean cultivation. The soybean harvester is also very familiar in Bangladesh that is very easy and time-saving instrument. Mechanized weeding practices are available in soybean cultivation. Thus, soybean production has become mechanized based which is very inspiring in soybean production.

Domestic and traded resources are mainly used in soybean production. Domestic resources are human labor, power tiller, seed, land rent and interest on operating capital while traded inputs were fertilizer and manure. Importers need the price of soybean, ship freight charge, import handling cost, transport cost and domestic trading cost. The FGD revealed that the production of soybean in Bangladesh has a comparative advantage rather than an import. Salam and Kamruzzaman (2015) reported that soybean production is more profitable compared to imports. Akter *et al.* (2010) stated the similar result.

There is a high interest of farmers for soybean production in Bangladesh. Our study indicated that most of the farmers want to expand soybean production due to various advantages for the high price, higher profit, short duration crop, less production cost and produce higher yield, and increase soil fertility. Farmers also stated that there is a high interest of farmers for soybean production in Bangladesh due to agronomics and cropping systems improvements that maximize soybean productivity, profitability and sustainability.

Results indicated different strengths and opportunities for soybean production in Bangladesh, regarding positive BCR, availability of suitable land for soybean cultivation, mechanized management practices, the comparative advantage compared to other crops and interest of farmers for soybean production. The opportunities that existed in soybean production exceeded the challenges involved in this sector. However, to boost soybean production both varietal development and crop management research need to be implemented in an integrated approach. Therefore, the future focus of research is development of insect and disease-resistant high-yielding varieties of soybean that can be grown in the gap between boro and amon rice.

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