

# Environmental Degradation due to Tobacco Cultivation in Northern Bangladesh

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**ABSTRACT:** A field study was conducted in Northern Bangladesh, Rangpur district to observe the impact of tobacco cultivation on the environment as well as to characterize contributing factors motivating tobacco cultivation. Information was collected from the tobacco cultivators by a questionnaire survey that was conducted in four mostly tobacco cultivated upazilas, namely Badargonj, Taragonj, Rangpur Sadar, Gangachara of Rangpur district. Information from non-tobacco cultivators was also collected from Mithapukur Upazila. Survey findings revealed that 62.16% of respondents believed that soil productivity is decreasing in the tobacco field and 70.27% of tobacco farmers were using more chemical fertilizer per year than the previous years. More than half (54.05%) of respondents reported that tobacco is replacing native food crops. Moreover, 51.30% of tobacco farmers were facing various health hazards due to tobacco cultivation. The present study also investigated that 97.14% of farmers got a high benefit along with 89.19% of respondent's availed organizational support from tobacco marketing companies. The overall satisfaction rate with the price was 80.56%, which was the main contributory factor for tobacco cultivation in the study area. The survey results also identified that farmers from Mithapukur Upazila gave up tobacco cultivation due to health hazards and unnecessarily underestimating the grade of tobacco leaf by the buyer company.

**Keywords:** Farmer, Economic impact, Health impact, Contributory factor, Tobacco cultivation

## INTRODUCTION

Bangladesh is mainly an agricultural country and the national economy is also based on it. Bangladesh has been renowned for growing a large variety of tropical crops particularly rice, wheat, tobacco, jute, pulses, oilseeds, sugarcane, etc. The tobacco industry is prospective and about one percent of our GDP is used in spending on tobacco products (Hassan et al., 2015). Tobacco is now one of the most health threatening items of our earth resources. The hazardous consequences of the tobacco industry are enormous in terms of different environmental factors like deforestation, climate change, impact on biodiversity and ecological imbalance by producing many toxic waste products (WHO, 2017). Globally tobacco is listed as 2nd major reason for the death of the world and the alarming part is that around 5.4 million people lost their lives in a premature stage (WHO, 2008). Tobacco cultivation has negative environmental impacts such as declination of biodiversity, erosion and degradation of the soil, water

pollution and contamination, and an effective rising of carbon dioxide in the atmosphere (Lecours et al., 2012). Every year around the world, 4.3 million hectares of the agricultural land is used for tobacco cultivation resulting in global deforestation between 2% to 4 % and it creates more than 2 million tons of solid waste. It is recorded from 1995 to 2015, tobacco formulation will produce a total of 45 tons of solid, 6 million tons of nicotine waste, and over 4 million tons of chemical waste (Novotny and Zhao, 1999). In large scale tobacco has been brought in the mid-sixties into the fields where food crops were grown, and more extensively after liberation in 1971 by the British American Tobacco Company in Testa silt in Rangpur District area. Rangpur district is in leading position among the tobacco cultivation districts in Bangladesh. According to a DAE report in (2020) Taragonj, Sadar, Gangachara, and Badargonj are the most tobacco producing upazilas (sub-districts) of Rangpur district. Researches show that tobacco farmers are experiencing some health risk in tobacco cultivation areas. It also causes environmental degradation. So, this study was carried out in 5 upazilas of Rangpur district to investigate the influence of tobacco cultivation on environmental degradation along with identifying the main contributing factors for motivating or demotivating tobacco cultivation.

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## MATERIALS AND METHODS

### Selection of Study Area

Among Tobacco cultivation practicing districts, Rangpur district was purposively chosen for the study. The criterion for selecting a site was the availability of tobacco cultivators. Information was collected through personal communication, and own investigation. During the study, a multistage sampling technique was adopted. Among 8 upazilas, 4 upazilas: Badargonj, Taragonj, Rangpur Sadar, and Gangachara were enrolled for data collection from tobacco cultivators, and Mithapukur upazila was selected for collecting information from non-tobacco cultivators (Table 1).

**Table 1:** GPS Location of the Study Area

Study Area (Upazila)	Location (GPS)
Badargonj	89°04' E, 25°43' N
Taragonj	89°06' E, 25°39' N
Rangpur Sadar	89°08' E, 25°49' N
Gangachara	89°11' E, 25°49' N
Mithapukur	89°18' E, 25°31' N

### Tobacco Cultivation Status of Study Area

Intensive cultivation of tobacco is found in Rangpur district among the tobacco farming districts in Bangladesh. According to the DAE (2020) cultivation area in different upazilas was reduced compared to 2015-16. Table 2 shows upazila wise cultivation area and production of tobacco of Rangpur district from 2015-16 to 2018-19.

### Selection of the Respondents

From each upazila, 100 respondents were chosen randomly for interview. A total of 400 tobacco cultivators and 100 non-tobacco cultivators were selected purposively from 5 upazilas. A detailed socio-economic survey was conducted to assess educational status, age, sex, land tenure status, present practices, occupation, and income per annum of tobacco cultivation and impacts on the environment. The respondents were characterized according to their sex, age, and socio-economic status that were presented in Table 3.

**Table 2:** Tobacco Cultivation Status of the Study Area

Upazila	2018-19		2017-18		2016-17		2015-16	
	Cultivation (ha)	Production (MT)	Cultivation (ha)	Production (MT)	Cultivation (ha)	Production (MT)	Cultivation (ha)	Production (MT)
Metro	50	85	25	42	8	13	80	128
Sadar	320	508	250	388	100	161	100	146
Kaunia	3	5	0	0	0	0	0	0
Gangachara	300	512	565	951	500	893	850	1680
Mithapukur	0	0	0	0	0	0	0	0
Pirgonj	0	0	0	0	0	0	0	0
Pirgacha	0	0	0	0	0	0	0	0
Badargonj	17	29	38	62	55	95	65	106
Taragonj	850	1563	510	939	502	842	500	819
Total	1540	2702	1388	2382	1165	2004	1595	2879

Source of Data: DAE 2020

**Table 3:** Respondents' Characterization

1	Sex	Male			Female	
2	Age (Years)	<25	25-35	35-45	45-55	>55
3	Educational Qualification	Illiterate	Primary	Secondary	Higher Secondary	Graduation
4	Farm Size	Small		Medium	Large	
		0.01-0.33acre		0.34-1 acre	>1.0 acre	
5	Occupational Status	Farmer	Business	Service	Student	

### Procedure for Collecting Data

The study was both explorative and descriptive that mixed with qualitative and quantitative data as well as secondary and primary data. The primary data were collected through a structured questionnaire survey, interviews, FGD (focus group discussion), and observations. The secondary data were collected from different sources like the Department of Agricultural Extension (DAE), Rangpur, Bangladesh. The questionnaire survey was conducted based on multistage and purposive sampling which included 50 respondents.

### Data Analysis Technique

Collected quantitative data were analyzed by their frequencies and percentages using statistical software: MS Excel. The Benefit-Cost ratio of tobacco cultivation was calculated by the following formula (Hassan et al., 2015):

$$\text{Benefit - Cost Ratio} = \frac{\text{Total Revenue}}{\text{Total Cost}}$$

Where, Total Revenue is the total outcome of the tobacco cultivation.

## RESULTS AND DISCUSSION

### Socioeconomic Status of Respondents

Respondents' responses were categorized according to their age, sex, occupation, education, and farm size are described here (Table 4).

Table 4 stated that 28% of the respondents were in the age group 45-55 where only 4% of respondents' age was less than 25 years.

Among the respondents 90% were farmer where only 2% were student and 2% service holder who were cultivating tobacco besides their occupation (Table 4).

Research found that farmers with a minimum of education were very much aware of the harmful effects of tobacco cultivation. In this study, 26% of the respondents were illiterate and 34% hardly completed their primary education and 28% passed the secondary level. Eight percent of the respondents completed their graduation and involved with tobacco cultivation. So, it can be stated that the educational status of the farmers is a very relevant factor of tobacco cultivation (Table 4).

**Table 4:** Socio-economic Status of Respondents

Categories	Frequency	Percent (%)
<b>Age Distribution of the Respondents</b>		
<25 years	2	4
25-35 years	9	18
35-45 years	13	26
45-55 years	14	28
>55 years	12	24
Total	50	100
<b>Occupational Status of the Respondents</b>		
Farmer	45	90
Business	3	6
Service	1	2
Student	1	2
Total	50	100
<b>Educational Status of the Respondents</b>		
Illiterate	13	26
Primary	17	34
Secondary	14	28
Higher Secondary	2	4
Graduation	4	8
Total	50	100
<b>Distribution of the Respondents According to Their Farm Size</b>		
Small (0.01-0.33 acre)	5	10
Medium (0.34-1.0 acre)	27	54
Large (>1 acre)	18	36
Total	50	100

In this study, the respondents were classified into small, medium, and large farmers according to their farm size. Table 4 pointed out that 54% of respondents were medium farmer who had 0.34-1.0 acre of land for cultivation.

### Impact Analysis

#### Impact on Soil

According to Table 5, 62.16% of respondents believed that soil is continuously losing its productivity along with 70.27% of respondents agreed on using more chemical fertilizer in their soil than ever before (Table 5).

Survey result also depicted that 43.24% of the respondents believed that soil productivity is decreasing too much and 35.14% of the respondents said that they are increasing too much use of chemical fertilizer every year (Table 5).

So, it can be indicated that soil productivity is decreasing day by day due to tobacco cultivation and farmers are increasing chemical fertilizer application every year. Moula et al. (2018) in their study on

Bheramara Upazila in Khustia District found that frequent farming of tobacco in the same land reduced soil fertility in almost all tobacco plots. Geist (1999) reported that tobacco cultivation decreases soil fertility than any other crop as it absorbs more nitrogen, phosphorus, and potassium than other cultivating crops. He also added that two specific method of tobacco cultivation – topping and suckering gain a high level of nicotine and more leaves that also decreases soil fertility. Yanda (2010) found in his study that tobacco cultivation caused a severe level of soil degradation in Tanzania. Similar findings were also found by Hossain et al. (2013).

### **Impact on Air**

Survey result illustrated that 54.05% of the respondents gave a negative response on the impact of tobacco cultivation on-air. Whereas 18.92% reported that the impact of tobacco cultivation on-air was too much (Table 6).

Ali et al. (2015) in their study found a significant effect of tobacco processing on air pollution. They also claimed that 80% of respondents reported too much impact of tobacco processing on air pollution. Lecours et al. (2012) reported that tobacco cultivation causes air pollution and other environmental degradation.

### **Impact on Social Environment**

Table 7 demonstrated that 54.05% of the respondents reported that people are changing their selection of crops, even some cases changing occupations and getting interested in tobacco cultivation. Having tobacco cultivation improves their social status because they believed that tobacco could ensure their money flow thus improve their lifestyle. The most important fact is that 78.38% of the respondents had a positive opinion about the involvement of their family members in tobacco farming. So, it can be said that tobacco cultivation has its impact on the social environment also.

**Table 5: Impact of Tobacco Cultivation on Soil**

Sl. No.	Farmer's Response			Response (%)	
				Yes	No
1.	Soil Productivity is Decreasing due to Tobacco Cultivation			62.16	37.84
	Degree of Impact on Soil Productivity				
	Too Much-43.24%	Much-5.41%	A Little- 10.81%	Very Little-2.70%	
2.	Farmers Need to Provide more Chemical Fertilizer Each Year for Production			70.27	29.73
	Degree of Using Chemical Fertilizer				
	Too Much-35.14%	Much-27.03%	A Little- 2.70%	Very Little-5.41%	

**Table 6: Impact of Tobacco Cultivation on Air**

Sl. No.	Farmer's Response			Response (%)	
				Yes	No
1.	Air is Being Polluted due to Tobacco Cultivation			45.95	54.05
	Degree of Impact on Air				
	Too Much-18.92%	Much-8.11%	A Little- 18.92%	Very Little-10.81%	

**Table 7: Impact of Tobacco Cultivation on Social Environment**

Sl. No.	Farmers' Response	Response (%)	
		Yes	No
1.	Discrimination is being happened in society due to tobacco cultivation	37.84	62.16
2.	Addiction is increasing in youth due to tobacco cultivation	21.62	78.38
3.	People are changing their selection of crop and occupation by getting interested in tobacco cultivation	54.05	45.95
4.	Tobacco cultivation impacts on your social status	54.05	45.95
5.	Tobacco cultivation hampering family peace	29.73	70.27
6.	Child labor is increasing due to tobacco cultivation	16.22	83.78
7.	Family members are getting involved in tobacco cultivation	78.38	21.62
8.	Education of family members is hampered due to tobacco cultivation	27.03	72.97

Tobacco poses health problems with negative impacts on the quality of living of the farmers and reported the involvement of family members in tobacco farming. Rimmer (2004) indicated that since casual agricultural workers are nearly impossible to find, farmers are forced to use their families to help them cultivate and perform other physically demanding tasks in the fields.

### Impact on Economic Status of Farmers

The survey results also explained that almost all the tobacco growers were benefited from tobacco cultivation (97.14%) and they were getting help from different tobacco companies (89.19%). Fixed markets were available in the respected area (97.30%) where tobacco growers can sell their products and they were also satisfied with the company price (80.56%). Among the respondents, 51.43% were much benefited and 58.33% were much satisfied with the price (Table 8).

Hossain and Rahman (2013) in their study on socio-economic analysis of tobacco cultivation in Kushtia district of Bangladesh found that 95.4% of respondents said that tobacco cultivation is more profitable and 61.5% of respondents said that they are getting loan or financial support from the tobacco company.

### IMPACT ON PUBLIC HEALTH

In the study area, tobacco farming was becoming a threat to public health where 51.35% of the tobacco growers, were facing different kinds of health hazards where headache and coughing are the major health problems (Table 9).

Similarly, Arcury et al. (2003 a, b) in their study found that up to 89% of workers can contract the green tobacco sickness (GTS) during cutting, manual harvesting, and manual loading of tobacco processing caused by a nicotine absorption into the skin and the respiratory system. They also reported that symptoms of intoxication include drooling, vomiting, nausea, migraine, diarrhea, respiratory distress, heart rate changes, and increased blood pressure among the tobacco workers, and not only for smoking damage but also the reason is that tobacco is cataloged in the poison of toxic plants for humans. Hu and Lee (2016) reported similar health problems in China, Tanzania and Kenya. According to WHO (2017) tobacco use is a threat to every person, regardless of sex and age and about 80% of premature deaths related to tobacco occur mainly in several low- and middle-income countries. In the study of Paul et al. (2019), farmers reported that they are experiencing breathing difficulties during fertilizer and pesticide application in the tobacco field.

**Table 8:** Impact of Tobacco Cultivation on Economic Status of Farmers

Sl. No.	Farmer's Response	Response (%)	
		Yes	No
1.	Farmers are Benefitted from Tobacco Cultivation	97.14	2.86
	Degree of Benefit		
	Too Much-22.86%	Much-51.43%	A Little-25.71%
2.	Farmers are getting support from the tobacco company	89.19	10.81
3.	Farmers are selling their products in the fixed market	97.30	2.70
4.	Farmers are satisfied with the price given by the tobacco company	80.56	19.44
	Degree of Satisfaction		
	Too Much-11.11%	Much-77.78%	A Little-11.11%

**Table 9:** Impact of Tobacco Cultivation on Public Health

Sl. No.	Farmer's Response	Response (%)		
		Yes	No	
	Farmers are Suffering from Health Hazard due to Tobacco Cultivation	51.35	48.65	
	Health Hazards that Farmers are Suffering from	Health hazards	Response (%)	Ranking
		Headache	19.10	1
		Coughing	17.98	2
		Vertigo	16.85	3
		Vomiting	15.73	4
		Asthma	14.61	5
		Spot in Skin	6.74	6
		Eye irritation	6.74	6
Gum disease	1.12	7		

### Impact on Food Crops

Table 10 stated that farmers have already replaced seasonal food crops like rice, wheat, potato, pulses, vegetable, and maize for tobacco cultivation that harms the national economy. According to survey results, 25.49% of respondents replaced seasonal rice and wheat from fields due to tobacco and ranked as one. The following rankings are potato, pulses, vegetables, and Maize.

Kutub and Falgunee (2015) in their case study of Doulotpur, Kushtia found that tobacco cultivation is destroying traditional food cultivation responded by 54% of the respondents. Mollah (2010) in his study also expressed that the cultivation area and production of food crops started declining in the study area. He also added that the crop diversity reduced due to tobacco cultivation and only rice and some vegetables are grown in kharif season.

### Contributory Factors behind Tobacco Cultivation

Tobacco cultivation declines soil fertility. It has the involvement of the family members in the cultivation and it also causes some public health hazards. Despite these negative effects, farmers are getting interested in tobacco cultivation mostly due to the availability of a fixed market, high benefit from tobacco cultivation, organizational support from tobacco companies, and their satisfaction with the price provided by the tobacco companies (Table 11).

From survey outputs, availability of fixed market along with high cash benefit provided by tobacco marketing companies promotes the tobacco farming in the study area, and more than 97% of respondents went assertive with these points. Organizational support from tobacco marketing companies as well as satisfactory selling price from tobacco marketing companies also played a potential role in excelling in tobacco farming in the area. Zohir (2001) in his study reported that farmers are getting interested in tobacco cultivation for its lucrative profitability compared to other crops that completely supports the study. Islam et al. (2010) in their study found that lack of alternative means of livelihood was another reason behind tobacco cultivation on the fertile banks of some rivers like Matamuhuri, Sangu, and Karnafuli.

### Factors behind Leaving Tobacco Cultivation

Survey results from Mithapukur upazila of Rangpur district revealed some hidden factors behind leaving tobacco cultivation (Table 12). Survey results confirmed that 44% of respondents gave up tobacco cultivation due to health problems caused by tobacco processing and curing. More than one quarter (26%) of farmers faced an economic problem like lower prices given by the tobacco company and unavailable market for non-registered farmers. Less than one fifth (18%) farmers left tobacco due to unsatisfactory dealing of the tobacco company for unusual lower grading of the tobacco leaf and giving a lower price.

**Table 10:** Impact of Tobacco Cultivation on Food Security

Sl. No.	Farmer's Response		Response (%)	
			Yes	No
1.	Tobacco Cultivation is Replacing other Food Crops		54.05	45.95
	Crops that are being Replaced by Tobacco	Crops	Response (%)	Ranking
		Rice	25.49	1
		Wheat	25.49	1
		Potato	21.57	2
		Pulses	13.73	3
		Vegetable	11.76	4
Maize	1.96	5		

**Table 11:** Contributory Factors of Tobacco Cultivation

Sl. No.	Factors	% of the Respondents		
		Yes	No	Ranking
1.	Availability of fixed Market for selling tobacco provided by tobacco marketing companies	97.30	2.70	1
2.	High cash benefit proposed by tobacco marketing companies	97.14	2.86	2
3.	Organizational support from tobacco marketing companies	89.19	10.81	3
4.	Satisfactory selling price is given by tobacco marketing companies	80.56	19.44	4

**Table 12:** Factors behind Leaving Tobacco Cultivation

SL No.	Factors	Percent (%)	Rank
1	Health problem	44	1
2	Economic problem	26	2
3	Collision with tobacco company	18	3
4	Agricultural problem	8	4
5	Social problem	4	5

Park et al. (2018) found in their study that the actual profit of tobacco is not so attractive because farmers do not count their free labor cost as well as the free labor of their family members. Chowdhury (2001) reported in his study that most of the tobacco farmers are deprived of the profit from tobacco by denying a fair price of their products through unscrupulous activities of the middlemen, money lenders, and hostile BAT officials. It is reported that tobacco has only one market provided by the tobacco companies and their agents usually fix the price based on the grade of the tobacco leaves. In this case, farmers faced a loss for not knowing much about the grade of tobacco leaves. Ali et al. (2015) reported that farmers are compromising the negative impact of tobacco cultivation because of economic factors. All these statements strongly support the findings.

### **Benefit-Cost Ratio**

The Survey result found that the total production cost of tobacco cultivation was 160,000 Tk (BDT) per acre when farmers usually sell their products of 1 acre for 200,000 Tk (BDT). So, the benefit-cost ratio was 1.25. Hassan et al. (2015) found a similar result that the benefit-cost ratio of his study was 1.29.

### **CONCLUSION**

Tobacco cultivation has serious environmental consequences. This study focused on the impact of tobacco cultivation on environmental degradation, more specifically on soil, air, social-environment, economic status of farmers, public health, and food security. By analyzing the above factors, the contributory factors of tobacco cultivation and the factors behind leaving tobacco cultivation were also identified. Research findings revealed that soil productivity is decreasing in the tobacco field of 62.16% of tobacco farmers and 70.27% of tobacco farmers are using more chemical fertilizer per year than the previous year. More than half (54.05%) of respondents reported that tobacco is replacing

commonly cultivated food crops. Moreover, 51.30% of tobacco farmers are facing some health hazards due to tobacco cultivation. The present study revealed that 97.14% of farmers are getting a high benefit, 89.19% getting organizational support and 80.56% of farmers are satisfied with the price given by the tobacco company which is the main contributory factors for tobacco cultivation in the study area whereas farmers gave up tobacco cultivation in Mithapukur upazila due to health hazards and unnecessarily underestimating the grade of tobacco leaf. The benefit-cost ratio was found at 1.25. So, it can be said that tobacco cultivation made the cultivated area environmentally vulnerable and unhealthy for living and it also hampers the social environment. It is high time to take necessary steps on preventing environmental degradation caused by tobacco farming. Farmers will leave tobacco cultivation if the government can take initiative measures to ensure alternatives profitable food-producing crop cultivation as tobacco farming.

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