

Farmers' experiences on problems and prospects of betel leaf cultivation in Teknaf peninsula of Bangladesh

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Abstract

A survey was conducted on September 2013 to know the problems and prospects of betel leaf cultivation. It was found that 64% farmers were cultivating betel leaf in and around forest area. Most of the farmers (70%) opined drought as the major problem in betel leaf cultivation followed by lack of technology and management, disease and insect infestations, insufficient inputs and labour. Harvesting of large amount of shading materials from forest area for construct *boroj* degraded the ecosystem and biodiversity. However, farmers were interested in betel leaf cultivation due to high return and availability of shading materials. Some farmers cultivated inter-crops that helped them for consumption and high income. Family members of household were engaged in various activities in betel leaf cultivation. Alternate income generation, shading materials, developing eco-friendly farming, plantation program and community awareness program would be helpful to conserve ecosystem.

INTRODUCTION

Betel leaf (*Piper betel*) is locally known as paan, which has an important socio-cultural and ceremonial uses, besides having significant medicinal properties and nutritional values [1]. Betel leaf is beneficial to the throat and removes viscosity in human beings. It helps in digestion and removes the bad smell of mouth. It is also good for respiratory system and used in treatments of various diseases such as bronchitis, cough and cold [2]. Betel leaf cultivation has vast potential as it plays an important role in economics and livelihood of people in South Asia [3, 4]. However, betel leaf plant is sensitive to pest, diseases and weather, which requires intensive care, management and high inputs [5]. Betel leaf plant grows well under shade with low light intensity, mild temperature (15 to 30°C), high humidity with 2250 to 4750 mm annual rainfall [4]. In an area with lower rainfall, however, betel leaf can be grown with frequent irrigation throughout the growing period. In general, betel leaf is grown under shaded condition in a structure called as *boroj*, which is a small hut approximately two meter in height. It is constructed with locally available materials like bamboo stems, jute sticks, paddy straw, petioles and leaves of banana etc.

Betel leaf is cultivated in many areas of Bangladesh. The production area of betel leaves was increased by 10%, while the yield was decreased by 5.5% in 2010-2011 compared to five years ago [6]. Nowadays, betel leaf is intensively cultivated in some parts of Teknaf Peninsula and the increment rate of area has been increased over 50% compared to that in five year ago [7]. Betel leaf cultivation has become a major source of subsistence and has been extended in forest area by clearing forest resources such as tree, pole, vine and undergrowth. About 10% forest area of Teknaf Peninsula is consumed by betel leaf cultivation [8]. The resources of whole forest area are being used in betel leaf cultivation for *boroj* construction both in plain and slope areas. Although the area for betel leaf cultivation is increasing tremendously, the yield is not increasing. Moreover, over exploitation of forest resources for *boroj* construction creating various ecological problems in the area. The aim of this article is to know the problems encountered by the farmers in betel leaf cultivation and its impacts on forest resources; and to investigate the prospects of betel leaf cultivation in Teknaf peninsula of Bangladesh.

MATERIALS AND METHODS

A. Characteristics of the study site

Teknaf upazila, under Cox's Bazaar district, is located at the southeast corner of Bangladesh where hill and coastal ecosystems are dominated in a narrow space [7]. The study was conducted in Baharchara union under Teknaf upazila (Fig. 1) in September 2013. Bangladesh Government has declared the area as ecologically critical area. The area is characterized by subtropical climate with a temperature range between 15 and

33°C during winter (January) and summer (May), respectively. In general, huge rain occurs and the total annual rainfall is around 5000 mm. The rainfall, however, is not well distributed at monthly basis. More than 70% of rainfall occurs during monsoon (June to August) and few rainfall occurs during dry season (December to March).

B. Survey

A survey on betel leaf cultivation was done to know the problems and prospects. A total 50 betel leaf farmers were selected randomly for interview. In order to collect information from the respondents, an interview schedule was prepared carefully keeping the objective of the study in mind. The interview schedule contained both open and closed questions. Data were collected through one to one interview during December 2012. Focus Group Discussion (FGD) was conducted for getting general information on betel leaf cultivation and livelihood of the respondents.

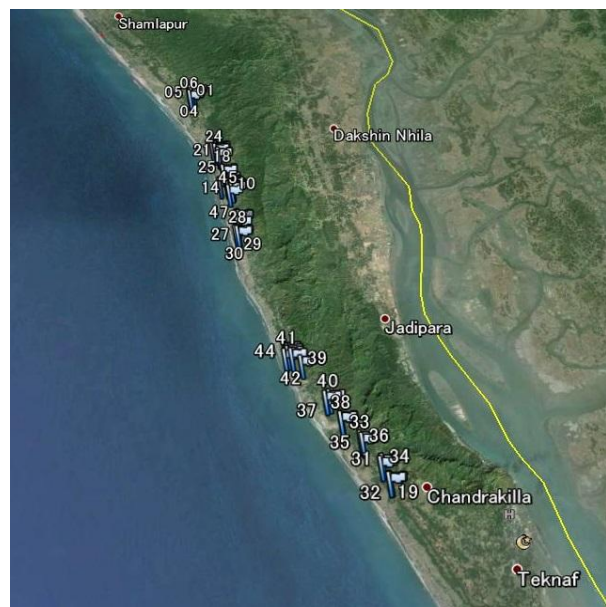


Fig. 1. Map of the study area and sampling locations

C. Secondary information

Secondary information was collected from Upazila Agricultural Office, Department of Agricultural Extension (DAE) and Range Office, Cox's Bazaar South Division, Forest Department (FD).

D. Data analyses

Statistical analysis was done to analyze data obtained from the survey. MS-Excel and Statistical Package for Social Science (SPSS) programs were used to process all collected information by computer. Descriptive statistics such as frequency and percentage distribution were employed to analyze data.

RESULTS AND DISCUSSION

A. Demography of the respondents

Age is one of the important factors that helps farmers to participate in various farming activities. Most of the surveyed farmers (61%) were middle aged (35-50 years old) followed by old aged (24.5%) and young aged (14.5%). It indicated that mostly middle aged people were engaged in betel leaf cultivation (Fig. 2).

Education makes people cosmopolite and helps to adopt new information and technologies. More than half (56%) of the farmers were illiterate, while 30% and 14% farmers had primary and secondary education, respectively (Fig. 3). It was observed that most of the farmers had no formal education that may affected their better understanding on environmental consensus regarding the farming activities.

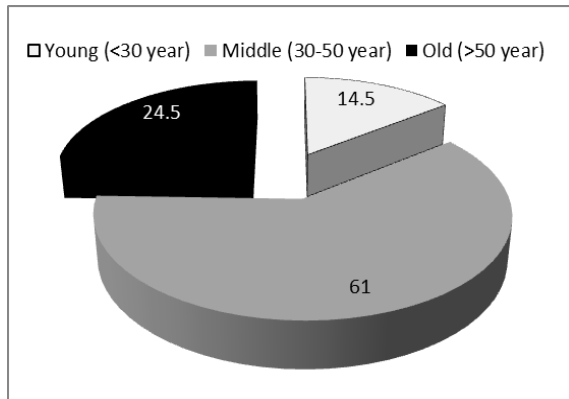


Fig. 2. Distribution of the respondent farmers according to age group

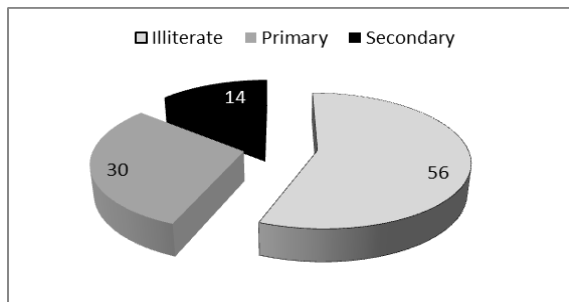


Fig. 3. Distribution of the respondent farmers according to education level

B. Land use system for betel leaf

Betel leaf cultivation became one of the main enterprises for subsistence in the study area. Land use system for betel leaf cultivation is interesting. In the study area, two major land topographies are found i.e. plain land (mainly owned by local people) and slope land (owned by forest department). Among the respondents, only 36% farmers cultivated betel leaf in their own land (plain land) and the rest (64%) of the farmers cultivated in slope land (mainly forest land). About 30% and 34% farmers got lease from the forest department (FD) directly and via other people, respectively (Fig. 4).

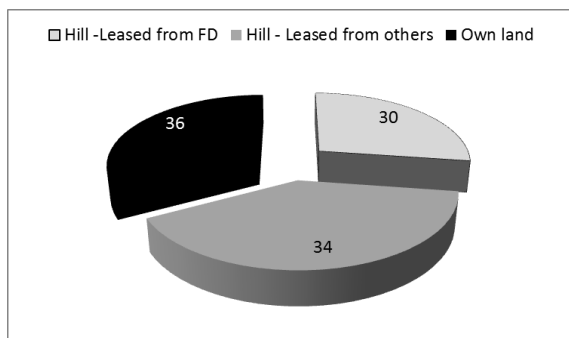


Fig. 4. Distribution of the respondent farmers according to land use system for betel leaf cultivation

C. Problems encountered in betel leaf cultivation:

Although betel leaf became a major crop and the area coverage has been increased remarkably, the production per unit area is not satisfactory. Farmers opined some problems that were being encountered by them, which is demonstrated in Table 1. Most of the respondent farmers (70%) opined drought (lack of moisture) as the major problem in betel leaf cultivation. Among them, 42% ranked it as the severe problem. Farmers had to apply irrigation water once or twice in a week. However, the availability of irrigation water is limited. Over use of irrigation water from ponds and other sources for betel leaf cultivation hampers other crop cultivation and depletes biodiversity. In general, cutting of betel leaf is transplanted during August to October when there is a plenty of moisture in soil. Although heavy rainfall occurs in the study area, but the monthly distribution is not even and the dry season starts from November. At the vegetative stage of betel leaf, rainfall as well as soil moisture is scarce; therefore irrigation is indispensable for better production [7].

Lack of technology and management was identified as the second major problem in betel leaf cultivation. Betel leaf is not a major crop in Bangladesh. Therefore there is lack of suitable technology. Moreover, due to poor education level and access to the information, farmers were not able to use modern technologies. Disease and insect infestations, and poor marketing were faced as third major problem by the respondent farmers. Betel leaf is consumed as green leaf, which is also very easy to rot. Therefore, betel leaf cannot be stored for long time and the market value becomes low. Wilt, leaf spot, stem rot and powdery mildew were some common diseases, while scale insect, mite, aphid and mealy bugs were reported as major pests. Betel leaf cultivation is input (water, fertilizer, pesticide etc.) and labor intensive. In some cases, inputs were either not available or expensive, hence making trouble in cultivation process. Insufficient input and labour were mentioned as the fourth biggest problem. Lack of good planting materials and post harvesting processing was also reported as problems and were ranked fifth and sixth, respectively.

Betel leaf is a shade loving crop and its quality and production cannot be ensured without shading. Mostly farmers use bamboo, sungrass, forest poles (from different species) and grasses as shading materials and making the *boroj* (structure). Nowadays, unavailability of shading materials is one of the reasons to reduce the production and cultivation area particularly in plainland. In the study area, however, it was not found as a big problem. It indicated that beside favorable climatic and edaphic conditions, availability of shading materials helped to expand the production area.

Table 1. Problems encountered by the farmers in betel leaf cultivation in Tenkap peninsula of Bangladesh

Problem	Degree of severity			
	1 st	2 nd	3 rd	Rank
Drought	42	14	14	1
Disease and insect infestation	8	36	16	3
Lack of technology and management	28	22	14	2
Insufficient input and labour	24	16	26	4
Lack of good planting materials	22	18	14	5
Poor marketing	16	12	22	3
Post harvesting processing	14	18	18	6
Availability of shading materials	4	14	18	7

D. Impacts and Prospects

Most of the people are poor in the study area. They do not have much opportunity to generate income. However, there are huge natural resources and local people are largely depend on those resources for their subsistence and livelihood. Farmers could get substantial amount of income from betel leaf cultivation with low investment.

Betel leaf is intensively cultivated in the study area with huge inputs including agrochemicals. Excessive use of

pesticides and other agrochemicals developing resistance power of insects and pathogens. At the same time, it also makes soil environment unsuitable for crop production. These problems have been accelerated by climate change and anthropogenic activities as well.

In general, farmers collect shading material from forest area for borj construction, which may play important role in depleting forest resources and degrading ecosystem. It was observed that 82% respondents understood that forest resources have been destroyed due to betel leaf cultivation. Few farmers were interested to stop betel leaf cultivation at the present situation. However, farmers suggested some points that would help to reduce the risk of forest ecosystem degradation. Among them, alternate income generation was mostly opined by the farmers, followed by alternate sources of shading materials, developing eco-friendly farming, providing government support, starting intensive plantation program and launching community awareness program.

It was found that some farmers (26%) planted trees in their borj. Among the trees, betel nut and mango were found dominant. Farmers opined that those trees would help to reduce the use of pole and also to generate additional income. On the other hand, 64% farmers cultivated other seasonal crops as intercrop in the borj. The most commonly cultivated crops were bitter gourd, sponge gourd, sweet gourd, cucumber, country bean, coriander and chili. Farmers were interested in intercropping as it increased income, overall production, land use and helped to reduce the infestation of insects and diseases. Most of the farmers cultivated intercrops in borj for their family consumption.

Most of the cultivation activities were operated by the farmer himself along with hired labour. It was found that other family members were also helping in pit preparation, fertilizer application, transplanting, intercultural operation, harvesting and marketing (Table 2). It indicated that betel leaf cultivation created employment opportunity for the family members.

Table 2. Labour distribution in various activities of betel leaf cultivation

Labor categories	Engagement (%)			
	Farmer himself	Wife / mother	Children /brother	Hired labor
Pit preparation	100	34	16	88
Fertilizer application	100	20	12	72
Transplanting	98	24	18	74
Intercultural operation	100	28	18	72
Harvesting	100	24	12	78
Marketing	100	18	12	66

CONCLUSION

Betel leaf cultivation has been expanded tremendously in the study area. Farmers encountered various problems in cultivating betel leaf such as lack of soil moisture (drought), lack of suitable technology and management, disease and pest infestation, insufficient inputs etc. However, shading materials for construction borj was not a big problem. Use of various agrochemicals in intensive betel leaf cultivation was found depleting soil fertility and crop productivity. Collecting a large amount of shading materials from forest area for construction borj also degraded the ecosystem and biodiversity. Farmers got substantial amount of income and benefit from betel leaf cultivation, which was very helpful for their livelihood and subsistence. It was found that family members were engaged in various activities in betel leaf cultivation. To conserve the ecosystem, it is essential to introduce high value crops for income generation, find alternate source of shading materials, develop eco-friendly farming, provide government support, start plantation program and launch community awareness program. Moreover, zoning to betel leaf cultivation with environment friendly design should be developed by joint effort of researchers, development workers, farmers and policy makers.

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REFERENCES

- [1] <http://www.dawn.com/news/33381/betel-leaf-farming-in-coastal-area>
- [2] RN Chopra, SL Nayar and IC Chopra. 1956. *Glossary of Indian Medicinal Plants*, pp.194. CSIR, New Delhi.
- [3] JH Jeng, SY Chen, CH Liar, YY Tung, BR Lin, LJ Hahn and MC Chang. 2002. Modulation of platelet aggregation by areca nut and betel leaf ingredients: Roles of relative oxygen species and cyclooxygenase. *Free Radical Biology and Medicine*, 32 (9): 860-871.
- [4] P Guha. 2006. Betel Leaf: The Neglected Green Gold of India. *J. Hum. Ecol.*, 19(2): 87-93.
- [5] BL Jana. 1996. Improved technology for betel leaf cultivation. A paper presented in the "Seminar-cum-Workshop on Betel leaf Marketing", held at State cashew nut farm, Directorate of Agricultural Marketing, Digha, Midnapur (W. B.), India, June 5-6, 1996.
- [6] BBS. 2011. Yearbook of Agricultural Statistics of Bangladesh. Planning Division, Ministry of Planning, Govt. of the People's Republic of Bangladesh, Dhaka.
- [7] MA Rahman, K Asahiro, M Tani, AZM Moslehuddin and MZ Rahman. 2013. Impacts of Climate Change and Land Use on Forest Degradation in Teknaf Peninsula. In: Proceedings of the International Conference on Environmental Aspects of Bangladesh (ICEAB 2013), 32-35.
- [8] M. Tani. 2012. Betel Leaf Cultivation on Forest Loss in the Teknaf Peninsula. In: Proceedings of the 3rd International Conference on Environmental Aspects of Bangladesh (ICEAB 2012), 3