ABSTRACT

Introduction

Dinhata occupies a unique place in non-FCV tobacco cultivation producing with the capability of good quality which grown during the Rabi season on alluvial sandy loam to silty loam soils under irrigated conditions. Thousands of people are engaged in the production, manufacture and distribution of tobacco. But recently cultivation of tobacco is facing challenging problems in view of the growing anti-tobacco campaigns world over against health hazard. In the other hand, the Government of India signed World Health Organization Framework Convention on Tobacco Control (WHO-FCTC) treaty. It is imperative that the area under tobacco cultivation ought to be reduced to 50% by the year of 2020. These issues are posing a serious challenge to tobacco farmers. So the farmers who depend on tobacco production for their livelihood, will therefore be left with no option but to seek other alternative crops to produce. It is therefore necessary to develop a systematic approach to facilitate the production of land suitability information and cost-benefit analysis for alternative crops instead of tobacco. Hence the present researcher tries to find out the environmental and economically sustainable alternative crops of tobacco in different physico-cultural environment of Dinhata subdivision.

The Area of Study

Dinhata subdivision is situated south-eastern part of Koch Behar district, extends from 25^0 57' 24'' to 26^0 14' 06'' north latitudes and 89^0 15' 17'' to 89^0 37'36'' east longitudes covering 764.84 sq km. area. The subdivision is divided into three administrative blocks namely Dinhata-I, Dinhata-II and Sitai. There are 33 Gram Panchayet and 307 Mouzas in this subdivision.

Objectives of the study

1. To study physical and cultural background of the study area.
2. To investigate the present status of tobacco cultivation of the study area.
3. To assess whether Govt. strategies in tobacco control are likely to affect the cultivation of tobacco of the study area.
4. To make land evaluation for best alternative crops of tobacco of the study area.

5. Identify significant constraints faced by tobacco farmers trying to shift out of tobacco production.
6. To study a comprehensive overview of the economic aspects of tobacco farming and to assess economically viable alternative crops to tobacco cultivation of the study area.
7. To suggest recommendations for policy makers aimed at assisting tobacco farmers' shift from tobacco cultivation to alternative crops.

Hypotheses

I. Profitability of tobacco cultivation emerges from the fact that most farmers economize on the cost of labour required for producing this highly labour intensive crop by using farmer's household labour especially of women and children.

II. Net returns from tobacco are less than from many other crops, and the economic condition of farmers would benefit from a switch from tobacco to other crops.

III. As proposed by World Health Organization Framework Convention on Tobacco Control for 50% reduction of the area under tobacco cultivation by 2020 AD, there is possibility for farmers to switch over from tobacco towards alternative crops for exploring viable and profitable substitutes to tobacco.

IV. If irrigation and credit facilities are provided farmers would divert their landholdings away from tobacco to more profitable crops.

Methodology

The present study was based on both primary and secondary data. Relevant primary data were collected from the sample farmers in Dinhata sub division through survey method with the use of schedule and questionnaire. A simple random sampling design without replacement was adopted for household survey. Following this method 240 farmers selected, out of which 120 famers are observed to cultivate tobacco crop.

- The climatic suitability evaluation is prepared by parametric method followed by FAO qualitative system. First of all, the climatic indices are calculated from the individual rating. Then, climate index has been calculated based on khiddir's square root method. Land suitability evaluation have been prepared by Analytical hierarchy process through geographic information system.

- For compare profitability of the target commodities to understand whether or not tobacco cultivation is more profitable than alternative crops, a cost-benefit analysis is used for each data set.
- Maps were prepared under GIS platform. Arc GIS 10.3 software were used to accomplish the spatial database creation. Finally Microsoft office was used for the documentation and calculations pertaining to the study.

Findings and conclusions

The study has been arranged into eight chapters. The chapter one deals with the objectives, hypothesis, review of literatures and methodologies. The second chapter provides an understanding of the physical, cultural and agronomic characteristics of Dinhata Subdivision. The third chapter incorporates types, species and cultural practice of tobacco; export and trade scenario of manufacturing tobacco; trend of tobacco cultivation, and negative impact of tobacco farming on environment and social impact briefly analyzed. The fourth chapter has been analysis present issues regarding tobacco cultivation in National perspective. The fifth chapter attempts to evaluate climate and soil site suitability for five alternatives crops to tobacco such as maize, potato, mustard, wheat and boro paddy, with the help of parametric and analytical hierarchy process using GIS. The Sixth chapter deals with an analytic study of cost and profitability of jati tobacco, motihari tobacco, maize, potato, mustard, wheat and boro paddy, with the help of statistical tools. The Chapter Seventh attempts to analyze perception of tobacco and non-tobacco farmers to identify of suitable crops for replacement of tobacco in the study area. The eighth and last chapter has been presented with summary and policy Implications.

- The geological formation of the study area is the Alluvium from present day formation to ancient times deposited by Singimari, Dharala, Baniadah rivers. The entire study area is essentially a flat country with minor undulation and low south easterly slope. The agro-climatic condition of this subdivision is characterized as humid and damp throughout the year with high rainfall during pre-kharif (March to May) and Kharif season (June to September). The overall mean annual rainfall was 2909.88 mm, with standard deviation 658.39 mm and coefficient of variation 22.62 %. The annual rainfall of 2800.5 mm with 105 rainy days and 2487.2 mm rainfall and 91 rainy days may be expected with 51.24% and 75.64 % probability level, respectively. The present research reveals that in kharif season rainfall is adequate

for agriculture and summer season rainfall would be helpful for summer ploughing operation but rabi cultivation needs irrigation planning. The average monthly humidity in the study area is 76.66 percent. It could be observed from the data, the winter starts by December and carries on till February and this period is perfect for rabi crop cultivation in the study area. Ground water in the study area is good and potable for both agricultural and domestic purposes as the concentration of chemical constituents are within the permissible limit except for high Fe-contents in localized pockets.

- As per 2011 census of India, Dinhata subdivision had a population 676792 out of which 348625 were males and 328167 were females and density of population was 978 persons per sq km and literacy rate 72.27 percent. Agriculture is the mainstay of life of the people of the study area. On an average size of holding is 4.1 acre, which ranges from 1.71 acre in the marginal size group to 9.22 acre in the large size group. Boro paddy, maize, potato, wheat, mustards and tobacco are majors rabi crops grown in the study area. There are no major irrigation schemes worth mentioning in the subdivision. At present about 54.33% of the cultivable area is under irrigation.
- Tobacco as a 'crop' is harmful in many ways. A number of concerns have been raised about the impact of tobacco cultivation on the farming families who are grown the crop. Among these there are direct impact on soil depletion, pollution of water from excessive use of chemical fertilizers, the enormous other environmental impact, health and socioeconomic costs associated with its production. Moreover, in terms of seasons and land covered, tobacco cultivation plays an effective role in replacing food and other important commercial crops such as Jute, Maize etc. in the study area. In spite of negative impact of tobacco cultivation, its production has been increasing at an average annual rate of 3.5% (2006-12) in Dinhata sub-division. It is also revealed that the provision of support for economically viable alternative activities are not covered in any Indian Act. Since they are not legislative measures.
- The result of climatic suitability showed that potato and wheat had high suitability (S1), with suitability rating 94.45 and 85.05 percent respectively and boro paddy, maize and mustard were moderately suitable (S2) with suitability rating 67.63, 77.92 and 62.59 percent respectively. The soil fertility map reveals that maximum percentage of the study area have low fertility group (51.12%) and only 26.70% area cover high fertility group. This implies high probability of multiple soil fertility

problems for crops in the study area. In general Sitai block possesses comparatively better position in term of soil fertility status than Dinhata-I and Dinhata-II blocks.

- Result of the land suitability evaluation for maize, potato, boro paddy mustard and wheat indicated that highly suitable class (S1) accounts 15.29%, 15.88%, 14.52%, 13.46% and 16.90% while moderately suitable (S2) constitutes 30.99%, 29.01%, 29.06%, 29.62% and 25.01% and the marginally suitable (S3) are 32.14%, 33.38%, 34.69%, 34.62% and 35.43% respectively. Whereas not suitable (N) areas for maize, potato, boro paddy mustard and wheat accounts 21.58%, 21.73%, 21.73%, 22.31% and 22.66% respectively. It is found that better alternative crops exists for replacement of tobacco cultivation in the study area.
- The primary consideration for alternative crops to tobacco were maize, potato, wheat, mustard and boro paddy. The cost-benefit analysis shows that cultivating potato (Rs.55424/ hectare), maize (Rs.40316/ hectare) and boro paddy (Rs.38851/ hectare), gave higher gross profit than motihari tobacco (Rs.34610/ hectare) in the study area. The average net profit was highest for potato (Rs.41846/ hectare), followed by maize (Rs. 31917/ hectare), jati tobacco (Rs.31820/ hectare), boro paddy (Rs.30110/ hectare), motihari tobacco (Rs. 14967/ hectare), mustard (Rs.5913/ hectare) and wheat (Rs.3422/ hectare). The data indicate that average cost-benefit ratio in respect of operating cost was higher in boro paddy (1.5), maize (1.37) than jati tobacco (1.03) and motihari tobacco (0.92). Average return to total cost was also higher in boro paddy (0.87), maize (0.84), and potato (0.46) than jati tobacco (0.34) and motihari tobacco (0.25), and hence these can be economically viable alternatives to tobacco. To identify significant constraints faced by tobacco farmers trying to shift out of tobacco production, various aspects of Farmers perception were work out. The majority (68.33%) of current tobacco farmer will continue to cultivate tobacco in the next cropping season. The factors given were farmer's experience, suitable soil and climatic condition for tobacco growing and profitability of tobacco cultivation. Whereas 25.83% non-tobacco farmer will shift to tobacco cultivation in the next cropping season. The reason given were suitable soil and climate, good price of tobacco cultivation and good source of income or profitable. For those who were shifting from tobacco to non-tobacco crops in the next cropping season, unprofitability, high input cost, fluctuation of price, farmer preference, high labour requirement, and disease prevalence were the major factors given by the respondents.

For those shifting from non-tobacco to tobacco, the major reason given were suitable soil and climate and good price of tobacco for tobacco in the market. Maize and boro paddy were the preferred crops by the tobacco farmers who intend to shift into these crop in the next cropping season. Majority of the tobacco farmers have expressed their willingness to divert area from tobacco to others crops subject to availability of irrigation and credit. If irrigation and credit facilities are provided most of the farmers will divert their landholdings away from tobacco to boro paddy and potato respectively.

Policy implication

- In the study area it has become apparent that maize, boro paddy, potato, mustard and wheat are equally suitable for climate and soil, covering large percentage of study area, which is an indication that those crops can be viable substitutes for the cultivators' practice to remove the ill effect of traditional tobacco cultivation.
- Cost benefit analysis reveals that the of maize and potato can be economically viable alternative cash crops than tobacco and boro paddy can also be profitable alternative food crop than tobacco in Dinhata subdivision.
- Owing to growing popularity of maize among tobacco farmers in the study area since recent past, it can be taken as a promising alternative cash crop to tobacco as involved farmers are aware of the ill effect of tobacco. Other crops like potato, boro paddy with significant suitability as assessed by the investigator both from physical and economic point of view can be taken by the farmers as second choice along with some season specific vegetables which also grow well in this region as realized by the sample farmers for replacement of tobacco cultivation in the study area.
- Irrigation facilities are required for boro paddy and vegetables, the government may take initiatives to provide sufficient irrigation facilities with suitable financial assistance to promote these alternative crops in order to reduce and replacement of tobacco.