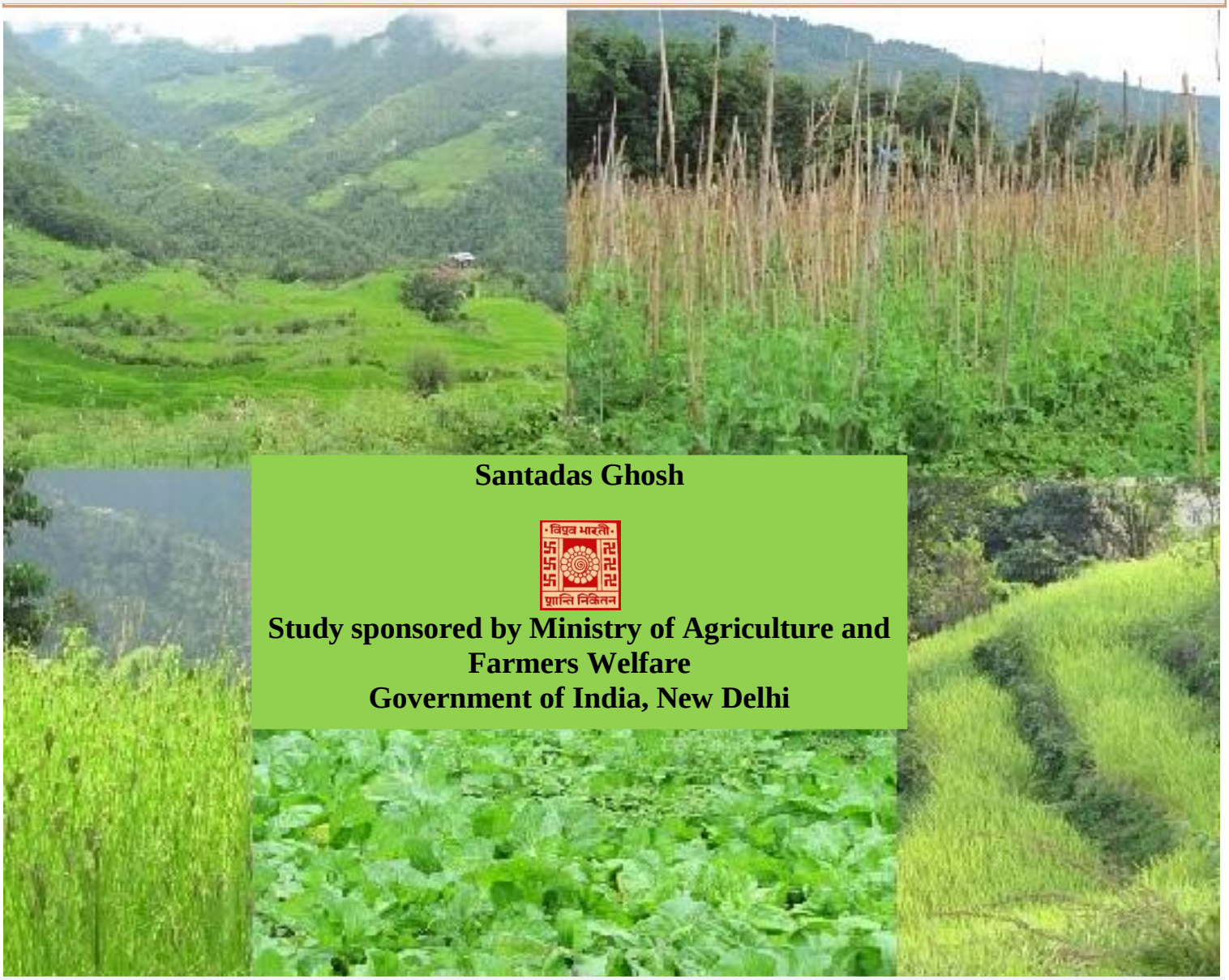
Study No. 181

A STUDY ON PRODUCTIVITY AND PROFITABILITY IN AGRICULTURE AND HORTICULTURE IN EASTERN HIMALAYAN REGION



Santadas Ghosh

Study sponsored by Ministry of Agriculture and Farmers Welfare
Government of India, New Delhi

Agro-Economic Research Centre
(For the States of West Bengal, Sikkim and Andaman & Nicobar Islands)
Visva-Bharati, Santiniketan
West Bengal

September - 2016

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A STUDY ON PRODUCTIVITY AND PROFITABILITY IN AGRICULTURE AND HORTICULTURE IN EASTERN HIMALAYAN REGION

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PREFACE

The present report titled *'A Study on Productivity and Profitability in Agriculture and Horticulture in Eastern Himalayan Region'* is the outcome of a study initiated by Agro-Economic Research Centre (Santiniketan) during 2014-15. In spirit, the study is a continuation of another report produced by the Centre, *Baseline Data on Area, Production and Productivity of Horticulture Crops in Sikkim*, prepared by the Centre in 2013. Agriculture in eastern Himalayan hill area is a very important source of livelihood in absence of major industrial activity in that region. However, available agricultural statistics lacks micro level details of productivity and profitability of major crops in the area. Aggregated data at block level often miss out the factors that might affect household level decision making on crop choices. Further, altitude and climate have major impacts on agricultural productivity and crop choice. Unlike in plains of India, such parameters vary widely within a small administrative unit in eastern Himalayan hills.

This study is a step further towards informed policy making for agricultural development of the hill region. It provided new insight into genetic diversity of different crops and use of chemical fertilizers in hills which has implication for environmental sustainability. The study finds out that some crops cannot be associated with a specific season as defined by calendar months in hill area. Productivity and profitability of some crops are found to be significantly variable across altitudes.

The study was proposed by Dr. Santadas Ghosh (Associate Professor in the Department of Economics & Politics, Visva-Bharati) to the Centre and was later approved by the MOA (GOI). Dr. Ghosh and his research team members from AERC (Santiniketan) have accomplished a challenging job in remote hill villages in Noorth Bengal and Sikkim and often faced language barriers between respondents and researchers. The researchers had lived up to such challenges with the help of field workers and officials of Gorkha Territorial Administration (GTA) and Department of Agriculture and Horticulture (Govt. of Sikkim) along with various NGO workers. All these have been done within a small budgetary allocation. This is a study peeping into hill agriculture from new angles which might be extended in its scope in future. On behalf of AERC (Santiniketan), I thank the Ministry of Agriculture and Farmers Welfare (GoI) for kind approval of the study and congratulate the Principal Investigator and his research team for bringing out this report.

Place: Santiniketan
Date:

Professor Swapan Dutta
Vice-Chancellor (Acting), Visva-Bharati
&
Honorary Director ,
AERC, Santiniketan

Executive Summary

In plains of India, the temperature, rainfall pattern, ground water resources and soil conditions show little variation within a CD Block. All of these factors together decide agricultural productivities in that area. Again infrastructural provisions, irrigation options, location *vis-a-vis* urban centres, local prices of agricultural inputs and outputs and transport and storage facilities are generally fairly comparable within such a Block. These factors are assumed to shape the choice of crops and their varieties by the farmers. The same is true for horticulture as well. There is negligible variation in agriculture and horticulture related activities within a Block located on plains. So, various statistics that are available at block level provide a reasonable idea of the state of agro-horticultural situation within it.

The situation is much different in the Eastern Himalayan hilly regions. The climate, water availability, top-soil quality and rainfall pattern changes drastically within small distances. Also, one can find large variation in transport and infrastructural facilities within a CD Block and consequently in local prices of inputs and farm outputs. Unfortunately, data available at block level collapse the whole spectrum of variations within it into an aggregate number. It can hardly give an idea of the real state of the block's agriculture and horticultural situation. In this backdrop, this study was aimed at estimating agro-horticultural productivity and its returns in the hilly regions of North Bengal and Sikkim through a carefully designed primary survey. Also, the role of the state-sponsored support programmes for local farmers can be crucial in determining the agricultural performance. This study accounts for such differences as Sikkim provides significant support to its farmers and Darjeeling lacks such support.

Objective

In the background stated above, this study had set out the following three objectives:

- *To gain a micro level understanding of major agricultural and horticultural practices and its variation across different agro-climatic zones within eastern Himalayan hills.*
- *To generate a baseline understanding of seasonality, productivity and returns from some major agricultural and horticultural crops in the region*
- *To examine whether state sponsored support programmes have any significant role in determining the returns from agro-horticultural activities in the region*
- *To provide relevant policy inputs for improvement in agricultural and horticultural profile of the hill farmers on the basis of study findings*

Data and Sampling

The study was entirely based on primary survey of farm households. Data were collected from 314 farming households in Sikkim and Darjeeling district of West Bengal between December, 2014 to January, 2015. Choice of households was made ensuring enough variation in altitude within each state, but maintaining comparability at similar altitude across Sikkim and Darjeeling. The finding from primary survey throws up some important characteristics of agriculture and horticulture in the hill area.

Depending on the elevation, the hill region can be categorized into five agro-ecological zones. These are:

(i) Tropical (below 610 metres)
(ii) Sub-tropical (610 – 1524 metres)
(iii) Temperate (1524 – 2743 metres)
(iv) Sub-temperate (2743 – 3962 metres)
(v) Alpine (3962 – 8153 metres)

All these agro-climatic zones are present in both Sikkim and Darjeeling. Almost all of the agricultural households are confined within the first three zones. Accordingly, this study remained confined within *Tropical*, *Sub-tropical* and *Temperate* zones of Sikkim and Darjeeling.

Findings

One important difference with plain-land agriculture is that, in hills, often a crop cannot be associated with a unique season. Largest variation in cultivars of crops is seen in the *sub-tropical* zone. Crop cycles vary significantly with altitude in terms of its sowing and harvesting time. This phenomenon is more pronounced in case of crops like radish and carrot which is more sensitive to temperature than rainfall. For crops which are more dependent on rainfall, like rice, seasonality is somewhat maintained. In such cases, altitude difference results in more local cultivar.

The hill terrain doesn't allow large land parcels and hence farm mechanization is almost absent in hills. There is no canal or groundwater irrigation facility. In absence of large fields and with little control on irrigation by individual farmers, application of chemical fertilisers is naturally not viable. Modern HYV seeds for staple food crops like rice are also not suitable in hills.

Though there is a large variety of agricultural and horticultural crops produced by the farming households, farmers are increasingly shifting to high value commercial crops such as large cardamom and ginger. There is a severe shortage of agricultural labour in hills area because youth is increasingly moving out to other parts of India and even abroad. In absence of a vibrant market of agricultural labourers in these sparsely populated isolated villages, crop choices are being influenced by the available assured labour supply from within farming households. Food crops like rice and maize require more labour and also more prone to wild animal raids. So, farmers are moving away from these food crops, compromising with local food security.

In spite of better state support to Sikkim farmers, productivity and profitability of most of the crops is better in Darjeeling compared to Sikkim. This might be the result of better rainfall in Darjeeling and its proximity to the city of Siliguri, nearest trading point in plains. State support in Sikkim is being directed towards high value commercial crops like large cardamom and ginger, and hence there is a declining interest in cultivation of staple food crops like rice and maize.

The Govt. of Sikkim is providing reasonable support to its farmers for training, inputs like seeds and saplings and facilitating the marketing of their produce. However, in the process, it

might have reduced the diversity of crop varieties. Darjeeling has shown more cultivar varieties of major crops compared to Sikkim across comparable agro-ecological zones. Profitability of large cardamom is seen to be consistently rising with altitude. For this crop, effective marketing and other state support has resulted in higher profitability of cardamom in Sikkim compared to Darjeeling.

Given the nature of very small plots of cultivation and lack of control over irrigation water, crop varieties are almost entirely local. With substantial livestock holding and using livestock waste, home-made bio-fertilizers are invariably used for all types of crops both in Sikkim and Darjeeling hills. The stated objective of Sikkim to make itself hundred percent organic, and the lack of such state efforts in Darjeeling, does not show up in any significant difference in fertilizer use pattern across the two regions.

State support is lacking to control the virus attacks that are plaguing farmers for high value crops like large cardamom and ginger. In certain parts of Darjeeling and Sikkim, these profitable horticultural crops had been wiped out in recent times due to virus attacks though it was previously produced and was very remunerative.

This study by AERC (Santiniketan) has tried to cover the information gap and bring to light certain aspects of hill agriculture that cannot be obtained from an aggregative study. Farm level data collected from 314 farmers highlights the following points:

- Agricultural and horticultural crops are found to be mostly confined within 2000 metre altitude. Largest variation in cultivars of crops is seen in the *Sub-tropical* zone (610-1524 Metres).

- For many crops, it is hard to classify them by their seasonality according to calendar months.

- This phenomenon is more pronounced in case of crops like radish and carrot which are more sensitive to temperature than rainfall. For crops which are more dependent on rainfall, like rice, seasonality is somewhat maintained. In such cases, altitude difference results in more local cultivars.

- The terrain doesn't allow large land parcels and hence farm mechanization is almost absent in hills.

- Application of chemical fertilisers is naturally not viable. Modern HYV seeds for staple food crops like rice are also not suitable in hills.

- Farmers are increasingly shifting to high value commercial crops such as large cardamom and ginger.

- There is a severe shortage of agricultural labour in hills area because young generation is increasingly moving out to other parts of India and even abroad.

- In absence of a vibrant market of agricultural labourers, crop choices are being influenced by the availability of own labour supply of farming households.

- Food crops like rice and maize require more labour and they are also more prone to wild animal raids. So, farmers are moving away from these food crops, compromising with local food security.

- In spite of better state support to Sikkim farmers, productivity and profitability of most of the crops is better in Darjeeling compared to Sikkim. This might be the result of better rainfall in Darjeeling and its proximity to the city of Siliguri, nearest trading point in plains.

- State support in Sikkim is being directed towards high value commercial crops like large cardamom and ginger, and hence there is a decline in farmers' interest on staple food crops like rice and maize.

- Darjeeling has shown more cultivar varieties of major crops compared to Sikkim. The Govt. of Sikkim is providing reasonable support to its farmers by training, providing inputs like seeds and saplings and facilitating the marketing of their produce. However, in the process, it might have reduced the diversity of crop cultivars.

- Profitability of large cardamom is seen to be consistently rising with altitude. For this crop, effective marketing and other state support has resulted in higher profitability of cardamom in Sikkim compared to Darjeeling.

- Given the nature of very small plots of cultivation and lack of control over irrigation water, crop varieties are almost entirely local. With substantial livestock holding and using livestock waste, home-made bio-fertilizers are invariably used for all types of crops both in Sikkim and Darjeeling hills.

Policy Implications

This study is a recent and unique one that generates farm level understanding of agricultural practices in Eastern Himalayan Hills. In doing so, it comes up with the following points that might be relevant to the policy authority:

- State support to farmers in Sikkim is being primarily directed towards high value commercial crops like large cardamom and ginger, and hence there is a decline in cultivation of rice and maize. Such supports may be extended to staple food crops like rice and maize to enhance local food security in Eastern Himalayan Hills.

- The stated objective of Sikkim to make itself hundred percent organic, and the lack of such state efforts in Darjeeling, does not show up in any significant difference in fertilizer use pattern across the two regions. Local geographical constraints in hill area do not support adaptation of modern agricultural inputs and HYV seeds. So, it might be wasteful expenditure to promote organic farming when it is already in practice by default. Money spent on awareness building on organic farming might be better used by providing the farmers with tangible agricultural inputs like free distribution of seeds.

- State support is lacking to control the virus attacks that are plaguing farmers for high value crops like large cardamom and ginger. In certain parts of Darjeeling and Sikkim, these profitable horticultural crops had been wiped out due to virus attacks though it was previously produced and was very remunerative. More state sponsored research and technology development for curing this specific crop disease is required.

- Large cardamom is the most remunerative crops among all the crops produced in the hill area of Sikkim and Darjeeling. Since large cardamom takes at least two years after plantation to yield profit, poor farmers cannot devote their land to it as they cannot afford such a long gestation period. To promote this crop to enhance farmers' income, specialized credit facilities should be devised. Special provisions for medium term agricultural credits to poor farmers should be made for large cardamom promotion.

- Crop insurance practice is almost totally absent in hill agriculture. This is primarily due to non-availability of specialized insurance schemes for hill agriculture. Such schemes should be developed through further studies and farmers need to get expert consultancy on crop insurance to promote profitable crops like large cardamom and ginger.

Way Forward

The study admits that it has faced huge challenges in dealing with unconventional measurement units of land as reported by the respondents. The diversity in hill agriculture has sometimes resulted in a small respondent size for a specific crop in a specific zone and in a particular state. This might cast some doubt about the robustness of productivity and profitability estimates that this survey has reported.

However, the study has thrown open the possibility of a detailed study in similar line incorporating a much larger set of crops and farmers. Also, the dynamics of hill agriculture in recent times could not be captured in such a one-shot study. There is good scope of revisiting these same farm households at regular intervals so that relatively more 'successful' farming practices and the factors enabling them can be filtered out. This is specially important in light of the recently announced resolve by the Government of India of "Doubling Farmers' Income by 2022". So, more detailed farm-level studies at regular intervals in Eastern Himalayan Hills remain open as a future research agenda - both for AERC (Santiniketan) and for any other interested agency.