Chapter I

INTRODUCTION

1.1 Background of the Study

Agriculture is one of the human activities in which people use areas of land to produce food, clothing materials and other products. It means that using the land raise animals, produce food, fruit and cash crops. Agriculture contains various branches such as agronomy, horticulture and livestock. All these branches are equally important to human being, as they get something very valuable from each branch of agriculture.

As the backbone of its economy, Sikkim's agriculture has shown a robust performance. The total food production in the state has steadily increased from over 58.56 thousand tonnes in 1980-81 to 1.03 lakh tonnes in 2000-2001 produced in hardly 6400 hectares of net sown area. (The Glory of New Sikkim 2003; 45)

After 1995-96 both the Net State Domestic Product (NSDP) and Per Capita Income have consistently recorded a steady growth. The NSDP at current prices increased from Rs 426 crore in 1995-96 to 891 crore in 2001-2002. The Per Capita Income also almost doubles from Rs 8905 to 16143 during the same period. This means both NSDP and Per Capita Income recorded a rather high growth rate of 18.91 percent and 13.55 percent per annum respectively. (Sikkim: A Statistical Profile, 2002)

Sikkim being a mountainous state has a rugged topography and small strip of flat lands. As well as the area brought under cultivation is small. Being an agriculture state, about 72 percent of the total population is engaged on agriculture. Moreover almost 85 percent of the population of Sikkim lives in rural areas and only the improvement in

agriculture can better their lot. (The Glory of New Sikkim 2003; 47) Generally the total agriculture product of Sikkim consists of two main types; cereal crops and cash crops. The cereal crops consists rice, wheat, millet, maize etc. and orange, ginger, cardamom etc. are mainly considered as important cash crops. Both the cereal crops and cash crops are grown in Sikkim.

Horticulture is the branch of agriculture which deals with the production of fruit, vegetables and flowers or ornamental plants. Hence, horticulture is divided into three main branches such as Olericulture (the study and cultivation of vegetables), Pomology (the study and cultivation of fruits) and Floriculture (the study and cultivation of flowers and ornamental Plants)

For Sikkim, horticulture must be considered a very important area of agriculture. Owing to horticulture is the main engine of rural economic regeneration in the state. Historically also, horticulture produce were the main source of income for the farmers. The only exportable surplus in the economy of the state is horticulture products. Thus, horticulture is the only developmental alternative which can transform the vision of making Sikkim a producer state, into a reality.

Fruits belong to the class of cash crops. These are very nourishing crops and have occupied a very important place in the agricultural sector of Sikkim. The citrus fruit plant includes evergreen trees and shrubs; the lemon, sweet orange, mandarin orange, citron, lime, bitter orange and bergamot. They are widely cultivated in most of the countries. However, in Sikkim there are only a few varieties of citrus fruits grown, of which 'mandarin orange' is widely cultivated. It has been cultivated from time immemorial.

This type of orange prefers more humid and subtropical summers, warmed winters and higher rainfall. All the tropical and

subtropical sub-mountain tracts with elevation from 600 to 1500m above mean sea level and rainfall ranging from 85 to 300 cm uniformly distributed from March to November are suitable for its cultivation. The main harvesting season of orange is October to January.The valleys of Tista and Rangeet river and their tributories of Sikkim and adjoining Darjeeling District of West Bengal offer an ideal Himalayan climate for the cultivation of Sikkim orange.(Subba 1984; 214)

During the 2006-2007 the production of orange was 9256 tonnes (Annual Progress Report Deptt. of Horticulture 2007; 8) orange is used for making juice jam and also used by fruit preservation factory located at Singtam. Orange squash 'Sikkim Supreme' is the famous product of this factory. Besides this remaining oranges supplied to Siliguri and from Siliguri to Calcutta, Delhi and Bangladesh.

Generally the important orange producing areas are the Tista and Rangeet river valleys within the elevation range of 600 to 1500m above MSL. Tashiding, Gyalshing, Omchung, Tijyah, Lingchom, Bermiok, Chakung, Khanisirbong, Zoom, Chumbung, Timburbong, Karthok is the west; Kewsing, Lingmoo, Sangmoo, Payong, Rateypani, Namthang, Tarku, Tokal-Bermiok, Turuk, Sumbuk in the south; Nazitam, Sang, Simiklingy, Khamdong, Sirwani, Samdong in the east and Dikchu and Hee-Gyathang in the north district of Sikkim are the important orange growing areas of Sikkim.

In the study area, orange is considered as one of the most dominant cash crops. It can be grown successfully on a wide range of soils. Sandy and gravelly hill brown soil with hill slopes seems to be ideal for cultivation. It can easily be grown on slightly acidic soils with 5.0 to 6.4 p^H range. It can tolerate acidity up to 4.0 p^H. (Subba, 1984; 215) The land for planting is bench terraced, running parallel to one another and one above the other, across the slope of hill, and tress are

planted in previously dug and filled pits measuring 60cm×60cm×60cm in spring at a distance of 5 to 6 meters. After this steady progress in the agriculture, the government expects to have much higher growth rates in all the area of agricultural production in the next few years.

1.2 Statement of Problem

The history of orange cultivation in Sikkim has been practiced for 300 years ago, and gradually improving its cultivation and holding area. Nowadays, farmers are more attracting towards its because of its high demand and increasing market price, suitable climatic atmosphere as well a geographical conditions.

Among the different cash crops orange occupies and important place in the field of agricultural economy. Nowadays, its popularity is not confined only in the state but it has been extended in national and international market as well. But, due to the different problems such as problem of transportation, systematic market system, pests, irrigation and other related problems have hampered its productivity as compared to the other crops.

Along with its expansion and demand in international level, the standard of farmers have been improved. If proper attention is given towards the above-mentioned problems, it will be the major source of cash earning in the study area. But, due to less emphasis given by government and Private sector, till today, no research has been conducted in this field. So that this study tries to investigate the true picture of the problems and prospects, affect of location and production and marketing from seven years in Khanisirbong Gram Panchayat unit of west district.

Therefore, this study focuses on some of the problems and present condition of the farmers facing orange cultivation in the study area, which are given below with respect to:-

- What is the production and marketing system of orange in the study area.
- What are the affect of location on orange cultivation in the study area.
- What are the problems and prospects of orange cultivation in the study area.

1.3 Objectives of the Study

The main objectives of the present study``` are to examine the different aspects of orange cultivation and their problems and prospects in the study area. The specific objectives of this study are as follows:

i. To examine the production and marketing of orange.

ii. To examine affect of location on orange cultivation in the study area.

iii. To identify the problems and prospects of orange cultivation.

1.4 Significance of the Study

Cash crop plays significant role on the economic status of Sikkimese people. Being a commercial crop, orange cultivation has contributed to the local farmers to improve their socio-economic life. But in lack of proper use of land resource, many peoples subsistence of livelihood would be difficult. Moreover in the study area no research work has been conducted yet now. It is the first endeavour to show the cultivation of orange in ward wise along with its general location of the Khanisirbong Gram Panchayat unit. This study will be helpful for the farmer, to improve their present condition regarding, unsystematic market, transportation facility, irrigation, diseases and insects problems. It will also be useful for the local people, project maker planner, administrator as well as policy maker and to those who are interested to know about it.

Furthermore, this research will provide a guideline for scholars and people those who are interested to know about the production and marketing of orange, the affect of location and problems and prospects of orange cultivation in Khanisirbong Gram Panchayat unit of west Sikkim. It is important source of the local farmer, which sustain livelihood. This study deals with some selected aspects such as the production and marketing of orange, the affect of location and problems and prospects.

1.5 Limitation of the Study

Keeping in the view of the time, cost and marginal strength of researcher, the study has been made in a small area. The study is concerned only with the area of Khanisirbong Gram Panchayat unit of west district. This may not be sufficient for the whole constituency district as well as the Sikkim state. This study is primarily concerned with orange cultivation. In order to obtain genuine information primary data was collected as well as secondary data was use for supporting facts of comparative analysis. To fulfill the aims and objective only 24 households from the Khanisirbong Gram Panchayat were being surveyed. Thus, the study based on small area, selection of limited sample size are the main limiting factors in the study.

Chapter II

LITERATURE REVIEW

Although there are some of the studies on Mandarin orange in Sikkim, very few literatures has found on orange cultivation in particular. Mandarin orange is successfully grown in south and west part of Sikkim. The lower part of west district i.e. Khanisirbong Gram Panchayat unit have been selected as the study area; for research; and for this fulfillment of research objectives available materials relating to the orange cultivation have been reviewed here.

Subba (2007) studied about the 'Fruit farming in Nepal with special reference to orange cultivation'. The study has identified that the orange cultivation plays a significant role in the development of rural economy of hill people. It can provide additional cash income to the farmers by generating so many employment opportunities. Among the various types of fruit, orange is also cultivated in the country which belongs to the category of sub-tropical group. It ranked in second position in terms of production. Nepal is suitable for orange as an important citrus, which is successfully grown here.

He further pointed out that there is a Regional variation in forms of orange production in Nepal. The FWDR is comparatively less favourable for orange cultivation than other development regions of Nepal. This is became the FWDR is physiographically a mountainous and rocky area with not very suitable soil type for the cultivation of many crops. The other regions however are mostly hilly and therefore suitable for orange cultivation. As such the geography of a given area plays a vital role for the cultivation orange.

DOH (2006) has published a book named ‘Package and Practices of Fruit’ this book focused that the mandarin orange is one of the most

important and popular fruit of Sikkim. This book also focuses about the soil and climate suitable for orange and their varieties, planting, spacing, pruning, fencing, irrigation, mulching, fertilization and plant protection measures. This book also deals about the diseases of orange plant as well as control from the common fungal diseases. This book mentioned that normally irrigation is not done in farmer field. However, irrigation is necessary from November onward in Sikkim condition. Irrigation can be done either basin or ring or drip system, because flood method of irrigation is not recommended due to frequent landslides. Moreover this book pointed that pruning is necessary to open up the trees for proper ventilation and to provide more chances for the inner wood to bear fruit, also to remove water shoots, which deprive the reserve food of the tree. Pruning is to remove the diseased and dry branches from November onward. This book also deals about the symptom and control of common fungal diseases, which are useful for the orange grower in Sikkim.

Deoju, Rijal et.al., (2006) studied about 'The status of Nepalese citrus industry'. The study has mentioned that citrus production is season based Most of citrus production is from November to March. Cold storage of these produces are merely practiced. During off season, large quantities of citrus enter into Nepal market from India and Nepal's large sum of money goes outside which would otherwise enrich the poor communities residing in the rural hilly areas. Though the production is in the increasing trend, but not in the satisfactory way. The area coverage and productivity both are not satisfactory. The study views orange cultivation to be dependent open seasons. The production is mainly concentrated between the months of Nov and March. As such orange is a winter crop. During March the orange crop is harvested. As well as the study makes a point in his study that offer March the summer season commences in Nepal but unfortunately cold storage is

not available in many areas. This leads to wastage of a huge quantity of orange. Along side the domestic market for orange is not also widely distributed. Similarly expert quality oranges are not produced. Hence, the internal system of marketing is not well managed. At the end huge quantities of oranges are imported from India to which an unnecessary expense is generated. Had proper management been initiated than a majority of farmers would have benefited from their produce. Therefore, the study focuses on the implementation of the needy infrastructure to expand and promote orange cultivation in Nepal.

Ruchal (2006) has studied about the 'Orange Cultivation in Sikkim.' She has focused on the productivity and production trend of mandarin orange, the relationship between farm size, horticulture loan, and the cost benefit of orange cultivation. Majority of the household are engaged in orange farming with the passage of time, this trend will continue to rise. Moreover orange cultivation is fruitful occupation. There is high demand for oranges from neighboring market centers i.e., Gangtok, Siliguri and Calcutta. She also pointed that sometimes the farmers do not receive good returns. It is always the presence of middlemen who absorbs majority of the profit. However due to the lack of cooperation, facilities, transportation the farmers prefer garden selling. It is the small farmers who sell their products in the local market. She has found that the trend of orange, in term of area and production is increasing in the study area. As well as in term of cost and benefit orange cultivation is mostly beneficial in the study area. orange farming provides more income to most of the households. Most of the farmer’s are serious and they try to employ technological know how in orders to increase production moreover the government also seems drawing out policies for the betterment of farmers.

The above analyses made by Ruchal views that the potentiality for better marketing facilities is hampered by the interference of the middle man. As such the poor farmers are not able to sell their produce in the local market. Therefore, it would be much better for government or the NGOs or self-help groups to intervene and take needy action again such corruption.

Sharma (2005) has studies about the 'orange marketing'. He has mentioned that the internal consumption of orange is near about 8% only and rest is exported to other part of the country. Due to the geographical location of state and lack of infrastructure facilities for marketing it is export to another state and the farmers are not able to earn profit as their labour because it is enjoyed by the other state. He pointed out; there are two types of channels of distribution in the state, organized and traditional. There is no supporting institution, which is engaged in orange marketing in the study area. Only few co-operatives societies are effective in the agriculture marketing. He also found that, there is problem of proper marketing information system. Due to the lack of sound information and organized marketing, farmers are compelled to sell their products at the farm at minimum price to the middlemen.

Thapa (2005) has studied on the topic of ‘Orange cultivation in the western hill region of Nepal. He has conducted research in Shanker Pokhari VDC of Parbat District. The main objectives of the study was to analyze the determinants of orange cultivation, and to explain the access to market by using the primary data collected from different respondents of the study area. Moreover he has also pointed out that the orange cultivation was significantly raised the economic status of the study area. Due to the fluctuation in market price, role of middleman and unorganized market system basically creates the main problems to the people of the study area during the time of goods selling in market.

Middlemen are the main profit earner than the producer. Lack of organized marketing system, storage facilities and processing industries are remarkable problems for the orange marketing. He also pointed that generally most of the orange orchards are small in size. In terms of literacy status, occupation, land holding size and food sufficiency the orange growers has better position. Moreover he has found that there is no systematic care and management in orange cultivation. The cultivation is more tradition. There is much lack of commercialization and modernization.

Acharya (2002) studied the general picture of Citrus fruit farming of hill in Nepal with special reference to Bharat Pokhari VDC of Kaski district, WDR. The study focuses about the factors affecting the Citrus cultivation in Bharat Pokhari, the current production situation of citrus fruits, prevailing problem of citrus farming and future prospect and suggest appropriate policy. This study mentioned that Citrus culture is the most dominant horticultural crop, which is very popular among farmers especially in the hill region of the country. Mid-hill region of the country produces more quality Citrus fruits in the recent decades. Citrus culture is expanding to the large areas and its characteristics going to touch commercial approach of cultivation. Present time, the area and production quantity have been in increasing trend. This study also pointed that the citrus fruit production in Bharat Pokhari is slightly increased however, it is not proportional the increasing rate of its cultivated are remarkably the fluctuation in production is observed because of bad weather such as uneven rain and hailstorms. Moreover he explained that citrus fruits ripen after Kartik so there is no disturbance of heavy rain. Lack of modern techniques, modern management of orchards and lack of processing in distress are the main predominant problem of citrus cultivation in Bharat Pokhari.

Sharma (2000) published a book named 'Agriculture'. This book deals about the agriculture system and development of agriculture in Nepal. He pointed that it is a sub-tropical fruit, well known throughout the world and cultivated from 600 to 1200m. above sea level. Citrus fruit are gown in sandy soil with a depth of at least 2 to 3 meters. They require a lot of nutrients and good drainage. Gently sloping land of our hilly region is best suited for growing citrus fruit. He has also mentioned that citrus plants are propagated mostly by budding, but it can also be done by ground-layering and air layering. This is done during the spring season or before the rainy season. Those planted during the spring season need a lot of care. They should be provided regular irrigations and need to be protected from several problems. After one year in the nursery, the plants are ready for planting in the orchard or garden. They should be planted at a distance of 7 to 8 metres.

Shrestha (1998) make a study about fruit cultivation in Nepal by observing various horticultural farm and orchard of the country. The analysis aim to find out the no low of technique and a knowledge of orange cultivation among the local farmers as well as in the plantations. Similarly was assessed cultivation in Nepal, constrains and drawback at different levels and the application of research in the cultivation o the orange fruit in the given area. He point out the farming system lacked techniques base, in advantage in planning and uncoordinated from work of policy. The major problems notice were the absence of scientific planting methods, improper management and limited plant protection manage. All these led to the attack of pests and diseases on the fruit. A few of the diseases identified were virus gumusia, canker, pink diseases leaf minor, powdery etc. As such it may be conducted that proper care and management and the import of knowledge and technique at various levels can bring better production.

Rajbanshi (1997) has studied in Mandarin orange farming in Manakamana VDC. The study focused on the production and productivity trend of mandarin orange .The study has found that the lack of organized marketing system as well as traditional management system of gardens are the main factors which has created hindrance in this field. The studies concluded that an orange fruit as a major fruits has become one of the important agricultural activities. He also explains about the various physical and non-physical factor influencing orange farming and practises of post harvesting. The income of farmers has not enhanced to a desired level due to marketing problems and assurance of diseases and pests. Farmers or owner made seller store for junar storage for five months period by using paddy straw leaves of pine for packing and storing the harvested orange.

Shrestha (1996) has published a book named ‘world Commercial Fruits at a Glance’. He mentioned that mandarin have less sugar content than sweet orange, but they are rich in vitamin. Mandarins are highly polyembryonic species having a small tree, 2 to 7m. They have small, rather narrow leaves that tend to fold in the center. Leaves have narrowly winged petioles. Flowers are small and white. Fruits medium sized round to globosely and often somewhat flatten. The peel is loose and bumpy and comes off easily. The peel is colored green. Yellow or deep orange when ripe. He moreover pointed that most varieties are resistant to heat and require hot weather to develop good flavour. A well drained light soil with low water table and somewhat acidic is the best for optimum production. In thoroughly prepared land, pots of 75cm ⏐ 75cm ⏐ 75cm sizes and dug at 6cm distance during Feb.-March or August-September. The pits are filled back with a mixture of soil. 25kg FYM/compost, 1to 2kg bone meal and 2kg wood ash. Sept. is the best time for planting. Harvesting by vesting by hand is much better than

machine harvest to get more quality fruits. A well-cared healthy tree of 10 to 15 years old produces 1000 to 1500 fruits annually.

Bhatta (1987) has studies on orange cultivation in Gulmi district. The study has focused on historical development, spatial distribution and production trend of orange. The study has tried to comprise the orange cultivation with cereal crops in the viewpoint of investment and benefit and found that it is more profitable than cereal crops which has also provided job opportunities for hill people. Despite the various problems its production trend is increasing day by day.

Chapagai (1987) has studied on the orange marketing in Bhojpur, has tried to link the problem of migration, rural unemployment and food scarcity to the low productivity of land in the hilly region. This study has suggested for the sufficient fruit production and efficient marketing in mountain region on order to get rid of these problem. It emphasized on proper system of pricing, distribution, storage and consumption of fruit. It has suggested managing physical infrastructure for agro-product, systematic market channels, supporting price to the producer for revolutionary change in agriculture sector.

Subba (1984) has studied about the 'Agriculture in the Hills of Sikkim'. He has mentioned that the mandarin prefer warmer winters and higher rainfall. All the tropical and sub-tropical sub-mountain tracts with elevations from 600 to 1500m. above mean sea level and rainfall ranging from 85 to 300cm. uniformly distributed from March to November are suitable for its cultivation. He pointed that Mandarin orange can be grown successfully on a wide range of soils. For Sikkim Mandarin sandy and gravelly hill brown soil with hill slope seems to be ideal for cultivation orange trees are sensitive to high concentration of salt and cannot stand water-logged conditions. The first three feet of soil are most important in orange growing as they form the major feeding

root zone of the tree. In Sikkim only one variety Sikkim mandarin is cultivated in commercial scale. However, there are several distinct groups of mandarin varieties available in India. They differ from each other by fruit characteristics such as rind colour, fruit shape and size or by tree characters such as shape, nature of spread of branches etc. He also pointed that there is no practice of irrigation citrus orchards in Sikkim.

Upadhayay (1979) the study has attempted to analyze the supply and demand situation of fruits in various seasons. However, the improvement and achievement from fruit production in poor due to many problems like lack of organized markets and marketing information lack of transportation and storage facilities etc. The study explains method of marketing of fruits and also tried to identify the major problems and remedies for the improvement of the marketing of orange in Nepal. And lastly he has concluded by pointing out that the fruit cultivation plays a significant role to achieve the major purpose of occupation in the eastern region of Nepal

Singh (1971) has published a book named Storage Behaviour of Sweet Oranges and Mandarins. He observed that two commercial types of mandarin oranges, viz. 'Coorg' Orange and 'Nagpur' orange were investigated. These types are grown in separate zones under altogether different conditions of soil and climate. The commercial plantations are, however, of recent origin and are closely associated with the establishment of coffee estates by the British settlers. Most of the orange plantations are inter-planted with coffee along the hill slopes all over coorg at an average altitude of 915m. He also mentioned that the tree is usually raised from seed. It is large, columnar in shape, sparingly spinous with compact foliage and heavy bearing. There are two cropping seasons in a year. Some trees bears fruits during one seasons whereas the remaining in the others. The main crop is harvested during

January-February and constitutes 90 percent of the annual production. The fruit of the main season crop develops an attractive orange colour, sweet taste and excellent flavour for which it enjoys high reputation all over the south India markets. The second or the rainy season crop (July-Aug.) produces green fruit with acid taste and poor keeping quality. He pointed that the minimum and the maximum temperatures experienced are 48 degree F and 90 degree F and the relative humidity from moderate to high. The soils are black or red loamy and mostly well drained. Soils that are very rich in lime are known to be toxic and harmful to mandarin cultivation.

The best quality of oranges grown at altitudes between 600m to 1400m above the sea level. This altitudinal range falls under the zone as identified by Singh to be favourable for coorg variety of mandarin orange. Therefore it can be said that better care and attention will surely lead to better production of oranges in the study area.

Chapter III

RESEARCH METHODOLOGY

Every research is conducted by developing for methodology which is based no its theoretical framework. In research methodology, this chapter includes the sampling design, tools of primary data collection and data analysis techniques.

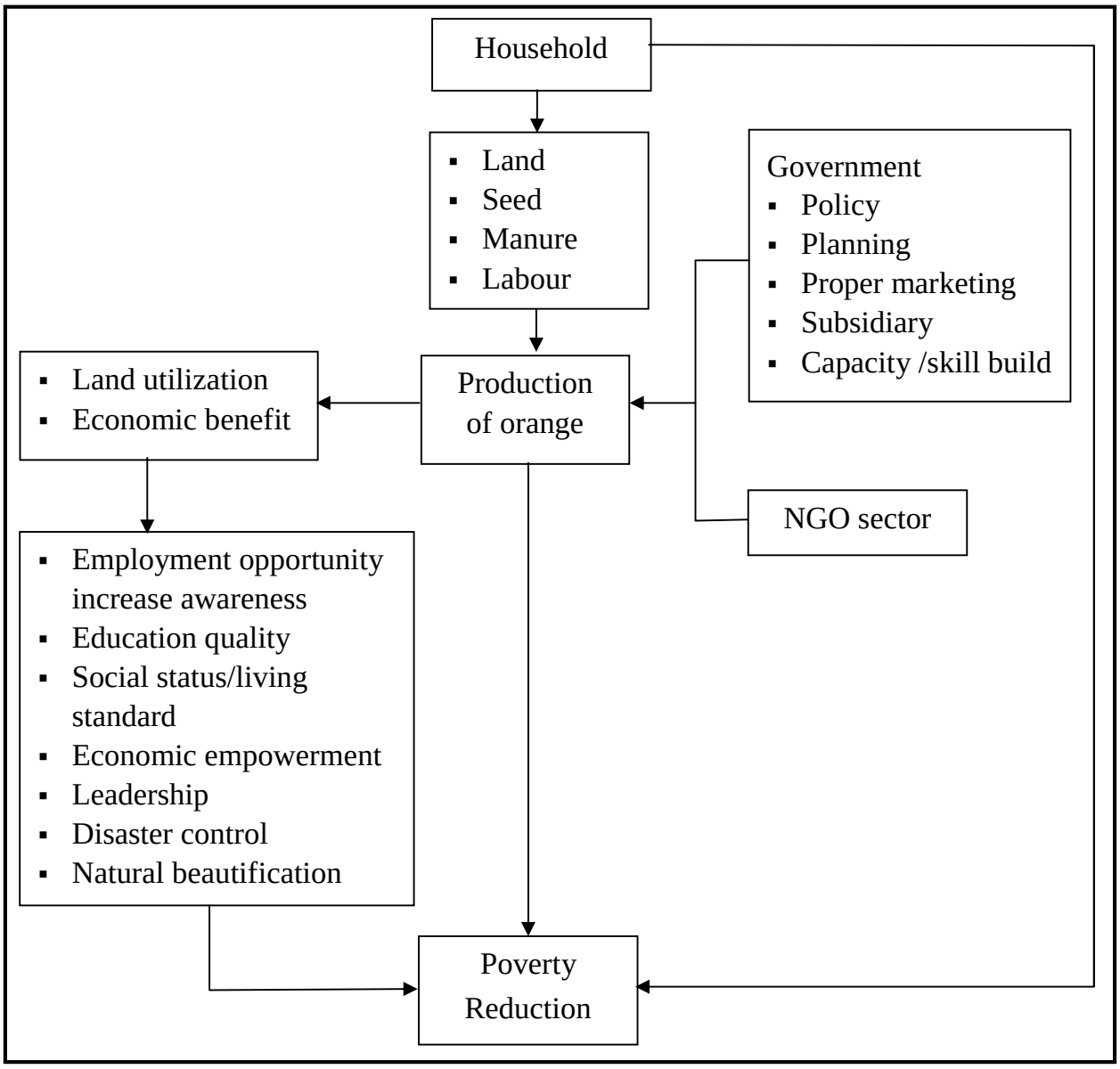
3.1 Conceptual Framework

As per the objective mentioned the scope of the study is to examine the different aspects of orange cultivation categorized into various domains. The first one being to examine the production of orange deals with the volume of oranges produced in a year viewed in different growing periods (months). Hence periodical rise and fall in the volume of production in relation to the months as well as years can be examined. Along with this, on examining the affect of location on orange cultivation it is seen that the best quality oranges thrive naturally on the altitude between 2000ft. to 4500ft. while in the low altitude lying between 1500ft. to 2000ft. the quality of oranges produced do not yield adequate market value, the same being for the oranges produced in the high altitudes of above 4500ft. in the study area. This affect of altitudinal diversity on the quality of oranges produced truly supports the model put forward by J.R. subba where he had studied the affect of elevation in relation to the quality of oranges produced. Hence it can be said that in the middle altitudes intensive care is not so required for the cultivation of oranges. On the other hand inspite of applying intensive care to the oranges in the lower and the high altitudes very little or rather no significant change or improvement is noticed in the quality of oranges produce yet it forms market commodity for a negligible amount of seller and buyer groups compared to the high trade as so absorbed by the oranges cultivated in the middle altitudes.

Investigating on the relation between the size of farms and the volume of oranges produced it has been observed that in the low altitudes the size of farms are small and the oranges produced are also of low quality cum market value as compared to that of big size farms and good quality cum good market value of the oranges produces in the middle altitude, the latter plight too experience by the high altitude oranges. Hence there is a high concentration of people and low investment in the middle altitudes. This however, does not mean that the low and high altitudes are ignored yet the environmental affects are such that inspite of utmost artificial care the quality of oranges show little or no betterment on the whole, nevertheless these underrated areas forms the basis of income for certain groups of village people. The study however, does not intend to leave these underrated areas and the people so involved in a comparatively low standard of living throughout in view of the fact that their lies prospects of crop diversification in the low as well as in the high altitudes where instead of the oranges, cereal cropping can be adopted in the low altitudes which will prove much beneficial compared to the oranges while the high altitude orange cultivation can be replace by rearing of spices such as cardamom, broom ‘kutcho’ etc.

As such there exists a scope for improvement wherein these underrated lands can be exploited to its true potential both in terms of physical as well as socio-economic change.

Figure 1: Conceptual Framework of Orange Cultivation



3.2 Selection of the Study Area

The Khanisirbong GPU has been selected for the study for various reasons. The area is very potent for orange cultivation provided proper measures are implemented on a larger scale. The indigenous farmers of the area have been practicing orange cultivation from a long time, almost from about 60 years ago or so. It is seen that orange cultivation forms a prime source of income for many yet the incentives and promotion is lacking for all round benefit. Therefore, to propagate the current situation of the area and open ways for improvement the

present study has been conducted to convey the findings to the local as well as to the concerned offices.

3.3 Sampling Method and Sampling Size

The study area has only 278 households, out of these total households only 119 households are cultivating orange in their farmland. Due to the limitation of time, energy and cost the present study has adopted a sampling methods while taking 20% of the sample size of the total orange growing households from four wards. However, selecting the particular sample size was mainly to get suitable proportion of household number from the four wards as the number of households is not equality distributed.

Even in sampling methods, random sampling (lottery method) has been adopted for the study. After collecting by four wards' total number of household from the Panchayat office, at first of all the total household numbers of four wards were written in a pieces of paper which were put into the container after folded them properly. The later on according to the require number on the basis of sample size, randomly numbered slip were take out from the container.

In case of Chikhim, out of 51 households, only 23 households are orange grower, from the total orange grower households, 5 households were selected according to the 20% of the sample size. In order to selected 5 households, at first all the total orange grower households number from 1 to 23 were written in pieces of paper and were put into the container. Thereafter, according to the required sampled 5 times numbered slip were randomly picked from the container and on the basis of number into the slip those houses were choose for the survey. For the rest three wards too similar procedure has been taken up. The table 1 shows the ward wise distribution of sample size of the study area.

Table 1: Distribution of total households, orange grower and sample households

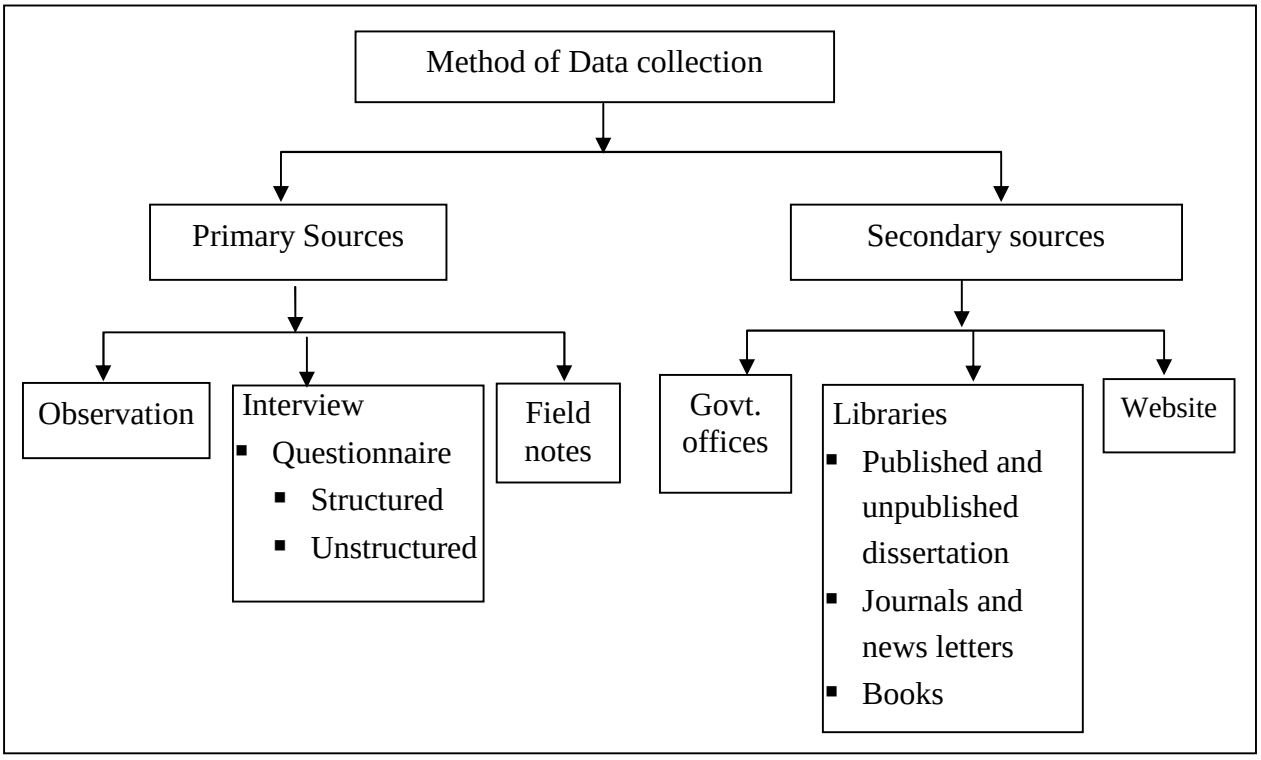
Name of GPU	Ward no.	Ward name	Total no. of HHs	No. of Orange grower	Sampled HHs	Percentage of Sampled HHs
Khanisirbong	1	Chikhim	51	23	5	20%
	2	Kewrani	68	20	4	20%
	3	Sirbong	77	57	11	20%
	4	Suntolay	47	-	-	-
	5	Hoorgoan	35	19	4	20%
	Total		278	119	24	20%

Source: Khanisirbong Gram Panchayat, Office.

3.4 Methods and Source of Data

To achieve the above-mentioned objectives, this study has been based on primary data, which is obtained from field survey. Respondents of study area are the major sources of primary information. The secondary data has also been used to get more information.

Figure 2 : Methodological Framework of Data Collection



3.4.1 Primary Source of Data

The study is being based on primary data, primary source of data is very important in any research work. The primary data are collected through field survey such as observation, preparation of field notes and interview the sampled households by constructing standard questionnaire in the study area. For this primary data collection the fieldwork was held from 23 of August to September 10, 2007. Both the qualitative and quantitative information are collected to fulfill the above objectives of this study.

3.4.1.1 Questionnaire and Interview

On the basis of declared objectives, a standard questionnaire was prepared. A questionnaire sheet for a household was managed. Researcher himself visited door to door for having interview. The questionnaire had been prepared to achieve information about the production trend of orange, the affect of location, the farm size and production of orange and the problem and prospects of orange cultivation. Mainly the interview was taken to the head of the household and in case of absent of head of the household few interviews were also taken out with one of the elder. Questionnaire used for collecting data have been attached in the appendix 1. The interview with the orange grower of the study area is shown in the photo 1.

Photo 1: Interviewing with Respondent

3.4.1.2 Field Observations

Field observation is the main key factor, which helps for observing the overall condition of the study. The present research worker has visited all the settlement of Khanisirbong GPU. Out of the five wards, four wards are found under orange cultivation. The households that were practicing orange orchards were noted. Research works come to learn about many facts, which is not filled even in the questionnaire. Khanisirbong GPU has been noticed that the people are generally engaged in agriculture sector. As well as more or less people are engaged in orange cultivation in the study area. During this fieldwork photos have been taken from the study area regarding the different activities of orange cultivation.

3.4.1.3 Field Notes

A field note was maintained to record the necessary information, which was not included in the questionnaire. To get a more reliable and

accurate information people from other groups were also interview and discussed for the problems and prospects about the orange cultivation in the study area. Every incident and discussion during the field survey were also noted in the field notes.

3.4.2 Source of Secondary Data

In addition to the primary data, the relevant secondary data has been added in the research work. Secondary data is used for knowing the previous orange cultivation in Sikkim as well as in the study area. The secondary data provides detailed information about orange cultivation in pervious years.

Therefore, such data have been collected from different offices, Such as Krishi Bhavan, Tadong, Department of Horticulture (DOH), population census office (Gayshing 2001), The maps were collected from forest Department Deorali, Gangtok (working plan), prepared survey of India. (SOI) as well as some data was collected from Khamisirbong Gram Panchayat office.

Moreover, for the secondary information different Government offices and libraries has been used. Likewise relevant literatures including both published and unpublished dissertation and books were used from the central library of Tribhuvan University, Kitipur, Kathmandu and Central Department of Geography. Similarly, websites were extensively used to collect relevant information as further study.

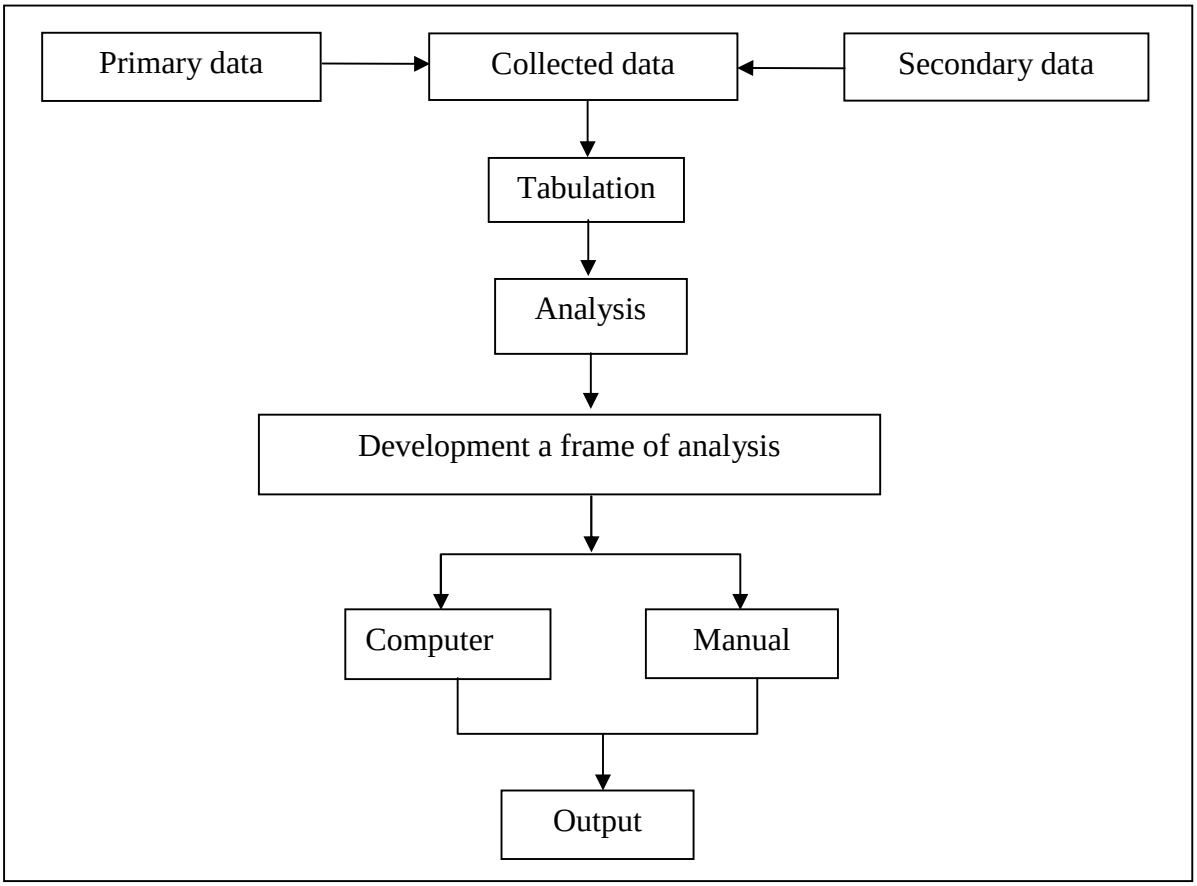
3.5 Methods of Data Analysis

After the collection of data from the respondents observation and secondary sources were edited and coded in tabular form. Data were collected through questionnaire, interview, observation etc. and secondary sources are analyzed qualitatively and quantitatively. Quantitative data which were collected through the interview,

Questionnaire, and observation, secondary sources were presented in table and figure as far as possible and according to requirements of the objectives in the study.

As well as during the data analyzing process first it was done by manually and after correcting it them only it was done by the computer (Microsoft word and Microsoft excel). Simple statistical tools such as ratio, average, and percentage have been used to analyze the quantitative data. Maps, tables, charts, diagrams are used to analyze the findings of the study. The figure 3 shows the step of data processing in the stage between the collection of data and its analysis.

Figure 3: Steps of data collection, processing and analysis



3.6 An Experiences of Fieldwork

Fieldwork is an interaction among the nature, researcher and respondents. The researcher must be humble and sincere at the time of research. Most of the respondent do not give their proper information due to they do not want to cast their income.

So that, at first researcher must be convince to respondent about the research. As well researcher must be very careful while taking an interview with respondents. Researchers have to know, that what he/she is thinking about this research. Moreover, researcher must be manage their leisure time to the respondent because of if researcher got short time at the period of interview, information may not be reliable. Most of the respondents have thought positive about research in spite of their no education. Sometimes some respondent become over serious to give the information, on the other hand, some respondent had harsh, and who do not care any questions as well. Some respondent unknowingly became hopeful about the benefits of orange cultivation. All the information was collected by researcher himself on foot visiting to respondents' door to door without any difficulties.

However the quality of information depend researcher and the respondents. It is more difficult with those who do not have any knowledge about it rather than those who have some ideas about it. Hence researcher must be serious as well as conscious and alert at the time of survey.

Chapter IV

GENERAL BACKGROUND OF THE STUDY AREA

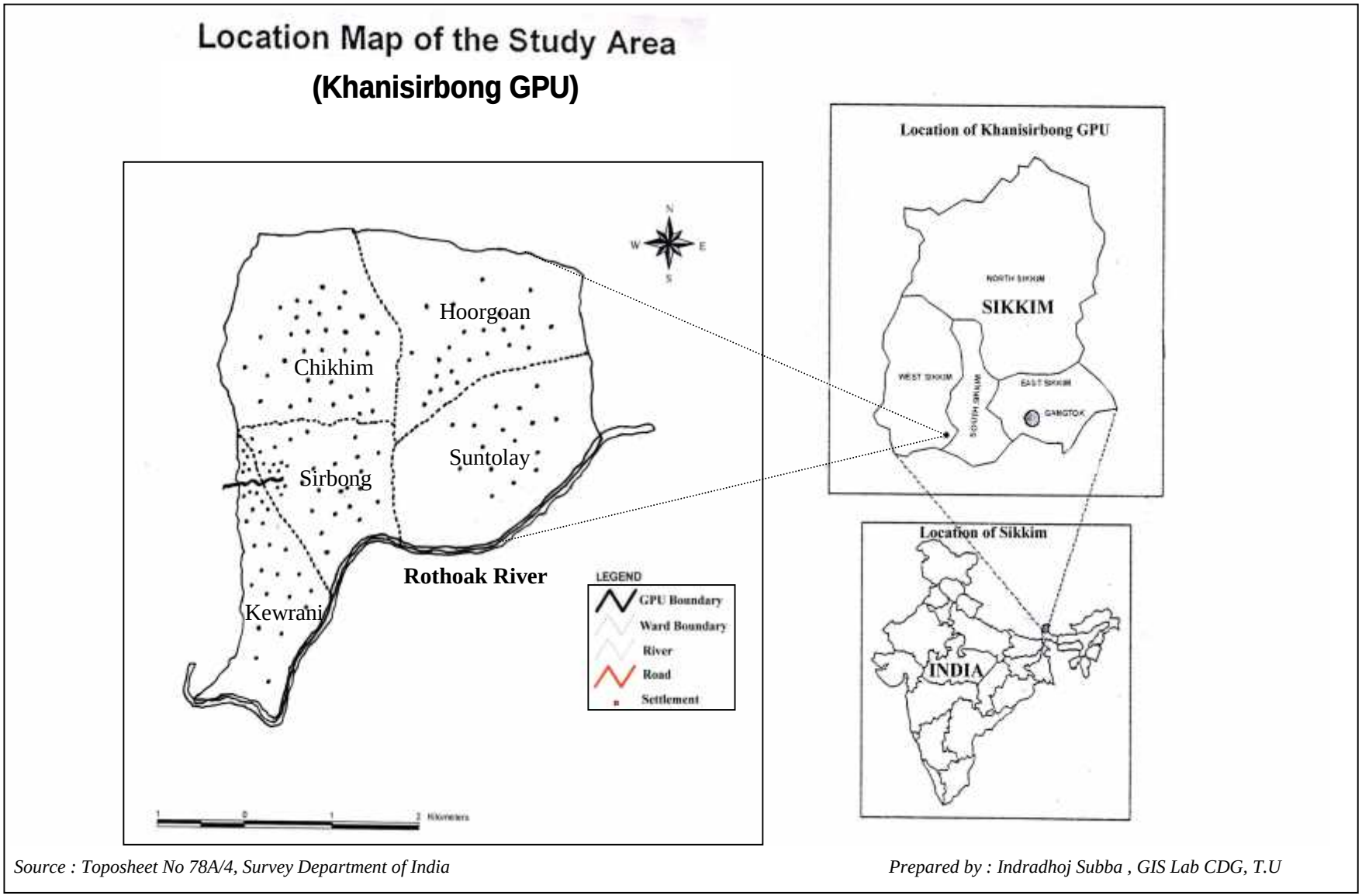
4.1 Introduction of the Study Area

Khanisirbong GPU lies in the southern part of the west district (Gayshing) of Sikkim state between 27⌈ 5' to 27⌈ 15' North latitude and 88⌈ 10' to 88⌈ 20' East longitude. The village is situated in the middle of the Chakung constituency and it is 11 km east of Chakung Bazar. (Map1)

The total area of Khanisirbong GPU is 566.82 hectare. Out of the total land 191.42 hectare is covered by forest and 7.85 hectare is barren land. Rest of the land is settlement, road, trail etc. Altogether there exists 278 households with total population of 1400 in the study area. (Khanisirbong GPU office)

The river Rothoak is the main river of the study area which flows all along the southern boundary of the village separating it with the Chakung and the Gelling Samsing GPU. The northern boundary is marked by the Gurasay peak Gumpa dara and the Lalitar. Towards the west lies the Gufa dara forming the western boundary of the Khanisirbong GPU. Suntolay Kholsa defines the eastern boundary of the study area. The photo 2 reveals that the view of study area.

Map 1



Source : Toposheet No 78A/4, Survey Department of India

Prepared by : Indradhoj Subba , GIS Lab CDG, T.U

Photo 2: View of the Study Area

4.1.1 Physical Condition

This portion provides an overview of the physical condition of the study area in terms of topography, drainage, climate and soil.

4.1.1.1 Topography

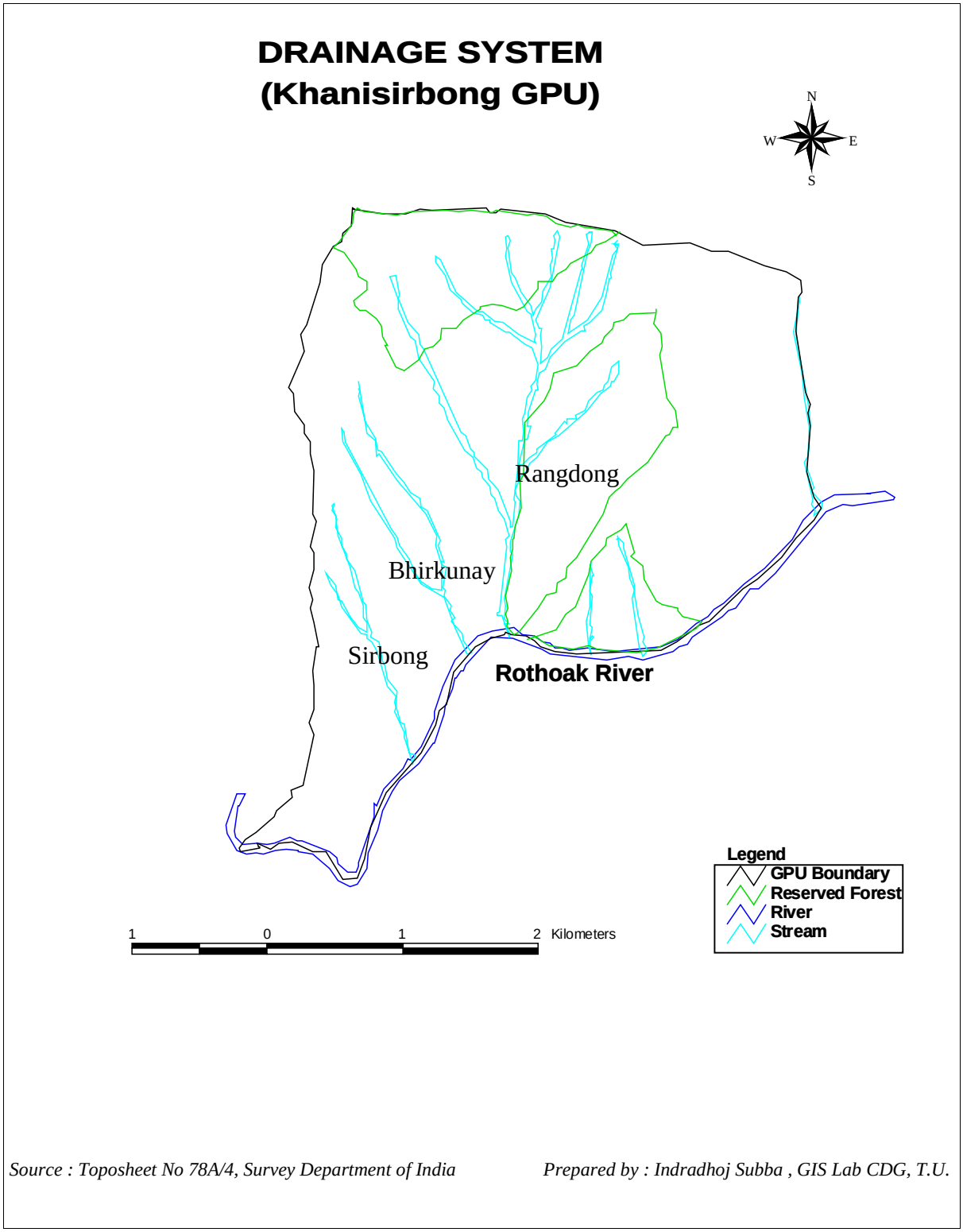
The area rises from 400m to 1600m above the sea level. (map 3) The terrain slopes from the north to south, however the slope get steeper towards the east. Besides Chikhim and Hoorgoan wards, the three wards lie almost at the same altitude i.e. from 400m to 1000m above the mean sea level.

4.1.1.2 Drainage

This study area basically drain with only one river Rothoak and two main streams, Rangdong Kholsa which is lies in between Chikhim and Hoorgoan wards and Bhirkunay Kholsa which originates from Saitling Bhir lying in the Chikhim ward as well as in the Sirbong ward. Both the streams are used for the purpose of drinking water almost in all

the parts of the Khanisirbong GPU. There is no irrigation facility due to less availability of river and streams. Moreover the study area is situated on a rugged cultivable land. Rangdong Kholsa is originates from Gumpa Bhir and both the streams join in the Rothoak river. This Rothoak river is the main and the biggest river of the study area. It flows from west to east direction and finally join in the main river of south-west district i.e. Rangeet river. Moreover few farmers are using Rothoak river for the purpose of Paddy cultivation in Kewrani and Sirbong wards with the help of temporary canals which is made up of locally available materials. The volume of water fluctuates from season to season. The major river Rothoak and both the streams are clearly shown on the map 2.

Map 2

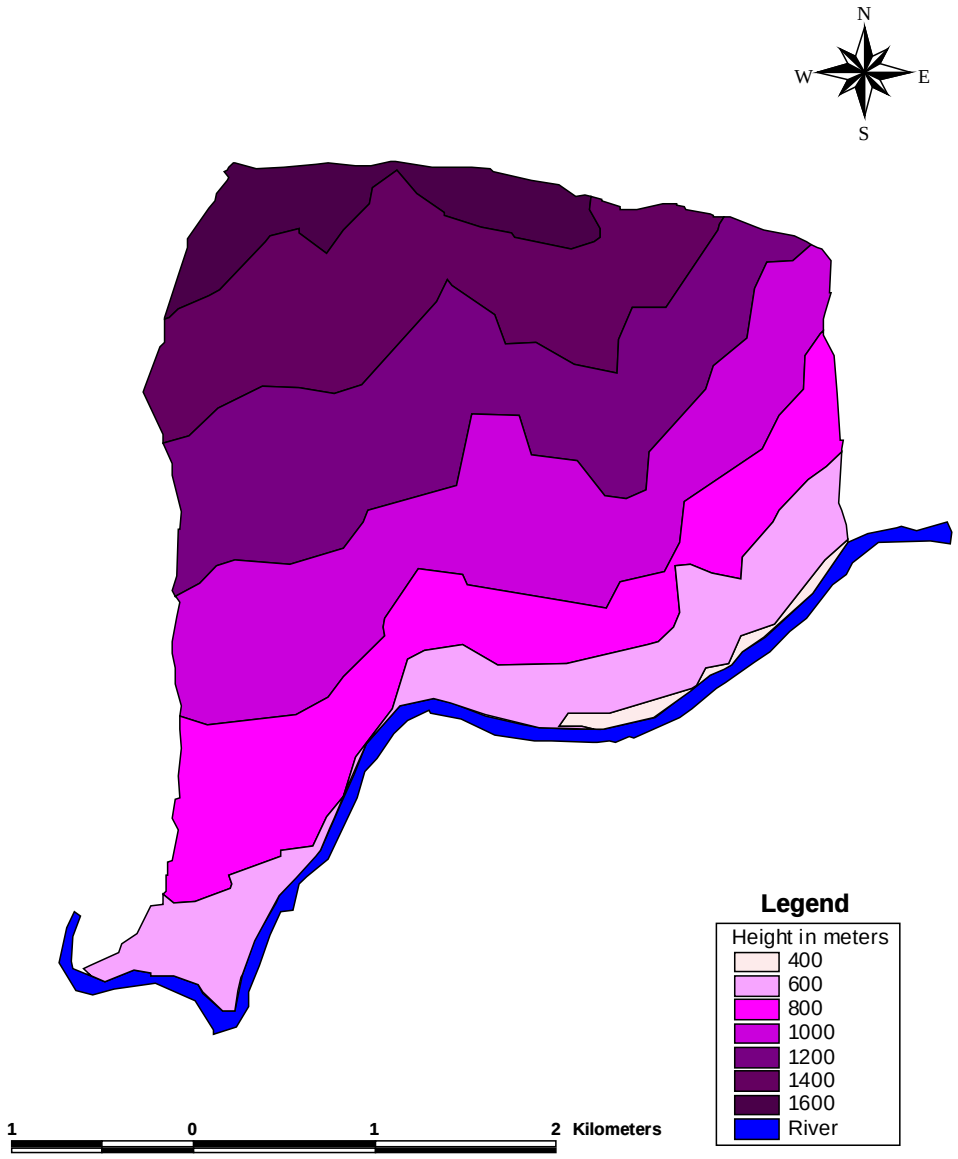


Source : Toposheet No 78A/4, Survey Department of India

Prepared by : Indradhoj Subba , GIS Lab CDG, T.U.

Map 3

RELIEF MAP
(Khanisirbong GPU)



Source : Toposheet No 78A/4, Survey Department of India

Prepared by : Indradhoj Subba , GIS Lab CDG, T.U.

4.1.1.3 Natural Vegetation

In the study area, about 191.42 hectare is covered by forest and bears a tropical climate. The major tree species of the study area are Panisas, Simal, Chilaunay, Gakul, Lampatey, Sirish, Utish, Dhupey, Sakhuwa, Katoos etc. Amliso, Kalijhar, Titepati, Shishnu etc. are important grasses found in the study area.

4.1.1.4 Climate

The Climate of the study area is tropical with altitude ranging from 400m to 1600m above the sea level. Though temperature decreases with the increase in altitude, so the north east part of the study area experiences cool and pleasant climate whereas the south west part of the study area is hot. Due to the absence of meteorological station temperature of the study area was not available. Rainfall starts from the end of June and last till the September. In winter, the land becomes dry and moderately cool in the study area.

4.1.1.5 Soil

In the study area, the soil types could not be assessed due to the absence of soil testing equipment. But it has been observed from the field area that the soil colour ranges from brown to dark coloured. Soils are formed on Schist rock and steep slope, which are susceptible to landslide. On account of fertility the lower part of study areas is highly fertile than upper part.

4.1.2 Socio-economic condition

Social and economic factor are closely interrelated to each other. Economic improvements consequently bring positive social changes, whereas favorable social factor are required to bring about progress in economic status of people the living in a particular community.

4.1.2.1 Population

Most of the villages of the study area are sparsely settled along the hill sides. There are 278 households currently inhabited by a total population 1400. Out of the total population, 706 are male and 694 are females. (Khanisirbong GPU office)

Table 2: Ward wise Distribution of households population in 2007

Name of GPU	Ward No.	Ward Name	Total No. of HH	Population			Percentage of population
				Male	Female	Total	
Khanisirbong	1	Chikhim	51	125	131	256	18.3
	2	Kewrani	68	184	179	363	25.9
	3	Sirbong	77	208	194	402	28.7
	4	Suntolay	47	100	96	196	14.0
	5	Hoorgoan	35	89	94	183	13.1
Total			278	706	697	1400	100

Source: Khanisirbong GPU Office, 2007.

The table 2 indicates that ward no. 3 (Sirbong) has the highest population than the other wards which comprises about 29 percent of the total population. Ward no. 5 (Hoorgoan) has the lowest population which is about 13 percent of total population. Similarly the Chikhim and the Hoorgoan wards are mostly populated by the females. The Chikhim ward is recorded to have 131 females and 125 male while the Hoorgoan ward have 94 females and 89 males. Besides these two wards the others ward are recorded to have more males than females.

Table 3: Caste wise distribution

S. No.	Caste/Ethnic	Households	Population		Total	Percentage
			Male	Female		
1	Limboo	75	213	194	407	29.1
2	Rai	67	143	186	329	23.5
3	Magar	88	238	213	451	32.2
4	Tamang	32	58	49	107	7.6
5	Gurung	3	12	16	28	2.0
6	Kami	6	13	9	22	1.6
7	Chettri	2	7	5	12	0.9
8	Damai	4	19	19	38	2.7
9	Lepcha	1	3	3	06	0.4
	Total	278	706	694	1400	100

Source: Khanisirbong GPU Office, 2007.

The table 3 reveals that, the out of total population of the Khanisirbong GPU about 32 percent people are the Magar community, followed by Limboo community with about 29 percent. But a small community is Lepcha with only about 0.4 percent people in the study area. On an overall count the males are more in number than the females. The males are recovered to be 706 while the females as 694. However the Rai community and the Gurung community have more females than males. While the Rai have 186 females and 143 males, the Gurung have 16 females and 12 males. The researcher observed in the field study, that the Limboo community is the highest orange producer than the other communities. It is due to the reason that the limboo community are settled in the suitable area of orange cultivation. There are nine communities in the study area viz. Limboo, Rai, Magar, Tamang, Gurung, Kami, Chettri, Damai and Lepcha.

Figure 4: Caste wise distribution

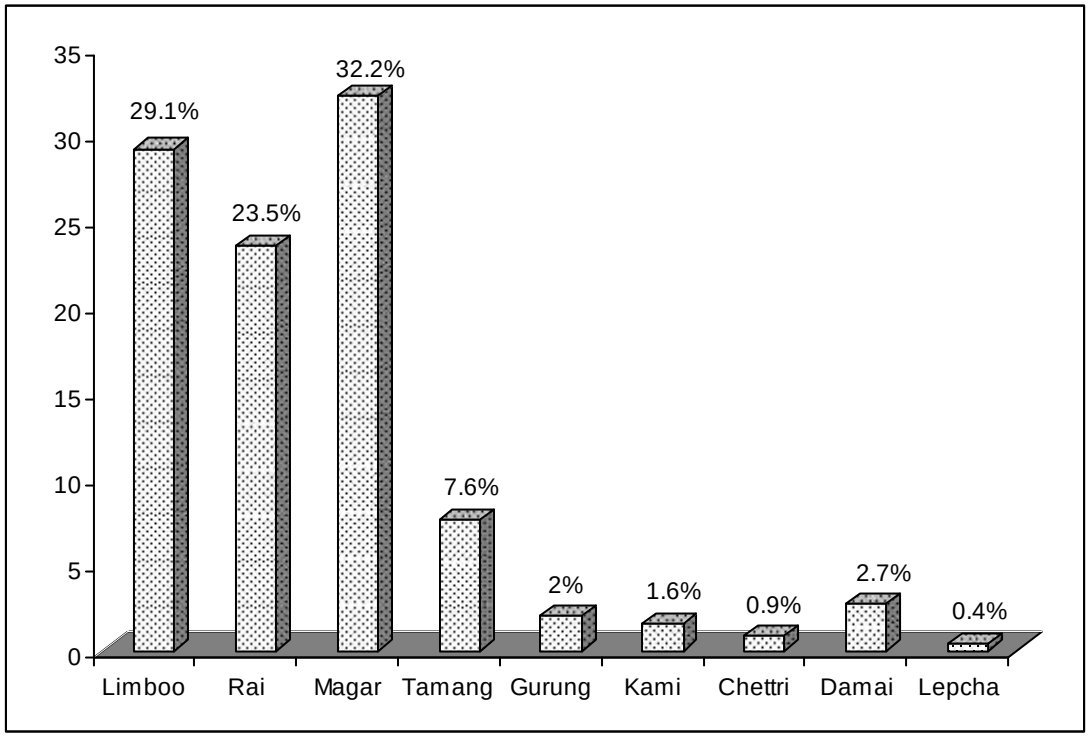


Table 4: Caste wise distribution of orange cultivators from the sampled households population

Caste/Ethnic	No. of sampled households	Percent	Population		Total	Percent
			Male	Female		
Limboo	15	62.5	49	44	93	57.4
Rai	6	25.0	23	25	48	29.6
Magar	3	12.5	12	9	21	13.0
Total	24	100	84	78	162	100

Source: Field Survey, 2007.

As per as the table 4 the Limboo community is the largest community involved in orange cultivation accounting to 57.4 percent of the total. Similarly they hold the highest number of households numbering to 15 (62.5 percent) of the total 24 sampled households. The Rai community occupied 29.6 percent of the total sampled households population and hold 6 households. But only 13 percent Magar community are involving in orange cultivation in the study area.

There are only three communities involved in orange cultivation, in spite of nine communities in the study area. Therefore, it is assumed that the Limboo and Rai communities are inhabited in suitable area for orange cultivation.

Figure 5: Caste wise distribution of orange cultivators from the sampled households population

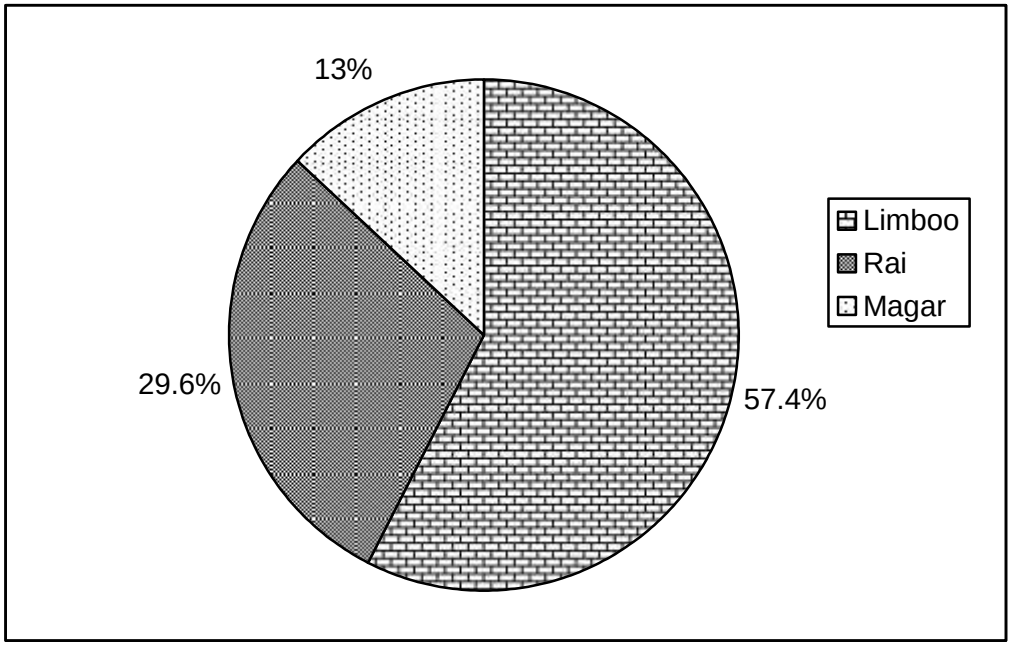


Table 5: Caste wise distribution of orange production from the sampled households population in 2006.

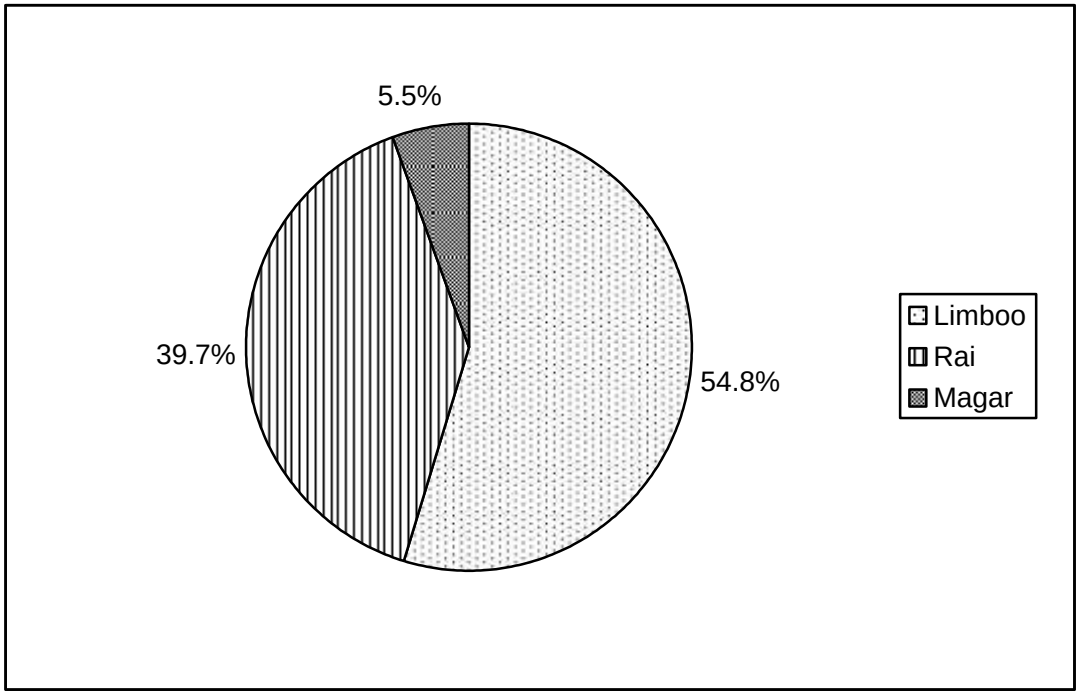
Caste/Ethnic	No. of Sample households	Percent	Production (in pieces)	percent
Limboo	15	62.5	313500	54.8
Rai	6	25.0	227000	39.7
Magar	3	12.5	31500	5.5
Total	24	100	572000	100

Source: Field Survey, 2007.

The table 5 shows that the Limboo community is the largest producer of oranges as well as the dominating population strength in the study area. They occupy 62.5 of the total households and produce. The

Rai community occupy 25% of the households and produce 37.7 percent of the total orange production. The Magar community occupy only 12.5 percent of the households and share a produce of 5.5% of the total orange production.

Figure 6: Caste wise distribution of orange production from the sampled households population in 2006.



4.1.2.2 Status of Education

In the year of 1991 the literacy of Sikkim was 56.94 percent. But within the one decade it has increased to 69.68 percent in the year 2001. (Sikkim: A Statistical Profile 2002; 7)

Education is the key of human development, it can change the attitude of people. In the Khanisirbong GPU, more or less people acquiring each standard of education from primary to highly educated, with many illiterates as well. Although different types of educational standards, prevail more or less literate or primary level people are found in the study area, due to no higher level of educational institutes in the study area. However, all the people could not get high education

because of their low income and they have to go far away for the education purpose from their residential place. The table 6 shows that the educational attainment of the sampled households population.

Table 6: Educational Attainment of sampled households population

S.N.	Level of education	No. of sampled populations	Percentage
1	Illiterate	17	12.3
2	Primary	80	58.0
3	Lower Sec.	24	17.4
4	Secondary	8	5.8
5	Higher Sec.	5	3.6
6	Above Higher Sec.	4	2.9
	Total	138	100

Source: Field Survey, 2007.

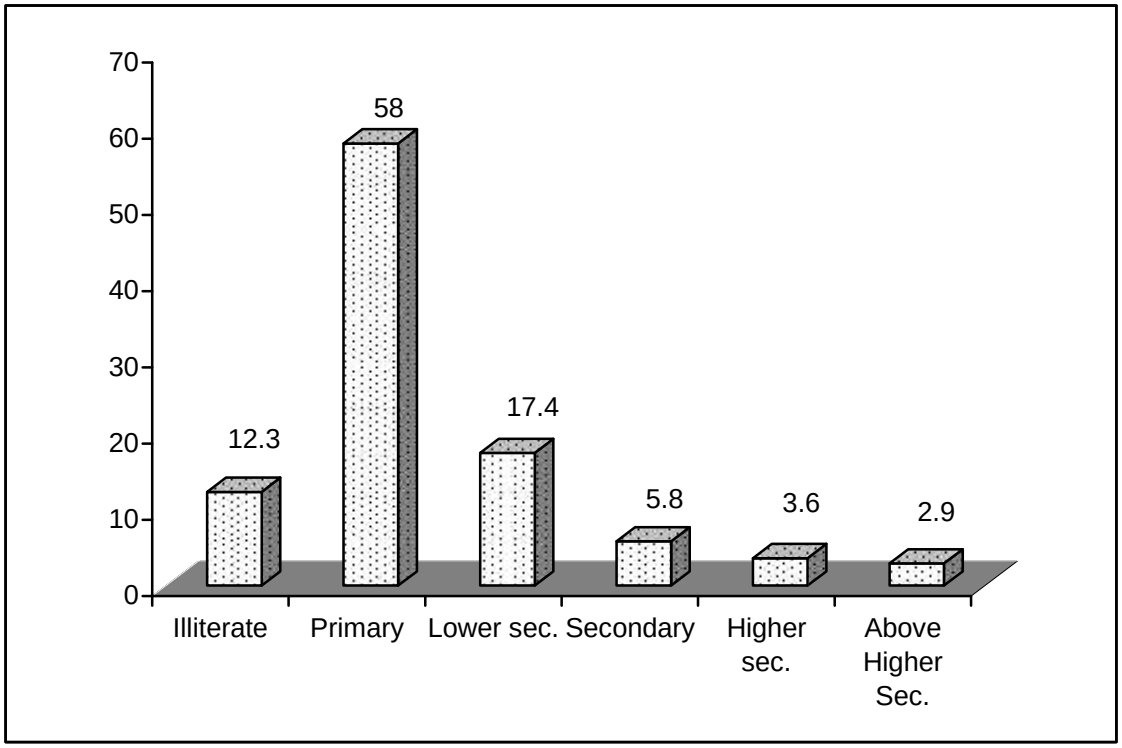
The table 6 indicates that, out of the sampled households population, 58 percent people are literate or primary level in the study area. But there are not enough educated people in the study area acquiring education from Higher Secondary, and above college level. 12.3 percent people are illiterate, this is due to with an average age of 50 plus. In the early years these people could not get education because there was no school in the study area.

To define the literacy boundary a specific age of 5 years old was taken as the lower limit. the age group below 5 though who were going to school have not been considered to have achieved educational attainment while conducting the field work. A total of 24 below age 5 children were observed who had been attending school.

It has been found out educational attainment is also directly proportional to better orange cultivation. The field survey noticed that 58 percent of the sampled households population has acquired primary

level education and these households has better and well managed orange farms compared to others. On the other hand thus of illiterate have not well managed. Figure 7 has been used for clear vision of educational attainment of the sampled households population of the study area.

Figure7: Educational attainment of sampled households population



4.1.2.3 Availability of Facilities and Services

By the help of the state government, the drinking water is supplied to the study area. There are facilities of electricity, education etc. There is one secondary school, one preprimary school, and one lower pre-primary school. There are also two ICDS centre which are also supported by the Central Government of India. There is one Dispensary located in the south west part of the study area. (Kewrani ward) Moreover one VLW centre is in the study area which is also located in the south-west part of the study area. There is also one Animal Husbandry Centre along with Government Quarter which is

located in the middle part of the study area. As well as newly built community Hall is also found in the study area. One more facility under construction is the Panchayat Prashasan Kendra. All the above mentioned facilities have been under taken by the state government of Sikkim. Although there are very low educated people, one private boarding school is found in the study area. Alongside there are three Christian churches under construction, one is the Roman Catholic Church and the others two are the Believer Church of India, (BCI) which is falls in Chikhim and Hoorgoam ward.

4.1.2.4 Occupational Status

Agriculture is the predominant activity of the Khanisirbong GPU. As the study area is rural, maximum people of this area depend upon agriculture. There is no market centre near the study area, hence people have to travel 11km away from the Khanisirbong GPU for selling their agricultural crops, purchase and so on. Moreover there are no industries, factories and multi-national projects in the study area. Therefore most of the people are engaged in agricultural fields.

From the early age to the present time, almost all the people of Khanisirbong GPU cultivate the different sorts of crops like, maize, millet, buck wheat, paddy, vegetables, pulses etc. Out of these crops, the main crop is maize because it is cultivated in every part of the study area. Although the maize is the main crop of the study area, some people of the south-east part of the study area depend upon the cultivation of orange. Moreover some people of the study area depend upon ginger cultivation from which they earn cash as well as produces good yield.

Table 7: Occupational status of sampled households population

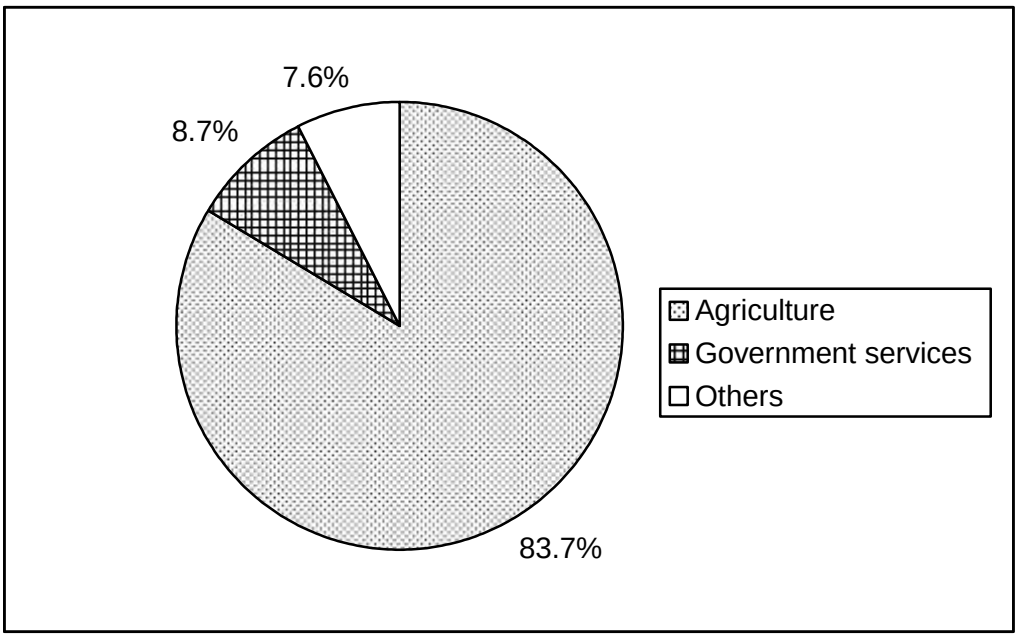
Occupation	No. of people engaged in different occupation	Percentage
Agriculture	87	83.7
Government services	9	8.7
Others	8	7.6
Total	104	100

Source: Field Survey, 2007.

By the total sampled households population (162 person) only 104 total population are shown in the table 7. This is due to 58 population are not engaged in any occupation in the study area. However, according to occupation classes, about 83.7 percent people are engaged in agriculture sector. Similarly, 8.7 percent engaged in government services and about 7.6 percent are engaged in other occupation such as trade, private job, local porter etc.

As per as the table 7, about 84 percent of the occupational sampled households people of the study area depend upon agriculture. So agriculture has been dominant occupation in comparison to the other occupations. The occupational structure of sampled population has also been visualized in figure 8.

Figure 8: Occupational structure of sampled households population



4.1.2.5 Agriculture

In the study area, agriculture is the main source of economic assets of the people. Agricultural products are the main sources of income for maintaining the economic condition of the people. Therefore, almost all the households of the study area are dependent on agriculture. About 84 percent people are engaged in the agricultural sector. They practice multiple type of agriculture and even involve in horticultural activities. Orange, ginger, and broom are the major cash crops and maize and other pulses are the main cereal crops of the study area.

4.1.2.6 Livestock

Livestock is also one of the major sources of income in the community of the study area. A lot of people rear livestock for fulfilling other needs. The domestic animal products such as milk, cheese, butter egg etc. are consumed by themselves. But few households have been supplying milk to the dairy for one year. Animal waste is a fertilizer which increases production of various crops. Bullocks are instrumental

in ploughing the agricultural field. Moreover in the study area that amount of livestock reared is directly proportional to the orange production of a particular household. More livestock means more manure for the crop hence better quality of oranges are produced in such households. The following table 8 shows the number of animals and its average size of holding in the study area.

Table 8: Number of animals in the sampled households

S. No.	Types of animals	Total no. of animals	Number of households	Average size
1	Cattle	56	14	4.0
2	Goat	96	10	9.6
3	Pig	15	12	1.3
4	Poultry	113	16	7.1
5	Other	24	7	3.4

Source: Field Survey, 2007.

The table 8 shows that, in the study area, almost all the farmers or households rear animals. The farmer keeps at least one to two pair of poultry. Goats are the domesticated as sources of income because they are very easy to sell from the house. Selling of animals is mostly dominant during the festival time. (Dashain/ Christmas) so that, every farmer rear one or two types of animal in the study area. As well as it is noticed that the household rearing cow, oxen and goat have better yield of oranges as they are enjoying provisional manure from their domesticated cattle. On the other hand households rearing pig, poultry and others do not get access to enough manure. Hence these households do not yield better oranges comparatively to those domesticating cow and oxen. The other animals like rabbit, dogs, cats etc. are also domesticated.

Chapter V

PRODUCTION AND MARKETING OF ORANGE CULTIVATION

5.1 Production and Area of Orange 2000-2006

The government of India has identified orange as an important crop of the state. Although these crops are being grown in Sikkim since time immemorial, it needs scientific intervention as commercial venture (Horticulture and Cash Crops Development Deptt. Government of Sikkim, 2006-07; 33)

Although there are different types of cash crops in the study area, orange and ginger occupied a high priority. Local farmers are more interested towards their production and they try to increase their farm size due to its high commercial value. Despite the production of orange is more or less good, as compared to increasing farm size per hectare, the production is almost stable stage.

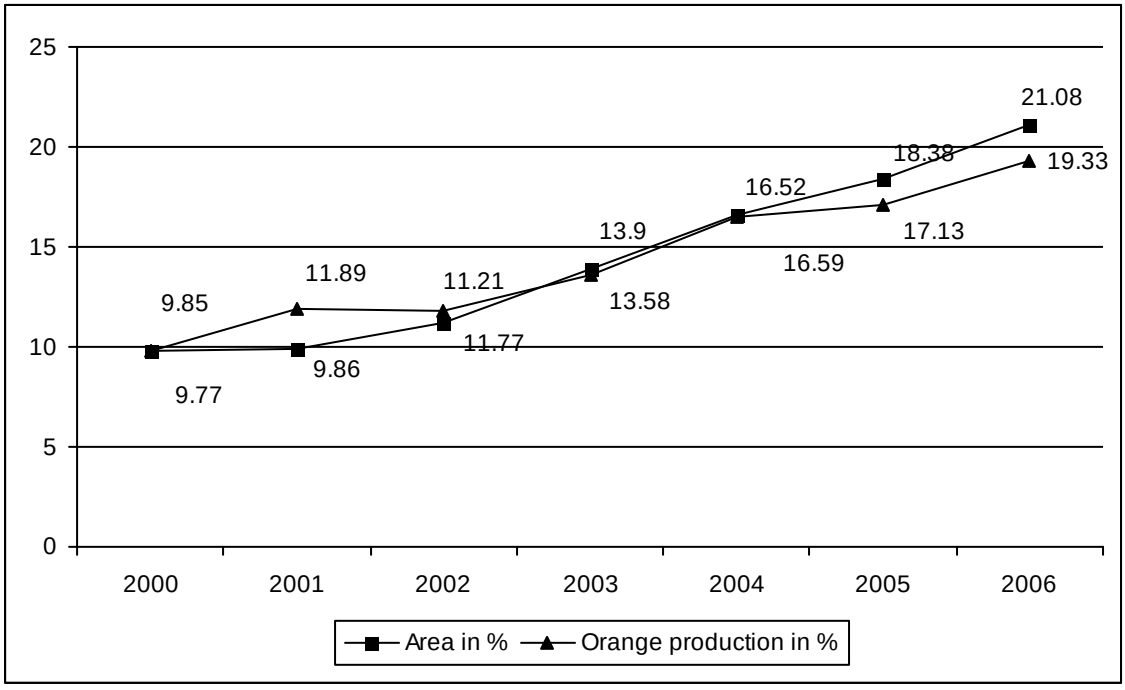
Table 9: Area and production covered by orange as per sampled households (2000-2006)

Year	Area in (ha.)	Area (in %)	Orange production (in 100 pieces)	Orange production (in %)	Production per hectare
2000	20	9.85	289000	9.77	14450.0
2001	22	9.86	351800	11.89	15990.9
2002	25	11.21	348200	11.77	13928.0
2003	31	13.90	401600	13.58	12954.83
2004	37	16.59	488600	16.52	13205.40
2005	41	18.38	506800	17.13	12360.97
2006	47	21.08	572000	19.33	12170.212
Total	223	100	2958000	100	13264.57

Sources: Field Survey, 2007.

It is evident from table 9, that the cultivated area is increasing compared to production. In 2000, only 22 hectare (9.85 percent) was cultivated which rose to 47 hectare (21.08 percent) in 2006. In the case of production of orange per pieces it shows an increasing amount. But in relation to production per hectare it has remained generally stable. During 2000 and 2001 production per hectare shows a high value of 14450.0 and 15990.9 pieces respectively. However, the following years though widely increased in area the production per hectare has remained near to stable. An accounting between 12000 to just over 13000 pieces per hectare annually.

Figure 9: Production and Farm Size of orange from 2000 to 2006



5.1.1 Ward-wise distribution of orange production and area

The study area constitutes of five wards, namely Chikhim, Kewrani, Sirbong, Suntolay and Hoorgoan. Amongst all the wards, Hoorgoan is the leading producer of orange in the study area. However, in Suntolay ward orange cultivation is absent or not practiced. This is because, the Suntolay ward lies in a low altitude and temperature, which is not favourable for orange cultivation to some extent. The area is

physiographically rocky, too and constitutes of steep slopes. As such the geography of a given area plays a vital role for the orange cultivation.

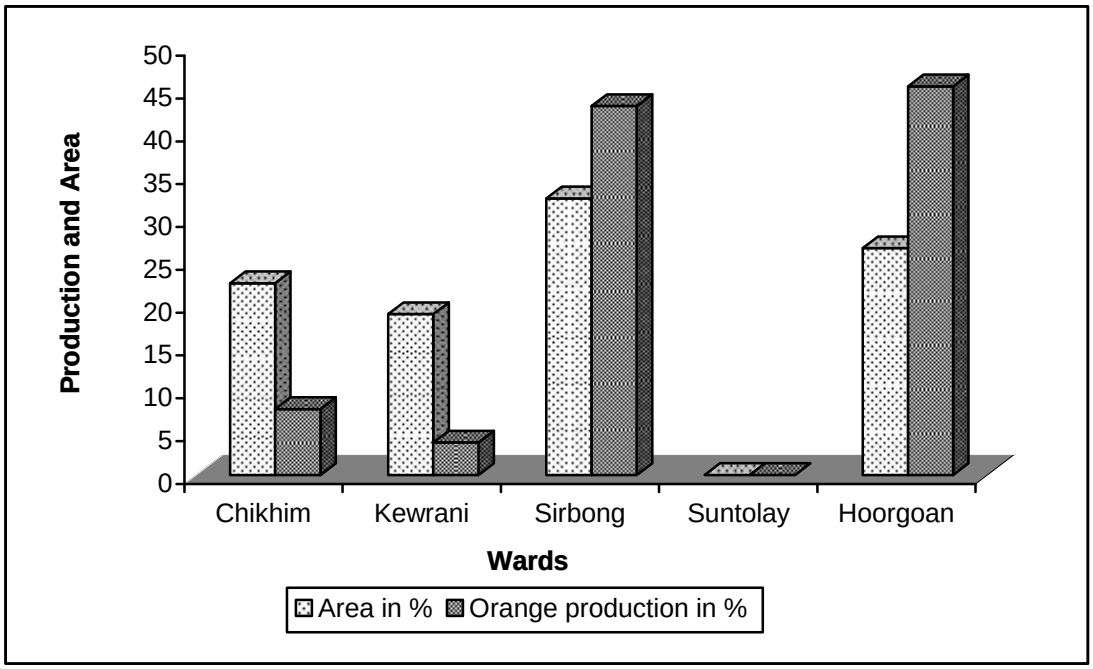
Table 10: Ward-wise distribution of orange production and area (2000-2006)

Name of GPU	Ward No.	Name of wards	Area in ha.	Area in %	Orange production in 100 pieces	Orange production in %
Khanisirbong	1	Chikhim	50	22.4	228000	7.7
	2	Kewrani	42	18.8	112300	3.8
	3	Sirbong	72	32.3	1273700	43.1
	4	Suntolay	-	-	-	-
	5	Hoorgoan	59	26.5	1344000	45.4
Total			223	100	2958000	100

Source : Field Survey, 2007.

As shown in the table 10, the Hoorgoan ward is the high producer of orange. This ward produces about 45.4 percent of orange from 26.5 Percent (59 ha.) of orange cultivated land. It is followed by Sirbong, producing about 43.1 percent of orange from the total area used for orange cultivation. Kewrani ward which produces only about 3.8 percent of orange from about 18.8 percent of orange cultivated land. Similarly, according to orange cultivated land, more cultivated land is in Sirbong ward about 32.3 percent. Likewise, the Kewrani wards has less orange cultivated land about. 18.8 percent among the four orange producer wards in the study area. The people of the Kewrani ward do not practice orange cultivation as widely as it is done in the other wards.

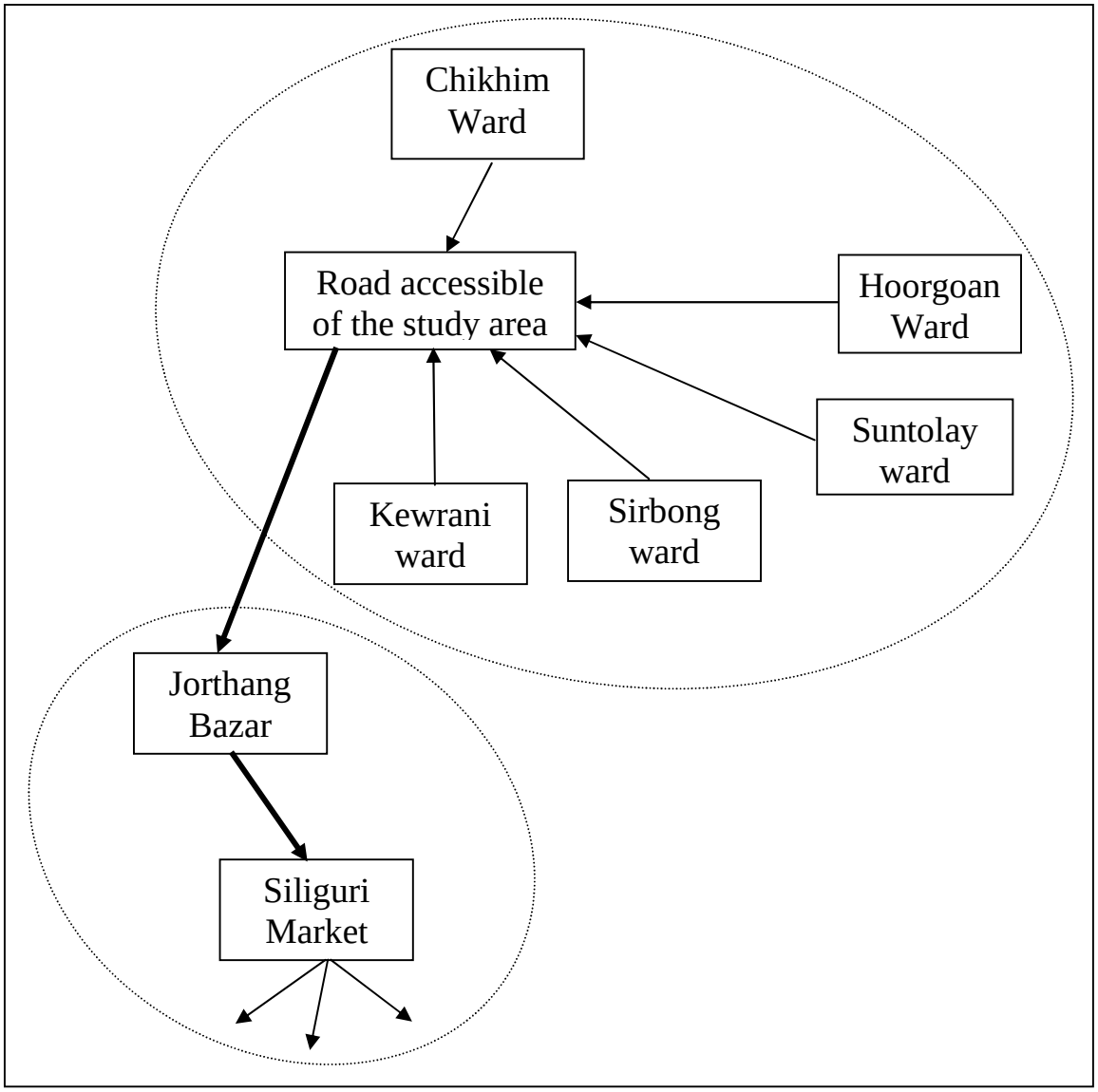
Figure 10: Ward-wise distribution of orange production and area (2000 - 2006)



5.2 Marketing of Orange Cultivations

Well organized marketing system encourages farmers to increase their production and farm size. The study are on being rural area, there is no market centre. Even though the nearest market is the Chakung Bazar, orange products are sold in the Jorthang Bazar. The Chakung Bazar is not sufficient for orange marketing because it is under developed market. It means that there is no orange traders in the Chakung Bazar. So, all the local contractors sell their product in Jorthang market centre. It is 22 km far from the Khnisirbong GPU and lies in the southern district of Sikkim. Orange products are taken by the contractor from the orange orchards by the local porter to the accessible road of the study area. By the accessible road they (contractor) used the vehicle for transporting to Jorthang Bazar. The figure11 reveals the spatial interactions ward of the study area.

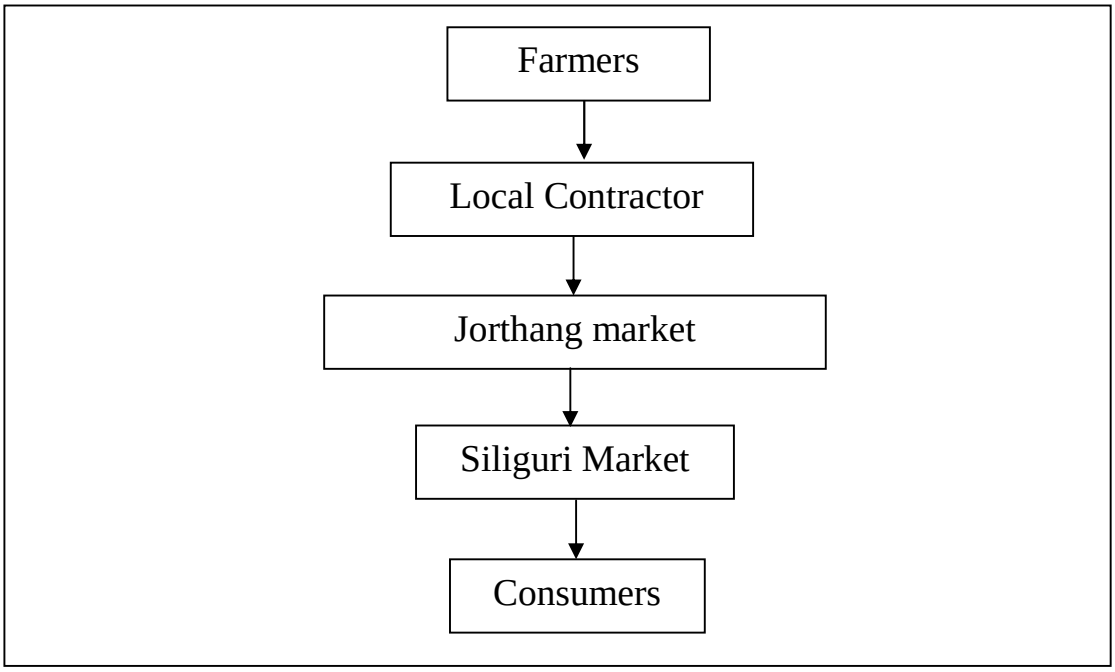
Figure 11: Spatial interactions ward of the Study Area



5.2.1 Marketing Channel of Orange

In the study area, marketing channel of orange is done only one way channel, sold by the contractor. The local farmers do not sell their products in the market because they do not have linkages with contractor of Jorthang Bazar. Hence the local contractor are the most important marketing channel of orange in the study area. The marketing channel of orange in the study area has been shown in figure 12.

Figure 12: Marketing Channel of Orange



5.3 Income Contribution of Orange Cultivation

Owing to favorable physical and socio-economic conditions of orange cultivation in the study area, large portion of the annual income is contributed by production of orange. Orange cultivation culture practicing farmers earn a remarkable income by selling production to contractor.

Table 11: Total income of households from orange cultivation 2006

Income group (in IC)	No. of sampled households	Percent
less than 10,000	13	54.2
10,000 - 20,000	4	16.7
20,000 - 40,000	2	8.3
40,000 - 60,000	3	12.5
Above - 60,000	2	8.3
Total	24	100

Source: Field Survey, 2007.

As shown the table 11, from the total sampled households, 13 households (54.3 percent) are getting less than 10,000 rupees from the

orange cultivation in a year. It is due to their small farm size. There are 4 households (16.7 percent) with an income between 10,000 - 20,000 from the orange cultivation. But, out of the 24 households sampled, only 2 households (8.3 percent) are getting more than 60,000 rupees from the orange cultivation in the study area. This has been noticed to be due to proper management and care the orchard as well as the size of farm these respective households were larger.

5.4 Suitability of Orange Cultivation in the Study Area

The growth and development of orange plant are primarily governed by the condition of the physical parameters like altitude, aspect, temperature, soil and the climate. Similarly other socio-cultural factors such as farm input, manure, pesticide, awareness and training play an important role. The success or failure of orange farming is intimately related to the location and weather conditions. Physical parameters plays a significant role in every phase of orange farming starting from the preparatory tillage to harvesting and storage. As location is the single major limiting factor in crop production, successful farming calls for appropriate decisions according to the location in the matter of types of crops. So, if the location is not suitable, the crop does not mature well enough thus are susceptible to many diseases and pests. The colour, shape, size and taste of any agricultural product depend on the suitability of the location.

5.4.1 Effect of Altitude on Orange Production (600-1200m)

It is noticed that in the area the average height of the orange plant is approximately 15 feet. The crown of a single plant covers a circumference of 22 feet. The orange fruit has a volume of an average palm size catch hold (9.5 inches in diameter), and a single tree bears around 500 fruits. The peel is thin, with sweet taste and is yellow in colour. Once the fruit is ripe, it hangs on the tree for 3 continuous

months i.e. during winter (Nov. - Jan.) while the fruit takes 3 month in Autumn (Sep. - Nov.) to mature.

Photo 3: Large crown of orange tree between (600-1200m)

5.4.2 Effect of Altitude on Orange Production (1000-1600m)

In this area the height of the orange plant is the approximately only 8 feet in average and the crown covering only nine feet in circumference and the orange fruit is also of a smaller size with only 6.5 inches in diameter. A tree at a time bears not more than 70 fruits. The peel is thick and green in colour and the fruit also tastes sour. A fruit takes a complete four months time to mature and hangs on the tree for a period another four months before it falls off naturally.

Photo 4: Small crown of orange tree between (1000-1600m)

To conclude, it can be said that the best quality oranges in the study area thrive in the south-west region with an altitude ranging between 600 to 1200 meters. Hence qualities vary with increase and decreases in altitude with due allowances to oranges in the lower altitude of the north-west and some upper parts of the south-west.

5.5 Effects of Aspects in Orange Production

The study area slopes from west to east and the scopes are generally south facing. However, the eastern slopes don't get maximum length of sunshine as the sun rays are directly received by the western slopes which faces to the east. Orange cultivated in the sun facing

slopes, which mostly lies towards the west are of better quality. These oranges are more sweet to taste, larger and ripen quickly and fall off the branches quite late. On the other hand oranges cultivated towards the eastern part of the study area lies in a shadow slope. As such the length of sun shine in this areas is less, hence the oranges are a bit sour, small in size, thickly green peeled and fall off the branches much earlier than those of western slopes. Therefore, it is evident that the length of sun shine plays in important part in the cultivation of oranges.

Chapter VI

GENERAL PROBLEMS AND PROSPECTS OF ORANGE CULTIVATION

6.1 Problems of Orange Cultivation

The Sikkim state is endowed with varied agro-climatic conditions suitable for the cultivation of large number of sub-tropical and temperate fruits but due to land scarcity and economic viability. Only mandarin orange and passion fruit are being commercially cultivated. During the year 2006-07 the production of Sikkim mandarin was 9,25,60,000 Pieces (Annual progress report 2006-07; 8). The government has initiated fruit development programmes and activities in different districts as well as in sub-division. Some progress and achievement have been seen, but the farmers are not to a satisfactory level. Some factors and conditions that lead to cause one or more problems, which hindered range development activities are generalized in this section. Along with the above mentioned, the major problems of orange cultivation as indicated by local people have been categorized in the following.

6.1.1 Economic Problems

The economic status of the study area is very low. They cannot go for planting of orange trees that require heavy initial investment as well as a handsome care and management practices regularly and continuously then after. Due to this high initial it cost has distracted farmers from orange plantation. Although the Horticulture Development has been solving the needs of orange plant to the farmers but the farmers are not in satisfactory level. Owing to the reason that orange plant is not only enough to the farmer as orange plant need a lot of care, management and insecticides, which a poor farmer cannot afford it due to their low economic status.

6.1.2 Problems of Climatic Hazards

Orange trees need adequate temperature, rainfall, wind, light, and atmospheric humidity for proper growth and development of orange trees and fruits. Often at times, frost and speed winds are seen in the Chikhim and Hoorgoan wards. They induce problems in orange cultivation to a variable extent. Frost and Freeze are so damaging to orange fruits and trees that may lead to death. Sometimes hails are also seen in the study area during the period of flowering of orange trees. The hails destroy or drops to the orange flowering. It also reduces or imbalances the sources and sinks relationship by destroying leaf surface. Moreover, such high winds aggravate premature drops of flowers and fruit heavily and may even uproot the whole tree.

6.1.3 Problems of Transportation

Due to the newly constructed road as well as under construction of pitch road, there are a lot of problems found in the study area. Furthermore, there has been inaccessibility of roads in the three wards i.e. Chikhim, Hoorgoan and Suntolay where there are much more problems of transportation facilities. They have to pay extra carriage charge to local porter from the accessible road. So that, every people have to endure these transportation problems specially, those who are staying far way from the road side. Similarly, most of the orange grower has been facing a lot of transportation problems during the period of marketing. Hence the carriage cost of orange may naturally become high in the study area.

6.1.4 Problems of Disease and Pest

In the study area, most of the farmers have been struggle by fungal disease and pests. Such diseases are Powdery mildew, Scab, Bark borer and Leaf minor.

6.1.4.1 Powdery Mildew

It is a whitish powdery disease causing a lot of problems orange's farmer are facing a problem in the study area. Because powdery mildew damages the leaves and fruit, the affected leaves get distorted and in severe conditions drop down. It is a major disease faced by the orange plants. The following photo shows that the affected fruit by powdery mildew.

Photo 5: Fruit damaged by powdery mildew

6.1.4.2 Bark Borer

The bark and shoot borer are serious pest in orange, especially neglected orchards. The Beetle (larvae) feed on bark of the orange tree and thus destroys the translocations tissues of the bark. Since they feed at night, they generally escape notice but their presence on an infested tree is indicated by the presence of hanging loose mass of five pieces of woods. But sometimes this type of larvae is also seen in the morning time. Almost all the farmers have been discouraged due to the presence of this sort of pest in the study area. The following photo 6 shows that the beetle (larvae) is feeding on the orange bark.

Photo 6: Problem of beetle (larvae) on orange tree

6.1.4.3 Orange Leaf Minor

It is a serious pest in the nurseries as well as in young and old orchards. The larvae usually mine the underside of leaves making serpentine mines, which are silver coloured because of entrapped air. The mining effects badly distort the leaves resulting in their curling and defoliation during severe attack. Due to the presence of this sort of pest more or less farmers are thinking about the prevention in the study area. But still there is no any suggestion given about it from Horticulture department in the study area. The following photo 7 shows the leaf minor of orange tee.

Photo 7: Problem of orange leaf minor

6.2 Prospect of Orange Cultivation

There is a still sufficient possibility to promote orange cultivation in the study area in spite of the several problems for the cultivation of orange such as scarcity of land etc. Almost all the local oranges farmers are very much interested towards its cultivation due to its increase in demand, day by day and its commercial value is also high enough. Further the government has been encouraging towards its cultivation to the local farmer, and sometimes the government also providing local plant seeds to the poor farming people. These plant seeds are distributed by the government of horticulture department of Sikkim through the Gram Panchayat Unit.

Orange cultivation plays a significant role in balancing the declining environmental condition, as continuous cultivation of cereal crops resulted in the decline of soil fertility and increasing population pressure on marginal land creates various environmental imbalances which resulted in natural disasters i.e. landslide, sheet wash, soil erosion

etc. Moreover it is also seen that cultivating orange is more beneficial than cereal crops owing to its better pay-off. Orange crops have also helped reduce the problems of unemployment as it creates seasonal job opportunities to local people during the period of picking and marketing.

The common talk in the area is such that whatever prospective farming land is left, untilled and unused (fallow) the same land be utilized for the cultivation of oranges rather than cereal crops as orange cultivation yields better pay offs on the grounds of environmental protection, employment opportunities and better income in cash. Therefore this study supports the notion that cultivation of oranges be promoted in the area.

Chapter VII

CONCLUSION, SUGGESTION AND RECOMMENDATION

7.1 Conclusion

In the Khanisirbong GPU, near about 84 percent people being engaged in agricultural sector practice mixed farming and even involve in horticultural activities. Orange, ginger and broom are the major cash crops while maize and other pulses are cultivated as the cereal crops in the study area.

The study area is a notable orange growing area in the western district of Sikkim. Mandarin orange has been cultivated from about sixty years or so in the study area. In the early periods, orange was cultivated as a subsistence crop but later on though it had received more popularity due to high demands in the national market level, yet the economic status of the orange farmers in the study area has not shown a considerable betterment.

Climatically, more or less Khanisirbong GPU is suitable for orange cultivation. The climate of the study area is tropical to sub-tropical in nature changing with altitude ranging from 400m to 1600m above sea level. Moreover there are several favourable physical as well as socio-cultural factors for orange cultivation, such as favourable altitudinal extent. The area lying between 600 to 1200m is comparatively favourable for orange production while the area lying below 600m or above 1200m are not so favourable for orange cultivation as well as production.

Generally most of the orange orchards are small in size and almost all the people have very small sizes of farm. The North-east part lies completely void of orange cultivation while the South-west part is the largest producer of orange. The farmer of the study area, live in

varied socio-economic condition. The study concludes that the socio-economic status of orange growers is higher than non-growers. In the basis of literacy status, occupation, and food sufficiency the orange growers has better position.

In terms of orange production of the study area, the production has increased from 9.80 percent to 19.00 percent from the initial year of 2000 to 2006. Although the production has increased, sometimes the farmers do not receive sufficient returns. This is because of the lack of proper marketing facilities, better transportation, direct garden selling etc. along with being inadequately linked to the market channel which also operates on a one way basis. As such there has been no commendable development in the study area. Majority of households in the study area are not settled nearby road facilities, as such they have to pay extra carriage charge to the local porter for carrying the produce to the motorable road. There is no such systematic care and management for orange cultivation due to the low economic status of the study area. As well as the cultivation is also practiced on a traditional mode. There are no modern equipment and technologies applied for cultivation of orange in the study area.

As per the farm size, more or less people are using their own land in orange cultivation in spite of their small land size. Farm size and care of oranges trees has played a significant role in production in the study area. In the present context, there has been increase in production along with the increase of it's farm size, however, in totality the produce of oranges per hectare has not shown a notable increase. Similarly there are a lot of problems faced by the local farmers because there are near to absent usage of initiatives like pesticides, insecticides etc. As such this is the most responsible retarding factor for low quality orange production in the study area.

Besides these problems and limitations, farmers of the study area are still optimistic for the future prospects of orange cultivation. As well as the prospects for orange cultivation of the study area is bright. People are being attracted day by day to its; cultivation. However, for the development of the cultivation of orange of the study area it is necessary to remove the above mentioned problems and should be organized systematic programmes and initiatives be implemented for enhancing orange cultivation in the Khanisirbong GPU.

7.2 Suggestion

The study comes to a conclusion that the farmers of the study area indeed seem to be quite prospective in lieu of orange cultivation. Although the orange farming form as a main source of income for many yet the technique used by many are still of primitive mode. Intensive or implementation of modern equipment is totally absent, the application of which would have certainly boosted up the production of orange in the study area. Keeping such prospects in view the following suggestions are formulated by the researcher for the upliftment of the existing socio-economic condition of the farmers.

7.2.1 Suggestion for the policy level

- Transportation needs to be strengthned in the study area as the three orange farming regions are completely void of motorable linkage. The absence of easy and quick transport to the market centre has resulted the price of the oranges to be high compared to the oranges brought from motorable linkage's. As such a proper transportation system, most probably road network be set up for equal market values and better socio-economic condition of the farmers in totality.

- Provision of insecticides and pesticides, improved seeds and conduction of vocational training be provided to the farmers so as to enhance better production.
- Initiatives and incentives be launched to promote further research an orange cultivation and other related subject matters.

7.2.2 Suggestion for the indigenous farmers (local level)

- It is better to use cow-dung to chemical fertilizers as the latter wears off the roots of the orange plant thus killing the plant. Cow-dung on the other hand has no side effects at all rather enhances plant quality.
- Manuring needs to be done between Feb and April. To do so in a appropriate way, the ground around the orange plant needs to be digged for over a depth of 1 foot and covered by manure, must likely cow-dung. This will aid in better flowering hence better quantity and quality of fruits.
- It has been noticed that in the picking period the contractor employ other people to pick up the oranges from the trees. These people often misstep and break the branches. The regeneration however, takes a long time. As such it is suggested that carefulness be adopted so as to prevent such losses.
- In the case of diseased or infected branch beyond cure, it is advisable to cut off the same branch to prevent further infection on the same tree and the surrounding crops as well.
- Daily care is necessary to prevent pest attacks and fungal infections. The common pest is the beetle about a size of a finger hence killing it on the spot will save the plant.
- As far as possible steep slops are better avoided for orange cultivation. Therefore terraced farming forms an alternative for

orange cultivation. A few terraces are observed in the study area as well, that has given a firm stand to the plant as well as way for many implementations.

7.3 Recommendations

The present study has its limitations and function within a few selected objectives. As such it is believed that various aspects relating to the subject matter remain untouched.

The present study titled as "Orange cultivation in Sikkim" views only the affect of location on orange cultivations as a prime objective. However, other attributes like production and marketing problem of orange cultivations are viewed within a selected sample, hence delimiting the inferences that would have come up had a wider area and greater sample taken. As such it becomes a recommendation for further research on the same matter that a greater sample be surveyed. The field survey conducted by researcher covered only 24 households out of the 119 households who are growing oranges, hence leaving 95 households unsurveyed. Therefore further study is recommended to survey the uncovered households in the Khanisirbong GPU the study area.

Likewise the study on the affect of soil on orange cultivation through the usage of soil tasting equipment can be done. Similarly effect of climate, implementation of intensive agricultural modes along with awareness level of the people regarding the prospect of the orange cultivation etc can be taken as other attributes for further research on the study area.

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APPENDIX 1

ORANGE CULTIVATION IN SIKKIM

(A Case Study of Khanisirbong Gram Panchayat Unit of West Sikkim)

Questionnaire to the Orange Farmers

1. General Information of Orange Farmers

House No..... Name of the household head.....

Age: ..... Religion .....

Sex:..... Caste: .....

Education: ..... Total No. of Family .....

Name of Village:.....

Total Landholding (in Acre) .....

2. Composition of the family on the basis of sex, age, education and occupation.

S.No.	Relation with Household	Marital Status	Sex	Age	Education	Occupation
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

3. Information about Agriculture

Types of Crops	Cereal crops				Cash crops		
	Maize	Rice	Wheat	Millet	Orange	Ginger	Cardamom
Area (in Acre)							
Production (in Kg/ 100 pieces)							
Income (in Rs.)							

4. Information of Animal Husbandry

Types of Animal	Pig	Goat	Cattle	Poultry	Others
No. of animals					

About Orange Cultivation

5. When did you start to cultivate orange ? Year .....

6. What are the main cause of orange cultivation?

   a) ..... b)..... c).....

7. How much land do you have under orange cultivation ?

No. of Orange Trees	Farm size (in Acre)	Annual Production (in Saikara)

8. Do you use manure for orange cultivation ? If yes, type of manure .....

   a. Chemical ..... b. Composed..... c. Others .....

9. Why you prefered this type of orange plant ? .....

10. What type of orange plant do you cultivated in your field ?

    a. Local ..... b. Hybrid ..... c. Others.....

    If yes, name of crops..... Why ? .....

11. Is there irrigation facilities needed for orange cultivation ?

    a. Yes..... b. No.....

12. What are the harmful insects to injure the orange trees? .....

13. Is it beneficial than other crops ? a. Yes ..... b. No.....

    If yes, why ? .....

14. What short of changes are brought in yours family by orange cultivation ?

    a. Economic status is increasing .....

    b. Economic status is constant .....

    c. Economic status is decreasing .....

15. Do you use to pesticide control harmful insects or diseases ?

    If yes, what types of .....

Marketing System

16. Where do you sell your orange ? .....

17. When will you sell ?

    a. Before Picking ..... b. as soon as Picking .....

    c. when the price is high .....

18. What is the transportation cost ? .....

19. How do you transport your orange to reached market ?

    a. Self .....b. By vehicle ..... c. Others source .....

20. Are you getting satisfactory price from your products ?

    a. Yes ..... b. No.....

    If No, ... what are the causes ?

    A. ..... B. ..... C .....

21. What is your yearly income from orange Cultivation ? .....

22. Which position orange get in your agri-income ? .....

23. Beside loan, have you taken any other assistance from government/ agriculture department ?

    a. Seed ..... c. Fertilizes .....

    b. Chemical ..... d. Others .....

24. What are the main problems that you are facing in cultivation of orange ?

    If yes, what are the problems .....

    a. Transportation..... b. Capital ..... c. Marketing .....

    d. Fertilizers ..... e. Lack of storage ..... f. Others .....

25. Which type of direction do you for orange cultivation ?

    a. Sun shine direction .....

    b. Sun shadow direction .....

For production trend

26. What is the trend of orange production ? .....

    a. Increasing ..... b. Decreasing ..... c. Constant .....

27. What is the production within seven year ?

Years	Area (in Acre)	Production	Price (in Saikara)
2000			
2001			
2002			
2003			
2004			
2005			
2006			

28. What are the main problems and proposed of orange cultivation in Sikkim ? Give the reason in details?

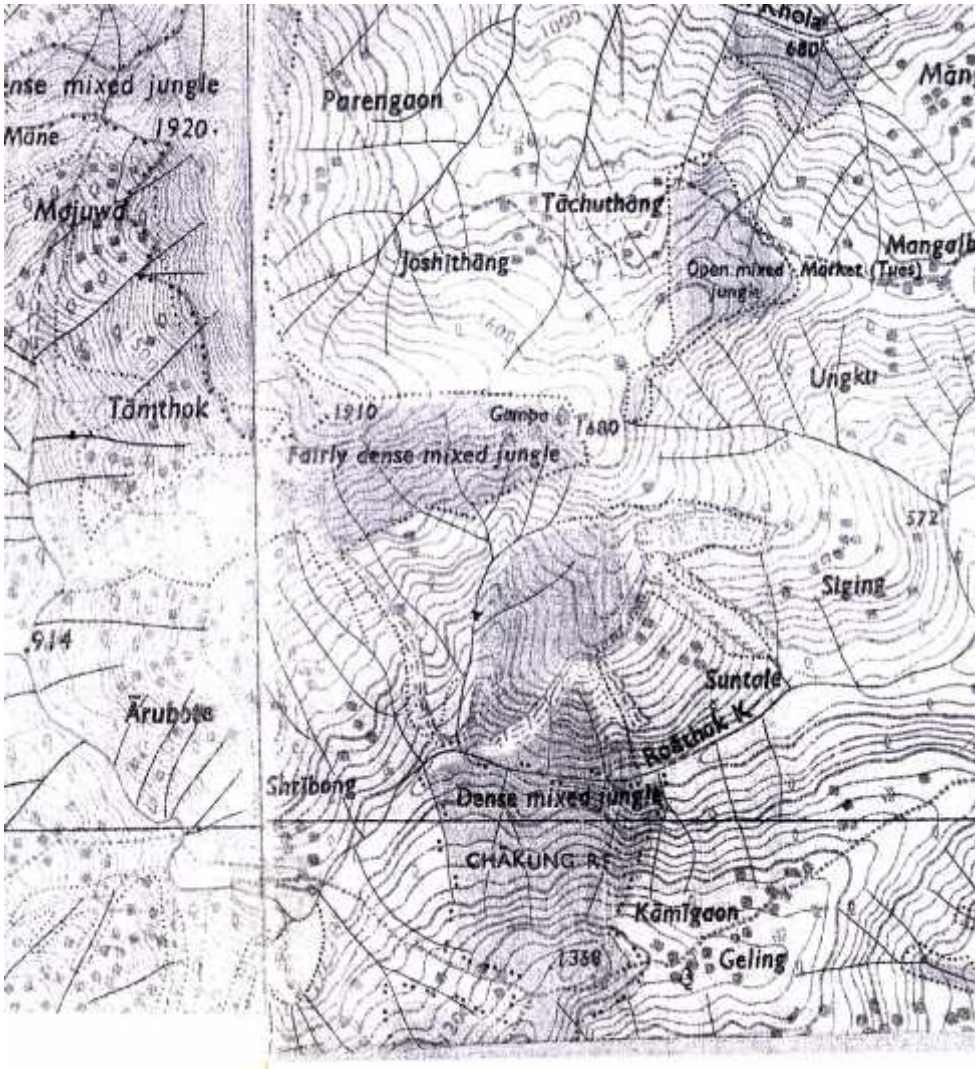
.....

.....

29. Observation/Measurement

Features	North-East	South-East	South-West	North-West
Height (in ft)				
Taste				
Crown (in ft)				
Diameter of fruit (in inch)				
Fruit (in 100 pieces)				
Fruit peel				
Fruit colour				

APPENDIX 2



Source : Toposheet No 78A/4, Survey Department of India.