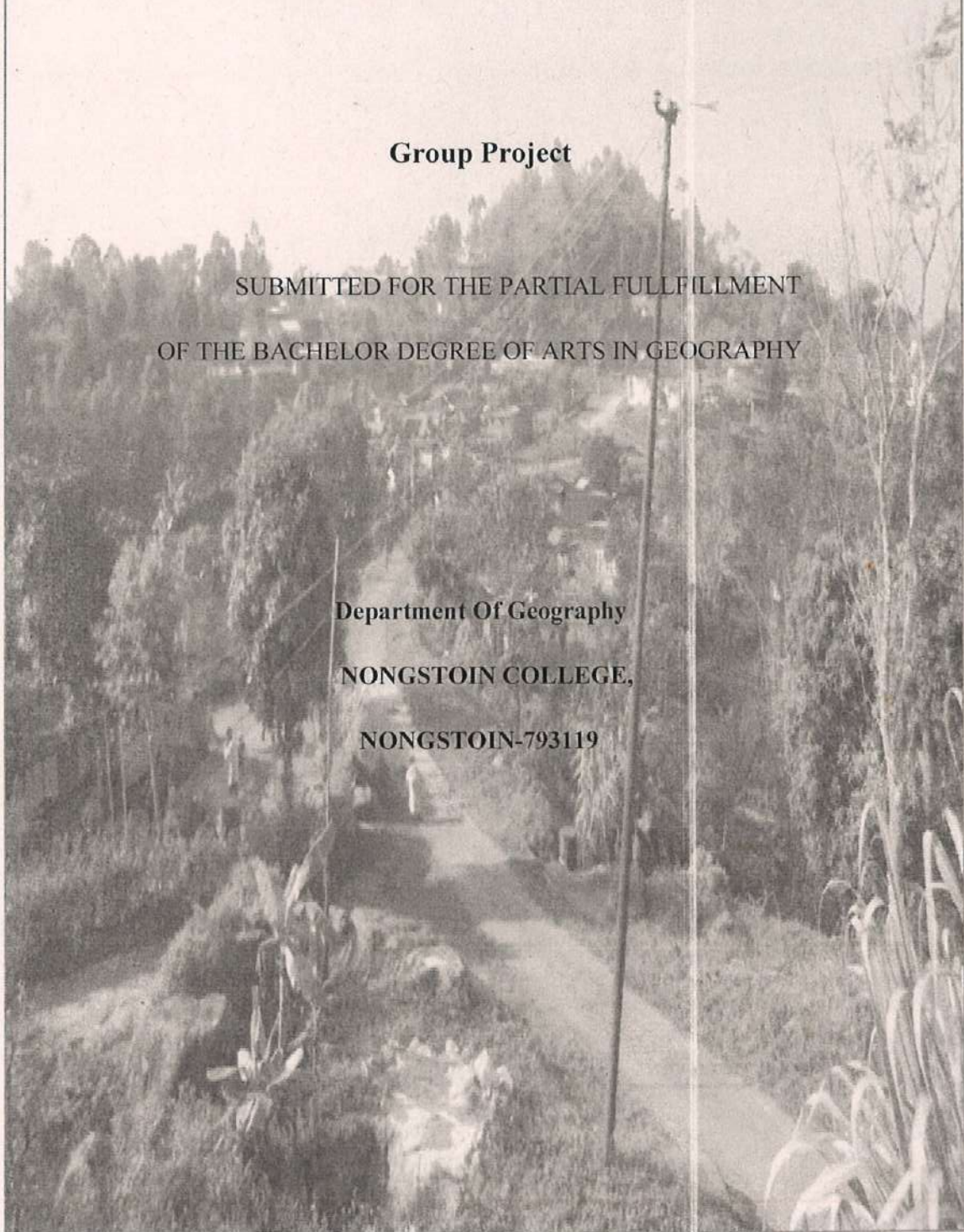


**AGRICULTURAL LAND USE AND PRODUCTIVITY
PATTERNIN NONGKYN-A VILLAGE**

Group Project

SUBMITTED FOR THE PARTIAL FULLFILLMENT
OF THE BACHELOR DEGREE OF ARTS IN GEOGRAPHY

Department Of Geography
NONGSTOIN COLLEGE,
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CERTIFICATE



This is to certify that the students of Sixth Semester, Department of Geography, Nongstoin College, Nongstoin for the session 2017-18 has undergone a Group Project title 'Agricultural land Use and Productivity Patteren in Nongkyn-A village' of Mawshynrut Block of West Khasi Hills District , Meghalaya under the supervision of the teachers of the Department of Geography.

This group project is an original work of the students and it has not been published in any form whatsoever. Hence, this report may be placed for evaluation and consideration.


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ACKNOWLEDGEMENT



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We would like to express our sincere gratitude and thanks to the Headman and all the people of Nongkyn-A village of Mawsynrkut Block of West khasi hills District of Meghalaya State for their support and Cooperation to conduct our project work including data collection and also seeking information relating to our project.

We also sincerely gratitude to our principal for permitting to us to visit Nongkyn-A village and at the same time providing financial assistance for undertaking this group project as per the partial fulfilment of the university curriculum.

Last but not the least, we would also like to thank God, the Almighty for his love and constant blessing that He showered upon us.

Dated: 23-05-2018

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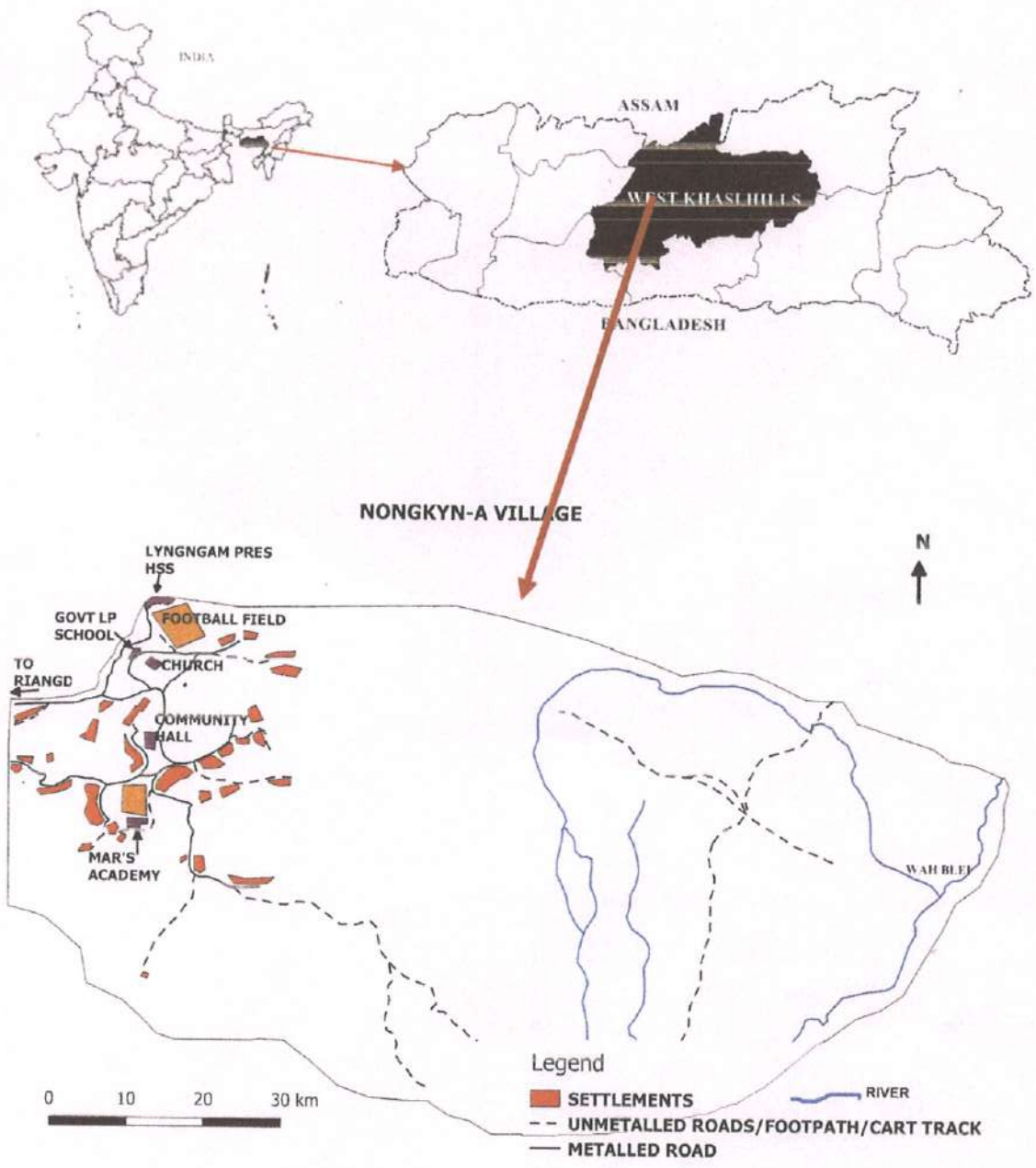


FIG.1 LOCATION MAP OF NONGKYN-A

NONGKYN-A
LAND USE/LAND COVER

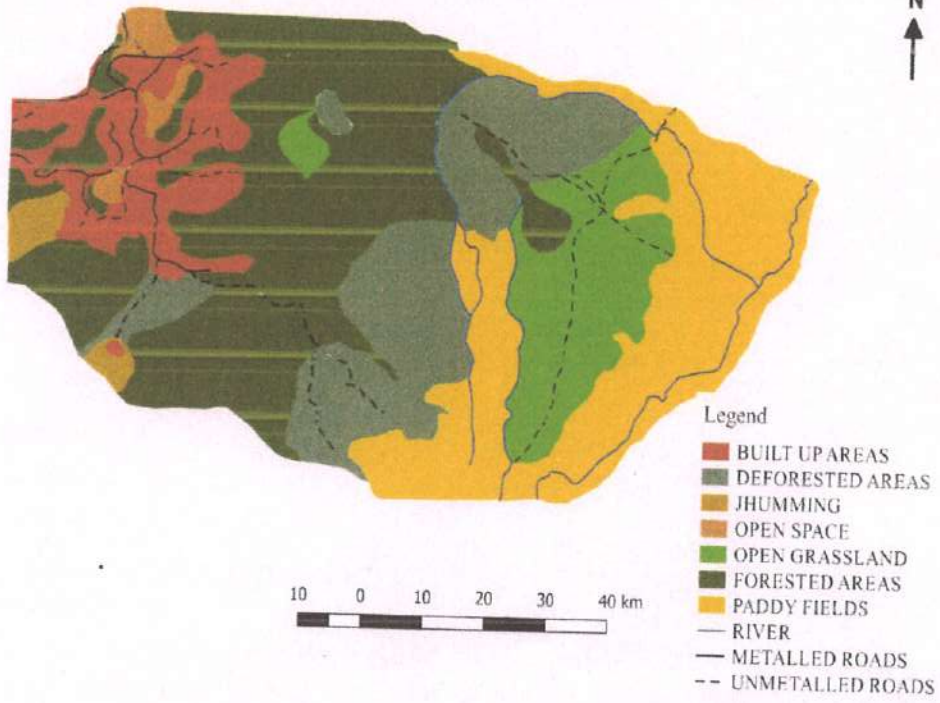


FIG. 2 - LAND USE/LAND COVER OF NONGKYN-A VILLAGE

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Agricultural area





CHAPTER-1

INTRODUCTION

1.1: Statement of the Problem

Agriculture is the backbone of human civilization as well as development. It is an extensive form of human occupation and more than half of the world's population depends on it for their livelihood. Agriculture Geography deals with the spatial organization of crops and their concentration.

Agriculture is the most dominant sector of the Indian economy and the crop production occupies the most important place. Agriculture is the primary source of livelihood for the majority of the people of West Khasi Hills. This sector is most important to the District economy, as it alone contributes more than half of the total state's income

The information related to agricultural development and studies have reflected that the crop output and the productivity growth in West Khasi Hills, over past years is not satisfactory. The works in the field of agricultural geography in West Khasi Hills, are still at a very initial stage. Though various works are being carried out, most of the studies are partially or fully deal with only at micro level to understand the problems in the rural areas.

The agricultural sector in Meghalaya in general and West Khasi Hills in particular, experiences various problems, that is, the cultivable land is highly limited because of physisographic conditions, subsequently effecting the intensity of cropping pattern as well as the yield pattern. The agricultural yield pattern is not only affected by monsoons, drought, but also by the technological and socio-economic factors. Therefore, the agricultural growth is very low. Hence, the farmers are victimized by various ill-effects like- poverty, leading to indebtedness and illiteracy.

In fact, the agro-ecological conditions and the size of land holdings are an important base for the agricultural production processes. Moreover, the size of land occupancy plays an important role on the agricultural crop yield, as land as a resource is being utilized by the farmers for the production processes.

The present study examines the agricultural land use and productivity pattern in Nongkyn-A village in particular and in West Khasi Hills in general. There is a lack of proper



agricultural land use management. Due to limited size of land holdings by the individual farmers, an effective land use is not possible.

There are certain factors responsible for the low productivity and improper agricultural management. These factors are- the uncertain monsoon rains on which the farmers mostly rely for their seasonal crops. There is a lack of irrigation facilities, which in turn, does not encourage multi-cropping. Fragmented land holdings do not support mechanization and improvement of land. Still, within these limiting factors, there is scope to improve the existing land use as well as production/productivity pattern in West Khasi Hills.

1.2: Objectives

The present study has been undertaken based on the following principal objectives:

- (1) To study the agricultural land use and cropping pattern
- (2) To examine Spatio-temporal changes in agricultural land use in the study region.
- (3) To examine the nature and extent of unequal distribution of land holding pattern among various segments.
- (4) To study the crop Production/productivity of the study area.

1.3: Data Based

I. Secondary Data Source

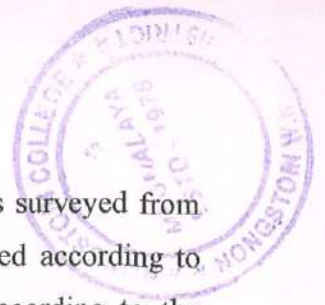
: District Statistical Hand Book, west khasi hills

: Agricultural Statistics of west khasi hills

; Department of Agriculture, Government of Meghalaya,

Primary Data Source

For primary information, personal observation of the agricultural situation, interviewed through prepared scheduled questionnaires for village as well as household levels. 50 (Fifty) household have been taken into consideration.



The field survey is being carried out with comprehensive questionnaires surveyed from house to house in the selected 50 families. Information collected, then tabulated according to land holding sizes. The classification of land holding size is being made according to the convenient of the researcher.

1.4: Review of Related Literature

The scientific and systematic studies related to agriculture geography have originated very recently, during the second half of the 20th century.

One of the important approaches in model building towards the study of agricultural activities initiated by the German scholars J.H. Von Thunen (1826). This was the first attempt to explain the agricultural land use patterns on economic terms, based on the concept of economic rent, i.e the decline of locational rent of land according to the distance from the market place. Based on it, he predicted a concentric series of agricultural zones around the central city.

N Saha carried out the first study on agricultural development in Meghalaya since 1973-74 and the data obtained from the Directorate of Economics and Statistics, Government of Meghalaya which provides valuable information about the agricultural economy of Meghalaya.

The "Peasant Agriculture in Assam" a structural analysis of the peasant agriculture in Assam by M.M Das (1984), who earned the fame of being the pioneer agricultural geographer of the regions. He discussed in detail about spatial as well as temporal pattern of peasant agriculture in Assam and its complex processes from structural point of view. He was individually involved with the peasant society as well as its problems faced by the cultivators in Assam.

AK Sen (1962) worked out three important results found to be more valid in Indian agriculture. One of the finding is that "By and large productivity per acre decreases with the increase of land holdings"

Hannumantha Rao (1966) generalized not only crop yield but also its associated factors that the percentage of crop area more than one, decreases sharply with the increase of land holding size, this is because of the percentage of irrigated holdings invariably declines with the increase of the land holding size.



1.5: Methodology

Though West Khasi Hills district in general is rich in various mineral and other resources but the state's economy is primarily based on agriculture. West Khasi Hills is one of the best agricultural regions of the State but the agricultural sector is still at subsistence level and the farmers are economically poor.

1.6: Chapter Scheme

The present research work relating to the agricultural land use and the productivity pattern in West Khasi Hills. The chapter scheme of present study is being designed as follows:

The Chapter-I is the introductory chapter and its starts with the statement of the problem associated with the objectives. It also incorporates the relevant literature survey.

The Chapter-II deals with background of the study area, geographical setting, climate, topography, and forest and water resources of the study region.

The Chapter-III discusses the general land use pattern and changing pattern of general land use in West khasi Hills, and general land use pattern and changing pattern of general land use in Nongkyn-A village.

The Chapter-IV is concerned with the agricultural production/productivity. The chapter is based on secondary sources of data collected from the Department of Agriculture, of West Khasi Hills and the Primary data collected during field survey.

The Chapter-V is concerned with the farm size attributes. This chapter is also based on primary data.

The Chapter-VI (last chapter) is essentially restricted to the summary and conclusions of the overall work with certain recommendations.



CHAPTER-II

BACKGROUND OF THE STUDY AREA

2.1: Introduction

Nongkyn-A is a medium size village located in Mawshynrut of West Khasi Hills district, Meghalaya with total 72 families residing. The Nongkyn-A village has population of 466 of which 239 are males while 227 are females as per Population Census 2011.

In Nongkyn-A village population of children with age 0-6 is 72 which make up 15.45% of total population of village. Average Sex Ratio of Nongkyn-A village is 950 which is lower than Meghalaya state average of 989. Child Sex Ratio for the Nongkyn-A as per census is 946, lower than Meghalaya average of 970.

Nongkyn-A village has higher literacy rate compared to Meghalaya. In 2011, literacy rate of Nongkyn-A village was 94.67 % compared to 74.43 % of Meghalaya. In Nongkyn-A Male literacy stands at 97.03 % while female literacy rate was 92.19 %.

As per constitution of India and Panchyat Raj Act, Nongkyna village is administrated by rangbah shnong (Head of Village) who is elected representative of village.

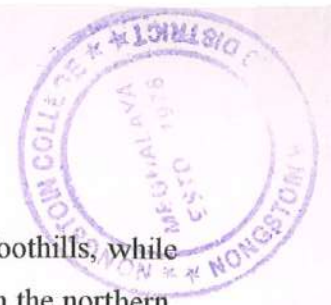
2.2: Geographical Setting

It lies between $25^{\circ}40'47.20''N$ and $25^{\circ}40'22.86''N$ *latitude* and $91^{\circ} 5'44.38''E$ and $91^{\circ} 4'57.89''E$ *longitude*. It is located along the Shillong-Nongstoin-Riangdo route, at a distance of 135 kilometres (approx.) from Shillong and at about 42 kilometres from Nongstoin.

The area is located in the western most part of West Khasi Hills with general altitude of 900 to 1400 m Above Mean Sea level and forms part of the central upland zone of the Meghalaya plateau. This portion of the plateau consists of rolling uplands. Denudational Low and High Hills occupies the major part of the area comprising of archean gneissic complex with patches of granitic rocks. It is moderately dissected by fractures and joints forming a good number of narrow intermontane valleys.

2.3: Climate

The climate here is mild, and generally warm and temperate. When compared with winter, the summers have much more rainfall. The average annual temperature is $23^{\circ}C$. At $13.5^{\circ}C$ on average, January is the coldest month of the year. The rainfall here averages 5558 mm. Precipitation is the lowest in December, with an average of 6 mm. In June, the precipitation reaches its peak, with an average of 1366 mm.



The climate of the district is mildly tropical in the northern and southern foothills, while in the central upland zone, the climate is temperate and places at medium altitude in the northern, western and southern parts of the district, experience sub-tropical climate. The district is influenced by the South- West monsoon and rainfall is assured during summer, but differs greatly in intensity from area to area within the district. The South-West monsoon normally sets in the second week of June and extends up to second week of October. The district receives some share of rain from North-East monsoon from the third week of October till first week of December. The major share of rainfall is received from May to August. The average rainfall ranges from 1200 mm to 3000 mm per annum. The details of climate are given in Table.

Table 2.1: Climate of West Khasi Hills

Months	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Temperature (°C)	13.23	17.95	21.64	24.95	26.17	27.03	27.25	27.07	25.99	24.37	20.23	15.72
Temperature (°C)	7.63	10.84	13.51	17.30	17.60	18.57	19.02	18.64	17.94	15.06	10.39	8.69
Precipitation(mm)	6.82	15.30	76.04	189.30	357.00	630.74	534.52	758.86	410.30	158.24	10.0	1.60

Source: Directorate of Agriculture, Meghalaya, Shillong, {Average rainfall and Temperature of 5 yrs (2009-2013)}

2.4: Topography

The District lies in the central part of the State of Meghalaya and is situated between approximately 25 degrees 10' and 25 degrees 51' N latitude, and between 90 degrees 44' and 91 degrees 49' E longitude. It is bounded on the north-west by Kamrup district of Assam, on the north-east by Ri Bhoi district, on the east by East Khasi Hills district, on the south by Bangladesh and South West Khasi Hills district, the erstwhile Mawkyrwat Civil Sub division, on the west by East Garo and South Garo Hills districts. The district comprises areas of about 5,247 sq.kms which is 23 percent of the total area of the state. Nongstoin, covering an area of about 76.00 Sq. Kms, is the Headquarter of the District.



2.5: Forest

According to Forest Survey of India (FSI) Report, 2003 the actual forest cover in Meghalaya is 16,839 sq. km which accounts for 75.08 % of the State's total geographical area, leaving only about 24 % non forest land. The FSI had also classified forests into three categories viz Very Dense, Moderately Dense and Open Forest. West Khasi Hills have 40.3% of dense forest and 59.7% open forest out of 73.51% total forest cover in the district.

2.6: Water Resources

The area is drained by the Wah Blei River and its tributaries along the eastern portion of the area running from northeast towards the south.



CHAPTER III

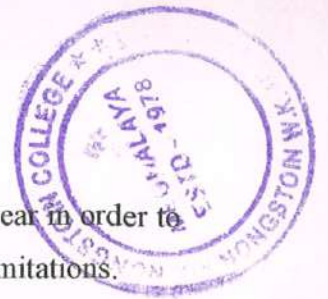
LAND-USE PATTERN

3.1: Introduction

Land-use means the allocation of land under different classes to measure the magnitude of utilisation of land into various categories. The land use and cropping mosaic of any region are the outcome of geomorphic features, climatic variables, soil conditions, historical processes and socio-economic institutions. The patterns of human behaviour plays an important role in the land use system of an area and it determines the land under which to be put according to his willingness. Different types of living conditions, social values and institutions create different patterns of land use within the limits imposed by different agro-physical controls.

On the basis of this classification, land in West Khasi Hills is categorised under nine broad classes:

- (a) Forest cover includes the land classes or those administered as forest under legal enactment. Its also includes grazing or tree crops within the forest cover
- (b) Area under non-agricultural use covers all areas occupied by settlement, road, railways, beds of stream/river, ponds, canals etc.
- (c) Barren and un-cultivable land includes barren rocky out crops of hills, mountains, plateau, deserts etc. These areas are not suitable for any productive activities, but it is possible to be brought under cultivation at very high cost.
- (d) Permanent pasture and grazing land embraces all the grazing land, it might be either meadows or village common pastures
- (e) Area under miscellaneous tree crops, which includes all the cultivable land, are not included in net area sown, but put into some agricultural uses, i.e, tree crops other than seasonal cropping.
- (f) Cultivable wasteland, where land considered by peasant as cultivable but not cultivated during the current agricultural year and last few years in succession. It might be left out on account of physical, social or economic limitations.



(g) Current fallow indicates the land left un-sown during the current agricultural year in order to regain its fertility and also may be remained un-cropped on account of economic limitations.

(h) The other fallow land comprises all the lands taken up for agricultural purposes but it is temporarily un-cropped for duration of one to five years.

3.2: General Land Use in West Khasi Hills, 2010-11 and 2017-18

The forest covers an area of 524700 hectares, i.e., 32 percent of the total geographical area of West Khasi Hills in the year 2017-18. The land not available for cultivation includes barren and uncultivated land, as well as the land put to nonagricultural uses, which occupies an area of 79413 hectares, i.e., 15 percent of the total area of West Khasi Hills. On the other hand, the other un-cultivated land, which includes permanent pasture and grazing land and the area under miscellaneous tree crops and groves as well as cultivable waste, occupies 134021 hectares or about 25 percent. The fallow land includes current and other than current fallow land, which covers an area of 55823 hectares. It is evident from the Table-3. 01 that the net sown area covers 35536 hectares i.e 7 percent of the total geographical area in the year 2017-18 which has been increasing steadily from 33117 hectares i.e 6 percent in 2010-11.

There is an increase in multiple cropped areas, recorded at 9081 hectares during 2010-11 i.e 2 percent, and it rose to 13611 hectares which is 3 percent, during 2017-18 of the total geographical area of the District.

The general land use pattern in West Khasi Hills is evident from the Table-3.01, where fallow land and cultivable wasteland is seen to have occupied an area of 99994 hectares or 22 percent in 2017-18. If these lands are brought under cultivation then the total net sown area will be extended to 135530 hectares against the existing net sown area of 35536 hectares .



3.01: Table-General Land Use in West Khasi Hills, 2010-11 and 2017-18

Classification	Area in hectare		Percentage	
	2010-11	2017-18	2010-11	2017-18
Geographical Area	524700	524700		
Forest	177735	166849	34	32
Not available for cultivation	64496	79413	12	15
Other uncultivated land	43216	40526	8	7
a)pt.pasture				
b)under misc tree crops	48217	49324	9	10
c)cultivable waste	38215	44171	7	8
Fallow lands	34621	33262	7	6
a)other than current				
b)current fallow	37810	22561	8	4
Net sown area	33117	35536	6	7
Area sown more than once	9081	13611	2	3
Total cropped Area	38192	39447	7	8

Source: District statistical hand book , West Khasi Hills.

3.3: Changing Pattern of General Land Use in West Khasi Hills

The transformations of general land use pattern have taken place in West Khasi Hills. It is evident from the Table-3.01 that within a span of 6 years the forest cover has decreased by 2 percent since 2010-11 to 2017-18. This is due to deforestation, emergence of new settlements, construction of roads etc.

Though area not available for cultivation has increased but at a slow pace, i e only 3 percent. The other uncultivable land decreased by 1 percent of growth within a period of 6 years. The fallow land also decreased from 15 percent in 2010-11 to 10 percent in 2017-18 (Figure-3.01).

The net area sown is increasing at a slow pace from 6 percent in 2010-11 to 7 percent during 2017-18 with 1 percent extra within 6 years. From the Table-3.01 it is seen that, there is a considerable increase in multiple cropped area During 2010-11 the coverage was 2 percent and it increased to 3 percent in 2017-18.

3.4: General Land Use in Nongkyn-A Village

The Study area occupy an areas of 364 hectares of land or (0.06 percent) of the total geographical area of the District.



Table 3.02-General Land Use in Nongkyn-A Village, 2010-11 and 2017-18

Classification	Area in hectare		Percentage	
	2010-11	2017-18	2010-11	2017-18
Total area Area	338	364		
Not available for cultivation	68	53	20	15
Other uncultivated land	27	23	8	8
a)pt.pasture				
b)under misc tree crops	36	34	11	9
c)cultivable waste	22	29	7	8
Fallow lands	24	27	7	7
a)other than current				
b)current fallow	16	31	5	9
Net sown area	56	67	17	18
Area sown more than once	35	40	10	11
Total cropped Area	54	60	16	16

Source: District statistical hand book ,West Khasi Hills and Household survey

The land not available for cultivation includes barren and un-cultivated land as well as the land put to non-agricultural uses covering an area of 53 hectares (0.06 percent) to the total area of West Khasi Hills in the year 2017-18. The land occupied by other un-cultivated land, which embraces- permanent pasture and grazing, land under miscellaneous tree crops and groves and cultivable waste, and covers an area of 86 hectares (25 percent). The fallow land includes current fallow and other than current fallow covers an area of 58 hectares (16 percent) of the total area of the study region

The net area sown in Nongkyn-A Village occupies 67 hectares (18 percent) of land. The percentage of net sown area is much higher in comparison to the District average (7 percent). The multiple cropped areas cover 40 hectares (11 percent) of the study area in the year 2017-18, which is also much higher than the state average (3 percent)

It is evident from the Table-3.02 that, the fallow land includes current and other than current and cultivable waste, which occupies an area of 87 hectares (19 percent) If this land is brought under cultivation then the total net sown area may be extended to 154 hectares against the existing net sown area of 67 hectares.

To have a clear picture about the agricultural production system, a detailed land use pattern is a must.



Forests:

The forested area represents an exclusive use of land occupying trees/shrubs. The area under grazing land or crops within forest cover is also included in the area under forest. The total area under forest in the study area recorded 50 hectares.

Land Not-Available for Cultivation:

The land not available for cultivation can be classified into two sub-groups because of the different utilisation. The area under non-agricultural use covers all the land occupied by settlements, roads, embankments, canals, burial place, play ground, etc. The land put to non-agricultural use covers 53 percent in the study area, as against 15 percent in the district.

Other Uncultivated Land Excluding Fallow Land:

The other uncultivable land excluding fallow land includes permanent pasture and other grazing land, miscellaneous tree crops and groves and cultivable wasteland.

(A) Permanent Pasture and Grazing Land:

The permanent pasture and grazing land in the study area covers an area 23 hectares, which was 8 percent in 2017-18.

(B) Land under Tree Crops and Grasses:

The land under miscellaneous tree crops and grasses covers an area of 34 hectares, representing 9 percent of the total study area during 2017-18.

(C) Cultivable Waste Land:

The cultivable wasteland in the study area increased from 22 hectare in 2010-11 to 29 hectare in 2017-18. The overall increase of cultivable wasteland is mainly due to the pressure of population on land.

Fallow Land:

The fallow land other than current fallow includes all lands, which were taken up for cultivation but are temporarily out of utilization for a period not less than five years. The current fallow



comprises of cropped areas that are kept fallow during the current year. The land under these categories together recorded 58 hectares (16 percent) in 2017-18.

Net Area Sown:

Net area sown represents the extent of cultivated area actually sown during the current agricultural year. This represents the differences between the total and the sum of total area under these classes. The total net sown area was recorded as 67 hectares, i.e. 18 percent to the total area in 2017-18

Area Sown More Than Once:

The area sown more than once or multiple cropped areas in the study area was 2016-17 hectares i.e 11 percent in 2017-18.

3.5 Changing Pattern of Agricultural Land Use in Nongkyn-A village:

There is a major change in the agricultural land use pattern in Nongkyn-a village. The total rice area was seen to have decreased from 247 acre or (60 percent) of the total agricultural area in 2005-06 to 238 acre or (55 percent) during 2017-18. Maize shows an increase of 74 acres or 17 percent of the total agricultural area in 2005-06 to 85 acre or 20 percent in 2017-18. The potato area was 24 acre in 2005-06 and it decreased to 20 acre during 2017-18 (6 percent to 5 percent) within twelve years.

It is also seen that the area under Sweet potato has increased from 15 acre in 2005-06 to 17 acre in 2017-18 i.e (4 percent to 5 percent) with in twelve years.

The area under Ginger increased from 36 acre or 9 percent of the total agricultural area in 2005-06 to 47 acre or 11 percent in 2017-18. It is also seen from the following table that the area under Soyabean decreased from 6 acre in 2005-06 to 5 acre in 2017-18. Other miscellaneous crop area increased from 12 acre or 3 percent in 2005-06 to 15 acre or 4 percent in 2017-18.

it is also seen that the overall operated area has increased from 414 acre in 2005-06 to 427 acre in 2017-18



Table 3.03 Agricultural land use of principal crops in acre in Nongkyn-A Village

Name of Principal Crops	2005-06		2017-18	
	Area	percentage	Area	Percentage
Rice	247	60	238	55
Maize	74	17	85	20
potato	24	6	20	5
Sweet potato	15	4	17	5
Ginger	36	9	47	11
Soyabean	6	1	5	1
Others crops	12	3	15	4
Total	414	100	427	100

Source: District Statistical Hand Book ,West Khasi Hills and Household Survey



CHAPTER IV

EXISTING AGRICULTURAL PRODUCTION/PRODUCTIVITY

4.1: Introduction

Agricultural production and productivity are the principal component in agricultural complexes; the changing pattern of agricultural production/productivity is another important aspect to understand the optimal condition of the regional processes. The agricultural production/productivity is the function of various combined factors, including physical, socio-economic and techno-organizational conditions. Therefore, the study of agricultural production/productivity occupies a prominent place in agricultural complexes, whether maximum returns per unit of area is achieved or not within the physico-cultural milieu as well as with the application of human efforts at the existing level of development (Bhatia-1967)

4.2: Changing Pattern of Agricultural production in West Khasi Hills District

Though the area is fertile, the production is much lower in comparison to the other area of the State. The agricultural production is decreasing at a tremendous pace. Rice is the staple food for the people of the district and the production has decreased from 11024 tonnes in 2005-06 to 8053 tonnes in 2017-18 with a negative growth rate of -73 percent. Table-4.01 evident that the other crops such as Maize and potato also decreased from 4319 tonnes in 2005-06 to 4083 tonnes in 2017-18 and from 45268 tonnes in 2005-06 to 24067 tonnes in 2017-18 respectively, With a negative growth rate of -95 percent and -53 percent.

Sweet potato production decreased from 3999 tonnes in 2005-06 to 2960 tonnes in 2017-18, with a negative growth rate of -74 percent. Ginger production decreased from 2019 tonnes in 2005-06 to 1702 tonnes in 2017-18, with a negative growth rate of -71 percent.



**Table 4.01 Production of principal crop in West Khasi Hills 2005-06 and 2017-18
(Production in metric tonnes and growth rate in percentage)**

crops	2005-06	2017-18	Growth rate
Rice	11024	8053	-73
Maize	4319	4083	-95
potato	45268	24067	-53
Sweet potato	3999	2960	-74
Ginger	2019	1702	-84
Soyabean	28	20	-71
Others crops	58	57	-98
total	66715	40942	-61

Source: District Statistical Hand Book ,West Khasi Hills and Household Survey

4.3 Changing Pattern of Agricultural Production in Nongkyn-A village:

Due to the lack of data on all crops in the study area, only few crops have been taken into consideration to measure the magnitude of agricultural growth since 2005-06 to 2017-18. Ginger production has shown maximum growth i.e +131 percent, increased from 55 tonnes in 2005-06 to 72 tonnes in 2017-18 followed by other miscellaneous crop increased from 8 tonnes to 10 tonnes with +125 percent over last twelve years. Since, 2005-06 to 2017-18, Maize production also increased from 141 tonnes to 142 tonnes with +101 percent and potato from 19 tonnes to 22 tonnes with +116 percent of growth

**Table 4.02 production of principal crop in nongkyn-A village 2005-06 and 2017-18
(Production in tonnes)**

Crops	Production 2005-06	Production 2017-18	Growth rate
Rice	741	693	-94
Maize	141	142	+101
potato	19	22	+116
Sweet potato	18	19	+106
Ginger	55	72	+131
Soyabean	7	8	+114
Others crops	8	10	+125
Total	989	966	-97

Source: District Statistical Hand Book ,West Khasi Hills and Household Survey

Rice has shown a decline in production from 741 tonnes in 2005-06 to 693 tonnes in 2017-18 with a negative growth of -94 percent. Sweet potato increased from 18 tonnes to 19 tonnes with a growth rate of +106 percent during 2005-06 to 2017-18. Production of Soyabean increased from 7 tonnes to 8 tonnes in 2017-18 with a growth rate of +114. The overall



production decreased from 989 tonnes in 2005-06 to 966 tonnes in 2017-18 with a negative growth rate of -97 percent.

4.4 Agricultural Productivity of Nongkyn-A Village:

Rice: Rice is an important crop and ranked first in respect of productivity per acre of land among the food crops. The average yield of rice per acre in the study area was 2912kg/acre in 2017-18.

**Table-4.03: Yield Rate of Agricultural Productivity in Nongkyna Village, 2017-18
(Yield in Kg/acre)**

Crops	2017-18	
	Area	Production
Rice	238	2912
Maize	85	1671
potato	20	1100
Sweet potato	17	1118
Ginger	47	1532
Soyabean	5	1600
Others crops	15	67
Total	427	2262

Source: Household Survey

From the Table-4.03 that, the productivity of Maize is 1671kg/acre in 2017-18 where as the average yield rate of potato in the study area was recorded 1100 kg/acre in 2017-18.

The average yield rate of Sweet potato was recorded 1118 kg/acre and that of the average yield rate of was recorded 1532 kg/acre.

It is evident from the following table that the average yield rate of Soyabean was recorded 1600 kg/acre.

4.5: Changing Pattern of Agricultural productivity in Nongkyn-A Village

It is evident from the Table- 4.04 that the yield of rice has decreased from 3000 kg/acre in during 2005-06 to 2912kg/acre in 2017-18. Maize also decreased from 1905 kg/acre to 1671kg/acre within the same period. Potato increased the productivity from 792 kg/acre to 1100kg/acre.



**Table-4.04 Agricultural land use of principal crops in Nongkyn_A Village
2005-06 and 2017-18**

Crops	2005-06		2017-18	
	Area(in Acre)	Production(Tonnes)	Area(in Acre)	Production(Tonnes)
Rice	247	3000	238	2912
Maize	74	1905	85	1671
potato	24	792	20	1100
Sweet potato	15	1200	17	1118
Ginger	36	1528	47	1532
Soyabean	6	1166	5	1600
Others crops	12	667	15	67
Total	414	2388	427	2262

Source: District Statistical Hand Book ,West Khasi Hills and Household Survey

Sweet potato decreased the productivity from 1200kg/acre during 2005-06 to 1118 kg/acre in 2017-18 In contrast to it, the yield of Ginger increased from 1528 kg/acre in 2005-06 to 1532 kg/acre. Soyabean increased from 1166 kg/acre to 1600 kg/acre over the years is may be due to the market price, which has been increased at a faster rate.



CHAPTER V

FARM SIZE AND PRODUCTIVITY PATTERN

5.1: Introduction

Indian agriculture is characterised by a very close relationship between land holding size and the productivity pattern. The land holding size influences agricultural operations with its production pattern. If farmer does not have a significant size of land holding for operation, he may not be able to manage infrastructure for agricultural production. The farmers of large size holdings have enough land to manage modern technology to increase the intensity of land use, accordingly affects the agricultural productivity, while the case is reverse for smaller size of land holdings.

5.2: Fragmentation of Land Holding

To study the agricultural production and productivity characteristics of various land holdings. The entire land holding systems have been classified into four categories.

Table-5.01 Nomenclature of the Farm sizes

Nomenclature	Farm size
Marginal farmer	0-2
Small farmer	2-4
Medium farmer	4-6
Large farmer	Above 6

Method Used:

- (1) The primary survey was conducted by collecting information of 50 numbers of farms of various sizes of land holdings in the study area.
- (2) The percentage share of land holdings varies according to the land holding sizes, because the sample farms have been taken on the basis of strength of total farm distributed.
- (3) The statistics related to the general land use, yield pattern have been generated from duly filled questionnaires according to various sizes of land holdings.



5.3 Agricultural Production Pattern:

Cropping Pattern:

The cropping pattern in Nongkyn-A village is characterised as mono-crop dominated with a very high percentage of rice acreage to the total cultivated area. This chief characteristic prevails with respect to the cropping pattern in the agricultural sector, not only in Nongkyn-A village but also in Meghalaya and occupies a very high percentage by food crops, which is an overwhelming proportion to the total cropped area.

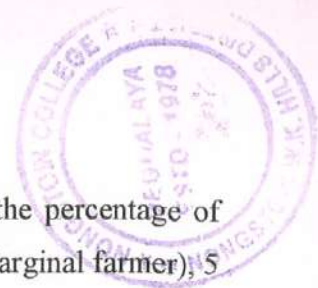
The statistics, which were collected and compiled, which shows that there is not much significant variation in the percentage of paddy crop among different sizes of land holdings the characteristic features of cropping pattern are given below:

Table-5.02 Cropping Pattern (figures in acre)

Characteristic	Land holding size	Rice	maize	Potato	Sweet potato	Ginger	Soyabean	Others
Marginal farmer	0-2	32(44)	12(17)	4(6)	5(7)	8(11)	9(13)	3(4)
Small farmer	2-4	85(57)	21(14)	9(6)	8(5)	20(13)	6(4)	1(0.6)
Medium farmer	4-6	67(50)	42(32)	7(5)	4(3)	13(10)	-	-
Large farmer	Above 6	54(77)	10(14)	-	-	6(9)	-	-
Average		238(56)	85(20)	20(5)	17(4)	47(11)	15(4)	4(1)

Source: Household Survey

- There are four important crops in the study area that covered about 90 percent of the cultivated land (Table-5.02) this are- rice, maize, Ginger and Potato. Rice is the staple food for the consumption of local people.
- The cropping pattern according to the size of land holdings shows that there is an insignificant variation in the percentage of rice among the various sizes of land holdings It varies from 44 percent (marginal farms) to 77 percent (large size) in the area.
- The cropping pattern according to the size of land holdings shows that the percentage of maize among the various sizes of land holdings it varies from 17 percent (Marginal farmer) to 14 percent (Large farmer).



- (d) The cropping pattern according to the size of land holdings shows that the percentage of potato among the various sizes of land holdings it varies from 6 percent (Marginal farmer), 5 percent (Large farmer).
- (e) The cropping pattern according to the size of land holdings shows that the percentage of Ginger among the various sizes of land holdings it varies from 11 percent (Marginal farmer), 13 percent (Small farmer), 10 percent (Medium farmer) and 9 percent (Large farmer).

5.4:Yield Pattern

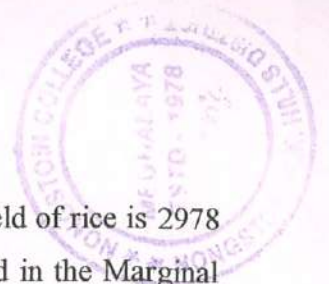
Agricultural yield is the function of a variety of factors including agro-climatic conditions (topography, soil and climate), socio-economic (size of land holding, land ownership) and input structure (labour, non-land capital and animal power) The combined effect of these factors manifests itself in yield and the measurement of agricultural yield is therefore required to understand whether maximum return per unit area has been achieved or not within physico-cultural milieu and with the application of man-power effect (Bhatia, S.S.-1967)

**Table-5.03 Cropping Yield (figures in acre)
(Yield in Kg/acre)**

Characteristic	Land holding size	Rice	maize	Potato	Sweet potato	Ginger	Soyabean	Others	Average yield/acre
Marginal farmer	0-2	4063	1833	1750	1200	1875	556	1500	1825
Small farmer	2-4	2941	2619	1111	1125	1400	500	4000	1957
Medium farmer	4-6	3687	976	714	1000	1231	-	-	1522
Large farmer	Above 6	1222	2400	-	-	2167	-	-	1930
Average		2978	1957	1192	1108	1668	528	2750	1740

Source: Household Survey

The crop yield pattern Table-5.03 gives a different picture than the cropping pattern in the area. It may give a different picture for productivity also. The average yield of crops is the real indicator of production. The various studies conducted on crop yield pattern in India, shows that there is a positive relationship between crop yield and farm size. Crop yield increases as the farm size increases because of the application of modern technology in the larger sizes of land holdings (Singh-1994).



- (a) As far as the yield patterns, rice is the predominant crop the average yield of rice is 2978 kg/acre in the study area. The highest average yield of rice is recorded in the Marginal farmer 4063 kg/acre to 1222 kg/acre. And it reveals that there is a gradual decline of yield pattern as the farm size increases. It is also evident that the overall yield pattern in respect of rice decreases as the size of the land holding increases
- (b) Maize is also widely cultivated in the study area. The average yield of maize is Minimum in the medium sizes of farms with 976 kg/acre where maximum yield is recorded in small sizes of farms 2619 kg/acre.
- (c) Potato is also, practices in the marginal, small and medium sizes of farms, where maximum yield is 1750 kg/acre in the marginal farm size, 1111 kg/acre in small farm size and 714 kg/acre in the Medium farm size. It maintained the tendency of decreasing yield as the farm size increases.
- (d) Sweet Potato is also, practices in the marginal, small and medium sizes of farms, where maximum yield is 1200 kg/acre in the marginal farm size, 1125kg/acre in small farm size and 1000 kg/acre in the Medium farm size. It maintained the tendency of decreasing yield as the farm size increases.



CHAPTER-VI

CONCLUSION AND SUMMARY

6.1: Conclusion

The agricultural system of West Khasi Hills in general and Nongkyn-A village in particular suffer from various problems. Therefore, the present work is being undertaken in order to understand structural problems along with the agricultural production/productivity system. The study area is very fortunate to have a very high proportion of area dominated by highly fertile soil, which provides potential for agricultural development.

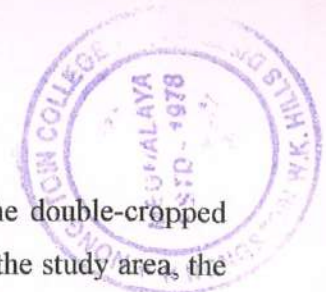
The present study has attempt to make an in depth study of fifty household sample. Spatial distribution for general land use and crop use has been analyze for year 2005-06 and 2010-11. The data for the general land use and agriculture land use collected from the office of agriculture department and statistical hand book west Khasi Hills. The data collected was converted into percentage. The primary data was collected through questionnaire from farmer. Besides this, observations are noted for getting more information.

The Simple random sampling method is chosen and selected. Questionnaire is related to family information, crop land use, crop yield and crop productions are collected.

Agriculture is dominantly controlled by physical and human environment. The physical factors like relief, soil, climate, water supply, which sets a broad limit for the agriculture and human factors like economic condition of farmer, price of crop in market etc. it effects on agricultural pattern of the area. These factors affects on farmers decision to take the particular crops in the agriculture.

The study of temporal variation for the crops in the study area has been computed for 7 years (2010- to 2017). Temporal variation is the change in proportion of area under different crops at two different times. The amount of area involved in change for every areal unit is calculated for individual crop.

Nongkyn-a village is essentially an agricultural based and fortunate to have about 18 percent of net sown area during 2017-18 against 17 percent in 2010-11 The double-cropped area also increased from 10 percent to 11 percent during same period. This is the result of high



population pressure, compelling the farmers to utilize the soil intensively. The double-cropped area is increasing at a faster rate with a positive growth rate of +5 percent. In the study area, the net sown area occupied 67 percent of the total area during 2017-18, which indicates an increase from 56 percent in 2010-11, which shows a positive growth rate of 119 percent. The double-cropped area also increased from 10 percent to 11 percent with a growth rate of +114 percent within the last five years.

6.2: Summary

The area under rice was 247 acre in 2005-06 and it decreased to 238 acre in 2017-8 during the last 13 years. Whereas, the area of maize it increased from 74 acre to 85 acre during the same period. The area of ginger also it increased from 36 acre in 2005-06 to 47 acre in 2017-18.

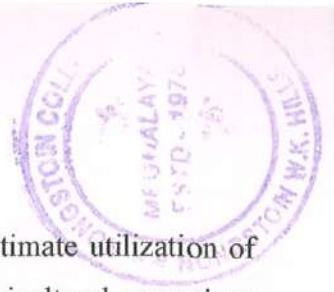
The production of the principal crops such as, rice, maize, sweet potato also decreased from 3000 tonnes, 1905 tonnes and 1200 tonnes to 2912 tonnes, 1671 tonnes and 1118 tonnes respectively. The production of potato indicate an increased from 792 tonnes in 2005-06 to 1100 tonnes in 2017-18. The overall areas of crops shows a mark of increased from 414 acre in 2005-06 to 427 acre in 2017-18. Whereas, the production of crops is decreasing with increasing in areas from 2388 tonnes in 2005-06 to 2262 tonnes in 2017-18.

Climatically the area is very suitable the cultivation of rice, maize, potato, sweet potato, ginger, soyabean etc. The area characterized with humid during summer and relatively dry in winter and rainfall is fairly high during the kharif crop season.

The rural settlement in the study area is surrounded by innumerable operational holdings of varying shapes and sizes. The average farm size is decreasing over the years not only in West Khasi Hills but also in the study area.

The total land available for cultivation was only-15 percent in west khasi hills and 43 percent in the study area during 2010-11. The land use pattern in the region is characterized by a high percentage of rice. More than 55 percent of the total cropped area was occupied by rice.

The area is chronically affected with hailstone and resulted to damaged to the standing crops. Drought is also another significant calamity, where farmer are highly dependent upon the monsoon rains, as the irrigation facilities in the area is negligible.



Due to the absence use of modern and advanced technology, the ultimate utilization of the potentiality of soil cannot be achieved, as the farmers practice the agricultural operations with traditional methods. The use of fertilizer is also very low. The artificial supply of water into the agricultural field is highly limited and rainfall is also low during the winter season. Therefore, rabi crop as well as multiple cropping system is almost absent, due to lack of controlled sources of water.

The farmer wants to engage their entire family members in the farming system, since they are operating their lands at a subsistence level, in order to fulfill their family needs only. The existing mode of production with high share of family labour, stands as constraint upon the economic development of the farmer.

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Schedule for the Village Survey on Agricultural Programme

- 1 Name of the Village
- 2 Name of the District
- 3 Name of the Block
- 4 Name of the Respondent
- 5 Age
- 6 Sex
- 7 Literacy Status
- 8 His/her Occupational Status
- 9 Total Number of the Family i) Male (ii) Female
- 10 Total Area of the Land Holding
- 11 Agricultural land use

Crop	Area	Production
Rice		
Maize		
Potato		
Sweet potato		
Ginger		
Soyabean		
Others		

12. Land Use Pattern.

- a) Total Area
- b) Total Cropped Area
- c) Area Sown More Than Once
- d) Land Not Available for Cultivation
- e) Land Put to Non-Agricultural Uses
- f) Barren and Un-Cultivable Land
- g) Permanent Pasture and Grazing Land
- h) Use Under Miscellaneous Crops
- i) Cultivable Waste

13. Production Pattern

Crop	Area	Production	Yield/ha
Rice			
Maize			
Potato			
Sweet potato			
Ginger			
Soyabean			
Others			

14. Any Problem Faced by the Farmers: