INTRODUCTION

* Economy of Assam
* Geography
* Agro Climatic Zones of Assam
* Cropping pattern
* Production performance
* Crop Season
* Horticultural Crops
* Agricultural inputs
* Agricultural situation in Nagaon District
* Geography
* Demography
* Cropping pattern
* Crop growth analysis
* Agro climatic sub region
* Agricultural situation in Barpeta District
* Geography
* Demography
* Cropping Pattern
* Horticulture
* Objective of Study
* Selection of study regions
* Hypothesis
* Methodology
* Study of two different period
Agriculture occupies an important place in all developing countries of the world and the problem of agricultural development in these countries are varied and manyfold. India is the largest developing country in the world where majority of the people are living in rural areas. The main source of livelihood of more than 70 percent of these rural people is agriculture. The problems of the Indian Agriculture is related with the problem of the third world countries and recently many third world countries realise that the development strategies which are adopted in last two decades were inappropriate and even irrelevant to their real needs. Rapid economic growth has further aggravated the problem of poverty, unemployment and inequality in many countries.

India is largely covered by small and marginal farmers and landless labourers and the plight of these farmers can be explained on mechanism of forced Commercialization.

The method of exploitation operates in the following fashion to meet his cash requirement, the peasant is forced to sell such a high proportion of the output immediately after the harvest that he left with too little to survive till the next harvest. Consequently he has to borrow cash at higher rate of interest to buy foodgrains from the market sometimes before the next harvest. Thus for the small peasantry as a whole, a regular cycle of distress buying and selling of foodgrains is set up.
In a fragmented small size farm units, simple and traditional agricultural implements, very limited use of chemical fertilizer and pesticide, low irrigation facilities and low capital investment are the general cause of low productivity.

The objectives of development strategy should meet the basic human needs of the entire population rather to create a consumer society on western model to benefit a limited privileged class.

In some developing countries the poorest segments of the population are facing the same hardship and poverty even inspite of rapid economic progress and the problem of employment and inequality; have become serious concern. It is now clear that the people of underdeveloped countries derive little or no benefit even inspite of growth or more than a decade in under developed countries. Although the average per capita income of the third world has increased by 50 percent since 1960, the growth has become very unequally distributed among countries, region within countries, and socio-economic groups. Paradoxically, while growth policies have succeeded beyond the expectations of the first development decade, the very idea of aggregate growth as a social objective has increasingly been called into question.
Development strategy, research, priority and extension efforts have failed to distribute the fruits of agricultural development efforts, to the majority of small farmers. Small farmers large in size play an important role in developing countries and in fact raising the productivity of small farm is the key to increase farm production.

The structure of agriculture of developing countries as well as world agriculture is characterised by small farms. The estimated agricultural population of developing countries (Africa, Latin America, Near east and Far east) can be counted about 60 percent as small farmers another about 15 percent as landless. About two thirds of all agricultural holdings in the world are small holdings, having a size between one and five hectare. This group accounts for only 6 percent of total agricultural area and 21 percent total crop area. The major focus of rural development in developing countries in the coming decade will be the development of small cultivation.

Small farmers generally not interested to adopt new technology at the initial stage. But the empirical evidence in India, Bangladesh and Pakistan indicates that the small farmers are not lagged behind in adoption of new technology.

The experience of small farmers in respect of introduction of improved maize cultivation in the state of
Puebla, Mexico during 1968-71 indicates the high yields and higher participation rates in the first two years, with the adoption of recommended practices and yield increased from about 1.5 tonnes per hectare to 3.9 tonnes over traditional technology.

The farmers income and profit also increased considerably. However, the yield and the growth in the level of participation started declining after a year. The main reason for decline was due to late rain as well as general dry condition. The new technologies developed and tested under adequate moisture conditions did not perform better than local technologies where subject to rainfall deficiencies.

The heavy capital investment and high variability of yield under unpredictable weather condition make the farmers not to accept the technology readily.

The Agricultural Extension Division of Indian Agricultural Research Institute conducted a study during 1970 in eight states of India in which findings indicate the adoption of improved technologies by small farmers varied among regions. In fact the small farmers actively experiment with new technologies and modify according to their local condition and environment. There is need to study the informal research and development undertaken by small farmers. This would give valuable information to design and develop new technologies which would have greater acceptance.
1. Economy of Assam:

The economy of Assam is very poor. More than 50 percent of state income is derived from agriculture and more than 90 percent of the area under agriculture is rainfed. The present population now stands at 2.24 crores as per 1991 census and 90 percent of these population are rice eaters. The economy almost all the year suffered from adverse effects of unprecedented natural calamities mainly flood and soil erosion, in addition drought also caused great harm in certain years. The occurrence of these types of natural calamities in quick succession cause severe setback in the state's agricultural activities. Role of large scale industries is almost negligible, only agriculture, small and cottage industries, forestry and mining etc play a major role in shaping the economy. Notwithstanding efforts made for generating additional employment opportunities, the problem of growing unemployment in the state continued to be matter of serious concern and it has brought socio-economic instability. Land is limited in supply and subject to diminishing in return, though both extensive and intensive method of cultivation are undertaken, the condition of rural people in general is not changing. The gross return from practices adopted by different cultivating classes are not at all satisfactory.

Assam the beautiful fertile land with blue hills and red rivers has tremendous potentialities in development of agriculture. Virtually agriculture in the state is a combination of peasant and tenant farming with the bulk of
cultivable land belonging to small and marginal farmers. The average size of operational holding in the state is 1.37 hectare, the highest average size being 2.04 hectare in hill district.

As per agricultural census, 1990-91 released from Directorate of Economics and Statistics, Assam, Guwahati in the year 1997 indicates the number of holding in percentage among marginal and small farmers is 82.46, 76.69 and 84.64 out of total number of holdings and area covered in percentage 43.41, 45.05 and 56.30 out of total area in respect of general, scheduled tribes and scheduled caste respectively. On the other hand the number of holdings in percentage among large size group of holding is 17.17, 23.31, 15.36 out of total number of holdings and area covered in percentage is 56.57, 54.95 and 43.70 out of total area in respect of general, scheduled tribe and scheduled caste respectively. Pie diagram is shown in respect of general at Fig. A. This is the position of distribution of operational holdings among the marginal and small farmers and under this circumstances increase of production, use of improved technology, equality of income is a matter of serious concern.

2. Geography:

The State of Assam is situated in the Eastern Himalayan region between 24° to 28°18' north latitude and 89°50' to 97°4 east longitudes. The state is almost
FIG: A

AGRICULTURAL CENSUS 1990-91
PRECENTAGE DISTRIBUTION OF
NUMBER OF OPERATIONAL HOLDINGS
AND OPERATED AREA FOR
GENERAL

- MARGINAL (BELOW ONE HECT)
- SMALL (ONE HECT TO BELOW TWO HECT)
- SEMI MEDIUM (TWO HECT TO BELOW FOUR HECT)
- MEDIUM (FOUR HECT TO BELOW TEN HECT)
- LARGE (TEN HECT AND ABOVE)
surrounded by Bhutan and Arunachal Pradesh in the North, part of Arunachal Pradesh, Nagaland, Manipur and Burma in the east, Bangladesh and West Bengal in the West, Mizoram, Part of Tripura and Meghalaya State covers the southern boundary. The geographical area is 78,523 sq.km.

Physiography:

The state can be divided into three broad physiographic units.

(i) The Brahmaputra Valley in the north
(ii) The Barak valley in the south
(iii) Hills regions which lie between these two valleys.

(i) The Brahmaputra Valley:

The Brahmaputra Valley is an alluvial plain surrounded on all sides by hills except in the west. The river Brahmaputra enters the plain near Sadiya and runs directly westwards for nearly 720 km. traversing every districts of the Assam valley, and turning due south to enter the plain of Bangladesh.

The Brahmaputra valley has a gradual slope from east to west. At Sadiya in the eastern most point the altitude is 134 meters above sea level, at Dibrugarh the altitude is 104 meters, at Guwahati the altitude is 50 meters
at Dhubri in the western point is only 35 meters.

(ii) The Barak Valley:

The Barak Valley mainly consists of flat plain of Cachar, Karimganj and Hailakandi district which is about 190 kms long and 96 kms wide covered by hills on the three side. The 'Barak' is the major river system.

(iii) The Hill regions:

The hills region include Karbi Anglong and North Cachar Hills.

(b) Climate:

The state enjoys, hot and humid climate with high rainfall and humidity as high as 85-90% or more in the majority of the districts. The mean annual maximum temperature (July-August) lies between 30°C to 33°C while the minimum temperature (December-January) ranges from 6°C to 12°C. The state belongs by an large to a high rainfall belt with annual rainfall ranging from 2504 mm in district of Goalpara to as high as 3227 mm in the district of Cachar.

On the average -

Winter (December to February) 60 mm
Summer (March to May) 640 mm
Monsoon (June to September) 1460 mm
Post Monsoon (October to November) 140 mm
(C) Soil:

The major soil groups are as follows:

(i) New alluvial soil: (Entisol)

A few kilometer on both the banks of the river Brahmaputra in the districts of Lakhimpur, Dibrugarh, Sibsagar, Jorhat, Nagaon, Sonitpur, Darrang, Kamrup, Barpeta, Bongaigaon, Dhubri and Goalpara include this areas. Less acidic and often neutral or slightly alkaline. Sandy loam loamsility loam in texture.

(ii) Old Alluvial Soil: (Inceptisol)

This group of soil is mainly found in Dirbugarh, Sibsagar, Jorhat and Nagaon districts. Acidic in reaction Sandy loam - lamsility clay in texture.

(iii) Old mountain valley Alluvial Soil: (Alfisol)

The group of soils are located in the foot hills of Goalpara, Dhubri, Kokrajhar, Kamrup, Sonitpur, Darrang and Lakhimpur districts beyond the areas covered by the new alluvial group. Also located in the adjoining foot hills areas of Nagaland, Karbi Anglong, N.C. Hills, Dibrugarh, Sibsagar and Nagaon district. This group of soils are also located in the districts of Barak valley and small areas in Kamrup district adjoining to the foot hills of Meghalaya. These area mainly heavy textured soils.

(iv) Non-laterised red soils (Ultisols)

This group of soils are found in the hills districts of Karbi Anglong and N.C. Hills.
Laterised Red Soils (Ultisols)

This group of soil are found in one or other form in some parts of Guwahati, Golaghat parts of Karbi Anglong and N.C. Hills and parts of low hilly areas of the Cachar district.

The soils of the state are acidic in reaction having $P_H$ between 4.5 and 6.5 except the new alluvial soils, which are neutral in reaction ($P_H$ 6-7). The soils of the foothills are also strongly acidic ($P_H$ 4.5-5.0), whereas remaining areas are weakly acidic ($P_H$ 5-6). As regards nutrient status, phosphate contents are low medium.

(3) Agro Climatic Zones of Assam:

Based on rainfall, terrain and soil characteristics, the state has been broadly delineated in six Agro climatic zones.

(a) North Bank Plains:

Comprises the districts of Dhemaji, North Lakhimpur, Sonitpur and Darrang. Total area 14424 sq.km. comprising 18.37% of the state area.

(b) Upper Brahmaputra Valley:

Comprises the districts of Sibsagar, Jorhat, Tinsukia, Dibrugarh and Golaghat. Total area 16013 km. Comprising 20.40% of the state area.
(c) Central Brahmaputra Valley comprises the districts of Nagaon and Morigaon with an area of 5561 sq.km. Comprising 7.08% of the state area.

(d) Lower Brahmaputra Valley:

Comprises the districts of Kamrup, Barpeta, Nalbari, Kokrajhar, Dhubri, Goalpara and Bongaigaon. Total area 20222 sq.km. comprising 25.75% of the state area.

(e) Barak Valley:

Comprises the district of Karbi Anglong and N.C. Hills with a total area of 15222 sq.km. which is 19.4% of the state area.

(f) Hills Zones:

Comprises the districts of Karbi Anglong and N.C. Hills with a total area of 15222 sq.km. which is 19.4% of the state area.

4. CROPPING PATTERN:

Agriculture in Assam are by and large, depends on independently variable factors as more than 90 percent of the cultivable area is rainfed. The rainfall is unevenly distributed which affects the crop production adversely. Crop production in Assam by and large traditional, using little capital per unit of land labour.
Crop area of some major crops are shown at Table No. 1. From the table it is clear that cropping pattern is not significant from 1985 to 1993. Crop area of some crop like sugarcane, jute are declining. On the other hand the crop area of other crops also not significant.

Change of crop area in percentage from 1985-86 to 1993-94 is rice 6.89 percent increase, wheat 2.20 percent increase, sugarcane 2.08 percent decrease, pulse 6.16 percent increase, jute and most 11.27 percent decrease.
TABLE NO. 1
CROP AREA OF MAJOR CROPS OF ASSAM
(IN HECTARE)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>RICE</th>
<th>WHEAT</th>
<th>MUSTARD</th>
<th>SUGARCANE</th>
<th>JUTE</th>
<th>PULSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985-86</td>
<td>2164112</td>
<td>92377</td>
<td>290651</td>
<td>48000</td>
<td>142000</td>
<td>146000</td>
</tr>
<tr>
<td>1986-87</td>
<td>2287057</td>
<td>120337</td>
<td>309662</td>
<td>46000</td>
<td>107000</td>
<td>150000</td>
</tr>
<tr>
<td>1987-88</td>
<td>2366016</td>
<td>98276</td>
<td>337542</td>
<td>43000</td>
<td>107000</td>
<td>138000</td>
</tr>
<tr>
<td>1988-89</td>
<td>2326357</td>
<td>106335</td>
<td>329107</td>
<td>41000</td>
<td>104000</td>
<td>126000</td>
</tr>
<tr>
<td>1989-90</td>
<td>2171650</td>
<td>93118</td>
<td>309660</td>
<td>30000</td>
<td>102000</td>
<td>120000</td>
</tr>
<tr>
<td>1990-91</td>
<td>2526741</td>
<td>83970</td>
<td>298991</td>
<td>35803</td>
<td>102919</td>
<td>121401</td>
</tr>
<tr>
<td>1991-92</td>
<td>2571961</td>
<td>76142</td>
<td>303291</td>
<td>37805</td>
<td>108930</td>
<td>125312</td>
</tr>
<tr>
<td>1992-93</td>
<td>2559277</td>
<td>73867</td>
<td>290121</td>
<td>33919</td>
<td>99017</td>
<td>119106</td>
</tr>
<tr>
<td>1993-94</td>
<td>2631000</td>
<td>79000</td>
<td>279000</td>
<td>47000</td>
<td>126000</td>
<td>155000</td>
</tr>
</tbody>
</table>

Source: i. Agricultural status of Assam, Directorate of Agriculture, Assam, Guwahati.

5. Production Performance:

In 1985-86: production of rice was 28.47 lakh tonnes, wheat 1.01 lakhs tonnes, pulse 0.69 lakh tonnes, Oilseeds 1.72 lakh tonnes, Jute 11.78 lakh tonnes, Mesta 0.53 lakh tonnes, sugarcane 19.71 lakh tonnes. In the year 1993-94, the production of rice was 36.36 lakh tonnes, wheat 1.31 lakh tonnes, pulse 0.86 lakh tonnes, Oilseeds 2.50 lakh tonnes, Jute 11.09 lakh tonnes, Mesta 0.47 lakh tonnes, sugarcane 22.00 lakh tonnes. Production performance changes from 1985-86 to 1993-94: rice 27.71% increase, wheat 29.70% increase, pulse 44.64% increase, oilseed 45.35 increase, jute 5.86 decrease, Mesta 11.32% decrease, sugarcane 11.62% increase.

Production trend of rice during 1985-86 to 1993-94 shown in at Fig. B. per hectare yield of rice in Assam is poor with comparison to other states of India along with other countries of the world. Yield variation of rice per hectare is noted at different countries of the world, different states of India, different districts of Assam to compare the production performance in the state in view of fund allocation in agriculture and allied sector since planning era and expenditure in different schemes by different district agricultural authority of Assam in district level.
Per hectare yield of rice in Assam is poor with comparison to other states of India along with other countries of the world. Yield variation of rice per hectare.

### A. 

<table>
<thead>
<tr>
<th>Country</th>
<th>KG</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>2617</td>
</tr>
<tr>
<td>China</td>
<td>5573</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4228</td>
</tr>
<tr>
<td>Vietnam</td>
<td>3089</td>
</tr>
<tr>
<td>Burma</td>
<td>2853</td>
</tr>
<tr>
<td>Philipines</td>
<td>2705</td>
</tr>
</tbody>
</table>

### B. 

**States of India:**

<table>
<thead>
<tr>
<th>State</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>3500 above</td>
</tr>
<tr>
<td>Tamilnadu</td>
<td>3001 to 3500</td>
</tr>
<tr>
<td>Goa, Haryana</td>
<td>2501 to 3000</td>
</tr>
<tr>
<td>A.P., J &amp; K</td>
<td>2001 to 2500</td>
</tr>
<tr>
<td>Karnataka, Manipur</td>
<td></td>
</tr>
<tr>
<td>W.B., Puducherry</td>
<td></td>
</tr>
<tr>
<td>Kerala, Tripura</td>
<td></td>
</tr>
<tr>
<td>U.P.</td>
<td>1501 to 2000</td>
</tr>
<tr>
<td>A.P. Assam</td>
<td></td>
</tr>
<tr>
<td>Bihar, Gujrat,</td>
<td></td>
</tr>
<tr>
<td>H.P., M.P.</td>
<td></td>
</tr>
<tr>
<td>Maharastra</td>
<td></td>
</tr>
<tr>
<td>Meghalaya, Nagaland</td>
<td></td>
</tr>
<tr>
<td>Orissa, Rajasthan</td>
<td></td>
</tr>
<tr>
<td>Sikkim</td>
<td>1001 to 1500</td>
</tr>
</tbody>
</table>
G. District of Assam:

Golaghat, Silchar 1500 to 2000
Hailakandi
Karimganj, Dhemaji
Dhubri, Goalpara
Kamrup, Nalbari
Darrang, Sonitpur
Nagaon, Morigaon
Jorhat, Sibsagar
North Lakhimpur
Dibrugarh, Tinsukia
Karbi Anglong
N.C. Hills, Bongaigaon
Kokrajhar, Barpeta 500 to 1000


6. Crop Season:

There are three crop season in Assam according to harvest.
(a) Summer crops harvested in June July, (b) Winter crops harvested in November-December and (c) Spring crops harvested in March-April.

7. Horticultural Crops:

Fruits occupy an area of 0.78 lakh hectares with a production of 9.2 lakh M.T. vegetables crops occupy
an area of 1.55 lakh hectares with a production of 19.07 lakh tonnes. The state is producing 1.80 lakh MT potato in an area of 0.60 hectares against the state's annual requirement of 8 lakh M.T.

8. Agricultural Inputs:

Agricultural inputs play an important role in accelerating the growth of agricultural production and productivity.

(a) Seeds:

The efforts are being made to maximise production and distribution of certified seeds through Assam Seed Corporation Ltd.

(b) Fertilizers:


G. Pesticide:

Crops including cereals, oilseeds, pulses, vegetables and sugarcane are vulnerable to pest attack. Around 11 lakhs hectares of gross cropped area are worst
affected by various crop-pests in Assam annually. Integrated pest management is introduced in order to reduce the dependence on the use of chemical pesticides for reduction of crop losses. The integrated pest management is a broad ecological approach that minimises pest population below economic injury level.

D. Irrigation:

Minor irrigation schemes specially ground water and surfaces water schemes have been accorded special attention. State's ultimate potential from ground water source is estimated to be 10 lakh hectares and there is a 10 lakh hectares and there is a feasibility to sink 5 lakh STWS in the State.

E. Agricultural implements and machinery:

167 numbers of tractors 14 numbers bulldozers for tillage and land development on hire system by the farmers.

F. Agricultural Credit:

The volume of institutional credit for agriculture was Rs. 283.58 lakh in 1991-92 and Rs. 181.50 lakhs in 1992-93. Overdues have been persisting more than 80 percent during last 2-3 years. The Assam Co-operative Apex Bank Ltd. adopted 481 numbers GPSS.

G. Crop Insurance:

A comprehensive crop insurance schemes has been in operation since 1985 and cover all farmers availing crop
loans from co-operative commercial and rural banks.

H. Transfer of Technology:

The entire state has been brought under T & V system (Training and Visit) of extension programme.

Although the present study is based into the background of agricultural process in plain areas of Assam, the area of field investigation is in the Barpeta and Nagaon district of the State.

Agricultural situation in Nagaon district:

The district of Nagaon is situated in central Brahmaputra valley zone has a total geographical area of 4002 sq.km. which is 5.05% of the total geographical area of the state of Assam. It is located in the sub zone IV of the eastern Himalayan Region (Zone No.2). The district comprises four agricultural subdivision viz. Naggaon, Raha, Kaliabor and Hojai.

1. Geography:

   (a) Physical features:

       The district lies between 25°45' north latitude and 91°59" east longitude and is bounded on its east and south by the hills of Karbi Anglong. On the west by Morigaon district and north by river Brahmaputra. Physiographically the district may be divided into the following five divisions Main river, Kalong, Kapili, Jamuna and Nikhari.
(b) Soil type and crop grown:

Soil varies from new alluvial to old alluvial with sandy loam to clay loam in structure. pH varies from 5.5 to 6.5 which is suitable for growing Rape and Mustard, Sugarcane, Jute, Pulse besides main crop of rice in Kharif and Rabi. Nizer and Soyabean has been introduced as commercial crops during last few years.

(c) Rainfall and climate:

Rainfall of the district depends on mainly on south west monsoon along with a premonsoon of the year. Rainfall varies from 1100 mm to 2000 mm. The dry belt is located in between Lumding and Karbi Anglong district with a rainfall of 1100 mm in a year. The climate of the district is hot and wet summer, dry and cool winter. The overall climate can be divided into four distinct seasons.

(i) Pre Monsoon (ii) Monsoon (iii) Post Monsoon (iv) Winter.

The premonsoon occurs from March to May. This rainfall during this period varies from 20% to 30% of the total precipitation. The monsoon starts at June and continue upto August. The precipitation varies between 60% to 70% of the total. The post Monsoon season extends from September to November and is characterised by fall in temperature and rainfall. The winter season extends from December to February and characterised by fall in temperature and rainfall with occasional cool breeze.
(d) Temperature:

The minimum temperature of the district goes to about 8°C which attains in January and the maximum is 38°C in July/August.

(e) Relative Humidity:

The relative humidity is recorded to be as 37% in the month of February and March at around 80% in other seasons.

(2) Demography:

The total population of the district is 18.92 lakh (1991 census) which contributes to 8.49% of the total state population. The density of the population in the district is 419 per sq.km. Rural population constitutes roughly 91% of the district population. Decadal variation in 1951-61 is (+) 35.91% in 1961-71 (+) 38.99% in 1971-91 (+) 51.26%.

(3) Cropping pattern:

The district is one of the most agriculturally prosperous district of Assam. Paddy occupies the predominant position in the cropping pattern of the district and occupies more than 70% of the crop area. Crop area coverage and production of major crop of Nagaon district is shown at Table No. II.

H.Y.V. has been gaining tremendous popularity among the farmers because of high yielding ability and more important factor is the limited crop period.
TABLE NO. II
Cultivated area of various crops and production of crops in the district of Nagaon

A : Area in Hectare  
P : Production in M.T.  
District : Nagaon

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>204992</td>
<td>267195</td>
<td>271592</td>
<td>213224</td>
<td>221085</td>
<td>208046</td>
<td>262776</td>
<td>254685</td>
<td>259078</td>
</tr>
<tr>
<td>A</td>
<td>377079</td>
<td>270022</td>
<td>360030</td>
<td>245841</td>
<td>239871</td>
<td>342450</td>
<td>361958</td>
<td>367611</td>
<td>375987</td>
</tr>
<tr>
<td>P</td>
<td>29358</td>
<td>20447</td>
<td>22100</td>
<td>13185</td>
<td>11755</td>
<td>12890</td>
<td>16634</td>
<td>12880</td>
<td>11873</td>
</tr>
<tr>
<td>Jute</td>
<td>58950</td>
<td>35096</td>
<td>37038</td>
<td>12575</td>
<td>19337</td>
<td>22838</td>
<td>32353</td>
<td>33333</td>
<td>20148</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>12336</td>
<td>11268</td>
<td>11268</td>
<td>10477</td>
<td>9650</td>
<td>9415</td>
<td>9911</td>
<td>9423</td>
<td>10360</td>
</tr>
<tr>
<td>A</td>
<td>685918</td>
<td>516908</td>
<td>543252</td>
<td>557711</td>
<td>533461</td>
<td>378278</td>
<td>446094</td>
<td>386691</td>
<td>419248</td>
</tr>
<tr>
<td>P</td>
<td>35646</td>
<td>36079</td>
<td>36161</td>
<td>29770</td>
<td>25682</td>
<td>26000</td>
<td>27168</td>
<td>27375</td>
<td>27354</td>
</tr>
<tr>
<td>Mustard</td>
<td>11600</td>
<td>12908</td>
<td>16015</td>
<td>10736</td>
<td>11525</td>
<td>14135</td>
<td>15648</td>
<td>16425</td>
<td>16084</td>
</tr>
<tr>
<td>Wheat</td>
<td>13017</td>
<td>26825</td>
<td>18724</td>
<td>15291</td>
<td>13790</td>
<td>10958</td>
<td>13496</td>
<td>14169</td>
<td>11075</td>
</tr>
<tr>
<td>A</td>
<td>14652</td>
<td>25397</td>
<td>20878</td>
<td>20429</td>
<td>12827</td>
<td>11335</td>
<td>14967</td>
<td>17244</td>
<td>13943</td>
</tr>
</tbody>
</table>

Source : Directorate of Economics and Statistics, Govt. of Assam
Approximately 80% of the area under summer rice is occupied by HYV rice followed by 50 percent Autumn rice and 45% for winter rice. The principal HYV rice grown in the district in all the crop season includes Mashuri, Pankaj, IR-36, Joya, IR8, Rasi, IET-6666. Monohar Sali and Cult-I have been grown in flood prone areas as late winter rice.

Agriculture in the district in general is market oriented. The bulk of the farm product is marketed through the village market and the traditional marketing channels. Jute is one of the important commercial crops which is entirely marketed by the farmers.

4. Crop growth analysis:

Area, production and yield of Autumn and summer rice increased while area under winter rice registered a fall of 0.57 percent during 1979-80 and 1989-90. However, production and yield rate of winter rice increased marginally. The fall in the area of winter rice is due to flood during the last triennium. Maize (Kharif) showed decline in respect of area, production and productivity. Jute, the principal crop of the district showed decline in area and production. But the productivity of Jute had increased. The increase in productivity was due to better cultural practices, use of fertilizers development and quality seeds. Special jute development scheme were also in operation in the Nagaon district.
Lack of irrigation facilities for growing wheat and extension of area to unsuitable land may be a major factor accounting for the declining in the productivity of wheat. Area under total cereals increased from 270.78 thousand hectares to 307.50 hectares signifying an annual growth rate 01.36 percent and the cereals output from 269.61 thousand tonnes to 329.04 thousand tonnes or by 2.20 percent. The yield increased marginally by 0.75 percent per annum. There was marginal increase in area, production and yield in area, production and yield of pulses during this period Rape and Mustard registered marked increase in area, production as well as productivity.

5. Agro climatic sub region :

There are distinct variations in agro climatic features in the district and it is considered highly necessary to divide the district into operationally significant agro climatic sub-zones for purpose of planning. The sub regionalization of the district is done on the basis of three agro climatic parameters viz. Physiography, soil and rainfall.

6. Irrigation :

The available potential for rabi and pre kharif irrigation in the district is estimated at 52.34 thousand hectares. Nearly 97.17% of the potential created is utilized in Kharif crop. The surface flow irrigation account for
63.58% of the total irrigation followed by 19.45% accounted for by ground water irrigation. Flow irrigation is almost exclusively concentrated in subzone II and VI, while surface left irrigation in subzone III and V.

Agricultural situation in Barpeta District:
(1) GEOGRAPHY: The district extends from 226°5'N to 26°49'N latitudes and 90°39'E to 91°17'E longitudes. In the north it is bounded by the Bhutan hills, on the south by Kamrup and Goalpara districts, on the east by Nalbari district and on the west by Kokrajhar and Goalpara districts. The total geographical area of the district is 3307 sq.km. which is approximately 4.21 percent of the total geographical area of the state. Topographically the district varies from low lying plains to elevated lands having a small hillock in the south west corner known as the "Baghbar". the northern part of the district comprises the foothills of Bhutan and the southern part is comparatively low lying through which the mighty Brahmaputra, the longest river of the state, flows weaving its way through many char areas. Originally, the northern part of the district was covered with natural forests but in course of time some parts of the same have been destroyed by people for agricultural purposes.

(a) Rivers:
The mighty river Brahmaputra flows east to west across the southern part of the district. Its tributaries like Beki, Manah, Pohumara, Kaldia and Palla flows from
north to south. The river Kaldia and Pohumara have joined together near Barpeta town being called by the name of Nakhandha. The river Palla and Beki also join with Nakhandha which is ultimately known as Choulkhowa river as it flows into the river Brahmaputra. The Choulkhowa river receives water supplied by almost all the tributaries of the region except the Manas with which it meets ultimate in the north of the Phulara hills. Now, the Chaulkhowa looks like a channel linking the tributaries together with the Brahmaputra through the Manas, but geomorphologically is may not be so. The small tributaries in the district are Hekua, Burha, Dong, Dhir, Chikni, Saru-Beki, Whelendi, Nakhandha, Karekhowa, Kumbhiera, Gyati, Chorphuli, Chamgunrijan, Rabang Goupachapara, Singmari Lukakunri, Sula, Rupsi, Dhanbil, Kakdong, Tikibhanga, Makhora and Ghoramara, all of which release their water into the Chaulkhowa.

(b) The water bodies:

It is almost 38 beels which are along the course of the river Brahmaputra and its tributaries. These water bodies are mostly situated in the low lying part of the region. The estimated average length of each of the beels is from 3.22 kms to 4.83 kms. In most of these water bodies, water is available throughout the year, but a few or the smaller beels dry up in the hot season.

(c) Soil:

Generally there are three types of soil in the Barpeta region. They are now alluvial, old alluvial and hill
soil. New alluvium soil is found in the active flood plains with its loose sandy character but receives annual replenishment of silts during the floods. Apart from the low lying areas or the northern bank of the Brahmaputra and the Char lands, this soil with a relatively compact form is found in the built up area of the middle plain where varieties of crops viz. rice, sugarcane, banana, vegetables etc. are grown. In the river banks, the new alluvium is less acidic, sometimes neutral or slightly alkaline. But in the built up areas it is relatively more acidic. Heavy clays and sandy loam with content of nitrogen in this soil of the built up area give good yield of rice, jute and vegetables. There are small and narrow patches of the old alluvium along the northern margin of the middle plains of the regions. The acidity of this soil is relatively more than the compact new alluvium of the middle plains. The hill soil is found in the northern foothill zone.

(d) Physiographic Division:

The Barpeta district is a part of the lower Brahmaputra valley. Therefore, its physically characteristics are more or less like those of other parts in the northern bank of the lower Brahmaputra valley. Physically divided into four regions.

(i) The foothills zone
(ii) The high plain in the northern part
(iii) The built up mid plain in the middle part
(iv) The low lying plain in the southern portion.
(e) Climate:

The climate of the Barpeta district is characterised by the relative coolness, extreme humidity, heavy summer rainfall and winter drought which are the major characteristics of monsoon type of climate. The subtropical location, foothills in the north, the Brahmaputra in the south and the hills of the south Kamrup and Meghalaya not far from its Southern borders, and open plains to the west and the east are the local factors controlling the climate of the region. The foothills ranges in the north protect this region the cold airmass of Bhutan and Tibet in winter. The Himalayas provide the conductive orographic condition for relief rainfall in the plains. As they obstruct the warm moist south-west monsoon airmass and deflect the currents of wind along with their clearing and adiabatic effect, an orographic low is developed here during the time of the onset of monsoon and this low attracts the southwest monsoon which results in heavy incessant rains.

(f) Temperature:

The average temperature during the winter months from December to February is about 18.8°C. From March to May the average temperature rises to 23°C. From the months of June to September, it further rises to the average of 27.17°C. From October to December the temperature is about 20°C.

(g) Rainfall:

Rainfall pattern also varies from locality to
locality. In the foothills the rainfall is higher than in the plains. The rain season starts from April and continues till September. The heavy rainfall period is July to September. In the foothills the rainfall is higher than the plain. Average rainfall in the foothills is 3162 mm (13 years average) whereas in Patbauri field trial station (Barpeta) it is recorded to the 1812 mm (3 years average) and in Sorbhog it is 2736 mm (10 years average).

(h) Fogs:

Fogs occur in most places of the region for a few days during the month of December and January. The prevalence of fog is mainly moisture evaporated from the river beds and numerous beels and swamps of the region.

(i) Floods:

The Brahmaputra and its tributaries like Beki, Palla, Kaldia, Pahumara, Bhalukadoba etc when in spate submerged a large area of the district almost every year and cause extensive damage to standing crops besides causing loss of life of human beings and animals.

2. Demography:

Total population as per 1971 census is 9,71,737. Density of population is 294 per sq.km. The population reaches 1385659 as per 1991 census. Decadal variation is 1951-61 is (+) 32.62% 1961-71 is 35.81% in 1971-91 is (+) 43.02%.
3. Cropping pattern:

In the Barpeta district, food crops normally dominate the agricultural land to a large extent. The total crop area of the district in 1987-88 was 3.24 lakhs. This total area cropped fluctuates slightly in other years depending on natural calamities like floods and drought.

There had been very low percentage in crop diversification in the Bhawanipur, Howli, Manikpur and Sarigh mouzas, all of which were situated in the built up mid plain region inhabited mostly by the indigenous non tribal peasants. This is because of the fact that these areas had been settled by the peasants for a long time practising almost the same kind of crops. Low percentage increase was due to the addition of a small number of Rabi crops during the later period. Percentage change was negative in the pub-Bajali and Uttar Bajali mouzas as the spread of education created alternative easier source of income and a tendency to leave the system had developed among the peasants. As only the most essential crops were grown in the latter period, so these two mouzas accounted in a low percentage decreased in the diversification of crops.

The present cropping programme followed by the farmers are:

(a) High Land:

Ahu-Sali, wheat, mustard, pulse, vegetables, potato, nizer.
(b) Low land:
Ahu-Sali, Wheat, Mustard, Pulse, Vegetable, Potato, Nizer.

(c) Char Land - Ahu-Jute, Wheat mustard, black gram nizer, dhania, potato, onion, garlic.

Broadcasted early Ahu is generally cultivated in all the low lying areas of the district where flood water comes in the month of June/July. Cultivators generally don't grow HYV rice due to various reasons. They prefer local drought resistant, tall short duration varieties. In some selected areas culture-I, Pusa 2-21, IR36 are also cultivated.

In Salai season cultivators generally don't prefer dwarf short duration HYV rice. In some limited areas only varieties like Joya, IR-8, Pusa 2-21 are grown. The cultivator generally prefers to grow long duration tall variety HYV Sali paddy such as Pankaj, Mashuri, Monohar Sali are most popular. Local varieties are generally popular. In low lying areas, cultivator generally prefer for growing local Bao rice mixed with Ahu Laldhapa, Bagadhapa, Hashphul are the common Bao varieties.

In case of Jute capsules, varieties of Jute in low and medium land are grown by the cultivators. The popular varieties are JRC 212, 747, 321. In medium and high land cultivators are growing olitoriius jute such as JRO 632, 524, 7835.
In case pulses, the cultivators generally grow pulses as a relay crop with Bao and Sali paddy. They generally prefer local varieties.

4. Growth analysis:
The district is no less than other district of the state in respect of area under autumn paddy, but in respect of production of the crop, the per hectare production in 1991 was only 529 kg, which is very low. On the other hand the area under Jute has been on the declining, probably due to following factors (i) more areas are brought under HYV paddy, in the sowing area of Jute (ii) price is not stable (iii) requirement of labourers with high wages.

In respect of spring paddy is very encouraging. In the year 1987-88 the area under this crop was on 600 hectares, in 1990-91 the area short upto 8025 hectares and per hectare production achieved was 2115 kg. In 1989-90, Ahupaddy area was 90000 hectare which was the highest in the state, but production was 625 kg per hectare only. The low production was attributed to the flood damage of the crop. Important aspects in the cropping is to be reckoned with the vegetables production both in quantity and variety is very encouraging, which has got major break through in respect of introduction high yielding hybrid varieties of cabbage and cauliflower. The vegetable area has been expanding but the area under mustard is reducing.
5. Horticulture:

Horticulture also plays a role in the district of Barpeta but poor in production of fruits. The larger part of the district is not suitable for such crops for flood.

Production of coconut, arecanut are suffered due to *ganoderma luciden* a root disease caused by the fungus of the some name of the disease. The occurrence of the disease in the state was known for several years back, but till this time no effective control measure have been evolved. There is apprehension of 'wipe out of this type of crop within a short span time.

All sorts of indigenous vegetables are grown in the districts extensively among them the prominent position occupying in respect of area and production during Rabi-potato, tomato, cabbage, cauliflower, brinjal and in Kharif vendy.

6. Irrigation:

The district has 5 Nos. of medium irrigation projects with command area 21,354 hectare for Rabi and Kharif. The water supply as needed is not enough. Minor irrigation which was potentialities of 50707 hectares for both the seasons, out of it 21725 hectare are being utilized. It is reported that many of the STW are remaining useless due to faulty installation.
Objectives of the study:

The objectives of the study are:
(a) Cropping pattern in the country side.
(b) Processing of raw crops by the cultivators.
(c) Economic viability of the improved agricultural operation.
(d) Spending habit.

Selection of study region:

Selection of study region in Barpeta and Nagaon district out of other districts in Assam is because of the following conditions:

(a) Cropping pattern is not similar and factors are not equally responsible to change of cropping pattern in both the district.
(b) Practices of improved implements by peasants of both the districts are not similar.
(c) Processing practices of raw crops by the peasants of both the districts are not similar.
(d) Both the districts are placed at separate agro climatic zones.
(e) Spending habit, life style among the resident between the districts are not similar.
(f) People and places of both the districts are more or less personally acquainted owing to my nature of job.
(g) Both the districts are not equally affected by natural calamities like flood and erosion.
Hypothesis: The following hypothesis are taken to study the subject.

(i) Changes of cropping pattern have not equally influenced the different ethnic group, inhabitant in the study area.

(ii) Processing practices of raw crops by peasants differ among the different ethnic groups.

(iii) Changes of income are not affected equally by change socio-economic conditions.

(iv) Investment for agricultural development are not similar amongst the different groups of people and in different locality.

(v) Per hectares production and rotation process differ considerably in different localities.

Methodology:

Agricultural practices are examined on the basis of field experiences and primary data available from thirty villages representing different ethnic group like Boro-Rabha along with Rajbangshi, immigrant Muslim people and mixed populated village of two district viz. Nagaon and Barpeta. Accordingly 3 blocks covered by total 15 villages with the representation of 5 villages in each block.
represented by 20 numbers of sample households in each village covered by 300 numbers of sample households in one district and total coverage of two districts in 6 blocks with a representation of total 30 numbers of villages represented by 5 villages in each block with village-wise representation of 20 numbers of households sample covered by total 600 sample households in two districts.

Households samples are classified according to category of size of land holding group.

For secondary and other information, the necessary help are taken from government agencies, various published literatures and journals etc. Moreover, the library of Gauhati University, National Library, Calcutta, Library of Delhi University, N.E.C. Library Shillong, Library of Agricultural University, Jorhat, Agro Economic Research Centre, Jorhat, Law Research Institute, Guwahati High Court are used.

Since the study is based on primary field survey and close observation of the study area, the secondary data, reports reference and notes of different authors are not exclusively used.

Study of two different periods:

Study regions are studies on two different periods viz. 1985 and 1993 and variation within the two different
periods viz. 1985 and 1993 and variation within the two different periods in respect of production, generation of income, investment, cropping pattern and cropping intensity, processing of raw crops, spending, technological awareness, cost of production and various other aspects are observed.

These variations are observed villagewise out of the blocks selected for study in two different districts. These variations are also observed among the villages inhabited by immigrant Muslim people, village inhabited by people of mixed community, village inhabited by ethnic group like Boro-Rabha and the villages inhabited by people of Rajbangshi community. List of sample villages groupwise exhibited according to block and district enclosed at Annexure No. 1 and No. 2.

These variation are found inspite of increase of expenditure of government since the inception of planning era, inspite of plan programme and schemes of the state authority in general and district authority in particular, inspite of new ideas and knowledge are acquired in different aspect of science and technology by our scientist, inspite of large extension machinery covered by qualified and trained up extension officials from University and different training institutes. The study is tried to understand the present socio-economic aspects on micro level so as to create a new environment to the needs of the society and needs of the common people.
NOTES AND REFERENCES


2. Sartaz Aziz: Rural Development learning from China Page XII


* * *