

Study No. 140

**End-term Evaluation Study/Appraisal in respect
of the Implementation of the Bringing Green
Revolution to Eastern India (BGREI)
Programme-A Study in Assam**



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PREFACE

The study on “Bringing Green Revolution to Eastern India”(BGREI) was under taken at the instance of the Crop Division, Ministry of Agriculture , Government of India. The programme was initiated in 2010-11 as one of the sub schemes of Rastriya Krishi BikashYojona (RKVY). Under the scheme, the demonstration plots are selected in cluster of areas belonging to different size groups of farmers in order to see the visible impact.In common parlance, the Eastern region of India is considered as food-grain deficit region and the basic aim of this programme is to make this region a food- grain surplus region.

The Agro-Economic Research Centre, Visva Bharati, Shantiniketan, West Bengal, was designated as the coordinating centre for the study. The draft report was submitted to the coordinating centre and the corrections and modifications were made based on its comments. The suggestions emerged from the final presentation of the report at Krishi Bhawan have also been incorporated in the report.

As per approved design, the present study was conducted based on primary and secondary level information/data. The secondary level analysis was based on the data supplied by the BGREI cell of the Directorate of Agriculture, Government of Assam while primary level analysis was based on the information collected from the beneficiary and non beneficiary farmers belonging to 5 selected sample districts viz. Kamrup, Udalguri, Golaghat, Karimganj and Jorhat under 5 different sub ecological regions having clusters of block demonstration of *Kharif* paddy, pulse and summer paddy. The sub ecological regions were Rainfed Upland in Kamrup, Rainfed Shallow Low Land in Udalguri, Rainfed Medium in Golaghat, Rainfed Deep Water in Karimganj and Irrigated Land in Jorhat.

In 2010-11, five programmes were under taken viz., i) Scientific Cultivation of HYV paddy, implemented in 13 non-NFSM districts, covering 9,410.30 hectares, ii) Scientific Cultivation of Hybrid Maize covering 4,867 hectares, iii) Scientific Cultivation of pulses (black gram/green gram) implemented in 17 districts covering 6,200 hectares under green gram and 12,582.87 hectares under black gram, iv) Distribution of Hand Compression Sprayers at subsidized rate to 7,937 beneficiaries implemented in 26 districts and v) programme on Amelioration of acid soil in 26 districts covering 50,000 hectares.

In 2011-12, three programmes were undertaken viz., i) Summer paddy demonstration clusters covering 200 hectares each ii) Assets Building Activities and iii) Site Specific Activities.

The study visualizes the impact of these programmes in terms of target and achievement, both physical and financial and productivity level attained by the crops under the clusters of demonstrations. However, the impact of a few activities, namely, asset building activities & site specific activities could not fully be assessed because of the problems inherent to the system itself. Continuous assessment of the programmes undertaken is desired for successful implementation of the flagship programme initiated by the Government.

I sincerely acknowledge with thanks the help & cooperation rendered by the officials of the BGREI cell together with others in the Directorate of Agriculture Govt. of Assam. I am also thankful to all the sample respondents for their spontaneous help and co-operation during the field surveys.

Like all other studies, this is also a joint output of the Centre. I am thankful to Dr. Jotin Bordoloi who painstakingly prepared the report. The names of the research staff associated with the study have been mentioned elsewhere in the report.

I hope that the report will provide first-hand information on the status of BGREI in Assam for the planners, policy makers and researchers.

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Chapter - I

Introduction

1.1 Background of the Programme

The Eastern region of India comprising Assam, Bihar, Chattisgarh, Jharkhand, Odisha, Eastern Uttar Pradesh & West Bengal is considered to be a food-grain deficit region. Much pressure was on Punjab and Haryana for food grain production basically for rice and wheat since the beginning of first green revolution initiated in mid-sixties in India. Now, both the states are not in a position to bear the burden more on account of changing soil structure. In this juncture, the country has no option but to look forward to the eastern region to feed the rising population in the days ahead.

In this backdrop and also in order to overcome the probable food crises, the Government of India, on the recommendation of Inter-Ministerial Task Force, launched the programme, “Bringing Green Revolution to Eastern India (BGREI)” in 2010-11. It is a sub-scheme of the Rashtriya Krishi Vikash Yojana (RKVY) implemented in Assam in the same year along with other eastern region states. In Assam, the programme was implemented as “Extending Green Revolution to Assam” in 2010-11 without any specific interventions/guidelines from the Ministry. The scheme was first of its kind for creating visible impact of the programme in the form of demonstrations under cluster approach involving different size groups of farmers.

Although, the productivity of the most of the field crops except that of horticulture is below the national average, Assam attained the level of food grain production to the tune of 45.57 lakh tonnes in 2009-10. In 2010-11, the state registered a record of rice production of 50.86 lakh tonnes which is more than 15 per cent over the previous year. In this regard farmers opined that the favourable weather condition was the main reason for this record production of rice during 2010-11. There might be some other factors as well which need a thorough investigation to arrive at a comprehensive answer.

In 2010-11, the BGREI programme was launched with five components without referring to any sub ecological region *viz.*, i) **Scientific Cultivation of HYV paddy**, implemented in 13 non-NFSM covering 9410.30 hectares, ii) **Scientific Cultivation of Hybrid Maize** implemented in eleven districts covering 4867 hectares, iii) **Scientific Cultivation of pulses (black gram/green gram)**

implemented in 17 districts covering 6,200 hectares under green gram and 12,582.87 hectares under black gram, iv) **Distribution of Hand Compression Sprayers** at subsidized rate to 7,937 beneficiaries covering 26 districts and v) **Amelioration of acid soil** implemented in 26 districts covering 50,000 hectares.

In 2011-12, 3 programmes are under taken viz., i) **Summer Paddy** demonstration clusters covering 200 hectares ii) **Assets Building activities** and iii) **Site Specific Activities**. Summer Paddy demonstration clusters were under taken in 5 different sub ecological regions. These are Upland rice (irrigated), Shallow Low Land, Medium Deep Water, Deep Water, High Yielding Varieties (irrigated) & Hybrid (irrigated). There are 25 cluster of block demonstration under Upland Rice (irrigated) in 5 districts, 29 clusters under Shallow Low Land in 9 districts, 34 clusters under Medium Deep Water in 7 districts, 25 clusters under Deep Water in 3 districts, 22 clusters under High Yielding Varieties (irrigated) in 8 district and 21 clusters under Hybrid (Irrigated) in 6 districts. Altogether there were 156 clusters in the state under rice covering 200 hectares in each demonstration in 2011-12 under BGREI.

Farm asset is an important input as it encourages a farmer to go for agricultural operation on time. A few farmers can afford to create assets on their own. Number of assets per hectare in Assam is still less than the national average. In this regard special thrust has been given by the State Agricultural Department through the on-going central sector scheme. Per hectare farm power in terms of HP was 0.54 in 2006-07 and it increased to 0.69 HP per hectare in 2009-10 while the national average stood at 1.20 HP per hectare. In order to bring about a change, a programme under Asset Building Activity, has also been proposed under BGREI. The programme includes distribution of 2 Drum Seeders to each of the progressive farmer under each cluster of size 200 hectares, Shallow Tube Wells, Dug Wells/Bore Wells and Pump Sets among the beneficiaries. The existing state machinery is at work to fulfill the targets as reported by the concerned district officials during the field investigation.

The Site Specific Activities include construction of community covered threshing floor with physical target of 35 numbers or power line provision for about 1500m with transformer for cluster of electrically operated pump sets for STW/LLP for about 10 numbers with a physical target of 29 numbers and Thresher with mover with a physical target of 35 numbers. Under this programme, there are additional 2 activities at the individual level of the beneficiaries. These are distribution of Thresher

without prime over with a physical target of 40 numbers and distribution of H.C. Sprayers with a physical target of 10,092 numbers. Most of these machinery are lying in the go-down of the district H.Q. and very few farmers express their willingness to receive the same. In addition to this programme, provisions to dig Water Harvesting Tank/Farm Pond for irrigation to individual farmer are also included under the Site Specific Activities. However, no achievement on this count has been reported in the field.

The programme would be completing two years of implementation by the end of the Eleven Five Year Plan (2011-12). But most of the programmes during 2011-12 are in initiation stage or in the process of implementation. The Ministry of Agriculture, Government of India therefore felt that it is the high time to conduct an evaluation study to assess the actual performance of the programme during the period of its implementation both at macro and micro level. This would help the concerned states to devise strategic action plans in conformity with identified constraints at grass root level. The study is proposed with the following objectives.

1.2 Objectives of the Study

- To study suitability/correctness of technical interventions/prescriptions and approach adopted at State/district and local levels;
- To observe crop response to technology promoted;
- To make critical evaluation of administrative aspects of implementation;
- To identify status and impact of implementation of various interventions;
- To identify gaps, if any existing between recommended, promoted and implemented strategies;
- To explore the effectiveness of scientific backstopping in the form of scientists deployed at the district;
- To examine the effectiveness of the provision of Progressive farmers & SDA staff entrusted with BGREI program and paid honorarium therefore;
- To examine effectiveness of cluster approach adopted during 2011-2012;
- To examine effectiveness of institutional support provided by CRRI, NGOs & BGREI cell established in DAC; and
- To examine effectiveness of monitoring mechanism (DLMTs and SLMTs) at district and State level.

1.3 Terms of Reference for the Study of BGREI programme as circulated by the Ministry

1. Adequacy of formulation of BGREI program (Program intervention/sub-interventions) to enhance the productivity of rice & wheat crops in BGREI states commensurating their needs relating;
 - (i) Block demonstration of rice;
 - (ii) Block demonstration of wheat;
 - (iii) Water Asset building;
 - (iv) Site specific interventions;
 - (v) Technical backstopping by Extension wings of State Department of Agriculture Krishi Vigyan Kendras (KVKs) & State Agricultural Universities; and
 - (vi) Monitoring mechanism.
2. Preparedness of the States to the challenge of the BGREI program;
3. Timeliness of formulation and approvals of the program by State Level Sanctioning Committees;
4. Timeliness of issue of administrative & financial sanctions of the approved program (s) by RKVY division;
5. Timeliness of release of funds by RKVY division to participating States;
6. Timeliness of release of funds by States' Finances Department to the implementing Departments (Director of Agriculture, Irrigation Departments, etc..) in each state;
7. Timeliness of communication of the district wise allocation of the program by the implementing departments;
8. Timeliness of release of funds by the implementing departments in the State to implementing districts
9. Adequacy of pre- positioning of agricultural inputs by the implementing departments at the State /district level in the BGREI States
10. Adequacy of the proposed monitoring mechanism and repond thereto that is, State Level Monitoring Teams (SLMTS), District Level Monitoring Teams (DLMTS)/CRRI-Cuttack, Krishi Vigyan Kendras (KVKs) and SAU scientists
11. Review of the impact of functional support by BGREI cell to the programme as a whole;

12. Efficacy of delivery mechanism of agricultural inputs, incentive for deep ploughing /land preparation, direct seeding in lines/line transplanting and honourarium to progressive farmers/SDA staffs by the implementing States/districts;
13. Adequacy and efficacy of reporting system in terms of timeliness, factuality of data in physical and financial (actual expenditure not committed expenditure) terms by districts to States to BGREI Cell;
14. Status and impact of implementation of various interventions i.e., gaps if any between recommended (containing guide lines), promoted (planned) and implemented strategies (actually implemented on the ground at farmers level) on the productivity of mandate crops in general and cropping system in particular.
15. Effectiveness of SLMTs/DLMTs in programme implementation
16. Effectiveness of institutional support provided by Central Rice Research Institute (CRRI) for programme monitoring and
17. Farmers' (beneficiary and non beneficiary) response is to the programme as a whole.

1.4 Data base and Research Methodology

The study was conducted on the basis of secondary and primary data to fulfill the stated objectives. The secondary level data are the data available at the State, District and Block levels. The primary level data were collected from the sample farmers (beneficiary and non-beneficiary) and other stakeholders in order to capture the grass root level impact of the programme. Two sets of data were collected, one for the year 2010-11 in which implementing agency was given free hand to choose the activities as per the State's specific requirements and for 2011-12, there were 3 broad categories of intervention, viz. .i) Summer Paddy demonstration clusters covering 200 hectares each ii) Assets Building Activities and iii) Site Specific Activities.

As per guidelines, in the first stage of sampling, five districts viz., Jorhat, Golaghat, Kamrup Metro, Udalguri and Karimganj have been selected on the basis of the concentration of units of demonstration under 5 agro-ecological sub regions viz., Rainfed up-land, Rainfed Shallow-Low Land, Rainfed Medium, Rainfed Deep Water and Irrigated land (HYV rice/ Hybrid rice). In the second stage, keeping in view of the concentration of sample units of demonstration, one block was selected for collection of primary level data as per prescribed schedule given by the Coordinating Centre. Accordingly, five blocks viz., Dergaon, Udalguri, Ramkrishna Nagar, Ujoni

Majuli and Rani which were selected from the districts of Golagaht, Udalguri, Karimganj, Jorhat and Kamrup, respectively. From each block, the list of sample beneficiaries and non beneficiaries from the nearby cluster were collected & 10 beneficiaries and 5 non beneficiaries were selected randomly from each selected block. All the relevant information were collected in a prescribed schedule from each sample respondent through personnel interview to capture the grass root level information. Altogether a total sample of 50 beneficiaries and 25 non beneficiaries spread over 5 selected districts were covered under the study. In the analysis of data, the Chi square test for homogeneity of sample respondents, mean difference test of yield of crops between beneficiary and non-beneficiary farmers and the factors affecting yield of crops were also worked out for statistical interpretation thereunder.

In addition to this, a series of threadbare discussion was held with the State Govt. officials both at district & State level together with the enlightened people of the respective areas and progressive farmers appointed under each demo to meet the objectives of the study.

1.5 Organization of the Study

This is a common study for eastern region of India coordinated by the Agro-Economic Research Centre, Visva-Bharati, Santiniketan. The study is organized as per guideline developed by the coordinating centre. Keeping in view of the objectives, the study was divided into major chapters. Each chapter was further divided into some sections/subsections. As a whole, the organization of the study was framed as follows:

Chapters

I. Introduction

- 1.1 Background of the programme
- 1.2 Objectives of the study
- 1.3 Data base and research methodology
- 1.4 Organization of the study
- 1.5 Limitations

II. Profile of the State and Selected Districts

- 2.1 Rainfall situation
- 2.2 Irrigation infrastructure
- 2.3 Cropping pattern

III. Evaluation of implementation Process

- 3.1 Evaluation of technical back stopping

3.2 Crop specific structured plan

3.3 Perception profiling

IV. Evaluation of Physical and Financial Progress

4.1 Block demonstrations

4.2 Assets building

4.3 Site specific interventions

V. Evaluation of Monitoring Process

5.1 Details about SLMTs

5.2 Details about DLMTs

VI. Results and Discussions

VII. Summary and Conclusions

VIII. Recommendations and Policy Suggestions

1.6 Limitations

The study has got its own limitations as primary level information was collected through interactions with the beneficiaries and non beneficiaries & most of their responses were memory based. There is also possibility of wrong entry of data despite our utmost care. Further non-availability of official information was also another limitation of the study.

Chapter –II

Profile of the State and the Selected Districts

Assam is situated in the sub-tropical zone lying in between $24^{\circ} 08' N$ and $27^{\circ} 09' N$ latitude and $89^{\circ} 42' E$ and $96^{\circ} 10' E$ longitude. The average annual temperature is recorded (July-August) at $30^{\circ} C$ to $35^{\circ} C$ while the minimum temperature (December-January) falls in between $6^{\circ} C$ to $12^{\circ} C$. Humidity is as high as 85.0 to 90.0 per cent in most of the districts.

The state is divided into three physiographic divisions- the Brahmaputra Valley, Barak Valley and Hills region. The Brahmaputra Valley covers 72 per cent, Barak valley covers 9 per cent and Hills region covers 19 per cent of the total geographical area of 78,438 sq. km. of the state.

The state is divided into 6 agro-climatic zones on the basis of homogeneous agro-climatic conditions. These are the North Bank Plains, the Upper Brahmaputra Valley, the Central Brahmaputra Valley, the Lower Brahmaputra Valley, the Barak Valley and the Hills zone.

Out of the total reporting geographical area of 78.50 lakh hectares (as per village paper), net area sown (28.10 lakh hectares) constitute 35.80 per cent. The gross cropped area recorded an increase from 38.39 lakh hectares in 2007-08 to 39.99 lakh hectares in 2008-09. The average size of operational holding has been decreasing over the periods. It was recorded at 1.15 hectares in 2000-01 which came down further to 1.11 hectares in 2005-06. The increase in percentage of number of holding in respect marginal and small farmers is also an emerging issue of the state agriculture. Combining both the groups, the figure stood at 85.25 per cent in 2005-06.

Assam has suitable agro climatic condition for paddy cultivation, and it occupies 91.9 per cent of the net cropped area and 65.90 per cent of the gross cropped area.

2.1 Rainfall Situation

Rainfall is one of the vital ingredients given by the nature free of cost in the production process of crops. It among many other factors, principally determines whether there will be a bumper harvest or there will be a decline in production of crops. Meteorological department has to play an important role in forecasting rainfall situation of a region so that farmers can go for cultivation on time with the adoption

all possible measures in their crop field. The rainfall pattern in recent years has changed drastically. In the State, while some districts receive abundant rainfall, some others experience acute deficit showing a highly erratic rainfall pattern. Deficient rainfall increases the cost of cultivation as farmers have to spend more on diesel for pump operation in order to supply water to their field. In Assam, the shortage and erratic supply of power is also a very common problem for the farmers to use electric pump set. Therefore, deficient rainfall has a strong bearing on the economic life of the farmers.

Assam falls under heavy rainfall zone for which it has both positive and negative impact on the State economy as a whole. A great deal of variation of rainfall is also observed in different agro-climatic zones and even in the same agro-climatic zone every year. On account of this variation, the state has the experience of frequent flood, erosion and draught in some districts. At present, the problem of erosion is more acute than floods. The flood situation of the State cannot be forecasted on the basis of amount of rainfall in the State alone. It largely depends upon the amount of rainfall in the neighbouring State, Arunachal Pradesh as the river Brahmaputra is the main outlet for both the States, creating acute land erosion problem in the downstream of the State. The State has already lost 4.30 lakh hectares of land in erosion since 1954 till date, affecting the socio-economic conditions of a large chunk of population. As per records, the state had experienced deficit rainfall in the last few years as compared to earlier years. It might be due to destruction of natural vegetation of the region along with the changes in global natural environment.

Table-2.1 amply demonstrates that the State had experienced a deficit rainfall from 2007 onwards except in 2010.

Table-2.1
Average Annual Rainfall in Assam

(In mm)			
Year (Jan-Dec)	Actual	Normal	Deviation (%)
2007	2076.3	2431.9	(-)14.6
2008	2048.1	2352.9	(-)13.5
2009	1700.2	2255.8	(-)25.0
2010	2282.2	2255.3	(+) 1.2

Source: Economic Survey of Assam, 2010-11

Table-2.2 visualizes the rainfall situation of the State during *Kharif* and *Rabi* Season during 2008 and 2009. In 2008-09, during *Kharif* season the State received deficient rainfall in April, May and June while in July and September, it received normal rainfall but there was excessive rainfall in August. In total, the State received normal rainfall during *Kharif* season. In *Rabi* season, the State received normal rainfall in October and deficient rainfall in March. In the rest of the months, it received scanty rainfall. In over all, there was deficient rainfall during *Rabi* season.

Table-2.2
Rainfall in Assam during *Kharif* and *Rabi* Season, 2008-09

Month	Actual rainfall received by the state (mm)	Percentage departure from Normal	Status
<i>Kharif</i> Season:			
April, 2008	153.5	-24%	Deficient
May, 2008	201.1	-45%	Deficient
June, 2008	358.8	-21%	Deficient
July, 2008	371.5	-11%	Normal
August, 2008	440.2	-33%	Excessive
September, 2008	247.9	-7%	Normal
Total (<i>Kharif</i>)	1773.0	-13%	Normal
<i>Rabi</i> Season:			
October, 2008	120.9	-14%	Normal
November, 2008	1.8	-93%	Scanty
December, 2008	1.4	-89%	Scanty
January, 2009	4.2	-77%	Scanty
February, 2009	10.0	-63%	Scanty
March, 2009	40.0	-49%	Deficient
Total (<i>Rabi</i>)	178.3	-44%	Deficient

Source: Economic Survey Assam, 2009-10

The pattern of rainfall in the State and the districts during the *Kharif* season of 2009 is shown below in Table 2.3. In April, 2009 the state received deficient rainfall of 22 per cent as there was deficient rainfall in 12 districts ranging from 24 per cent to 80 per cent. In May 2009, the state received deficient rainfall of 45 per cent as there was deficient rainfall in 17 districts ranging from 30 per cent to 86 per cent. In June 2009, the State received deficient rainfall of 35 per cent as there was deficient rainfall in 17 districts ranging from 20 per cent to 77 per cent. From 1st June to July 31st, 2009 the State received deficient rainfall of 27 per cent as there was deficient rainfall in 14 districts ranging from 20 per cent to 72 per cent. The State

received deficient rainfall of 13 per cent but can be considered as normal from 1st June to 31st August, 2009 as there was deficient rainfall in 6 districts ranging from 21 per cent to 63 per cent. The State received deficient rainfall from 1st June to 31st September but can be considered as normal despite deficient rainfall in 8 districts from 21 per cent to 63 per cent.

Table-2.3
Rainfall in Assam During Kharif Season, 2009

Period / Month	Actual rainfall received	Rainfall pattern in the State	Rainfall pattern in the Districts
April, 2009	145.2 mm against normal rainfall of 185.1 mm	(-)22% (deficient)	Deficient rainfall in 12 districts ranging from (-)24% to (-)80%
May, 2009	185.3 mm against normal rainfall of 334.4 mm	(-)45% (deficient)	Deficient rainfall in 17 districts ranging from (-)30% to (-)86%
June, 2009	270.7 mm against normal rainfall of 419.5 mm	(-)35% (deficient)	Deficient rainfall in 17 districts ranging from (-)20% to (-)77%
1 st June to 31 st July, 2009	611.9 mm against normal rainfall of 835.4 mm	(-)27% (deficient)	Deficient rainfall in 14 districts ranging from (-)20% to (-)72%
1 st June to 31 st August 2009	1021.3 mm against normal rainfall of 1176.1 mm	(-)13% (Normal)	Deficient rainfall in 6 districts ranging from (-)21% to (-)63%
1 st June to 30 th September, 2009	1181.9 mm against normal rainfall of 1434.1 mm	(-)18% (Normal)	Deficient rainfall in 8 districts ranging from (-)21% to (-)63%

Source: Economic Survey Assam, 2009-10

Table 2.4 gives the rainfall pattern in the State during the *Kharif* crop season of 2010 and was favourable both in terms of total rainfall and it's spread. The overall actual rainfall was recorded at 2066.3 mm against the normal rainfall of 1976.00 mm with 5 per cent departure from actual.

Table-2.4
Rainfall in Assam During Kharif Season, 2010

Month	Actual(mm)	Normal(mm)	Departure from Normal
April,2010	360.0	186.0	93%
May,2010	329.6	328.8	0%
June,2010	443.5	429.6	3%
July, 2010	326.0	416.8	-22%
August,2010	319.4	347.3	-8%
September,2010	287.8	267.5	8%
Total	2066.3	1976.0	5%

Source: Economic Survey Assam, 2010-11

It has been observed that there was a significant variation in rainfall in each month as the distribution pattern of rainfall varied from district to district. As a result, the drought like situation in some districts caused serious damage to *Kharif* crops, more particularly the Winter Paddy. To cope up with this situation, efficient irrigation system is a must in each district for sustainable development of State agriculture. The word “Sustainable Agriculture” is broadly associated with three major satisfaction of the farmers i.e., physical, mental and spiritual health of the farmers. Otherwise it would not be possible to reduce the drudgery & pains of the farmers.

Table -2.5, 2.6, 2.7 and 2.8 give the pattern of actual rainfall and its deviation from normal rainfall in respect of the sample districts during 2007-2010. The average annual rainfall during the reference years exhibited deficient rainfall with a variation in between 78.87 per cent and 0.26 per cent. Also, the month wise and average annual rainfall and its departure (%) from normal rainfall against the BGREI and NFSM districts of Assam are portrayed in Table-2.9a and 2.9b for the years 2010 & 2011.

Table-2.5
Average Annual Rainfall in Sample Districts of Assam in 2007
(In mm)

District	Actual	Normal	Deviation (%)
Jorhat	1754.0	2195.3	(-)20.10
Golaghat	1628.5	1746.7	(-)6.76
Kamrup	1764.8	1896.2	(-)6.93
Karimganj	2282.2	2255.3	(+) 1.2
Udalguri	N.A	N.A	N.A

Source: Economic Survey Assam, 2010-11

Table-2.6
Average Annual Rainfall in Sample Districts of Assam in 2008
(In mm)

District	Actual	Normal	Deviation (%)
Jorhat	1776.2	2265.3	(-)21.59
Golaghat	1378.5	1752.0	(-)21.31
Kamrup	1578.8	1896.2	(-)16.74
Karimganj	1475.8	3751.0	(-) 60.66
Udalguri	N.A	N.A	N.A

Source: Economic Survey Assam, 2010-11

Table-2.7
Average Annual Rainfall in Sample Districts of Assam in 2009
(In mm)

District	Actual	Normal	Deviation (%)
Jorhat	2088.5	2257.1	(-)7.47
Golaghat	1199.8	1751.7	(-) 31.52
Kamrup	1442.0	1896.2	(-)23.95
Karimganj	2296.10	3751.0	(-) 38.79
Udalguri	N.A	N.A	N.A

Source: Economic Survey Assam, 2010-11

Table 2.8
Average Annual Rainfall in Sample Districts of Assam in 2010
(In mm)

District	Actual	Normal	Deviation (%)
Jorhat	2088.5	2257.1	(-)7.47
Golaghat	1705.4	1746.4	(-) 2.35
Kamrup	1883.3	1888.3	(-)0.26
Karimganj	3010.2	3711.1	(-) 78.87
Udalguri	N.A	N.A	N.A

Source: Economic Survey Assam, 2010-11

Table-2.9.a
District wise rainfall data of Assam during the year 2010 & 2011.

Unit: Actual Rainfall (R/F) in mm; Rainfall Departure (Dep): in %

Sl.	District	Year	Factor	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly
(1) BGREI Districts																
1	CACHAR	2010	R/F	0.0	9.9	234	588.1	597.3	680.7	474.5	584.9	659.9	206.7	16.5	41.4	4093.9
			Dep	-100	-79	54	88	32	7	-16	19	85	-6	-63	266	
		2011	R/F	14.1	12.2	73.8	114.2	454.2	398.5	480.1	383.5	281	87.3	0	0.1	2299.0
			Dep	6	-76	-56	-56	18	-25	-9	-19	-22	-52	-100	-99	
2	HAILAKANDI	2010	R/F	0	0	132	420	303.6	218.5	139.8	215	146.3	77	6.6	14.4	1673.0
			Dep	-	-	-7	35	-39	-57	-71	-36	-52	-56	-81	47	
		2011	R/F	8	3.5	24	46.1	262.8	147.3	313.6	239.7	136.5	46.6	0	0	1228.1
			Dep	10	-92	-81	-81	-37	-69	-27	-41	-57	-69	-100	-100	
3	KARIMGANJ	2010	R/F	0	0	57.4	742.3	268.6	700.2	282.8	332.7	561.6	49.1	5	20.2	3019.9
			Dep	-	-	-60	92	-60	-2	-54	-28	38	-78	-94	149	
		2011	R/F	9.9	0	35.3	28.5	174.9	345.4	498.5	508.4	195.4	94.2	0	0	1890.5
			Dep	-25	-100	-79	-92	-71	-46	-23	16	-53	-61	-100	-100	
4	DHUBRI	2010	R/F	0	0	66.7	426	558.5	563.5	340	251	286	36.7	1.4	1.9	2531.7
			Dep	-100	-100	45	168	37	-10	-36	-40	-20	-77	-92	-54	
		2011	R/F	7.3	22.3	135	69.1	267	389.2	273.2	387.2	228.4	9	5.6	0.6	1794.1
			Dep	-29	91	190	-53	-32	-35	-51	-8	-33	-94	-71	-85	
5	KAMRUP (R)	2010	R/F	0	0	124	369.7	356	482.7	250.9	233.5	223.2	75.7	5.3	0.5	2121.6
			Dep	-	-	105	117	22	25	-28	-15	14	-34	-68	-95	
		2011	R/F	9.3	23.4	53.6	101.4	224.5	88.4	373.4	204	255.5	0.3	15.3	1.3	1350.4
			Dep	-23	13	-9	-33	-23	-76	8	-18	36	-100	1	-83	
6	JORHAT	2010	R/F	0	0	108	325	272.4	328	413.8	290.3	187.1	113.9	27.6	8.8	2074.9
			Dep	-	-	11	36	-13	-1	8	-22	-38	-14	14	-44	
		2011	R/F	14.7	23.3	76.4	55.1	448.3	247.6	413.1	288.1	167.5	17.8	9.9	14.9	1776.7
			Dep	-34	-37	-5	-73	62	-14	6	-17	-39	-85	-61	-4	
7	GOLAGHAT	2010	R/F	0	0	111	213.8	305	281	339.4	183.8	175.5	85.7	7.5	1.2	1704.0
			Dep	-	-	55	48	14	11	12	-39	-14	-32	-65	-91	
		2011	R/F	14.1	3	63.2	61.9	308.3	231.6	490.1	201.9	135.2	29.7	4.1	2.1	1545.2
			Dep	-71	-90	-3	-54	26	-9	56	-26	-35	-71	-79	-86	
8	SIVASAGAR	2010	R/F	0	0	60.7	317.9	303.8	267.7	417.6	347.8	432.9	159.7	28.2	0	2336.3
			Dep	-	-	-38	44	-13	-24	-3	-14	50	10	-13	-100	
		2011	R/F	0	0	0	0	129	186.7	500.3	201	406.8	52.5	6.7	2	1485.0
			Dep	-100	-100	-100	-	-50	-27	33	-41	107	-45	-67	-81	
9	DIBRUGARH	2010	R/F	1.3	9.8	143	436.7	334.5	333.7	447.2	397.3	398	90.4	35.4	6.5	2633.9
			Dep	-96	-83	38	96	7	-20	-16	-10	21	-41	33	-67	
		2011	R/F	14.5	12.8	169	145.5	126	297.2	463.4	280.6	267.6	64.9	2.3	20	1863.7
			Dep	-53	-76	41	-37	-57	-26	-11	-31	-18	-53	-90	8	
10	N.C.HILLS	2010	R/F	0	0	36.3	195.5	104.2	195	201	241.4	178	45.8	3.1	23.3	1223.6
			Dep	-	-	-74	-17	-79	-66	-52	-33	-39	-77	-91	276	
		2011	R/F	0	8.2	54.6	62.9	215.1	75	253.4	197.6	88.6	21.1	0	0	976.5
			Dep	-100	-83	-66	-70	-30	-77	-6	-2	-53	-89	-100	-100	

Source: Directorate of Economics & Statistics, Govt. of Assam and GOI

Excess: +20% or more of Long Period Average Rainfall

Normal: Between +19% and -19% of Long Average Rainfall

Deficient: Between -20% and -59% of Long Average Rainfall

Scanty : Between -60% and -99 % of Long Average Rainfall

Table-2.9.b
District wise rainfall data of Assam during the year 2010 & 2011.

Sl. No.	District	Year	Factor	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly
NFSM Districts																
1	GOALPARA	2010	R/F	0	0	52.4	484.2	485.5	612	234.5	177.9	107.1	106.4	4.2	2.1	2266.3
			Dep	-	-	-6	155	2	3	-47	-46	-64	-29	-74	-34	
		2011	R/F	14.6	0	80.7	41.7	252.4	407.2	395.6	231.8	149.9	25.6	31.5	0	1631.0
Dep	15		-100	58	-79	-37	-28	-21	-31	-51	-84	45	-100			
2	BONGAI-GAON	2010	R/F	0	2.1	110	550.4	566.6	864.6	612.2	291	506.8	65.8	0	0	3569.7
			Dep	-100	-87	42	146	8	29	2	-21	23	-58	-100	-100	
		2011	R/F	1	10.4	119	47.6	219.2	258.2	412.6	370.6	241.1	66	35.6	0	1781.7
Dep	-90		-67	108	-74	-50	-59	-47	-24	-41	-61	-90	-100			
3	NALBARI	2010	R/F	0	0	139	516.7	393.3	602.2	281.4	186.6	240.4	45.4	3.1	2.2	2410.1
			Dep	-	-	129	203	35	55	-19	-32	23	-60	-81	-78	
		2011	R/F	11.3	16.1	136	79.4	246.8	203.6	313.1	276.9	212.6	8.8	4.7	0	1509.3
Dep	-24		-13	140	-57	-35	-63	-34	-14	-3	-92	-78	-100			
4	Barpeta	2010	R/F	0	1.7	91.3	448.3	436.1	735.2	636.7	329	575.6	40.8	1.2	0.7	3296.6
			Dep	-100	-93	67	133	22	106	45	44	123	-62	-92	-93	
		2011	R/F	2.7	8.9	141	67.2	301.1	455.7	424.3	323.4	253	6.9	17.2	0	2001.1
Dep	-74		-67	161	-62	-23	-34	-44	-39	-45	-95	-16	-100			
5	DARRANG	2010	R/F	-Data Not Available-												
			Dep	-Data Not Available-												
		2011	R/F	-Data Not Available-												
			Dep	-Data Not Available-												
6	KARBI-ANGLONG	2010	R/F	0	0	38.8	132.2	135.5	147.7	76.7	201.5	103.7	106.8	0.3	0.6	943.8
			Dep	-	-	-4	43	3	-33	-63	1	-41	-12	-99	-96	
		2011	R/F	7.6	12	43.4	41.3	55.1	260.3	207.3	144.5	49.2	23.3	0.2	0	844.2
Dep	-41		-50	-19	-61	-60	16	-13	-34	-73	-77	-99	-100			
7	LAKHIMPUR	2010	R/F	0	0	150	349	349.6	808.6	488.7	490	529.9	59.2	38.5	4.4	3267.7
			Dep	-	-	67	66	-29	27	-18	4	22	-70	25	-83	
		2011	R/F	6.6	10.5	188	132.7	299.5	439.5	940.6	403.9	389.5	15.3	4.6	6.3	2837.1
Dep	-76		-78	145	-20	-10	-17	55	-14	-8	-89	-80	-69			
8	SONITPUR	2010	R/F	0	0	127	328.8	342.6	703.4	299.2	404	220	38.7	7.3	1.1	2472.0
			Dep	-	-	143	123	18	98	-20	25	-8	-67	-70	-92	
		2011	R/F	7.3	7.2	119	82	255.9	246	398	320.1	171.4	15.9	79.9	0.2	1702.7
Dep	-62		-69	138	-43	-10	-32	4	-5	-25	-86	282	-98			
9	NOWGONG	2010	R/F	0	0	45.8	168.7	205.8	226.3	162.5	362.7	161.4	105.9	6.1	3.2	1448.4
			Dep	-	-	-15	32	1	-32	-58	6	-32	-20	-70	-66	
		2011	R/F	9.8	3.4	31.6	25.7	200.2	243.2	240	221.9	115.3	35.3	0.7	0.4	1127.5
Dep	-18		-85	-34	-80	17	-15	-26	-25	-47	-71	-97	-96			
10	TINSUKIA	2010	R/F	0	0	142	494.2	438.2	333	461.1	263.8	358.2	86.9	39.8	27.8	2644.7
			Dep	-	-	5	188	55	4	1	-37	40	-39	138	49	
		2011	R/F	34.1	14.3	161	148	214.9	273.9	329.6	224.8	330.2	35.5	3.9	9.3	1779.0
Dep	28		-76	22	-31	-21	-29	-36	-42	1	-70	-84	-51			
11	MORIGAON	2010	R/F	0	0	46.9	178.6	235.7	488.7	270.6	322.5	146.1	109.2	0.6	2.4	1801.3
			Dep	-	-	-13	40	16	46	-31	-6	-39	-18	-97	-74	
		2011	R/F	10.2	9.6	30.8	42.2	208.1	207.2	369.9	221	89.6	56.8	6.6	0	1252.0
Dep	-45		-61	-40	-64	23	-33	-1	-29	-60	-52	-67	-100			
12	KOKRAJHAR	2010	R/F	0	0	87.1	595.2	643.6	660.1	859.9	578.5	626.2	45.5	0.1	0	4096.2
			Dep	-	-100	12	167	23	-1	43	57	52	-71	-100	-100	
		2011	R/F	3	9	188	136.3	357.7	411.9	812	472.6	257.8	19	7.8	0	2675.1
Dep	-72		-68	310	-37	-22	-50	-6	-30	-44	-88	-57	-100			

Source: Directorate of Economics & Statistics, Govt. of Assam and GOI

Thus, the month wise data during last two years also clearly indicates the kind of variation of rainfall causing a great concern to the farmers & stakeholders associated with agricultural development of Assam.

2.2 Irrigation infrastructure

Agriculture in Assam is basically rainfed agriculture. The present irrigation infrastructure of the State is not up to the mark. Without adequate infrastructure, modernization of agriculture is not possible even in areas known for heavy rainfall.

Introduction of multiple cropping pattern and new HYV/Hybrid varieties are not possible without assured irrigation facilities. Therefore, irrigation has to play a significant role in the context of food security of the growing population and towards economic welfare of the farmers. As per report of the irrigation department of Assam, the ultimate Gross Irrigation Potential (annually irrigable area) area has been estimated at about 27 lakh hectares which constitutes 67.50 per cent of the gross cropped area of 39.99 lakh hectares. However, this potential is yet to be realized in true sense of the term.

In Assam, irrigation development programmes are going on under two major heads viz. Major & Medium Irrigation and Minor Irrigation depending upon the situation of the cropped field. The three departments viz., Irrigation Department, Agriculture Department and the Department of Panchayat & Rural Development of the State are associated with the development of irrigation facilities in the State. The State Irrigation Department acts as a nodal agency for all type of irrigation. The other two departments restrict to only on minor irrigation schemes viz., the Shallow Tube Wells and Low Lift Pump (LLP).

Table 2.10 reflects the irrigation status of the State owned irrigation projects/schemes in *Kharif* crop season and *Rabi & Pre Kharif* season in terms of irrigation potential utilized under the minor and major/medium irrigation schemes during 2006-07, 2007-08, 2008-09, 2009-10 and 2010-11. In addition, during 2006-07 and subsequent years, the State Department undertook various irrigation schemes under Accelerated Irrigation Benefit Programme (AIBP) funded by the Government of India. The Table also reflects more coverage of area under Minor Irrigation Scheme as compared to Major and Medium Schemes. Under Minor irrigation, Irrigation potential utilized increased from 59,363 hectares in 2006-07 to 79,261 hectares in 2010-11 with the compound growth rate of 5.96 per cent per annum while

under Major/Minor Irrigation, the area decreased from 67,093 in 2006-07 to 50,561 hectares in 2010-11 registering a compound growth rate of (-) 5.50 per cent per annum. Combining both, the area increased from 1, 26,456 hectares in 2006-07 to 1, 29,826 hectares in 2010-11 and the compound growth rate grew at the rate of 2.66 per cent per annum.

Table-2.10
Year-wise and Crop Season-wise Irrigation Potential Utilized in Assam
(in hectare)

Year	Kharif Season			Rabi & Pre-Kharif Season			Grand Total		
	Minor	Major & Medium	Total	Minor	Major & Medium	Total	Minor	Major & Medium	Total
2006-07	47269	56781	104050	12094	10312	22406	59363 (46.94)	67093 (53.06)	126456 (100)
2007-08	41795	32668	74463	10486	4322	14808	52281 (58.56)	36990 (41.44)	89271 (100)
2008-09	40775	34902	75677	10923	9071	19994	51698 (54.04)	43973 (45.96)	95671 (100)
2009-10	77495	70274	147769	11178	9907	21085	88673 (52.51)	80181 (47.49)	168854 (100)
2010-11	63649	44691	108340	15612	5874	21486	79261 (61.05)	50565 (38.95)	129826 (100)

Note: figures in parentheses indicate percentage to total
Source: Economic Survey Assam, 2010-11

It may be mentioned here that there is a wide gap between the created irrigation potential and the potential actually utilized. During 2006-07, the potential actually used was 22.85 per cent only. There are certain reasons for lower utilization of irrigation facilities. Heavy rainfall in *Kharif* season, carrying large quantity of sand particles from river water damage the crop field or the created potential fails to supply the required water as and when necessary. Iron toxicity in ground water, shortage of power, high price of fuel, loopholes in management, *etc.* are some other reasons for lower utilization of irrigation potential created.

Crop season-wise area irrigated in different districts of Assam during 2010-11 (provisional) is presented Table-2.11. Out of the gross cropped area of 41.05 lakh hectares of the State, irrigation covered about 10.83 lakh hectares in *Kharif* crops and

about 2.15 lakh hectares in *Rabi & Pre Kharif* in 2010-11. In aggregate, irrigated area stood at 12.98 lakh hectares. The highest (23.08%) irrigated area was found in Nagaon and the lowest irrigated area (.02%) was found in the district of Karimganj during the year.

Table: 2.11
Crop season-wise area irrigated in 2010-11 (provisional)
(Area in hectare)

Sl. No.	Name of District	<i>Kharif</i>	<i>Rabi & Pre Kharif</i>	Total	Percentage to total
1	Dhubri	287	368	655	0.50
2	Kokrajhar	6521	777	7298	5.62
3	Bongaigaon	140	29	169	0.13
4	Goalpara	1440	278	1718	1.32
5	Barpeta	523	543	1066	0.82
6	Nalbari	88	81	169	0.13
7	Kamrup Metro	2442	1604	4046	3.12
8	Kamrup	248	90	338	0.26
9	Darrang	5320	1052	6372	4.91
10	Sonitpur	5973	25	5998	4.62
11	Lakhimpur	670	188	858	0.66
12	Dhemaji	-	-	-	-
13	Morigaon	202	934	1136	0.88
14	Nagaon	24812	5150	29962	23.08
15	Golaghat	55	81	136	0.10
16	Jorhat	-	35	35	0.03
17	Sivsagar	35	-	35	0.03
18	Dibrugarh	-	-	-	-
19	Tinsukia	528	15	543	0.42
20	KarbiAnglong	18185	5163	23348	17.98
21	DimaHasao	4056	-	4056	3.12
22	Karimganj	-	23	23	0.02
23	Hailakandi	530	-	530	0.41
24	Cachar	1075	2181	3256	2.51
25	Chirang	5511	856	6367	4.90
26	Baksa	12079	603	12682	9.77
27	Udalguri	17620	1410	19030	14.66
Total		108340	21486	129826	100.00

Source: Economic Survey Assam, 2011-12 (Chief Engineer, Irrigation Department, Assam)

2.3 Cropping Pattern

The type of soil, the type of agro-climatic condition, the extent of rainfall, the irrigation status, the social back ground, the economic factors of the farmers and the economic return or monetary gain per unit of area basically determine the cropping pattern of a region or a State. Also, agricultural economic policies of each of the Five Year Plans do have significant bearing on changing cropping pattern of a State. As Assam is situated in heavy rainfall zone, it follows a rice-based cropping system which is adopted in the entire Eastern part of the India. To ensure good yield, it needs supplemented irrigation if there is any shortfall of rain in the growing season of the crops. Reports say that, if crop has to depend solely on rainfall, it requires not less than 30 cm per month of rains over the entire growing period.

The crop season of the State is basically divided into two main seasons- *Kharif* from April to September and *Rabi* from October to March. Some of the crops are grown in particular season while some other crops are also grown in both the seasons, depending upon the seed varieties and its suitability depending on climatic conditions. The main cereal crops of *Kharif* season of Assam includes Rice Normal *Ahu* (Direct seeded), Rice Normal *Ahu* (Transplanted), *Sali* Rice, *Bao* Rice and Maize. *Kharif* pulses include Black gram, Green gram and *Arhar*. Sesamum, Groundnut, *etc.* are the oil seed crops of *Kharif* seasons. The fiber crops include jute, mesta, cotton and ramie. Both cotton and ramie cover a significant area. *Boro* rice (Suumer paddy), early *Ahu* (direct seeded/transplanted), wheat, *Rabi* maize, *etc.*, are the cereals grown in the State during *rabi* season. Summer black gram/green gram, lentil, pea, grass pea (*Khesari*), *etc.*, are the pulses; rapeseed-mustard, linseed, niger, *rabi* ground nut *etc.*, are the oilseeds and potato is grown as tuber crops. In addition, different types of vegetables and spice crops (ginger and turmeric) are grown in the both the *Kharif* and *Rabi* seasons as well. The area under *Kharif* and *Rabi* vegetables are also on the rise as reflected in the statistics available with the Economic Survey of Assam, 2011-12.

Among the cereal crops, particularly rice dominates the cropping pattern scenario of the State. It is the principal crop for the people of Assam. Rice is cultivated in the State in three broad Seasons- Autumn, Winter and Summer. Autumn rice is commonly known as ‘*Ahu*’, winter rice as ‘*Sali*’ and summer rice as “*Boro*” .

Winter rice occupied the highest proportion of area and followed by summer and autumn rice. Table-2.12 reveals the changes in cropping pattern in terms of percentage of cropped area to gross cropped area of the state. The area under autumn rice has declined from 11.54 per cent in 2005-06 to 8.42 per cent in 2010-11. Farmers are usually reluctant to go for this crop as pre-harvest loss is more as first shower of monsoon comes at the time of harvesting and immediately after harvesting they are to go for winter rice (*Sali* paddy). Moreover, yield rate of autumn rice is lower than that of the summer paddy. Therefore, the farmers have a tendency to switch over to

Table-2.12
Cropping Pattern and its Changes over the Period
from 2004-05 to 2010-11 in Assam

(Figures are percentage to total cropped area)

Sl. No.	Crop	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1	Autumn Rice	11.54	11.55	10.36	9.90	9.51	8.42
2	Winter Rice	49.51	45.67	48.20	50.03	49.19	49.99
3	Summer Rice	9.14	9.51	9.45	10.16	10.83	10.73
4	Total Rice	70.19	66.74	68.01	70.09	69.54	69.13
5	Wheat	1.45	1.83	1.64	1.41	1.65	1.21
6	Maize	0.55	0.58	0.53	0.48	0.52	0.54
7	Other Cereals & Small Millets	0.23	0.21	0.20	0.14	0.16	0.13
8	Arahar	0.17	0.21	0.18	0.14	0.16	0.19
9	Blackgram	1.02	1.13	1.11	1.13	1.18	1.32
10	Greengram	0.23	0.21	0.23	0.17	0.22	0.24
11	Peas	0.52	0.58	0.64	0.59	0.60	0.59
12	Lentil	0.55	0.61	0.64	0.62	0.63	0.65
13	Gram	0.06	0.06	0.06	0.06	0.05	0.05
14	Other Pulses	0.55	0.67	0.56	0.62	0.47	0.35
15	Total Pulses	3.10	3.48	3.42	3.33	3.27	3.39
16	Total Food grains	75.52	72.87	73.81	74.55	74.21	74.37
17	Rape & Mustard	6.15	7.26	6.88	6.38	6.85	6.56
18	Niger	0.20	0.30	0.26	0.20	0.22	0.22
19	Castor	0.03	0.03	0.03	0.03	0.03	0.03
20	Linseed	0.23	0.24	0.23	0.20	5.87	5.96
21	Sesamum	0.41	0.40	0.38	0.34	0.33	0.32
22	Total Oilseeds	7.19	8.41	8.11	7.53	7.59	7.31
23	Jute	1.65	1.77	1.76	1.69	1.79	1.67
24	Mesta	0.15	0.15	0.15	0.14	0.14	0.13
25	Sugarcane	0.67	0.82	0.76	0.82	0.74	0.81
26	Fruits	3.28	3.48	3.39	3.44	3.49	3.55
27	Tubers	2.32	2.68	2.49	2.45	2.56	2.55
28	Vegetables	6.73	7.20	6.97	6.83	6.90	6.99
29	Spices	2.49	2.62	2.58	2.54	2.58	2.61
30	P.C. to total	100.00	100.00	100.00	100.00	100.00	100.00
31	All crops area (In lakh)	34.48	32.80	34.17	35.44	36.37	37.19

Source: Directorate of Agriculture, Government of Assam.

Summer paddy. Winter paddy cultivation is an age-old practice of all the farmers of the state. It has a major share in the food dish of most of the people of Assam. Although no significant improvement in area has been observed during the period

under observation, yet it dominates the cropping pattern of the state. The area under this crop increased marginally from 49.51 per cent in 2005-06 to 49.99 per cent in 2010-11. Summer rice has shown a sizeable increase in the area from 9.14 per cent to 10.73 per cent during the same period. It is basically due to creation of minor irrigation facility through STW and LLP. Farmers are also benefited for its higher yield rate by applying modern package of practices. Recently, farmers have started raising their voice that the price offered by the private traders is not at all sufficient and cost effective. In this regard, State's intervention is not sufficient enough to safeguard the interest of the farmers. If it is not tackled properly, farmers may withdraw themselves from farm activities in course of time. As a consequence, the state may fall in the grip of shortage of food grain production in the near future.

In total rice, there was no significant improvement in area under operation. It varied in between 70.19 percent and 69.13 per cent during the period under observation. The area under wheat showed a decreasing trend from 1.45 per cent in 2005-06 to 1.21 per cent in 2010-11 while the area under maize remained almost static during the period and so was observed in case of pulses area. In case of total oilseeds, the area also increased marginally from 7.19 per cent in 2005-06 to 7.31 per cent in 2010-11. The area under jute remained almost static with a little bit of variation in between 1.77 per cent and 1.65 per cent and so was happened with mesta as well. Sugarcane is also an important *Kharif* crop (cash crop) of the State but its area is decreasing over the years due to diversion of sugarcane area to small tea gardens in the state. With the growing nos. of small sugarcane juice vendors in nearby city/ town, farmers started getting remunerative prices for each stick and simultaneously the high prices of molasses, which in turn, encourage the farmers to go for sugarcane cultivation. The area under sugarcane is reported to be increased marginally from 0.67 per cent in 2005-06 to 0.81 per cent in 2010-11.

As Assam is situated in sub-tropical region, a good number of horticultural crops such as banana, coconut, areca nut, pineapple, orange, papaya, Assam lemon, jack fruits, etc., are grown in the state. But the area under these crops are scattered & are attached with the homestead areas of almost all the households. In a few districts, orange, pineapple, areca nut with betalvine and black peepers are grown in garden yards. All these fruit crops have distinct taste and flavour when compared with

other states of the country. The area under fruits increased marginally from 3.28 per cent in 2005-06 to 3.55 per cent in 2010-11. Ongoing Central Sector Scheme, the Horticultural Mission might have an impact on it. Tuber crops include potato, sweet potato, tapioca, etc. The state is not self-sufficient in potato production. The state has to depend on outside supplies. The area under tuber crops increased marginally from 2.32 in 2004-05 to 2.55 in 2010-11. Market and availability of quality seeds are the two major factors for increase in area in the reference year. The farmers of the state cannot go for bumper harvesting as the cold storage facilities are still insufficient in the state to minimize the losses. Similarly, varieties of *Kharif* as well as *Rabi* vegetables are grown in the entire state. The state is self-sufficient in production of vegetables. It occupied a significant area and showed marginal increase from 6.73 per cent in 2005-06 to 6.99 per cent in 2010-11. Only a limited number of farmers have the familiarity to produce off season vegetables to fetch higher price. In Assam, spice crops mainly include turmeric, ginger, onion, garlic, corrigendum, black peepers, chilly, etc. Although, there is a good scope to become self-sufficient in spice production, the state yet depends on outside supply for most of the spice crops. The area under spice crops increased from 2.49 per cent in 2005-06 to 2.61 per cent in 2010-11. It might be due to ongoing schemes under Horticulture Mission, a Central Sector Scheme.

From the analysis of cropping pattern, it may be concluded that there were no significant changes in cropping pattern in the state during the period of study. Most of the time, seed was considered to be a major constraint. Existing irrigation facilities have not been utilized fully by the farmers due to some technical loopholes in the irrigation system. Rising input cost in one hand and lower productivity on the other hand, have resulted in continuous decline in profit per units. Poor mechanization of agricultural activities & inefficient market network also dampened the spirit of the farmers in accepting/trying new crops. Higher production at a low cost is the solution of the problem by increasing the productivity per unit of land in consideration of the limitation of arable land in the state. Together with this, gross cropped area can be increased by double or multiple cropping practices.

Chapter - III

Evaluation of Implementation Process

3.1 Evaluation of Technical Backstopping

All the beneficiaries accessed technical backstopping from the resourceful persons engaged under BGREI programme. Table-3.1 indicates the access of participating farmers to technical backstopping for different operations under the demos undertaken across the sub ecological regions. In five sample districts, the field observations were made in two sets of demos, *e.g.*, one for HYV *Sali* paddy and another for pulses (green gram & black gram) in 2010-11 and one set of demo for summer paddy (HYV & Hybrid) in 2011-12. The table reflects the aggregate sample picture of technical backstopping of all the demos during 2010-11 and 2011-12. In each demo of 100 hectares, there was one progressive farmer to guide the beneficiary farmers in different activities from land preparation to plant protection. Similarly, identified extension functionaries, such as DAO/ADO/ SAU Scientist/ Scientist entrusted by CRRI/Scientist entrusted by ICAR / scientist of KVK supervised all the technical backstopping in each demo. Performance index has been worked out on the level of satisfaction of the farmers at different stages of operations. In all the sub ecological regions, the farmers accessed technical backstopping in land preparation, sowing/planting and in the use of micronutrient only. In this regard, significant role was played by the progressive farmers and the identified extension personnels. The performance of KVK personnels was insignificant and that too, found in two districts only *viz.*, Udalguri and Karimganj district. Performance indices were found almost at middle order across the sub regions. In totality, 72 per cent of the farmers (50), accessed technical advice from progressive farmers with performance index at 1.33 and from extension personnels with performance index at 1.44 in land preparation. Only 8 per cent of the farmers received technical guidance from KVK scientists with performance index at 1.50 in land preparation. In sowing/planting, 42 per cent of the farmers accessed information from the progressive farmers with performance index at 1.48 and 30 per cent of the farmers accessed it from the identified extension workers with performance index at 1.33 and only 4 per cent farmers got benefitted by the services of KVK scientists with performance index 1.00. In the use of micronutrient,

44 per cent, 32 per cent and 8 percent of the farmers accessed technical backstopping from the progressive farmers, extension personnels and KVK-scientists with performance indices at 1.50, 1.44 and 1.75, respectively.

Table 3.1
Access of the participating farmers to technical backstopping

Technical backstopping	Farmers Reporting			Performance Index		
	Coordinated by progressive farmers	Supervised by identified extension worker	Monitored by KVK	Progressive farmer	Identified extension worker	KVK
Rainfed Upland: District: : Kamrup						
Land preparation	8 (80)	10(100.)	0	1.38	1.40	0
Sowing/planting	2(20)	2(20)	0	1.50	1.00	0
Direct seeding	0	0	0	0	0	0
Seed treatment	0	0	0	0	0	0
Micro nutrient	4 (40)	3 (30)	0	1.50	1.67	0
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0	0	0
Rainfed Shallow Low Land: District Udalguri						
Land preparation	7(70)	8(80)	2(20)	1.14	1.13	1.50
Sowing/planting	6	4	0	1.33	1.50	0
Direct seeding	0	0	0	0	0	0
Seed treatment	0	0	0	0	0	0
Micro nutrient	6(60)	4(40)	1(10)	1.67	1.25	2.00
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0	0	0
Rainfed Medium: District: Golaghat						
Land preparation	6(60)	6(60)	0	1.33	1.67	0
Sowing/planting	3(30)	2	0	1.33	1.00	0
Direct seeding	0	0	0	0	0	0
Seed treatment	0	0	0	0.	0	0
Micro nutrient	3(30)	1(10)	0	1.00	2.00	0
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0.	0	0
Rainfed Deep Water: District: Karimganj						
Land preparation	8(80)	6(60)	2(20)	1.38	1.50	1.50
Sowing/planting	6(60)	4(40)	2(20)	1.67	1.50	1.00
Direct seeding	0	0	0	0	0	0
Seed treatment	0	0	0	0	0	0
Micro nutrient	4(40)	5(50)	3(30)	1.75	1.40	1.67
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0	0	0
Irrigated: District: Jorhat						
Land preparation	7	6	0	1.43	1.67	0
Sowing/planting	4	3	0	1.50	1.33	0
Direct seeding	0	0	0	0	0	0
Seed treatment	0	0	0	0	0	0
Micro nutrient	5	3	0	1.40	1.33	0
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0	0	0
State: Assam						
Land preparation	36((72)	36(72)	4(8)	1.33	1.44	1.50
Sowing/planting	21(42)	15(30)	2(4)	1.48	1.33	1.00
Direct seeding	0	0	0	0	0.	0
Seed treatment	0	0	0	0	0	0
Micro nutrient	22(44)	16(32)	4	1.50	1.44	1.75
Weed management	0	0	0	0	0	0
Plant protection	0	0	0	0.	0	0

Note : Figures within brackets indicates percentage. Index varies between 1-3
Performance index(Good-1,Satisfactory-2, Poor-3)

3.2 Crop Specific Structured Plan

In 2010-11, Rice demos (HYV Paddy) were undertaken in 13 BGREI districts (covering 9,410.3 hectares), Hybrid Maize demo in 11 districts (covering 4,867 hectares) and scientific cultivation of pulses was undertaken covering an area of 6,200 hectares and 12,582.87 hectares under Black Gram and Green Gram, respectively. In 2011-12, there were 156 demos of Summer Rice (HYV/Hybrid) across the five different sub ecological regions (covering 31,200 hectares) in 12 BGREI districts.

Table-3.2 reveals the changes in cropping pattern in 2011-12 over 2010-11 against the sample beneficiaries and non beneficiaries across different sub ecological regions of the sample districts. The area under *Kharif* paddy increased by 15.12 per cent for beneficiaries and there was no any change in case of non-beneficiaries in rain fed upland region of Kamrup district; it was found to decrease by 4.88 per cent for beneficiaries and increase by 1.85 per cent for non-beneficiaries in Rain Fed Shallow Low Land in Udalguri district. Further, it was found to increase by 1.80 per cent for beneficiaries and 1.17 per cent for non-beneficiaries, respectively in Rain Fed Medium Land in Golaghat district; it was decreased by 0.48 per cent for beneficiaries and there was an insignificant increase of 0.17 per cent for non-beneficiaries in Rain Fed Deep Water region in Karimganj district. The area was found to increase by 10.55 per cent in case of beneficiaries and decrease by 0.69 per cent in case of non beneficiaries in irrigated region in Jorhat district. For state as a whole, the area under *Kharif* paddy decreased from 94.59 hectares in 2010-11 to 94.34 hectares in 2011-12 registering a decrease of 0.26 per cent during the reference year in case of beneficiaries and in case non-beneficiaries, it increased from 40.47 hectares in 2010-11 to 41.02 hectares in 2011-12 with an increase of 0.58 per cent.

In case of *Kharif* vegetables, the area decreased by 16.67 per cent in Kamrup district, 14.88 per cent in Udalguri district, 18.79 per cent in Golaghat district, 6.45 per cent in Karimganj district, and 5.38 per cent in Jorhat for beneficiaries and in case of non-beneficiaries, it increased by 11.11 per cent in Kamrup district, 41.49 per cent in Golaghat, 4.27 per cent in Jorhat, while it was decreased by 19.35 per cent in Kiarimganj district. For the state as whole, area under *Kharif* vegetables decreased by 35.37 per cent for beneficiaries while it increased by 38.68 per cent for non-beneficiaries.

Table 3.2
Changes in Cropping Pattern of the Sample Farmers

Seasons/Crops	Area under crops (in hectare)				Extent of change	
	Beneficiary		Non-beneficiary		Beneficiary	Non-beneficiary
	2010-11	2011-12	2010-11	2011-12	2011-12	2011-12
Rainfed Upland: District: Kamrup						
Kharif						
Paddy	11.18	12.87	3.51	3.51	1.69 (15.12)	0.00 (0.00)
Vegetables	0.54	0.45	0.13	0.18	-0.09 (-16.67)	0.05 (11.11)
Rabi						
Pulses (Black/Greengram)	2.60	3.77	0.78	0.78	1.17 (45.00)	0.00 (0.00)
Vegetables	0.83	0.45	0.33	0.35	-0.38 (-45.78)	0.25 (55.56)
Summer						
Paddy	2.45	3.25	0.4	0.4	0.80 (32.65)	0.00 (0.00)
Rainfed Shallow Low Land: District: Udalguri						
Kharif						
Paddy	19.28	18.34	7.09	7.43	-0.94 (-4.88)	0.34 (1.85)
Vegetables	2.15	1.83			-0.32 (-14.88)	0.00 (0.00)
Rabi						
Pulses (Blackgram)	1.36	2.40	0.33	0.46	1.04 (76.47)	0.13 (5.42)
Vegetables	3.96	3.89	1.67	1.71	-0.07 (-13.00)	0.04 (1.03)
Summer						
Paddy	3.14	7.70	1.20	1.54	4.56 (145.22)	0.34 (4.42)
Rainfed Medium: District: Golaghat						
Kharif						
Paddy	26.04	26.51	7.76	8.07	0.47 (1.80)	0.31 (1.17)
Vegetables	2.77	2.41	1.01	2.01	-0.36 (-18.79)	1.00 (41.49)
Rabi						
Pulses (Black/Greengram)	3.46	2.81	0.85	0.89	-0.65 (-28.43)	0.04 (1.42)
Vegetables	3.62	7.68	3.37	2.15	4.06 (112.15)	-1.22 (-15.89)
Sugercane	2.99	2.14	4.02	1.74	-0.85 (-16.00)	-2.28 (-106.54)
Summer						
Paddy	10.00	8.40	0.80	0.80	-1.60(-15.66)	0.00 (0.00)
Rainfed Deep Water: District: Karimganj						
Kharif						
Paddy	20.94	17.66	11.47	11.5	-3.28 (-0.48)	0.03 (0.17)
Vegetables	0.62	0.58	0.31	0.25	0.04 (-6.45)	0.06 (-19.35)
Rabi						
Pulses (Blackgram)	3.19	4.00	1.68	1.60	0.81 (25.39)	-0.08 (-2.00)
Vegetables	8.37	8.33	2.01	3.34	-0.04 (-0.48)	1.33 (15.97)
Summer						
Paddy	3.1	2.58	2.56	1.98	-0.52 (-16.77)	-0.58 (-22.48)
Irrigated: District: Jorhat						
Kharif						
Paddy	17.15	18.96	10.64	10.51	1.81 (10.55)	-0.13 (-0.69)
Vegetables	2.23	2.11	0.75	0.84	-0.12 (-5.38)	0.09 (4.27)
Rabi						
Pulses (Blackgram)	2.00	4.00	0.40	1.54	2.00 (100.00)	1.14 (28.50)
Vegetables	4.55	3.00	2.67	0.93	-1.55 (-34.07)	-1.74 (-0.58)
Summer						
Paddy	2.54	7.10	1.20	1.87	4.56 (179.53)	0.67 (9.44)
State: Assam						
Kharif						
Paddy	94.59	94.34	40.47	41.02	-0.25 (-0.26)	0.55 (0.58)
Vegetables	7.69	5.55	3.18	4.41	-2.72 (-35.37)	1.23(38.68)
Rabi						
Pulses (Black/Greengram)	12.61	16.98	4.04	5.27	4.37 (34.66)	1.23 (7.24)
Vegetables	21.33	23.35	10.05	8.48	2.02 (9.47)	-1.57 (-6.72)
Sugercane	2.99	2.14	4.02	1.74	-0.85 (-28.43)	-2.28 (-106.54)
Summer						
Paddy	21.23	29.03	6.16	6.59	7.8 (36.74)	0.43 (1.48)

Note: Figures with in brackets indicate percentages

Source: Field Survey Data

In case of beneficiaries, the area under pulses (green gram/ black gram) was found to increase by 45 per cent Kamrup district, 76.47 per cent in Udalguri district, 25.39 per cent in Karimganj district, 100 per cent in Jorhat district and the area was decreased by 28.43 per cent in Golaghat district. In case of non-beneficiaries, the area under pulses (green gram/black gram) was found to increase by 5.42 per cent in Udalguri district, 1.42 per cent Golaghat district, 28.50 per cent in Jorhat district and it was found to decrease by 2.00 per cent in Karimganj district. For state as whole, it was found to increase by 34.66 per cent in case of beneficiaries and 7.24 per cent in case of non-beneficiaries.

In case of beneficiaries, the area under *Rabi* vegetables, was increased by 112.15 per cent in Golaghat district only and it was decreased in the rest of the districts.

In case of beneficiaries, the area under summer paddy was found to increase by 32.65 per cent in Kamrup, 145.22 per cent in Udalguri, 179.53 in Jorhat district while it was decreased by 15.66 per cent in Golaghat, 16.77 per cent in Karimganj while in case of non beneficiaries, the area remained the same in Kamrup and Golaghat district and it increased by 4.42 per cent in Udalguri, 9.44 in Jorhat and it was decreased by 22.48 per cent in Karimganj district. For state total, the area under summer paddy was increased by 36.74 per cent and 1.48 per cent in case of beneficiaries and non-beneficiaries, respectively.

The reasons of decrease in area under different crops could be attributed to the low price of produces, non-availability of quality seeds on time, high cost of labour and other inputs. It has been observed that when there is a programme under the agricultural department either at central or state level, the area under the specific crops increases. From experience it is observed that, the farmers of Assam are not in a position to continue any programme or activity, once a Govt. programme comes to an end. Obviously, there is a need to review the situation and find out the reasons behind. In this regard, farmers opined that their earning is very limited and they cannot take much risk to spend more. Moreover, there is a constant fear for floods and draught like situation among the farmers of Assam, which prevent them to increase the area under any crops in *Kharif* or *Rabi* season.

Table -3.3 shows the extent of change of cropping intensity across the sub ecological regions of the 5 sample districts for beneficiaries and non-beneficiaries

during 2010-11 and 2011-12. The highest cropping intensity of 155.03 per cent and 146.72 per cent were found in Udalguri and Kamrup district for beneficiaries and non-beneficiaries, respectively in 2010-11 and the highest cropping intensity of 156.28 per cent and 149.93 were found in respect of beneficiaries and non-beneficiaries, respectively in Udalguri district during 2011-12. For state as a whole, the cropping intensity stood at 146.17 per cent for beneficiaries and 140.94 for non beneficiaries in 2010-11 and it stood at 149.22 per cent and 150.15 per cent for beneficiaries and non beneficiaries, respectively in 2011-12. The highest (2.95 %)

Table 3.3
Extent of Change in Cropping Intensity

Type of farmers	Cropping Intensity		Extent of change	Remarks
	2010-11	2011-12		
Rainfed Upland: District: Kamrup				
Beneficiary	147.42	151.54	4.12 (2.79)	Significant increase
Non-beneficiary	146.72	148.72	2.00 (1.36)	Marginal increase
Rainfed Shallow Low Land: District: Udalguri				
Beneficiary	155.03	156.28	1.25 (0.81)	Marginal increase
Non-beneficiary	145.13	149.93	4.80 (3.31)	Significant increase
Rainfed Medium: District: Golaghat				
Beneficiary	138.38	141.35	2.97 (2.15)	Significant increase
Non-beneficiary	131.19	139.63	6.43 (3.68)	Significant increase
Rainfed Deep Water: District: Karimganj				
Beneficiary	150.01	154.43	4.42 (2.95)	Significant increase
Non-beneficiary	144.49	148.17	3.68(2.55)	Significant increase
Irrigated: District: Jorhat				
Beneficiary	140.01	142.5	2.49 (1.78)	Significant increase
Non-beneficiary	137.18	139.29	2.11 (1.54)	Significant increase
State: Assam				
Beneficiary	146.17	149.22	3.05 (2.09)	Significant increase
Non-beneficiary	140.94	145.15	4.21 (2.99)	Significant increase

Note : Figures within brackets indicates percentage.'

Source: Field Survey Data

cropping intensity increase was found in Karimganj and the lowest (0.81%) in Udalguri district in respect of beneficiaries. For non-beneficiaries, the highest increase in cropping intensity (3.68%) was found in Golaghat district and the lowest increase of 1.36 per cent in Kamrup district. The state average cropping intensity increased by 2.09 per cent for beneficiaries and 2.99 per cent for non-beneficiaries in 2011-12 over 2010-11. It might be due to existence of better irrigation facilities among the

non-beneficiaries as compared to beneficiaries. The cropping intensity of beneficiary and non-beneficiary farmers increased due to increase in area under summer paddy, pulse and *Rabi* vegetables (Table-3.3).

Table 3.4 shows a comparative picture on the extent of yield gap of *Kharif* paddy, summer paddy and pulses between estimated yield of the State average (quinquennial) and actual yield of beneficiary farmers and non-beneficiary farmers in 2010-11 and 2011-12 across the sub ecological regions. There existed significant yield gap over the State average in case of beneficiaries and non beneficiaries as well. All the 3 crops under the BGREI programme had shown higher yield rate in the reference years. In 2010-11, Kamrup district with 34.26 quintal yield per hectare in terms of paddy, showed the best performance in *Kharif* paddy for beneficiary farmers registering an increase of 49.48 per cent over the State average and the lowest was recorded in Jorhat district with 28.69 quintal per hectare with the increase of 25.17 per cent over the State average. In overall, the average yield with 31.25 quintal per hectare of *Kharif* paddy for beneficiary farmers had shown an increase of 36.34 per cent over the State average in 2010-11. In case of non-beneficiary farmers, the highest performance with 35.86 quintal per hectare was shown by Kamrup district with highly significant increase of 56.46 per cent over the State average and Jorhat district with 25.51 quintal per hectare had shown the lowest increase in yield of *Kharif* paddy with 11.30 per cent in the reference year.

In 2011-12, Kamrup district maintained the best performance in the yield of *Kharif* paddy with 39.56 quintal per hectare for beneficiary farmers with an increase of 63.07 percent over the State average and lowest was found in Jorhat district with 34.25 quintal per hectare with an increase of 41.18 per cent over the State average. The average yield of *Kharif* paddy for beneficiary farmers was increased by 48.56 per cent over the State average. In case of the non-beneficiary farmers, the highest performance was recorded in Jorhat district with 32.56 quintal per hectare with an increase of 34.21 per cent over the State average and the lowest increase in yield of *Kharif* paddy with 15.42 per cent was shown by the Golaghat district with 28.00 quintal per hectare during 2011-12.

Fig -1 and II visualize a comparative picture on the extent of yield gap between the potential and estimated actual yield of *Kharif* paddy, summer paddy and pulses (aggregate yield of 5 ecological groups) during 2010-11 and 2011-12.

There existed a significant gap between the actual and potential yield rate against each of the crops under demonstration. In 2010-11, the yield gap in *Kharif* paddy was found at 77.60 per cent in 2010-11 and 53.99 per cent in 2011-12. The yield gap in summer paddy was found at 51.30 per cent in 2010-11 and 26.55 per cent in 2011-12 and in pulses, the gap was 79.69 per cent in 2010-11 and 66.67 per cent in 2011-12.

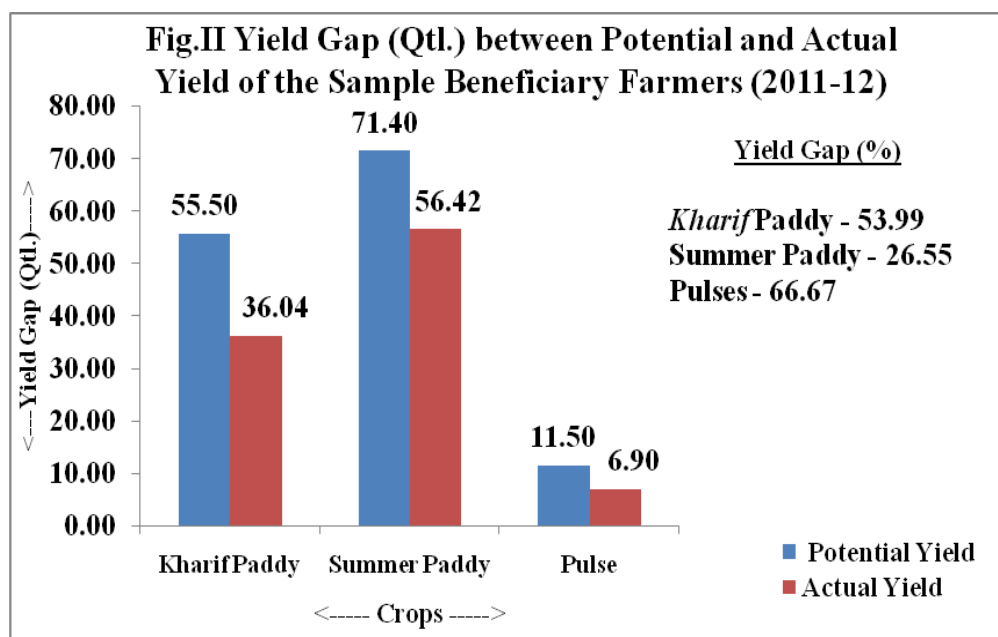
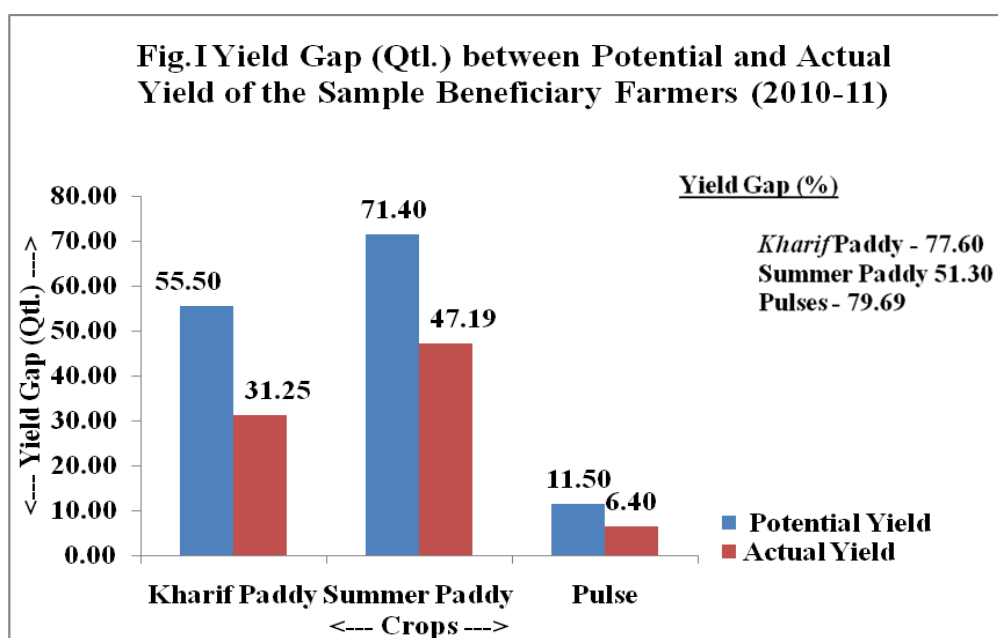


Table 3.4
Extent of Yield gap of Paddy and Pulse between the State
average (QE) and sample average
yield in quintal (paddy terms)

Crop	Estimated yield (Quinquennial)		Beneficiary				Non-beneficiary			
	(2005-06 to 2009-10) QE:2010-11	(2006-07 to 2010-11) QE:2011-12	Actual yield		Yield gap over state		Actual yield		Yield gap over state	
			2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
Rainfed Upland: Kamrup										
Kharif Paddy	22.92	24.26	34.26	39.56	11.34 (49.48)	15.3 (63.07)	35.86	28.14	12.94 (56.46)	3.88 (15.99)
Summer Paddy	30.92	33.3	49.26	52.33	18.34 (59.31)	19.03 (57.15)	38.56	41.53	7.64 (24.71)	8.23 (24.71)
Pulse	5.41	5.44	6.56	7.21	1.15 (21.26)	1.77 (32.54)	0	7.18	0 (0.00)	1.74 (31.99)
Rainfed Shallow Low Land: District: Udalguri										
Kharif Paddy	22.92	24.26	32.56	36.58	9.64 (42.06)	12.32 (50.78)	28.46	28.05	5.54 (24.17)	3.79 (15.62)
Summer Paddy	30.92	33.3	46.89	54.32	15.97 (51.65)	21.02 (63.12)	27.19	42.94	(-)3.73(12.06)	9.64 (28.95)
Pulse	5.41	5.44	5.56	5.99	0.15 (2.77)	0.55 (10.11)	5.49	7.98	0.08 (1.48)	2.54 (46.69)
Rainfed Medium: District: Golaghat										
Kharif Paddy	22.92	24.26	31.88	34.95	8.96 (39.09)	10.69 (44.06)	28.7	28	5.78 (25.22)	3.74 (15.42)
Summer Paddy	30.92	33.3	44.32	58.5	13.40 (43.34)	25.2 (75.67)	29.14	44.65	(-)1.78 (-5.76)	11.35 (34.08)
Pulse	5.41	5.44	6.56	6.98	1.15 (21.26)	1.54 (28.31)	5.78	8.05	0.37 (6.84)	2.61 (47.98)
Rainfed Deep Water: District: Karimgang										
Kharif Paddy	22.92	24.26	28.88	34.86	5.96 (26.00)	10.6(43.69)	26.72	28.95	3.80 (16.58)	4.69 (19.33)
Summer Paddy	30.92	33.3	49.68	59.21	18.76 (60.67)	25.91 (77.81)	27.36	46.56	(-)3.56 (-11.51)	13.26 (39.82)
Pulse	5.41	5.44	6.26	7.09	0.85 (15.71)	1.65 (30.33)	5.12	7.95	(-)0.29 (-5.36)	2.51 (46.14)
Irrigated: District: Jorhat										
Kharif Paddy	22.92	24.26	28.69	34.25	5.77 (25.17)	9.99 (41.18)	25.51	32.56	2.59 (11.30)	8.3 (34.21)
Summer Paddy	30.92	33.3	45.81	57.75	14.89 (48.16)	24.45 (73.42)	29.25	46.07	(-)1.67 (-5.40)	12.77 (38.35)
Pulse	5.41	5.44	7.08	7.25	1.67 (30.87)	1.81 (33.27)	7.64	6.98	2.23 (41.22)	1.54 (28.31)
State: Assam										
Kharif Paddy	22.92	24.26	31.25	36.04	8.33 (36.34)	11.78 (48.56)	29.05	29.14	6.13 (26.75)	4.88 (20.12)
Summer Paddy	30.92	33.3	47.19	56.42	16.90 (52.62)	23.12 (69.43)	30.3	44.35	(-)0.62 (-2.01)	11.05 (33.18)
Pulse	5.41	5.44	6.4	6.9	0.99 (18.30)	1.46 (26.84)	6.16	7.63	0.75 (13.86)	2.19 (40.26)

Note : Figures within in brackets indicate percentages.

Sources: 1. Basic Agricultural Statistics, Govt. of Assam,, Directorate of Economics and Statistics.

2. Field Survey Data

In 2010-11, Karimganj district with 49.68 quintal per hectare showed the best performance in the yield of summer paddy for beneficiary farmers with significant increase of 60.67 per cent over the State average and the lowest was found in Golaghat district with 44.32 quintal per hectare with an increase of 43.34 per cent over the state average. In overall, the average yield of summer paddy for beneficiary farmers was increased by 52.62 per cent over the State average, in 2010-11. In case

non-beneficiary farmers, the highest performance was shown by Kamrup district with 38.56 quintal per hectare with an increase of 24.71 per cent over the state average and the yield of summer paddy was found to decrease by (-) 12.06 per cent over the state average in Udalguri district with 27.19 quintal per hectare in the reference year. In overall, it was found to decrease over the state average by (-) 5.40 per cent in 2010-11.

In 2011-12, Karimganj district with 59.21 quintal per hectare showed the best performance in the yield of summer paddy for beneficiary farmers with an increase of 77.81 percent over the State average and the lowest was found in Kamrup district with 52.33 quintal per hectare with an increase of 57.15 per cent over the state average. In overall, the average yield of summer paddy for beneficiary farmers was increased by 69.43 per cent over the state average,. In case of non-beneficiary farmers, Karimganj and Kamrup districts showed the highest and the lowest performance with increase of 39.82 and 24,72 per cent respectively. In overall it was increased by 38.35 per cent over the state average of yield in 2011-12.

In 2010-11, Jorhat district with 7.08 quintal per hectare showed the best performance in the yield of pulse for beneficiary farmers with an increase of 30.87 per cent over the State average and the lowest was found in Udalguri district with 5.56 quintal per hectare with an increase of 2.77 per cent over the state average. In overall, the average yield of pulse for beneficiary farmers was increased by 18.30 per cent over the State average, in 2010-11. In case of non-beneficiary farmers, the highest performance was shown by the district of Jorhat with 7.64 quintal per hectare with an increase of 41.22 per cent over the state average while the yield of pulses was found to decrease by (-) 5.36 per cent in case of Karimganj district over the state average in the year. In overall, it was found to increase by 13.86 per cent over the state average in 2010-11.

In 2011-12, the district Jorhat with 7.25 quintal per hectare, showed the best performance in the yield of pulse for beneficiary farmers registering an increase of 33.27 percent over the State average and the lowest was found in Udalguri district with 5,99 quintal per hectare with an increase of 10.11 per cent over the state average In overall, the average yield of pulse for beneficiary farmers was increased by 26.84 per cent over the State average in 2011-12. In case of non-beneficiary farmers, Golaghat district with 8.05 quintal per hectare showed the highest performance with an increase of 47.98 per cent over the state average and the lowest increase with 28.31 per cent was found in Jorhat district with 6.98 quintal per

hectare. In overall, it was increased by 40.26 per cent over the state average yield in 2011-12.

Thus, almost all the three crops under study showed significant increase in yield as compared to that of State average. One of the reasons might be due to the interventions of BGREI programmes. Distinct variations were also observed between beneficiary and non beneficiary farmers. Variation in yield across the sub ecological regions might have occurred due to the prevailing weather condition of the districts. Although, Jorhat district falls under irrigated sub ecological region, its performance was not found satisfactory as compared to other sub ecological region except in pulses.

Also, there exists a significant gap between the potential and the actual yield of crops under consideration. This is a major issue before the State to be redressed on priority basis. The productivity of crops must be enhanced if the farmers are to survive in the cut throat competition all around.

Table-3.5

A comparative analysis between two quinquennial mean (QE) estimate of Area, Production and Yield of winter rice in BGREI districts of Assam.

Area in hectare, Production in tonnes, Yield in kg/ha

BGREI District	Area 2005-06 to 2009-10 QE:2010-11	Area 2006-07to 2010-11 QE:2011-12	Production 2005-06 to 2009-10 QE:2010-11	Production 2006-07to 2010-11 QE:2011-12	Yield 2005-06 to 2009-10 QE:2010-11	Yield 2006-07to 2010-11 QE:2011-12	Increase (+) / Decrease (-) of yield (%)
Cachar	88,763	88,506	160,567	132,563	1,785	1,810	1.38
Hailakandi	38,621	38,424	84,412	71,617	2,190	2,260	3.21
Karimganj	64,160	63,969	130,133	110,702	2,032	2,126	4.60
Dhubri	31,785	31,285	36,623	31,531	1,161	1,209	4.13
Kamrup	82,409	82,203	134,904	131,964	1,619	1,750	8.05
Baksa	62,492	66,080	93,805	88,408	1,488	1,521	2.21
Chirang	32,508	33,805	39,991	35,880	1,234	1,309	6.10
Udalguri	46,586	50,070	54,130	55,519	1,149	1,181	2.85
Golaghat	75,077	80,919	145,610	146,306	1,916	1,976	3.10
Jorhat	78,709	80,522	126,748	118,830	1,598	1,657	3.70
Dibrugarh	70,452	69,778	123,981	109,156	1,761	1,865	5.93
Sibasagar	98,793	97,280	196,574	175,467	1,975	2,088	5.75
Average	64,196	65,237	110,623	117,673	1,701	1,783	4.83
Increase(+)/ Decrease(-)		1.62		6.37		4.83	

Source: *Basic Agricultural Statistics, Govt. of Assam, Directorate of Economics and Statistics'*

Table 3.5, 3.6 & 3.7 gives a comparative analysis between 2010-11(QE) & 2011-12(QE) quinquennial mean (QE) estimates of area, production and yield of winter rice, summer rice and pulses in BGREI districts of Assam with increase and decrease of area, production and yield in percentage. In case of winter rice, it showed an overall increase of area, production and yield with 1.62, 6.37 & 4.83 per cent respectively, in the year 2011-12 over 2010-11.

In case of summer paddy, it showed an overall increase of area, production and yield with 0.54, 8.64 & 9.33 per cent, respectively in the year 2011-12 over 2010-11 (Table-3.6).

Table-3.6
A comparative analysis between two quinquennial mean estimate of Area, Production and Yield of summer rice in BGREI districts of Assam.

Area in hectare, Production in tonnes, Yield in kg/ha

BGREI District	Area 2005-06 to 2009-10 QE:2010-11	Area 2006-07to 2010-11 QE:2011-12	Production 2005-06 to 2009-10 QE:2010-11	Production 2006-07to 2010-11 QE:2011-12	Yield 2005-06 to 2009-10 QE:2010-11	Yield 2006-07to 2010-11 QE:2011-12	Increase +/- decrease - of yield (%)
Cachar	9,244	8,659	14,186	13,687	1,503	1,565	4.13
Hailakandi	2,693	3,143	5,339	6,213	1,972	1,990	0.91
Karimganj	5,324	5,570	8,485	9,383	1,607	1,691	5.20
Dhubri	43,992	47,477	106,163	125,275	2,453	2,671	8.86
Kamrup	41,079	41,871	98,254	105,625	2,385	2,517	5.53
Baksa	10,949	9,619	18,894	18,119	1,746	1,915	9.69
Chirang	3,450	3,105	5,588	5,320	1,612	1,783	10.56
Udalguri	8,532	7,153	14,572	12,638	1,709	1,734	1.46
Golaghat	3,870	3,866	7,696	7,564	1,979	1,945	-1.72
Jorhat	2,537	1,931	2,489	2,181	1,280	1,317	2.89
Dibrugarh	70	60	136	140	2,078	2,237	7.64
Sibasagar	54	49	108	107	2,078	2,239	7.75
Average	10,983	11,042	23,492	25,521	2,119	2,317	9.33
Increase+/- decrease -		0.54		8.64		9.33	

Source: Basic Agricultural Statistics, Govt. of Assam, Directorate of Economics and Statistics

Table-3.7
A comparative analysis between two quinquennial mean estimate of Area, Production and Yield of Pulses in BGREI districts of Assam.

Area in hectare, Production in tonnes, Yield in kg/ha

BGREI District	Area 2005-06 to 2009-10 QE:2010-11	Area 2006-07to 2010-11 QE:2011-12	Production 2005-06 to 2009-10 QE:2010-11	Production 2006-07to 2010-11 QE:2011-12	Yield 2005-06 to 2009-10 QE:2010-11	Yield 2006-07to 2010-11 QE:2011-12	Increase +/- decrease - of yield (%)
Cachar	3,850	3,672	1,897	1,804	493	492	-0.28
Hailakandi	2,680	2,797	1,506	1,609	561	575	2.45
Karimganj	1,048	952	388	350	371	366	-1.37
Dhubri	6,366	7,016	3,230	3,687	590	602	1.90
Kamrup	6,499	6,800	3,877	4,029	578	570	-1.39
Baksa	5,014	5,007	2,722	2,603	543	521	-4.05
Chirang	3,222	3,301	1,722	1,755	536	533	-0.63
Udalguri	5,643	5,691	3,033	3,009	544	533	-2.06
Golaghat	3,246	3,078	1,998	1,975	608	630	3.66
Jorhat	5,603	6,867	2,347	2,919	417	423	1.37
Dibrugarh	813	871	371	389	458	448	-2.19
Sibasagar	721	737	401	417	551	563	2.24
Average	3,696	3,869	1,931	2,018	527	529	0.30
Increase+/- decrease -		4.70		4.54		0.30	

Source: Basic Agricultural Statistics, Govt. of Assam, Directorate of Economics and Statistics

In case of pulses, it showed an overall increase of area, production and yield with 4.70, 4.54 & 0.30 per cent, respectively in the year 2011-12 over 2010-11 (Table--3.7).

A comparative analysis of yield level achieved by the beneficiary farmers and the productivity level obtained from the secondary data pertaining to the years 2010-11 and 2011-12 in *Kharif* paddy, summer paddy and pulses are shown in the Table 3.8, 3.9 and 3.10, respectively. All the mandate crops for the State across the BGREI districts had shown significant increase in area, production and yield. In *Kharif* paddy, the overall yield increased by 26.43 per cent in 2010-11 and 39.17 per cent in 2011-12 over the State estimated yield. In case of summer paddy, the overall yield increased by 76.74 per cent in 2010-11 and 115.50 per cent in 2011-12 over the State estimated yield and in pulses, it increased by 27.04 per cent in 2010-11 and 36.90 per cent in 2011-12 over the State estimated yield. This significant increase in yield might be due to the resultant effect of the BGREI programme in all the sample districts.

Table-3.8
A comparative analysis of yield level achieved by the beneficiary farmers over the State yield in 2010-11 and 2011-12 in *Kharif* paddy

BGREI Sample districts	Yield in kg/ha					
	Yield 2005-06 to 2009-10 QE:2010-11	Yield (based on primary data)	Increase+/- decrease - of yield (%)	Yield 2006-07 to 2010-11 QE:2011-12	Yield (based on primary data)	Increase +/- decrease - of yield (%)
Kamrup	2,385	3,426	43.66	2607	3,956	51.72
Udalguri	1711	3,256	90.26	1760	3,658	107.82
Golaghat	2855	3,188	11.65	2944	3,495	18.72
Karimganj	3028	2,888	-4.62	3167	3,486	10.07
Jorhat	2381	2,869	20.48	2469	3,425	38.70
Average	2472	3125	26.43	2590	3604	39.17

Source: 1. Basic Agricultural Statistics, Govt. of Assam Directorate of Economics and Statistics
2. Primary source

Table-3.9
A comparative analysis of yield level achieved by the beneficiary farmers over the State yield in 2010-11 and 2011-12 in summer paddy

BGREI Sample districts	Yield in kg/ha					
	Yield 2005-06 to 2009-10 QE:2010-11	Yield (based on primary data)	Increase+/- decrease - of yield (%)	Yield 2006-07 to 2010-11 QE:2011-12	Yield (based on primary data)	Increase +/- decrease - of yield (%)
Kamrup	3553	4,926	38.63	3750	5,233	39.56
Udalguri	2547	4,689	84.10	2898	5,432	87.42
Golaghat	2949	4,432	50.29	1962	5,850	198.18
Karimganj	2394	4,968	107.48	2519	5,921	135.05
Jorhat	1907	4,581	140.24	1962	5,775	194.35
Average	2670	4719	76.74	2618	5642	115.50

Source: 1. Basic Agricultural Statistics, Govt. of Assam Directorate of Economics and Statistics
2. Primary source

Table-3.10
A comparative analysis of yield level achieved by the beneficiary farmers over the State yield in 2010-11 and 2011-12 in pulses

BGREI Sample districts	Yield 2005-06 to 2009-10 QE:2010-11	Yield (based on primary data)	Increase +/- decrease - of yield (%)	Yield 2006-07 to 2010-11 QE:2011-12	Yield (based on primary data)	Increase +/- decrease - of yield (%)
Kamrup	578	656	13.42	570	721	26.42
Udalguri	544	556	2.13	533	599	12.34
Golaghat	608	656	7.89	630	698	10.75
Karimganj	371	626	68.82	366	709	93.86
Jorhat	417	708	69.69	423	725	71.42
Average	504	640	27.04	504	690	36.90

Source: 1. Basic Agricultural Statistics, Govt. of Assam, Directorate of Economics and Statistics
2. Primary source

Table-3.10.a gives the CGR of area of rice under BGREI and NFSM districts during 2010-11 and 2011-12. In BGREI districts, during 2010-11, the highest CGR of area with 9.6 per cent was recorded in Golaghat district followed by Kamrup Metro (8.5%), Udalguri (4.8%), Jorhat (3.2%), Chirang (3.1%), N.C Hills (2.1%), Kamrup Rural (1.9%), Hailakandi (1.6%), Baksa (1.4%), Dhubri (0.9%), Cachar (0.5%), Dibrugarh (0.4%), Karimganj (0.2%) and Sivasagar (-0.2%) while in NFSM districts, the highest CGR was recorded in Borpeta district with 10.5 per cent followed by Morigaon (7.4%), Darrang (6.7%), Lakhimpur (3.3%), Tinsukia (2.6%), Goalpara (2.3%), Sonitpur (2.0%), Kokrajhar (0.4%), K. Anglong (0.3%), Nalbari (-1.2%), Nagaon (-1.3%), Dhemaji (-1.6%) and Bongaigaon (-2.5%) in 2010-11. The overall CGR of area in BGREI districts was recorded at 2.3 per cent in BGREI districts and 2.1 per cent in NFSM districts during the year.

In 2011-12, in BGREI districts the highest CGR of rice area with 6.6% per cent was found in Golaghat district followed by Kamrup Metro (5.2%), Jorhat (3.2%), Udalguri (2.4%), Hailakandi (1.6%), Chirang (0.5%), Kamrup Rural (0.2%), Baksa (-0.1%), N.C Hills (0.0%), Dhubri (-0.7%), Cachar (-1.6%), Dibrugarh (-0.8%), Karimganj (-1.9%) and Sivasagar (-2.2%) while in NFSM districts, the highest CGR was recorded in Borpeta district with 6.3 per cent, followed by Morigaon (5.0%), Darrang (4.1%), Lakhimpur (1.7%), Sonitpur (0.4%), Goalpara (0.1%), Tinsukia (0.0%), Kokrajhar (-2.0%), Nagaon (-2.0%), K. Anglong (-2.0%), Nalbari (-2.9%), Dhemaji (-2.3%) and Bongaigaon (-3.9%). The overall CGR of area in BGREI districts came out at 0.3 per cent while in NFSM districts, CGR was recorded at 0.2 per cent in 2011-12. It is at (-0.2) per cent in all India level.

Table- 3.10.a**CGR of Area of Rice during 2010-11 and 2011-12 (base year QE 2009-10=100) in Assam**

Sl. No.	District	Area ('000' hectare)							CGR: 2010-11	CGR: 2011-12
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11*	2011-12\$		
		1	2	3	4	5	6	7		
BGREI Districts										
1	Baksa	96.0	91.2	87.2	94.8	92.0	103.2	86.1	1.4	-0.1
2	Cachar	109.9	102.1	99.7	111.5	110.1	106.1	89.5	0.5	-1.6
3	Hailakandi	46.8	42.6	47.2	49.9	47.0	48.8	43.4	1.6	0.1
4	Karimganj	75.4	74.1	76.4	76.3	76.7	74.6	62.6	0.2	-1.9
5	Dhubri	93.3	89.0	89.1	88.5	95.1	95.4	81.4	0.9	-0.7
6	Kamrup(R)	124.4	90.2	118.2	122.2	117.9	120.2	105.0	1.9	0.2
7	Chirang	43.1	51.5	53.6	51.4	51.8	53.6	44.3	3.1	0.5
8	Kamrup(M)	19.2	23.3	25.2	29.5	27.7	29.7	25.4	8.5	5.2
9	Udalguri	77.7	79.6	73.0	94.3	88.9	96.2	80.4	4.8	2.4
10	Jorhat	88.2	75.0	86.6	86.9	97.0	94.2	78.3	3.2	0.8
11	Golaghat	80.3	62.8	79.3	80.0	106.6	111.1	90.6	9.6	6.6
12	Sivasagar	101.3	97.2	93.5	106.4	101.6	94.6	81.7	-0.2	-2.2
13	Dibrugarh	79.8	71.9	58.8	70.5	75.1	77.3	65.2	0.4	-0.8
14	N.C. Hills	14.5	14.0	14.5	14.5	16.0	15.5	13.2	2.1	0.0
Total BGREI Districts		1049.7	964.2	1002.3	1076.7	1103.5	1120.3	946.9	2.3	0.3
NFSM districts										
1	Goalpara	77.7	72.2	78.4	83.3	81.4	84.0	70.3	2.3	0.1
2	Bongaigaon	76.5	63.3	66.0	68.4	65.1	62.4	53.4	-2.5	-3.9
3	Nalbari	81.3	81.3	80.5	80.4	76.6	77.2	64.8	-1.2	-2.9
4	Barpeta	118.2	111.0	104.2	164.3	171.4	167.5	135.1	10.5	6.3
5	Darrang	75.2	50.3	58.7	73.6	79.1	86.3	69.4	6.7	4.1
6	Dhemaji	82.7	77.8	74.4	72.2	71.9	78.1	67.4	-1.6	-2.3
7	K. Anglong	127.2	124.7	122.7	125.9	126.4	128.0	102.5	0.3	-2.0
8	Lakhimpur	121.4	121.3	121.6	123.6	135.5	142.5	123.4	3.3	1.7
9	Sonitpur	169.3	127.3	167.1	173.4	156.0	170.6	147.5	2.0	0.4
10	Nagaon	213.7	169.2	192.6	195.2	181.1	186.3	168.8	-1.3	-2.0
11	Tinsukia	59.3	60.4	62.9	65.7	67.5	65.6	54.6	2.6	0.0
12	Morigaon	58.5	67.9	84.0	76.8	77.8	90.7	78.1	7.4	5.0
13	Kokrajhar	109.8	98.2	108.5	104.6	102.8	110.9	85.7	0.4	-2.0
Total NFSM Districts		1370.6	1224.8	1321.7	1407.4	1392.3	1450.0	1221.1	2.1	0.2
Assam State (DES, GOI)		2420.3	2189.0	2324.0	2484.2	2495.8	2570.3	2168.0	2.2	0.2
All India		43659.8	43813.6	43914.4	45537.4	41918.3	42862.4	43974.4	-0.5	-0.2

Source:DES, State/GOI.

NB: 1. 2010-11*: Final estimate.

2. 2011-12\$: 4th Advance.

3. APY data has been fixed to DES, GOI indices using appropriate algorithm.

Table-3.10.b gives the CGR of production of rice under BGREI and NFSM districts during 2010-11 and 2011-12. In BGREI districts, during 2010-11, the highest CGR of production with 14.1 per cent was found Kamrup Metro followed by Golaghat (13.1%), Jorhat (10.3%), Udalguri (8.3%), Kamrup Rural (7.7%), Sivasagar (7.5%), Dibrugarh (6.6%), Chirang (6.3%), Baksa (5.9%), Dhubri (5.9%), Karimganj (5.5%), Hailakandi (5.1%), Cachar (4.7%), and N.C Hills (0.9%), while in NFSM districts, the highest CGR was found in Borpeta district with 22.1 per cent followed by Morigaon (15.9%), Lakhimpur (15.4%), Darrang (14.1%), Sonitpur (11.2%), Goalpara (10.0%), Tinsukia (8.5%), Nalbari (7.8%), Kokrajhar (7.8%), K. Anglong (5.7%), Bongaigaon (3.6%). Nagaon (2.4%) and Dhemaji (-0.4%) in 2010-11. The overall CGR in BGREI districts came out at 7.30 per cent while in NFSM districts, the overall CGR stood at 9.34 per cent in 2010-11. The CGR of production of rice in Assam and India were recorded at 8.38 and 0.31 per cent, respectively.

Table- 3.10.b**CGR of Production of Rice during 2010-11 and 2011-12 (base year QE 2009-10=100) in Assam**

Sl.	District	Production ('000' tons)								CGR: 2010-11	CGR: 2011-12
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11*	2011-12\$			
		1	2	3	4	5	6	7			
BGREI Districts											
1	Baksa	125.73	116.81	107.85	162.92	144.92	151.61	141.16	5.9	4.2	
2	Cachar	218.79	165.56	98.78	234.64	222.71	211.87	163.63	4.7	1.6	
3	Hailakandi	91.22	83.41	92.38	115.60	114.80	102.23	88.20	5.1	1.9	
4	Karimganj	120.50	143.44	118.57	184.00	176.43	141.93	158.83	5.5	4.4	
5	Dhubri	145.80	151.00	160.70	148.65	159.22	214.05	221.02	5.9	7.2	
6	Kamrup(R)	211.31	137.98	218.43	226.26	223.95	264.31	213.87	7.7	5.0	
7	Chirang	49.40	63.41	51.78	49.01	68.19	73.32	51.71	6.3	2.5	
8	Kamrup(M)	34.27	37.21	46.18	52.10	55.09	66.55	53.28	14.1	10.0	
9	Udalguri	88.44	64.20	91.19	121.61	95.53	115.17	105.99	8.3	6.5	
10	Jorhat	140.84	86.59	116.12	137.30	184.63	171.43	136.33	10.3	6.4	
11	Golaghat	156.07	100.87	151.32	158.22	217.74	231.12	187.22	13.1	9.6	
12	Sivasagar	185.55	145.34	158.25	260.37	234.21	209.73	169.61	7.5	3.1	
13	Dibrugarh	127.19	111.05	93.73	135.75	152.31	152.59	83.28	6.6	-0.5	
14	N.C. Hills	24.51	18.55	26.73	25.50	28.33	20.42	28.71	0.9	2.6	
Total BGREI Districts		1719.63	1425.41	1532.00	2011.92	2078.08	2126.31	1802.81	7.30	4.6	
NFSM districts											
1	Goalpara	118.63	100.74	124.89	148.56	137.66	185.54	158.16	10.0	8.1	
2	Bongaigaon	87.60	60.21	69.58	80.98	75.46	94.80	87.40	3.6	3.6	
3	Nalbari	104.97	108.03	130.05	138.79	128.90	157.39	111.85	7.8	3.4	
4	Barpeta	135.63	114.29	119.58	219.65	261.52	295.21	267.29	22.1	18.3	
5	Darrang	108.85	67.91	96.66	129.55	127.43	177.50	159.95	14.1	12.7	
6	Dhemaji	90.50	93.51	94.17	75.75	91.52	93.04	90.20	-0.4	-0.2	
7	K.Anglong	185.28	179.46	190.46	193.31	250.00	222.71	139.16	5.7	-0.6	
8	Lakhimpur	126.27	84.10	91.76	74.49	173.93	232.25	205.41	15.4	15.9	
9	Sonitpur	236.67	129.56	220.04	252.39	236.91	337.90	262.07	11.2	8.5	
10	Nagaon	338.75	271.67	316.76	312.48	373.71	331.50	287.57	2.4	0.3	
11	Tinsukia	79.91	75.72	86.94	94.44	95.02	121.19	93.75	8.5	5.5	
12	Morigaon	89.20	92.71	114.69	138.98	150.36	180.10	189.09	15.9	14.8	
13	Kokrajhar	130.56	112.69	131.44	137.20	155.29	181.16	154.30	7.8	5.9	
Total NFSM Districts		1832.81	1490.60	1787.01	1996.59	2257.71	2610.29	2206.19	9.34	7.1	
Assam State (DES, GOI)		3552.44	2916.01	3319.01	4008.51	4335.79	4736.60	4009.00	8.38	5.9	
All India		91793.40	93355.30	96692.90	99182.40	89093.00	95979.80	104322.00	0.31	1.3	

Source:DES, State/GOI.

NB: 1. 2010-11*: Final estimate.

2. 2011-12\$: 4th Advance.

3. APY data has been fixed to DES, GOI indices using appropriate algorithm.

During 2011-12, in BGREI districts, the highest CGR of rice production with 10.0 per cent was found in Kamrup Metro followed by Golaghat (9.6%), Dhubri (7.2%), Udalguri (6.5%), Jorhat (6.4%), Kamrup Rural (5.0%), Karimganj (4.4%), Baksa (4.2%), Sivasagar (3.1%), N.C Hills (2.6%), Chirang (2.5%), Hailakandi (1.9%), Cachar (1.6%) and Dibrugarh (-0.5%), while in NFSM districts, the highest CGR of rice production was found in Borpeta district with 18.3 per cent followed by Lakhimpur (15.9%), Morigaon (14.3%), Darrang (12.7%), Sonitpur (8.5%), Goalpara (8.1%), Kokrajhar (5.9%), Tinsukia (5.5%), Bongaigaon (3.6%), Nalbari (3.4%), Nagaon (-0.3%), Dhemaji (-0.2%) and K. Anglong (-0.6%). The overall CGR of

production in BGREI districts came out at 4.6 per cent while in case of NFSM districts, the overall CGR was worked out at 7.1 per cent. In the State, the CGR of production stood at 4.6 per cent in 2010-11 while it was 7.10 per cent in 2011-12. The corresponding figures for the State and all India were recorded at 5.9 per cent and 1.3 per cent, respectively.

Table-3.10.c gives the yield of rice and the CGR of yield of the BGREI and NFSM districts during 2005-06 to 2011-12. In 2010-11, in BGREI districts, the highest CGR of yield of 7.8 per cent was found in Sivasagar district followed by Jorhat (6.9%), Dibrugarh (6.1%), Kamrup Rural (5.7%), Karimganj (5.4%), Kamrup Metro (5.1%), Dhubri (5.0%), Baksa (4.5%), Cachar (4.2%), Hailakandi (3.5%), Udalguri (3.3%), Golaghat (3.2%), Chirang (3.1%), and N.C Hills (-1.2%), while in NFSM districts, the highest CGR of yield was found in Lakhimpur (with 11.80 per cent followed by Borpeta (10.4%), Sonitpur (9.2%), Nalbari (9.1%), Morigaon (7.9%), Goalpara (7.5%), Kokrajhar (7.4%), Darrang (7.0%), Bongaigaon (6.2%), Tinsukia (5.8%), K. Anglong (5.3%), Nagaon (3.9%) and Dhemaji (1.2%). The overall CGR of yield in BGREI districts was recorded at 4.9 per cent in 2010-11 while in NFSM districts, the CGR came out at 7.1 per cent in the reference year. The CGR were recorded at 6.00 and 0.90 per cent in the State and all India level, respectively.

In 2011-12, in BGREI districts, the highest CGR of yield of 7.9 per cent was found in Dhubri district followed by Karimganj (6.4%), Jorhat (5.6%), Sivasagar (5.4%), Kamrup Rural (4.7%), Kamrup Metro (4.5%), Baksa (4.3%), Udalguri (3.9%), Cachar (3.2%), Golaghat (2.8%), N.C Hills (2.6%), Chirang (2.1%), Hailakandi (1.7%) and Dibrugarh (0.20%). In NFSM districts, the highest CGR of yield was recorded in Lakhimpur district with 14.00 per cent, followed by Borpeta (11.3%), Morigaon (9.3%), Sonitpur (8.2%), Darrang (8.2%), Kokrajhar (8.1%), Goalpara (7.9%), Bongaigaon (7.8%), Nalbari (6.5%), Tinsukia (5.6%), Nagaon (2.4%) Dhemaji (2.1%) and K. Anglong (1.4%). The overall CGR of yield in BGREI and NFSM districts were found at 4.2 per cent and 6.9 per cent, respectively. The CGR of rice yield during the year 2011-12 was recorded at 5.6 and 1.5 per cent in the State and all India level, respectively.

Table- 3.10.c
CGR of Yield of Rice during 2010-11 and 2011-12 (base year QE 2009-10=100) in Assam

Sl.	District	Yield in kg/ha ('000' tons)							CGR: 2010-11	CGR: 2011-12
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11*	2011-12\$		
		1	2	3	4	5	6	7		
BGREI Districts										
1	Baksa	1310	1281	1236	1749	1581	1469	1639	4.5	4.3
2	Cachar	1991	1622	991	2104	2022	1997	1828	4.2	3.2
3	Hailakandi	1949	1960	1959	2319	2445	2097	2034	3.5	1.7
4	Karimganj	1599	1935	1551	2411	2299	1902	2539	5.4	6.4
5	Dhubri	1563	1697	1803	1679	1674	2243	2715	5.0	7.9
6	Kamrup(R)	1699	1530	1847	1851	1900	2200	2037	5.7	4.7
7	Chirang	1146	1232	965	954	1318	1367	1168	3.1	2.1
8	Kamrup(M)	1788	1598	1836	1768	1990	2244	2098	5.1	4.5
9	Udalguri	1138	807	1250	1290	1075	1197	1319	3.3	3.9
10	Jorhat	1597	1154	1341	1581	1904	1820	1741	6.9	5.6
11	Golaghat	1943	1607	1909	1977	2042	2080	2068	3.2	2.8
12	Sivasagar	1832	1496	1693	2447	2305	2217	2075	7.8	5.4
13	Dibrugarh	1594	1544	1593	1924	2028	1975	1277	6.1	0.2
14	N.C. Hills	1692	1326	1839	1754	1772	1319	2182	-1.2	2.6
Total BGREI Districts		1638	1478	1528	1869	1883	1898	1904	4.9	4.2
NFSM districts										
1	Goalpara	1527	1395	1593	1783	1692	2208	2250	7.5	7.9
2	Bongaigaon	1145	952	1053	1183	1159	1519	1636	6.2	7.8
3	Nalbari	1292	1329	1616	1727	1683	2040	1726	9.1	6.5
4	Barpeta	1148	1030	1147	1337	1526	1762	1978	10.4	11.3
5	Darrang	1448	1349	1647	1790	1618	2057	2304	7.0	8.2
6	Dhemaji	1095	1203	1266	1068	1274	1191	1338	1.2	2.1
7	K. Anglong	1456	1445	1552	1533	1978	1740	1357	5.3	1.4
8	Lakhimpur	1040	690	754	613	1288	1630	1665	11.8	14.0
9	Sonitpur	1398	1018	1317	1481	1524	1981	1777	9.2	8.2
10	Nagaon	1585	1605	1645	1629	2071	1780	1704	3.9	2.4
11	Tinsukia	1348	1253	1383	1437	1408	1847	1718	5.8	5.6
12	Morigaon	1525	1366	1365	1810	1934	1986	2422	7.9	9.3
13	Kokrajhar	1189	1147	1212	1312	1511	1634	1800	7.4	8.1
Total NFSM Districts		1337	1217	1352	1419	1622	1800	1807	7.1	6.9
Assam State (DES, GOI)		1468	1332	1428	1614	1737	1843	1849	6.0	5.6
All India		2102	2131	2202	2178	2125	2239	2372	0.9	1.5

Source: DES, State/GOI.

NB: 1. 2010-11*: Final estimate.

2. 2011-12\$: 4th Advance.

3. APY data has been fixed to DES, GOI indices using appropriate algorithm.

3.3 Perception profiling

The basic aim of the BGREI programme was to make all the States of the eastern India a surplus food grain region. Thus, a precise objective of the BGREI was to increase the yield rate of the major crops grown in different sub-ecological regions through technological backstopping in rainfed situation and motivating the farmers towards adoption of scientific technology as supported by inputs supply and adequate technical guidance by the experts appointed under BGREI. Table 3.11 depicts the perception of beneficiaries under BGREI initiatives on different aspects. Adequate supply of inputs, timeliness of information and assurance for continuation of BGREI cultural practices to the next season got very high rating (more than 75%).

Rating of BGREI programme in terms of performance (good), technical guidance available from SDA/KVK/SAU/CRRI, expectations of the farmers in terms of timely supply/availability of inputs and low price of the produce got high rating lying in between 50-75 per cent. Low rating were noted against technical guidance from KVK (5%) and progressive farmers (20%) while medium rating was reported against SDA, ADO and VLEW upto 25 per cent.

Table 3.11
Perception profiling of the beneficiary

Particulars	As perceived by the beneficiary (%)	Perception status/Remarks			
		Low (0-25)	Medium (25-50)	High (50-75)	Very high (>75)
1. Supply of inputs					
Adequate	80.00				✓
Inadequate	20.00	✓			
2. Rating BGREI					
Poor	0.00	✓			
Average	30.00		✓		
Good	70.00			✓	
3. Suggestions for improvements					
Provide timeliness of information	80.00				✓
Supply of more inputs	20.00	✓			
4. Technical guidance available from SDA/KVK/SAU/CRRI					
Yes	60.00			✓	
No	40.00		✓		
5. Who guided the best technical guidance					
SDA (State Department of Agriculture)	25.00		✓		
KVK (Krishi Vigyan Kendra)	5.00	✓			
SAU (State Agricultural University)	-				
CRRI (Central Rice Research Institute)	-				
ADO (Agriculture Development Officer)	25.00		✓		
VLEW (Village Level Extension Worker)	25.00		✓		
Progressive farmers	20.00	✓			
6. Expectation of the farmers					
In-time supply of inputs	50.00			✓	
Technical guidance	50.00			✓	
7. Problems in supply/availability of inputs					
Yes	0.00	✓			
No	100.00				✓
*8. Preference for source of inputs					
Direct from input dealer	75.00				✓
Cooperative society	25.00		✓		
Agril. Dept. outlets	-				
9. Faced problem in marketing of produce					
Transportation of produce	40.00		✓		
Low price	60.00			✓	
10. Price received in paddy (Rs./qt) in 2011-12	800.00	Lower than the MSP (Minimum Support Price)			
11. BGREI cultural practices will be followed next season at their own cost					
Yes	100.00				✓
No	0.00				
12. If BGREI cultural practices will not be followed, the reasons					
	-				
	-				

Source: Field Survey

There was no problem in supply/availability of inputs and it got very high rating to the extent of 100 per cent. According to preference for source of inputs, the input dealer got high rating by 75 per cent and the cooperative society got medium rating by 25 per cent of the beneficiaries. Marketing and transportation of produces got medium rating by 40 per cent and the low price of produces got high rating by 60 per cent of the respondents. The most vulnerable point was that the farmers had to sell their surplus produce (Paddy) below the MSP. The Government has fixed the MSP of paddy in between Rs.1,030-Rs.1.080 per quintal for the state of Assam for the season 2010-11. Farmer's price of paddy at open market was reported to be 32 per cent less than that of the MSP. In the reference year, they had to sell their produce at a price as low as Rs.800 per quintal. To improve upon the situation the farmers are required to produce the crop (paddy) as per the prescribed standards and the Govt. machineries should also come forward to procure the produces at remunerative prices. Silver lining is that almost all the beneficiaries have shown their interest to adopt the improved cultural practices that are being followed under the BGREI programme.

Chapter -IV

Evaluation of Physical and Financial Progress

4.1 Block Demonstrations

This chapter is mainly based on the report of the BGREI Cell, Directorate of Agriculture, Government of Assam. Under the BGREI programme, block demonstration of *Kharif* paddy and pulses were initiated in 2010-11. *Kharif* paddy covered 13 non NFSM districts and Pulses (green gram and black gram) programme was implemented in 17 districts. Demos on summer paddy programme was undertaken in 12 districts of Assam in 2011-12.

There were altogether 96 demos under *Kharif* paddy, 188 demos under pulses and 156 demos under summer paddy covering at least one block from each district in 2010-11 and 2012. It was reported by the department that the programme could not be taken up in all the blocks of the districts due to financial problem. Under *Kharif* paddy, the highest number of demonstrations (11) was found in Kamrup and the lowest (6) demonstrations in Hailakandi district (Table-4.1).

Table 4.1
Number of Blocks, Gram Panchayet and Villages at a glance for
Block Demonstrations (D/C) under BGREI in *Kharif* 2010-11

Name of the district	Number of clusters of Block demonstration	Number of block	Number of Gram Panchayet	No of Villages
Kamrup	11 (11.46)	16	146	1393
Udalguri	7 (7.29)	5	NA	NA
Golaghat	8 (8.33)	8	102	1086
Karimganj	6 (6.25)	7	96	940
Jorhat	8 (8.33)	8	110	866
Baksa	7 (7.29)	7	NA	NA
Cachar	8 (8.33)	15	163	1051
Chirang	7 (7.29)	2	NA	NA
Dhubri	7 (7.29)	15	168	133
Dibrugarh	7 (7.29)	7	93	1348
Sivasagar	7 (7.29)	9	118	881
Hailakandi	6 (6.25)	5	62	331
N.C. Hills	7 (7.29)	5	NA	640
Total	96 (100.00)	109	2116	1738

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note: Figures in parentheses indicate the percentage over total

Under pulse programme, the highest number of cluster of demonstrations were found in Kamrup, Lakhimpur and Dhemaji with 14 demos each and the lowest in Karimganj, Sonitpur, N.C. Hills and Karbi-Anglong districts with 9 demos each (Table-4.2).

Altogether there were 156 clusters of demonstrations under summer paddy and the highest number of demonstration(51) was recorded in Kamrup district and the lowest in Dibrugarh district with 1 demo only (Table-4.3).

No record was available on the number of villages covered under the demos with the State BGREI Cell. However, the total no. of villages in each of the districts were furnished in the Tables (4.1, 4.2 & 4.3) as general information only.

Table-4.2
Number of Blocks, Gram Panchayat and Villages at a glance for
Block Demonstrations (D/C) under BGREI in pulse 2010-11

Name of the district	No. of clusters of block Demonstration	No. of Blocks	Number of Gram Panchayet (As on 31-08-04)	Number of Villages
Kamrup	14 (7.45)	16	178	1393
Udalguri	9 (4.79)	5	NA	NA
Golaghat	12 (6.38)	8	102	1086
Karimganj	9 (4.79)	7	96	940
Jorhat	9 (4.79)	8	111	866
Kokrajhar	12 (6.38)	6	88	973
Cachar	12 (6.38)	15	163	1051
Nagaon	10 (5.32)	18	240	1421
Dhubri	12 (6.38)	15	172	133
Sonitpur	9 (4.79)	14	158	1874
Darrang	13 (6.91)	11	155	1341
Hailakandi	10 (5.32)	5	62	331
N.C. Hills	9 (4.79)	5	NA	640
Lakhimpur	14 (7.45)	9	81	1170
Dhemaji	14 (7.45)	5	65	1315
Tinsukia	11 (5.85)	7	88	88
Karbi-Anglong	9 (4.79)	11	NA	2843
Total	188 (100)	165	1759	17465

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note: Figures in parentheses indicate the percentage over total

Table-4.3
Number of Blocks, Gram Panchayat and Villages at a glance for
Block Demonstrations (D/C) under BGREI in summer paddy 2011-12

Name of the district	No. of clusters of block Demonstration	No. of Blocks	Number of Gram Panchayet (As on 31-08-04)	Number of Villages
Kamrup	51 (32.68)	16	178	1393
Udalguri	11 (7.05)	5	NA	NA
Golaghat	19 (12.13)	8	102	1086
Karimganj	31 (19.87)	7	96	940
Jorhat	9 (5.77)	8	111	866
Baksa	2 (1.28)	6	88	973
Cachar	5 (3.21)	15	163	1051
Chirang	10 (6.41)	18	240	1421
Dhubri	11 (7.05)	15	172	133
Dibrugarh	1 (0.64)	14	158	1874
Sivasagar	2 (1.28)	11	155	1341
Hailakandi	4 (2.56)	5	62	331
Total	156 (100)	128	1525	11409

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note: Figures in parentheses indicate the percentage over total

Table-4.4 visualizes the concentration of demos in relation to block in each of the districts in *Kharif*, 2010-11. Evidently, more no. of demonstrations should have been undertaken in the selected districts to cover at least one demo in each block. The highest concentration of demos was found in Chirang district with 3.50 demos per block and the lowest in Dhubri with 0.47 demos per block. In overall, the concentration stood at 0.88 demo against each of the blocks.

Table 4.4
Concentration of block demonstrations (D/C) in relation to blocks at a glance under BGREI in *Kharif* paddy, 2010-11

Name of the district	No. of Clusters of Block demonstration	No. of Blocks	Concentration of D/C in relation to block
Kamrup	11	16	0.69
Udalguri	7	5	1.40
Golaghat	8	8	1.00
Karimganj	6	7	0.86
Jorhat	8	8	1.00
Baksa	7	7	1.00
Cachar	8	15	0.53
Chirang	7	2	3.50
Dhubri	7	15	0.47
Dibrugarh	7	7	1.00
Sivasagar	7	9	0.78
Hailakandi	6	5	1.20
N.C.Hills	7	5	1.40
Total	96	109	0.88

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table 4.5
Concentration of block demonstrations (D/C) in relation to blocks at a glance under BGREI in pulse, 2010-11

Name of the district	No. of clusters of block Demonstration	No. of Blocks	Concentration of D/C in relation to block
Kamrup	14	16	0.875
Udalguri	9	5	1.800
Golaghat	12	8	1.500
Karimganj	9	7	1.286
Jorhat	9	8	1.125
Kokrajhar	12	6	2.000
Cachar	12	15	0.800
Nagaon	10	18	0.556
Dhubri	12	15	0.800
Sonitpur	9	14	0.643
Darrang	13	11	1.182
Hailakandi	10	5	2.000
N.C. Hills	9	5	1.800
Lakhimpur	14	9	1.556
Tinsukia	11	7	1.571
Karbi-Anglong	9	11	0.818
Total	174	160	1.088

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table-4.5 visualizes the concentration of demos in relation to block in each district for pulse, 2010-11. It is seen that more number of demonstrations should have been undertaken in 6 districts to cover at least one demo in each block. The highest concentration of demos was found in Kokrajhar and Hailakandi with 2 demos each, and the lowest in Dhubri district with 0.56 demo per block. In overall, the concentration stood at 1.08 demos against each of the blocks.

Table-4.6 portrays the concentration of demos in relation to block in each of the districts for summer paddy, 2011-12. Evidently, more number of demonstrations should have been undertaken in 7 districts to cover at least one demo in each block. The highest concentration of demos was found in Kamrup district with 3.19 demos per block and the lowest in Sivasagar with 0.80 demo only per block. In overall, the concentration stood at 1.43 demos against each of the blocks.

Table 4.6
Concentration of block demonstrations (D/C) in relation to blocks at a glance under BGREI in summer paddy, 2011-12

Name of the district	No. of clusters of block Demonstration	No. of Blocks	Concentration of D/C in relation to block
Kamrup	51	16	3.188
Udalguri	11	5	2.200
Golaghat	19	8	2.375
Karimganj	31	7	4.429
Jorhat	9	8	1.125
Baksa	2	7	0.286
Cachar	5	15	0.333
Chirang	10	2	5.000
Dhubri	11	15	0.733
Dibrugarh	1	7	0.143
Sivasagar	2	9	0.222
Hailakandi	4	5	0.800
N.C. Hills	0	5	0.000
Total	156	109	1.431

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table-4.7 indicates concentration of demonstration per net cropped area in all the BGREI districts for *Kharif* paddy, 2010-11. The overall concentration stood at 0.010 hectare. To keep uniformity of concentration of demonstration, more number of clusters should have been included in some of the districts (six) .

Table 4.7
Concentration of block demonstrations (D/C) per net cropped area
at a glance under BGREI in kharif, 2010-11

(Area in Hectare)

Name of the district	Total area of the district (Kharif paddy)	Demonstration area	Concentration of demonstration per net cropped area
Kamrup	90032	1135	0.013
Udalguri	61418	700	0.011
Golaghat	103460	750	0.007
Karimganj	63143	620	0.010
Jorhat	85597	750	0.009
Baksa	84168	700	0.008
Cachar	88908	750.3	0.008
Chirang	35740	650	0.018
Dhubri	33097	700	0.021
Dibrugarh	75859	700	0.009
Sivasagar	92927	700	0.008
Total	814349	8155.3	0.010

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table-4.8 presents concentration of demonstration per net cropped area in all the BGREI districts for pulse, 2010-11 found to be in the lower side. at lower level as compared to demonstration area. In overall, it stood at 0.242 hectares only.

Table 4.8
Concentration of block demonstrations (D/C) per net cropped area
at a glance under BGREI in pulse, 2010-11

(Area in Hectare)

Name of the district	Total area of the district	Demonstration Area	Concentration of demonstration per total cropped area
Kamrup	6892	1390	0.202
Udalguri	4705	926	0.197
Golaghat	2807	1215	0.433
Karimganj	538	914	1.699
Jorhat	11618	925	0.080
Kokrajhar	5451	1170	0.215
Cachar	3185	1215	0.381
Nagaon	7219	930	0.129
Dhubri	8705	1215	0.140
Sonitpur	6645	927	0.140
Darrang	5229	1275	0.244
Hailakandi	2690	980	0.364
N.C. Hills	846	925	1.093
Lakhimpur	5175	1330	0.257
Dhemaji	1575	1390	0.883
Karbi-Anglong	1944	925	0.476
Tinsukia	2492	1130.87	0.454
Total	77716	18782.87	0.242

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table-4.9 indicates concentration of demonstration per net cropped area in all the BGREI districts for summer paddy, 2011-12. In totality, the concentration stood at 0.235 hectare only.

Table 4.9
Concentration of block demonstrations (D/C) per net cropped area
at a glance under BGREI in summer paddy, 2011-12
 (Area in Hectare)

Name of the district	Total area of the district QE(2011-12) (Summer paddy)	Demonstration area	Concentration demonstration per total cropped area
Kamrup	41871	10200	0.244
Udalguri	7153	2200	0.308
Golaghat	3866	3800	0.983
Karimganj	5570	6200	1.113
Jorhat	1931	1800	0.932
Baksa	9619	400	0.042
Cachar	8659	1000	0.115
Chirang	3105	2000	0.644
Dhubri	47477	2200	0.046
Dibrugarh	60	200	3.333
Sivasagar	49	400	8.163
Hailakandi	3143	800	0.255
Total	132503	31200	0.235

Source: BGREI Cell, Directorate of Agriculture & Statistical Hand Book, Govt. of Assam

Table-4.10 shows the target and achievement of *Kharif* paddy block demonstrations under 5 sub ecological regions across 13 districts. The highest number of demonstrations (11) was recorded in Kamrup district. It might have happened due to the fact that the State Agriculture Directorate is located in this district. Number of demos ranged between 6 and 8 in the rest of the districts. In total, the highest number of demos (23) was found in irrigated land followed by 21 in medium deep water, 19 in irrigated up land, 17 in deep water and 16 in shallow lowland situation. The status of achievement was 100 per cent as per report of the Directorate.

Table 4.10
Physical target-wise achievement of *Kharif* paddy block
demonstrations (D/C) in Assam (2010-2011)

Target as per BGREI programme	District-wise physical achievement														Status of Achievement (%)
	Kamrup	Udalguri	Golaghat	Karimganj	Jorhat	Baksa	Cachar	Chirang	Dhubri	Dibrugarh	Sivasagar	Hailakandi	N.C.Hills	Total	
Irrigated Upland	4	1	1	1	2	2	2	0	0	2	2	1	1	19 (19.79)	100.00
Shallow lowland	1	3	1	2	1	2	1	0	1	0	2	2	1	16 (16.67)	
Medium deep water	3	0	3	1	2	0	2	4	1	1	2	0	2	21 (21.79)	
Deep water	2	1	0	2	0	2	2	1	0	2	2	1	2	17 (17.71)	
Irrigated	1	2	3	0	3	1	1	2	5	2	0	2	1	23 (23.94)	
Total	11	7	8	6	8	7	8	7	7	7	7	6	7	96 (100.00)	

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam.

Note: Figures in parentheses indicate the percentage over total

Table 4.11 displays the block demonstrations of rice (*Kharif* and Summer) in Assam. Block demonstrations were undertaken with two varieties of seeds – HYV and Hybrid rice. In case of pulses, it was done with HYV seeds in 2011-12. There was no demonstration of wheat during the reference year. No demonstration of hybrid rice was undertaken in *Kharif* paddy during 2010-11. In summer paddy, there were 156 demonstrations of which only 21 demos were under hybrid in 2011-12. It was reported that inadequate seeds, shortage of mechanical device for line showing, inadequate technical support to motivate the farmers were the major constraints and stood as limitations in increasing the number of hybrid demos. Of 252 rice demos (*Sali & Boro*), 91.67 per cent were HYV demos and only 8.33 per cent belonged to hybrid in the State during 2010-11 and 2011-12. In case of pulse demos, there were altogether 188 demos covering all BGREI districts. The highest with 14 demos each was found in Kamrup, Lakhimpur and Dhemaji district, while the lowest with 9 demos each were in Udalguri, Karimganj, Jorhat, Sonitpur, N.C. Hills and Karbi Anglong district. This variation might be due to the fact that there was no specific guidelines from the Ministry in the reference year, 2010-11.

Table 4.11
Number of block demonstrations (D/C) of rice (HYV & Hybrid)
And Pulses by *Kharif*, *Rabi* and Summer in Assam (2010-11, 2011-12)

Target under BGREI	District-wise physical achievement													Status of Achievement (%)	
	Kamrup	Udalguri	Golaghat	Karimganj	Jorhat	Baksa	Cachar	Chirang	Dhubri	Dibrugarh	Sivasagar	Hailakandi	N.C.Hills		Total No. of D/C
Crop															
KHARIF (2010-11)															
HYV (Rice)	11	7	8	6	8	7	8	7	7	7	7	6	7	96	100.00
Hybrid (Rice)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sub-total	11	7	8	6	8	7	8	7	7	7	7	6	7	96 (38.09)	100.00
BORO (SUMMER) (2011-12)															
HYV (Rice)	45	9	13	31	8	1	5	10	6	1	2	4	0	135	100.00
Hybrid (Rice)	6	2	6	0	1	1	0	0	5	0	0	0	0	21	-
Sub-total	51	11	19	31	9	2	5	10	11	1	2	4	0	156 (61.91)	100.00
TOTAL RICE (2011-12)															
HYV (Rice)	56	16	21	37	16	8	13	17	13	8	9	10	7	231 (91.67)	
Hybrid (Rice)	6	2	6	0	1	1	0	0	5	0	0	0	0	21 (8.33)	-
Grand total	62	18	27	37	17	9	13	17	18	8	9	10	7	252 (100.00)	

Contd/...

Table 4.11 Contd/...

Target under BGREI	District-wise physical achievement																	Status of Achievement (%)	
Districts → Crop ↓	Kamrup	Udalguri	Golaghat	Karimganj	Jorhat	Kokrajhar	Cachar	Nagaon	Dhubri	Somitpur	Darrang	Hailakandi	N.C.Hills	Lakhimpur	Dhemajj	Tinsukia	Karbi- anglong	Total	
Pulse	14	9	12	9	9	12	12	10	12	9	13	10	9	14	14	11	9	188	100.00

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam.

Note: Figures in parentheses indicate the percentage over total

Table-4.12(a) shows the distribution of inputs (seeds/micronutrient) through different seed supplying agencies and expenditure incurred therein under block demonstrations (D/C) of *Kharif* paddy in BGREI districts. In Assam, National Seed Corporation (NSC) was the only seed supplying agency through which seeds were distributed among the beneficiary farmers free of cost in all the BGREI districts. A total of 376.41 MT of seeds were distributed covering 96 demos. The quantity of seeds per demo stood between 4.13 MT and 3.70 MT with an average of 3.92 MT. This variation occurred due to the variation of area under demos in each district. The highest expenditure of Rs.1,207,640 was recorded in Kamrup district as the district had the highest no of demos (11) with the largest area of 1,135 hectares. The lowest expenditure was incurred (Rs. 590,520.00) in Hailakandi district. The area under demos and the number of demos were the factors for which expenditure came down in the instant case. The total expenditure incurred on seed was to the tune of Rs.10,012,506.00.

Table 4.12(a)
Distribution of inputs in block demonstrations (D/C) of
Paddy (HYV) under BGREI in *Kharif*, 2010-11

Name of the district	No. of D/C	Area Covered (Ha.)	Seed						Zinc Sulphate		
			Total Quantity (MT)	Quantity/ D/C (MT)	Total Value (Rs.)	Seed supplying agencies			Total Quantity (MT)	Quantity/ D/C (MT)	Total Value (Rs.)
						ASC	NSC	Total			
Kamrup	11	1,135	45.40	4.13	1,207,640		√		11.35	1.03	397,250
Udalguri	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Golaghat	8	750	30.00	3.75	798,000		√		7.50	0.94	262,500
Karimganj	6	620	24.80	4.13	659,680		√		6.20	1.03	217,000
Jorhat	8	750	30.00	3.75	798,000		√		7.50	0.94	262,500
Baksa	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Cachar	8	750.3	30.01	3.75	798,319		√		7.50	0.94	262,605
Chirang	7	650	26.00	3.71	691,600		√		6.50	0.93	227,500
Dhubri	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Dibrugarh	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Sivasagar	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Hailakandi	6	555	22.20	3.70	590,520		√		5.55	0.93	194,250
N.C.Hills	7	700	28.00	4.00	744,800		√		7.00	1.00	245,000
Total	96	9,410.30	376.41	3.92	10,012,506		√		94.10	0.98	3,293,605

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note :Seed – 40 kg/ha Price- Rs.26.60/kg Zink Sulphate- 10 kg/ha Price- Rs. 35/kg

Zinc Sulphate was one of the inputs distributed among the beneficiaries as micronutrient. The total quantity of micronutrient was 94.10 MT and on an average, 0.98 MT was distributed per demo with a little bit of variation between 1.03 MT and 0.93 MT per demo. The total expenditure on supply of micronutrient was Rs. 3, 293,605.00.

Table 4.12(b) shows the distribution of inputs other than seeds and micronutrients and expenditure incurred by each BGREI districts on these for *Kharif* paddy demonstration. There were altogether 96 demos covering an area of 94,103 hectares under *Kharif* paddy demonstration. A total quantity of 489.34 MT of urea was distributed among all the districts with an average rate of 5.10 MT per demo. The total expenditure on urea stood at Rs. 2,740,279. Further, 423.46 MT of DAP was distributed in all the districts @ 4.41 MT per demo with a total expenditure of Rs. 46,536.87. As against this, 423.46 MT of MOP was distributed @ 4.41 MT per demo involving a total expenditure of Rs. 2,244,357.00. Also, 84.69 MT of bio-fertilizer was distributed @ 0.88 MT per demo with a total expenditure of Rs.3,048,937.

Table 4.12(b)
Distribution of inputs in block demonstrations (D/C) of
Paddy (HYV) under BGREI in *Kharif*, 2010-11

Name of the district	No. of D/C	Area Covered (Ha.)	Urea			DAP			MOP			Bio-fertiliser		
			Total Quantity (MT)	Quantity/D/C (MT)	Total Value (Rs.)	Total Quantity (MT)	Quantity/D/C (MT)	Total Value (Rs.)	Total Quantity (MT)	Quantity/D/C (MT)	Total Value (Rs.)	Total Quantity (MT)	Quantity/D/C (MT)	Total Value (Rs.)
Kamrup	11	1,135	59.02	5.37	330,512	51.08	4.64	48985.57	51.08	4.64	270,698	10.22	0.93	367,740
Udalguri	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Golaghat	8	750	39.00	4.88	218,400	33.75	4.22	44507.81	33.75	4.22	178,875	6.75	0.84	243,000
Karimganj	6	620	32.24	5.37	180,544	27.90	4.65	49057.50	27.90	4.65	147,870	5.58	0.93	200,880
Jorhat	8	750	39.00	4.88	218,400	33.75	4.22	44507.81	33.75	4.22	178,875	6.75	0.84	243,000
Baksa	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Cachar	8	750.3	39.02	4.88	218,487	33.76	4.22	44525.62	33.76	4.22	178,947	6.75	0.84	243,097
Chirang	7	650	33.80	4.83	189,280	29.25	4.18	44083.93	29.25	4.18	155,025	5.85	0.84	210,600
Dhubri	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Dibrugarh	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Sivasagar	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Hailakandi	6	555	28.86	4.81	161,616	24.98	4.16	43914.38	24.98	4.16	132,368	5.00	0.83	179,820
N.C.Hills	7	700	36.40	5.20	203,840	31.50	4.50	47475.00	31.50	4.50	166,950	6.30	0.90	226,800
Total	96	9,410.3	489.34	5.10	2,740,279	423.46	4.41	46536.87	423.46	4.41	2,244,357	84.69	0.88	3,048,937

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam.

Note: Urea- 52 kg/ha, Price- Rs.5.60/kg, , DAP- 45 kg/ha, Price- Rs. 10.55/kg, MOP- 45 kg/ha, Price- Rs. 5.30/kg & Bio-fertilizer-9 kg/ha., Price- Rs.36/kg

Table 4.12© gives district-wise quantity of seeds and micronutrient distributed and expenditure incurred on these for summer paddy . There were 135 demos with 200 hectares each. The quantity of distributed seeds and micronutrients varied with the number of demos in each district. A total of 1080 MT seeds were distributed

among the 13 districts @ 8 MT/demo and the total value of the seeds was to the tune of Rs.270,00,000. There was no report of distribution of Carbandazim and Pretilachlor. 675 MT of Zink Sulphate were distributed as micronutrient @ 5 MT / demo. The total expenditure involved was Rs. 2, 36, 25,000.00

Table 4.12(c)
Distribution of inputs in block demonstrations (D/C) of
Paddy (HYV) under BGREI in Summer, 2011-12

Name of the district	No. of D/C	Area Covered (Ha.)	Seed			Carbandazim			Zinc Sulphate			Pretilachlor		
			Total Qty. (MT)	Qty./D/C (MT)	Total Value (Rs.)	Total Qty. (kg)	Qty./D/C (kg)	Total Value (Rs.)	Total Qty. (MT)	Qty./D/C (MT)	Total Value (Rs.)	Total Qty. (Lit)	Qty./D/C (Lit)	Total Value (Rs.)
Kamrup	45	9000	360	8	90,00,000	-	-	-	225	5	78,75,000	-	-	-
Udalguri	9	1800	72	8	18,00,000	-	-	-	45	5	15,75,000	-	-	-
Golaghat	13	2600	104	8	26,00,000	-	-	-	65	5	22,75,000	-	-	-
Karimganj	31	6200	248	8	62,00,000	-	-	-	155	5	54,25,000	-	-	-
Jorhat	8	1600	64	8	16,00,000	-	-	-	40	5	14,00,000	-	-	-
Baksa	1	200	8	8	2,00,000	-	-	-	5	5	1,75,000	-	-	-
Cachar	5	1000	40	8	10,00,000	-	-	-	25	5	8,75,000	-	-	-
Chirang	10	2000	80	8	20,00,000	-	-	-	50	5	17,50,000	-	-	-
Dhubri	6	1200	48	8	12,00,000	-	-	-	30	5	10,50,000	-	-	-
Dibrugarh	1	200	8	8	2,00,000	-	-	-	5	5	1,75,000	-	-	-
Sivasagar	2	400	16	8	4,00,000	-	-	-	10	5	3,50,000	-	-	-
Hailakandi	4	800	32	8	8,00,000	-	-	-	20	5	7,00,000	-	-	-
N.C.Hills	0	0	0	0	0	-	-	-	0	0	0	-	-	-
Total	135	27000	1080	96	270,00,000	-	-	-	675	60	2,36,25,000	-	-	-

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note: Seed – 40 kg/ha Price- Rs. 25/kg, Zinc Sulphate – 25 kg/ha Price- Rs.35/kg

Table 4.13(a) gives the pattern of distribution of inputs under block demonstration (D/C) of summer paddy (Hybrid) in 2011-12. The block demonstration of hybrid summer rice was implemented in 6 districts only. Altogether, there were 21 demos, 6 in Kamrup district, 2 in Udalguri, 6 in Golaghat, 1 each in Jorhat and Baksa and 5 in Dhubri district. A total quantity of 63 MT seed was distributed @ 3 MT per demo. The total value involved stood at Rs. 9,450,000.00. There was no report of distribution of Carbandazim (fungicide) and Boron (micronutrient) in summer paddy (hybrid). 105 MT of Zinc Sulphate (micronutrient) was distributed @ 5 MT per demo valued at Rs. 3,675,000. A total quantity of 6720 litres of pretilachlor was distributed as herbicides @ 320 litre per demo involving a total value of Rs. 2, 688, 000.00.

Table 4.13(b) presents the pattern of distribution of inputs in block demonstration of pulses (*Rabi*) in 2010-11. There were altogether 188 demos. Nearly 469.58 MT of seeds was distributed @ 2.50 MT per demo. The total value of the

Table 4.13.a

Distribution of inputs in block demonstrations (D/C) of paddy (Hybrid) under BGREI in Summer, 2011-12

Name of the district	No. of D/C	Area Covered (Ha.)	Seed			Carbandazim			Zinc Sulphate			Boron			Prettlachlor		
			Total Qty. (MT)	Qty/ D/C (MT)	Total Value (Rs.)	Total Qty (kg)	Qty/ D/C (Kg.)	Total Value (Rs.)	Total Qty (MT)	Qty/D /C (MT.)	Total Value (Rs.)	Total Qty (kg)	Qty/ D/C (Kg.)	Total Value (Rs.)	Total Qty (Lit)	Qty/ D/C (Lit.)	Total Value (Rs.)
Kamrup	6	1,200	18	3	2,700,000	-	-	-	30	5	1,050,000	6	1	330,000	1920	320	768,000
Udalguri	2	400	6	3	900,000	-	-	-	10	5	350,000	2	1	110,000	640	320	256,000
Golaghat	6	1,200	18	3	2,700,000	-	-	-	30	5	1,050,000	6	1	330,000	1920	320	768,000
Karimganj	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Jorhat	1	200	3	3	450,000	-	-	-	5	5	175,000	1	1	55,000	320	320	128,000
Baksa	1	200	3	3	450,000	-	-	-	5	5	175,000	1	1	55,000	320	320	128,000
Cachar	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Chirang	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Dhubri	5	1,000	15	3	2,250,000	-	-	-	25	5	875,000	5	1	275,000	1600	320	640,000
Dibrugarh	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Sivasagar	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Hailakandi	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
N.C.Hills	0	0	0	-	-	-	-	-	0	-	-	0	0	0	0	-	-
Total	21	4200	63	3	9,450,000	-	-	-	105	5	3,675,000	21	1	1,155,000	6720	320	2,688,000

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note: No report of using Carbandazim,

Seed – 15kg/ha, Price- Rs. 150/kg, Zinc Sulphate – 25 kg/ha, Price- Rs.35/kg Boron – 5 kg/ha, Price- Rs.55/kg, Prettlachlor- 1.6Lit/ha., Rs. 400/Lit

Table 4.13.b
Distribution of inputs in block demonstrations (D/C) of Pulses under BGREI in rabi, 2010-11

Name of the district	No. of D/C	Seed			DAP			MOP			Bio Fertiliser			Lime		
		Total Qty (MT)	Qty/D/C (MT)	Total Value (Rs)	Total Qty (kg)	Qty/D /C (kg)	Total Value (Rs)	Total Qty (kg)	Qty/D /C (kg)	Total Value (Rs)	Total Qty (kg)	Qty/D/C (kg)	Total Value (Rs)	Total Qty (Qtl.)	Qty/D /C (Qtl.)	Total Value (Rs)
Cachar	12	30.38	2.50	2,991,375	64,395	5,300	743,762	26,730	2,200	141,669	1,215	100	43,740	4,860	4	1,676,700
Hailakandi	10	24.50	2.50	2,412,500	51,940	5,300	599,907	21,560	2,200	114,268	980	100	35,280	3,920	4	1,352,400
Karimganj	9	22.85	2.50	2,250,200	48,442	5,300	559,505	20,108	2,200	106,572	914	100	32,904	3,656	4	1,261,320
Dhubri	12	30.38	2.50	2,991,375	64,395	5,300	743,762	26,730	2,200	141,669	1,215	100	43,740	4,860	4	1,676,700
Kakrajhar	12	29.25	2.50	2,880,000	62,010	5,300	716,216	25,740	2,200	136,422	1,170	100	42,120	4,680	4	1,614,600
Kamrup	14	34.75	2.50	3,425,875	73,670	5,300	850,889	30,580	2,200	162,074	1,390	100	50,040	5,560	4	1,918,200
Nagaon	10	23.25	2.50	2,289,563	49,290	5,300	569,300	20,460	2,200	108,438	930	100	33,480	3,720	4	1,283,400
Sonitpur	9	23.18	2.50	2,282,288	49,131	5,300	567,463	20,394	2,200	108,088	927	100	33,372	3,708	4	1,279,260
Darang	13	31.88	2.50	3,139,125	67,575	5,300	780,491	28,050	2,200	148,665	1,275	100	45,900	5,100	4	1,759,500
Udalguri	9	23.15	2.50	2,279,863	49,078	5,300	566,851	20,372	2,200	107,972	926	100	33,336	3,704	4	1,277,880
Golaghat	12	30.38	2.50	2,991,375	64,395	5,300	743,762	26,730	2,200	141,669	1,215	100	43,740	4,860	4	1,676,700
Lakhimpur	14	33.25	2.50	3,274,750	70,490	5,300	814,160	29,260	2,200	155,078	1,330	100	47,880	5,320	4	1,835,400
Dhemaji	14	34.75	2.50	3,422,500	73,670	5,300	850,889	30,580	2,200	162,074	1,390	100	50,040	5,560	4	1,918,200
Karbianglong	9	23.13	2.50	2,277,438	49,025	5,300	566,239	20,350	2,200	107,855	925	100	33,300	3,700	4	1,276,500
Tinsukia	11	28.28	2.50	2,783,175	59,943	5,300	692,342	24,882	2,200	131,875	1,131	100	40,716	4,524	4	1,560,780
Jorhat	9	23.13	2.50	2,277,438	49,025	5,300	566,239	20,350	2,200	107,855	925	100	33,300	3,700	4	1,276,500
N.C.Hills	9	23.13	2.50	2,277,438	49,025	5,300	566,239	20,350	2,200	107,855	925	100	33,300	3,700	4	1,276,500
Total	188	469.58	2.50	46,246,275	995,499	5,300	11,498,013	413,226	2,200	2,190,098	18,783	100	676,188	75,132	4	25,920,540

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Note:Seed 25 kg/ha price – Black gram Rs. 97/kg Green gram Rs.101.50/kg, DAP- 53 kg/ha, Price- Rs. 10.55/kg, MOP- 22 kg/ha, Price- Rs. 5.30/kg , Bio-fertilizer-1kg/ha., Price- Rs.36/kg, Lime- 400 kg/ha., Rs.3.45/kg.

seeds stood at Rs. 4,62,46,275.00. A total quantity of 9,95,499 kg of DAP was distributed @ 5,300 kg per demo valued at Rs.1, 14, 98,013.00. The quantity of MOP distributed was of 4,13,226 kg @ 2,200 kg per demo. The total value of MOP was to the tune of Rs.21, 90,098.00. The quantity of bio fertilizer was 18,783 kg @ of 100 kg per demo involving a total value of Rs. 676,188.00. To reduce the acidity of soil, 75,132 qtl of lime was also distributed @ of 4 qtl per demo. The total value of lime was reported to be of Rs.2, 59, 20,540.00.

Table 4.14 gives the crop-wise breakup of inputs delivered in block demonstrations under BGREI in 2010-11. Altogether, there were 440 demos which include 96 demos of HYV *Kharif* paddy, 135 demos of HYV summer paddy, 21 demos of Hybrid summer paddy and 188 demos of pulses (black gram and green gram). About 1,989 MT of seeds were delivered which included 376.41 MT of HYV *Sali* paddy seeds, 1080 MT of HYV summer paddy seeds, 63 MT of hybrid summer paddy seeds and 469.58 MT of pulse seeds against 440 demos. The total value of all the seeds stood at Rs. 92,708.781.00. Together with this, 874 MT of Zinc Sulphate, 21,000 kgs of boron and 6,720 liters of pretilachlor were delivered in block demonstrations, valued at Rs. 30,593,605 for Zinc sulphate, Rs. 1,155,000 for boron and Rs. 2,688,000 for pretilachlor.

Table 4.14
Break-up of inputs delivered at a glance in block demonstrations (D/C) under BGREI, 2010-11 and 2011-12

Crop	No. of D/C	Seed		Carbandazim		Zinc Sulphate		Boron		Pretilachlor	
		Qty (MT)	Value (Rs.)	Qty (kg)	Value	Qty (MT)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (Lit)	Value (Rs.)
KHARIF (2010-11)											
HYV (Paddy)	96	376.41	10,012,506	-	-	94.10	3,293,605	-	-	-	-
Hybrid (Paddy)	-	-	-	-	-	-	-	-	-	-	-
SUMMER (Boro) (2011-12)											
HYV (Paddy)	135	1,080	270,00,000	-	-	675	2,36,25,000	-	-	-	-
Hybrid (Paddy)	21	63	9,450,000	-	-	105	3,675,000	21,000	1,155,000	6720	2,688,000
RABI (2010-11)											
Pulse	188	469.58	46,246,275	-	-	-	-	-	-	-	-
Total	440	1,989	92,708,781	-	-	874	30,593,605	21,000	1,155,000	6,720	2,688,000

Source: BGREI Cell, Directorate of Agriculture, Govt. of Assam

Adoption of deep ploughing and land preparation activities undertaken by the beneficiary and non-beneficiary respondents are presented in Table 4.15, across different sub-ecological regions. It was seen that all the beneficiary famers had

adopted both the activities while the adoption level of non-beneficiary farmers ranged between 40 to 80 per cent against deep ploughing operation.

Table 4.15
Adoption of deep ploughing and land preparation
at the farm level by the respondents

Sl. No.	Particulars	Beneficiary		Non-beneficiary		Extent of change	
		Adopted	Not-adopted	Adopted	Not-adopted	Beneficiary	Non-beneficiary
Rainfed Upland: District: Kamrup							
1.	Deep ploughing	100.00	0.00	60.00	40.00	100.00	60.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00
Rainfed Shallow Low Land: District: Udalguri							
1.	Deep ploughing	100.00	0.00	40.00	60.00	100.00	40.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00
Rainfed Medium: District: Golaghat							
1.	Deep ploughing	100.00	0.00	60.00	40.00	100.00	60.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00
Rainfed Deep Water: District: Karimganj							
1.	Deep ploughing	100.00	0.00	80.00	20.00	100.00	80.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00
Irrigated: District: Jorhat							
1.	Deep ploughing	100.00	0.00	60.00	40.00	100.00	60.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00
State: Assam							
1.	Deep ploughing	100.00	0.00	60.00	40.00	100.00	60.00
2.	Land preparation	100.00	0.00	100.00	0.00	0.00	0.00

Source: Field Survey

Table 4.16(a)
Package of practices in block demonstrations at the farm level in Kharif Paddy

Package of practices	Unit	Prescribed under BGREI programme	Adopted by the beneficiary farmer	Adopted by the non-beneficiary farmer	Gap if any (%)	
					Beneficiary	Non-beneficiary
Rainfed Upland: District: Kamrup						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	Nil	-	-	-	-
(b) 25-50 cm		Nil	-	-	-	-
(c) 50-100 cm		Nil	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	Nil	-	-	-	-
(b) 50% direct transplanted		Nil	-	-	-	-
(c) 100% transplanting		Nil	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	23.50	100.00
Seed treatment	Qty	Nil	-	-	-	-
Zinc	Qty	10kg	yes	no	0.00	100.00
Boron	Qty	Nil	-	-	-	-
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Rainfed Shallow Low Land: District: Udalguri						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	Nil	-	-	-	-
(b) 25-50 cm		Nil	-	-	-	-
(c) 50-100 cm		Nil	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	Nil	-	-	-	-
(b) 50% direct transplanted		Nil	-	-	-	-
(c) 100% transplanting		Nil	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	10.75	0.00
Seed treatment	Qty	Nil	-	-	-	-

table-4.16.a contd..						
Zinc	Qty	10kg	yes	no	100.00	0.00
Boron	Qty	Nil				
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Rainfed Medium: District: Golaghat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	Nil	-	-	-	-
(b) 25-50 cm		Nil	-	-	-	-
(c) 50-100 cm		Nil	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	Nil	-	-	-	-
(b) 50% direct transplanted		Nil	-	-	-	-
(c) 100% transplanting		Nil	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	23.50	0.00
Seed treatment	Qty	Nil	-	-	-	-
Zinc	Qty	10kg	yes	no	100.00	0.00
Boron	Qty	Nil				
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Rainfed Deep Water: District: Karimganj						
Deep ploughing and land preparation						
00-15 cm	Rs.	Nil	-	-	-	-
25-50 cm		Nil	-	-	-	-
50-100 cm		Nil	-	-	-	-
Direct seeding						
50% direct seeding	Rs.	Nil	-	-	-	-
50% direct transplanted		Nil	-	-	-	-
100% transplanting		Nil	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	10.75	0.00
Seed treatment	Qty	Nil	-	-	-	-
Zinc	Qty	10kg	yes	no	100.00	0.00
Boron	Qty	Nil				
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Irrigated: District: Jorhat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	Nil	-	-	-	-
(b) 25-50 cm		Nil	-	-	-	-
(c) 50-100 cm		Nil	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	Nil	-	-	-	-
(b) 50% direct transplanted		Nil	-	-	-	-
(c) 100% transplanting		Nil	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	10.75	0.00
Seed treatment	Qty	Nil	-	-	-	-
Zinc	Qty	10kg	yes	no	100.00	0.00
Boron	Qty	Nil				
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
State: Assam						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	Nil	-	-	-	-
(b) 25-50 cm		Nil	-	-	-	-
(c) 50-100 cm		Nil	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	Nil	-	-	-	-
(b) 50% direct transplanted		Nil	-	-	-	-
(c) 100% transplanting		Nil	-	-	-	-

Seed	Qty	40 kg/ha. (HYV)	yes	no	16.33	0.00
Seed treatment	Qty	Nil	-	-	-	-
Table-4.16.acontd..						
Zinc	Qty	10kg	yes	no	100.00	0.00
Boron	Qty	Nil	-	-	-	-
Weed Management						
Pretilachlor	Qty	Nil	-	-	-	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-

Source: Field Survey

Table 4.16(b)
Package of practices in block demonstrations at the farm level in Summer Paddy

Package of practices	Unit	Prescribed under BGREI programme	Adopted by the beneficiary farmer	Adopted by the non-beneficiary farmer	Gap if any (%)	
					Beneficiary	Non-beneficiary
Rainfed Upland: District: Kamrup						
Deep ploughing land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		1500/ ha.	Yes	Yes	16.67	0.00
(c) 50-100 cm		-	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		120.85/ ha.	Yes	Yes	92.30	0.00
Seed	Qty	40 kg/ha. (HYV) 15 kg/ha.(Hybrid)	yes	no	23.53 100.00	- -
Seed treatment	Qty	Nil	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Boron	Qty	NIL	-	-	-	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-
Rainfed Shallow Low Land: District: Udalguri						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		1500/ ha.	Yes	Yes	16.67	0.00
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	23.53	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	25 kg/ha.	yes	no	100.00	-
Boron	Qty	5 kg/ha.	yes	no	100.00	-
Weed Management						
Pretilachlor	Qty	1.6 Lit/ha.	yes	no	100.00	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Rainfed Medium: District: Golaghat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		1500/ ha.	Yes	Yes	16.67	0.00
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	23.53	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	25 kg/ha.	yes	no	100.00	-
Boron	Qty	5 kg/ha.	yes	no	100.00	-
Weed Management						
Pretilachlor	Qty	1.6 Lit/ha.	yes	no	100.00	-

Table-4.16(b) contd..						
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Rainfed Deep Water: District: Karimganj						
Deep ploughing and land preparation						
00-15 cm	Rs.	NIL	-	-	-	-
25-50 cm		1500/ ha.	Yes	Yes	16.67	0.00
50-100 cm		NIL	-	-	-	-
Direct seeding						
50% direct seeding	Rs.	NIL	-	-	-	-
50% direct transplanted		NIL	-	-	-	-
100% transplanting		NIL	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	25.63	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	25 kg/ha.	yes	no	100.00	-
Boron	Qty	5 kg/ha.	yes	no	100.00	-
Weed Management						
Pretilachlor	Qty	1.6 Lit/ha.	yes	no	100.00	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
Irrigated: District: Jorhat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		1500/ ha.	Yes	Yes	16.67	0.00
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	yes	no	10.75	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	25 kg/ha.	yes	no	100.00	-
Boron	Qty	-	-	-	-	-
Weed Management						
Pretilachlor	Qty	1.6 Lit/ha.	yes	no	100.00	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-
State: Assam						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		1500/ ha.	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	40 kg/ha. (HYV)	-	-	21.71	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	25 kg/ha.	yes	no	100.00	-
Boron	Qty	5 kg/ha.	yes	no	100.00	-
Weed Management						
Pretilachlor	Qty	1.6 Lit/ha.	yes	no	100.00	-
Conoweeder	Rs.	Nil	-	-	-	-
Manual	Rs.	Nil	-	-	-	-
Plant protection	Rs.	Nil	-	-	-	-

Source: Field Survey

Table 4.16(c)

Package of practices in block demonstrations at the farm level in *Rabi* Pulses

Package of practices	Unit	Prescribed under BGREI programme	Adopted by the beneficiary farmer	Adopted by the non-beneficiary farmer	Gap if any (%)	
					Beneficiary	Non-beneficiary
Rainfed Upland: District: Kamrup						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		NIL	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Lime	Qty	4 qtls./ha.	yes	no	87.50	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-
Rainfed Shallow Low Land: District: Udalguri						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		NIL	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Lime	Qty	4 qtls./ha.	yes	no	85.00	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-
Rainfed Medium: District: Golaghat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		NIL	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Lime	Qty	4 qtls./ha.	yes	no	87.50	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-

Table-4.16.(c) contd..

Package of practices	Unit	Prescribed under BGREI programme	Adopted by the beneficiary farmer	Adopted by the non- beneficiary farmer	Gap if any (%)	
					Beneficiary	Non- beneficiary
Rainfed Deep Water: District: Karimganj						
Deep ploughing and land preparation						
00-15 cm	Rs.	NIL	-	-	-	-
25-50 cm		NIL	-	-	-	-
50-100 cm		NIL	-	-	-	-
Direct seeding						
50% direct seeding	Rs.	NIL	-	-	-	-
50% direct transplanted		NIL	-	-	-	-
100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Lime	Qty	NIL	-	-	-	-
Boron	Qty	4 qtls./ha.	yes	no	90.00	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-
Irrigated: District: Jorhat						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		NIL	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Lime	Qty	4 qtls./ha.	yes	no	85.00	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Conoweeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-
State: Assam						
Deep ploughing and land preparation						
(a) 00-15 cm	Rs.	NIL	-	-	-	-
(b) 25-50 cm		NIL	-	-	-	-
(c) 50-100 cm		NIL	-	-	-	-
Direct seeding						
(a) 50% direct seeding	Rs.	NIL	-	-	-	-
(b) 50% direct transplanted		NIL	-	-	-	-
(c) 100% transplanting		NIL	-	-	-	-
Seed	Qty	25 kg/ha. (HYV)	yes	no	33.07	-
Seed treatment	Qty	NIL	-	-	-	-
Zinc	Qty	NIL	-	-	-	-
Lime	Qty	4 qtls./ha.	yes	no	87.00	-
Weed Management						
Pretilachlor	Qty	NIL	-	-	-	-
Cono weeder	Rs.	NIL	-	-	-	-
Manual	Rs.	NIL	-	-	-	-
Plant protection	Rs.	NIL	-	-	-	-

Source: Field Survey

Tables 4.16 (a), 4.16(b) and 4.16 (c) show the detailed package of practices adopted in block demonstrations at the farm level for *Kharif* paddy, Summer paddy and Pulses across the sub ecological regions of 5 sample districts. In *Kharif* paddy demos, there was no report of adoption of prescribed package of practices [Table-4.16

(a)] except for the use of HYV seeds @ 40 kg per hectare and Zinc Sulphate @ 10 kg sulphate @10 kg per hectare. The beneficiary farmers reported that these two inputs were supplied to them free of cost. Fertilizers were also supplied to them free of cost. Some gaps were noticed in case of seed rate per hectare. A gap of 23.50 per cent was found in Kamrup and Golaghat district and 10.75 per cent in Udalguri, Karimganj and Jorhat district. In the State as a whole, the seed gap was found at 16.33 per cent. In case of use of micronutrient, 100 per cent gap was noticed in all the districts. There was no report of use of HYV seeds and micronutrients in case of non beneficiaries. Therefore, the gap could not be ascertained for these two inputs.

In Summer paddy demos [Table 4.16 (b)], there was no report of adoption of prescribed package of practices except for land preparation @ Rs. 1500/- per hectare, transplanting @ Rs. 120.85/- per hectare (only in Kamrup district at the time of field visit), use of HYV and Hybrid seeds @ 40 kg and 15 kg per hectare, respectively. Zinc sulphate, boron and Pretilachlor were supplied free of cost at the rate of 25 kg per hectare, 5 kg per hectare and 1.6 lit per hectare, respectively in all the sample districts except for Kamrup. Similar observations were observed in case of *Rabi* pulses as well as indicated in Table-4.16 (c).

Table 4.17 gives the component-wise physical and financial target and achievement under asset building activities in Assam during 2011-12. As per programme design, there were 5 components under asset building activities. Of the 5 components, only 2 components were undertaken *viz.*, installation of shallow tube well and

Table 4.17
Component-wise physical and financial targets and achievements
in asset building activities in Assam (2011-12)

Component	Physical target under BGREI*		Physical achievement under BGREI**		Achievement (%)	
	Number	Amount sanctioned	Number	Amount utilised	Physical	Financial
Shallow tube well	5,000	600.00	5,000	600.00	100.00	100.00
Pump sets	500	50.00	In process	50.00	In process	100.00
Dug well/bore well	-	-	-	-	-	-
Re-excavation of ponds	-	-	-	-	-	-
Total	5,500	650.00	-	-	-	-

Source: Agril. Engineering Wing & BGREI Cell, Directorate of Agriculture, Govt. of Assam

distribution of Pump sets. There was a target for installation of 5000 shallow tube wells and for this, an amount of Rs. 600 lakh was sanctioned. And there has been 100% achievement against STW-component as reported by the State Agriculture Department. In case of distribution of 500 pump sets, an amount of Rs.50 lakh was sanctioned.

During the visits to the sample districts, it was reported that the pump sets were procured & received by the respective district head quarters, but it is yet to reach the beneficiary. At this stage, it would be difficult to record specific comments against the physical achievements. Cent per cent financial achievement had been reported for both the components under asset building activities.

Table 4.18 gives component-wise physical and financial target and achievement in site specific activities in Assam during 2011-12. There were 5 components under this programme to be implemented by the Chief Engineer, Directorate of Agriculture with a sum of Rs 709.00 lakh. An amount of Rs.373.10 lakh was sanctioned for installation of 29 numbers of power lines for operating STW on cluster basis @10 numbers per cluster. As per report of the Chief Engineer,

Table 4.18
Component-wise physical and financial targets and achievements
in site specific activities in Assam (2011-12)

(Rs. In Lakhs.)

Component	Amount sanctioned under BGREI*	Physical achievement under BGREI		Achievement (%)	
		Number	Amount utilised	Physical	Financial
(i) Power line provision for about 1500 metre with transformer for plaster of electrically operated pump sets for STW/LLP (@ 10 Nos. / Cluster)	709.00	29	373.10	In Process	100.00
(ii) Thresher with prime mover (Community farmer groups)		35	31.50	In Process	100.00
(iii) Thresher without prime mover for individual		40	18.00	In Process	100.00
(iv) H.C. Sprayer for individual		10,092	127.16	100.00	100.00
Sub-Total		549.76			
(v) Water harvesting tank/farm pond for irrigation to individual		38	159.24	In Process	100.00
Total	709.00	709.00			

Source: Agril. Engineering Wing & BGREI Cell, Directorate of Agriculture, Govt. of Assam

Agriculture, the detailed Project Report preparation in consultation with the Assam State Electricity Board (ASEB) is under process for installation of power lines and it is expected to be completed by December, 2012. An amount of Rs. 31.50 lakh was sanctioned for 35 threshers with prime mover for community farmer group and Rs. 18.00 lakh was sanctioned for 40 numbers of threshers without prime mover for individual farmer. Quotations for both the components have already been floated and the rates are going to be finalized soon. Rs.159.24 lakh was sanctioned for 38 numbers of water harvesting tanks/farm ponds for providing irrigation to individual farmers. This component is also in progress and expected to be completed by

November, 2012. As per records, the site specific activities attained 100 per cent financial achievement, but the physical targets are lagging behind. If all these programmes are implemented in right earnest, the farmers will be benefited to a large extent.

Table 4.19
Intervention-wise physical and financial progress at a glance
in BGREI programme in Assam (2010-11 & 2011-12)

Type of interventions	Amount sanctioned by GOI (Rs. in crores)*			Physical and financial progress (Rs. in lakhs)**		Achievement (%)	
	2010-11	2011-12	Total	No.	Amount utilised	Physical	Financial
A. Block demonstrations							
• Rice HYV(Kharif)(2010-11)				96	300.00	100.00	100.00
• Rice HYV (Summer)(2011-12)				135	1670.13	100.00	100.00
• Rice Hybrid (Summer)(2011-12)				21	298.494	100.00	100.00
• Pulse HYV(Rabi)(2010-11)				188	800.00	100.00	100.00
• Maize Hybrid (Rabi)(2010-11)				49	300.00	100.00	100.00
Sub-total (A)				440	3368.494	-	-
B. Asset building activities							
• Shallow tube well (2011-12)				5,000	600.00	100.00	100.00
• Pump sets(LLP) (2011-12)				500	50.00	In Process	100.00
• Dug well/bore well (2011-12)				-	-	-	-
• Re-excavation of ponds (2011-12)				-	-	-	-
Sub-total (B)				5,500	650.00	-	-
C. Site specific activities							
• H.C. Sprayer (for individual) (2010-11)				7,937	100.00	100.00	100.00
• H.C. Sprayer (for individual) (2011-12)				10,092	127.16	100.00	100.00
• Rs.1260/sprayer Govt. Share & Rs. 540/sprayer farmers share							
• Amelioration of Acid Soil (2010-11)	17.50	33.32	50.82	50,000 Ha. area	250.00	100.00	100.00
• Powerline provision for about 1,500 m with transformer for operating STW/LLP in cluster basis @ 10 nos./cluster (2011-12)				29	373.10	In process (Expected completion by December 2012)	100.00
• Thresher with prime mover for community farmer Group (2011-12)				35	31.50	In process (Expected completion by October 2012)	100.00
• Thresher without prime mover (for individual) (2011-12)				40	18.00	In process (Expected completion by October 2012)	100.00
• Water Harvesting Structure (Pond) for irrigation to individual				38	159.24	In process (Expected completion by November 2012)	100.00
• Total site Specific training expences				-	4.506	-	100.00
Sub-total (C)	-	-	-	-	1063.326	-	-
Grand Total (A+B+C)	17.50	33.32	50.82	-	5082.00	-	-

Source: Agril. Engineering Wing. & BGREI Cell, Directorate of Agriculture, Govt. of Assam

Table 4.19 gives the detailed intervention-wise physical and financial progress at a glance under the BGREI programme in Assam. The Government of India

sanctioned 17.50 crores in 2010-11 and Rs. 33.32 crores in 2011-12 and the total sanctioned amount stood at Rs.50.82 crores. The type of interventions such as block demonstrations of HYV *Kharif* paddy with 96 demos, HYV Summer paddy with 135 demos, Hybrid summer paddy with 21 demos, block demonstration of pulses (Black gram/Green gram) HYV with 188 demos and Hybrid Maize with 49 demos attained 100 per cent achievement in terms of physical and financial progress. But in case of asset building activities and site specific activities, most of the activities are in process and it will take some more time to achieve 100 per cent target in physical terms. Delay in release of funds together with lengthy administration procedure may perhaps be ascribed to such delay in achieving the targets.

Chapter -V

Evaluation of Monitoring Process

5.1 Details about SLMTs

The State Level Monitoring Team (SLMT) (Table-5.1) is set up under the Chairmanship of Addl. Secretary/Joint Secretary of the Department of Agriculture & Cooperation. The team includes CRRI representative of the State, the Director of Agriculture and a few resourceful personnel as proposed by the Director as members. The team meets once in every month to review the district-wise progress of implementation of various interventions. This monitoring team acts as the main bridge between the CSC (Central Steering Committee), SLMT and the District Level Monitoring Team (DLMT). As per report of the departmental officials, there were 12 SLMT meetings in 2010-11 and 6 meetings in 2011-12. The meetings reviewed all ongoing programmes in the State of Assam and recommended remedial measures to be adopted for proper implementation of the programme where there were gaps. The meetings also emphasized on constant supervision of all the activities and proper coordination with the farmers. The SLMT gets feedback from the district Krishi Vigyan Kendras (KVKs) and Assam Agricultural University (AAU) as they function in close coordination with the State Directorate of Agriculture.

Table 5.1

State Level Monitoring Teams for BGREI in Assam

State	AS/JS (Chairman of SLMC)	Technical expert	State Representatives	Partner Institute of CRR I
Assam	Joint Secretary (PP), DAC	Addl. Comm. (Crops), DAC	Director of Agriculture, Govt. of Assam.	VC/Scientist, AAU, Jorhat

5.2 Details about DLMTs

It has been observed that there was a 5 member District Level Monitoring Team (DLMT) with DAO/Dy Director of the concerned district as the Chairman to monitor all the activities under BGREI and they are to hold meeting frequently to review the problems faced by the farmers and to suggest all possible remedies thereto. The composition of the DLMT is as follows:

Sl.No.	Member with designation	Status
1	District Agricultural Officer//Dy. Director of the concerned district	Chairman
2	Scientist of district level KVK	Member
3	ATMA consultant of the district	Member
4	District representative of Agril. Engineering Department	Member
5	District representative of Irrigation/Water Resource Department	Member

However, no official record could be traced in regard to frequency of the meetings during the reference period. As per information of the State Agriculture Department, there were 5 to 6 numbers of DLMT meetings during the interim period to execute the programmes as per the annual work plan approved by the Ministry.

Chapter -VI

Results and Discussions

In course of the investigation, an attempt was also made to know the socio-economic conditions of the sample farmers based on some specific indicators. The size of holding is considered to be one of the important parameters for judging the economic status of a farmer. Table 6.1 gives the average size of operational holdings by farm size groups for beneficiary and non beneficiary farmers along with the number of famers in each size group. Average size of holding was found to be 0.77 hectare for beneficiary and 0.79 hectare for non-beneficiary farmers in marginal size group, 1.67 hectares for both beneficiaries & non-beneficiaries in small size group, 2.69 hectares for beneficiary and 3.98 hectares for non beneficiary farmers in medium size group and 4.6 hectares for beneficiaries in large size group. There were no farmers under large size group in case of non-beneficiaries. The overall average size of holding was 1.89 hectares for beneficiary farmers and 1.61 hectares for non beneficiaries. Of the 50 sample beneficiaries, 20 farmers (40%) belonged to marginal size group, 16 (32%) belonged to small size group, 12 (24%) farmers belonged to medium size group and 2 (4%) farmers belonged to large size group while in case of non-beneficiary farmers, 12 farmers (48%) belonged to marginal size group, 9 (36%) belonged to small size group, 4 (16%) farmers belonged to medium size group and no farmers were found under large size group.

Table 6.1
Size of holding of the sample farmers

Size of land holdings (In hectare)	Average size of holdings		Number of farmers	
	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary
Marginal(Less than 1.00)	0.77	0.79	20 (40.00)	12 (48.00)
Small (1.00-2.00)	1.67	1.67	16 (32.00)	9 (36.00)
Medium(2.00-4.00)	2.69	3.98	12 (24.00)	4 (16.00)
Large (4.00-10.00)	4.60	0.00	2 (4.00)	0 (0.00)
Overall	1.89	1.61	50 (100.00)	25 (100.00)

Source: Figures within brackets indicate percentages to the total No. of farmers in respective categories.

Table 6.2 gives a comparative picture of the level of education between beneficiary and non beneficiary farmers by different standards. By and large, cent per cent literacy was found in both the categories. But there was a distinct variation in the level education by different standards. The highest no of (44 per cent) farmers in both the categories were found in secondary/higher secondary level and only 12 per cent of the beneficiary farmers attained the graduate and technical degree level of

education and it was 8 per cent in case of non beneficiary farmers. Further 30 per cent of the beneficiary farmers completed primary standard and it was 28 per cent in case of non-beneficiary farmers. In middle standard, it was 14 per cent for beneficiary and 20 per cent for non-beneficiary farmers. No farmers were found to have attained post graduate & above level of education in any of the categories. However, the farmers under both the categories had shown interest to raise their educational status to a possible extent.

Table 6.2
Level of education of the sample farmers

Level of education	Beneficiary	Non-beneficiary
Illiterate	0 (0.00)	0 (0.00)
Primary	15 (30.00)	7 (28.00)
Middle	7 (14.00)	5 (20.00)
Secondary/Higher Secondary	22 (44.00)	11 (44.00)
Graduate/Technical Degree	6 (12.00)	2 (8.00)
Post Graduate & above	0 (0.00)	0 (0.00)
Total	50 (100.00)	25 (100.00)

Source: Field Survey data

Note: Figures within brackets indicate percentages.

Test of Homogeneity of the sample farmers

All the respondents belonging to rainfed shallow low land, rainfed medium, and rainfed deep water and the State as a whole were found to be homogeneous in respect of level of education and size of holding (Table-6.2a) from their correlation co-efficients.

Table 6.2(a)
Test of homogeneity of the sample farmers

Particulars	Rho value	Remarks
Rainfed Upland: District: Kamrup		
Level of education	0.337	Heterogeneous
Size of holding		
Rainfed Shallow Low Land: District: Udalguri		
Level of education	0.516	Homogeneous
Size of holding		
Rainfed Medium: District: Golaghat		
Level of education	0.644	Homogeneous
Size of holding		
Rainfed Deep Water: District: Karimganj		
Level of education	0.611	Homogeneous
Size of holding		
Irrigated: District: Jorhat		
Level of education	0.381	Heterogeneous
Size of holding		
State: Assam		
Level of education	0.558	Homogeneous
Size of holding		

Source: Field Survey data

Further, the χ^2 (Chi-square) test for homogeneity of correlation coefficients was also tried with the help of the test statistics as given below:

$$\chi^2 = \sum_{i=1}^k (n_i - 3) (z_i - Z)^2 \quad \text{with } k-1 \text{ d.f.}$$

$$= \sum_{i=1}^k (n_i - 3) (z_i)^2 - \frac{\sum (n_i - 3) z_i)^2}{\sum (n_i - 3)}$$

where, $Z_i = \frac{1}{2} \log_e \frac{1+r_i}{1-r_i}$

The calculated value of the χ^2 (9.38) at 4 degrees of freedom was less than the table value of χ^2 at 5 per cent level of significance. It indicates that there was a homogeneity of beneficiary samples as a whole across the different ecology in respect of level of education and size of holding.

Table 6.3 shows the economic activities of the farmers by occupations. In case of beneficiary respondents, 78 per cent farmers were involved in self-employed farming while it was 88 per cent in case of non-beneficiaries which indicate that the cultivation is the main source of their livelihood. Besides cultivation, 8 per cent beneficiary farmers had petty salaried job, 4 per cent of the sample farmers were reported to be pensioner and another 4 per cent engaged themselves as agricultural labourer in both the groups who used to work in nearby crop field. During off time, 6 per cent beneficiary farmers and 8 per cent non-beneficiary farmers earned

Table 6.3
Occupation of the sample farmers

Occupational status	Number of farmers	
	Beneficiary	Non-beneficiary
Self-employed Farming	39 (78.00)	22 (88.00)
Self-employed Non-farming / Business	0 (0.00)	0 (0.00)
Salaried Person	4 (8.00)	0 (0.00)
Agriculture Labour	2 (4.00)	1 (4.00)
Non-agricultural Labour	3 (6.00)	2 (8.00)
Pensioner	2 (4.00)	0 (0.00)
Household Work	0 (0.00)	0 (0.00)
Student	0 (0.00)	0 (0.00)
Others (specify)	0 (0.00)	0 (0.00)
Total	50 (100.00)	25 (100.00)

Source: Field Survey data

Note: Figures within brackets indicate percentages.

additional income by engaging themselves as non agricultural laborer. No students were reported to be engaged in any economic activities of the farm family and there was no report of farmer's engagement in household work.

Mean Difference Test

Econometric Analytical Model for the study:

The particular form is : $Z = (\bar{X}_1 - \bar{X}_2) / \sigma \left(\frac{1}{N_1} + \frac{1}{N_2} \right)^{1/2}$

Where, Z = Standard Normal Variate

\bar{X}_1 = Mean of Series1 (Say Beneficiaries)

\bar{X}_2 = Mean of Series 2 (Say Non-beneficiaries)

σ = Standard Deviation

N_1 = Number of observations in series 1(Say Beneficiaries)

N_2 = Number of observations in series 2(Say Non-beneficiaries)

The Result of Mean Difference Test:

The above mentioned modal is used to test whether there was any difference between the yield rate of beneficiary and non-beneficiary farmers. Test was done under the three crops viz., *Kharif* paddy (Table-6.4), summer paddy (Table-6.5) and pulses (Table-6.6) under BGREI programme in the State. The test clearly spelled

Table-6.4
Result of Mean Difference Test for *Kharif* Paddy

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	50	25
Mean (yield)	4708.85	3668.10
SD	474.78	486.72
SE of Mean	67.15	97.34
	Equal variance assumed	Equal variance not assumed
t-statistic	8.014*	7.947*
Degree of Freedom	73	47

* indicates significant at 0.01 level

Source: Calculated from field data

Table-6.5
Result of Mean Difference Test for Summer Paddy

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	50	25
Mean(yield)	5657.75	4504.21
SD	480.77	450.34
SE of Mean	68.00	90.07
	Equal variance assumed	Equal variance not assumed
t-statistic	9.878*	10.098*
Degree of Freedom	73	51

* indicates significant at 0.01 level

Source: Calculated from field data

out that there was a significant difference in yield rate of each crop between beneficiary and non-beneficiary farmers and were found statistically significant at 0.01 per cent probability level. It also indicated that the yield rate for beneficiary farmers was higher than that of the non-beneficiary farmers.

Table-6.6
Result of Mean Difference Test for Pulses

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	40	20
Mean(yield)	684.46	614.57
SD	187.36	221.23
SE of Mean	29.65	49.49
	Equal variance assumed	Equal variance not assumed
t-statistic	1.489*	1.408*
Degree of Freedom	58	33

* indicates significant at 0.01 level

Source: Calculated from field data

Impact of BGREI intervention on rice based cropping system was assessed in terms of operation-wise productivity and net return per hectare of *Kharif* paddy against the beneficiaries and non-beneficiaries across the sub ecological region during 2010-11 and are presented in Table-6.7. In Kamrup district under rainfed upland situation, the highest productivity of *Kharif* paddy in case of beneficiary farmers was recorded with 4,923 kg per hectare followed by 4,883 kg per hectare in Karimganj under the deep water sub region, 4,845 kg per hectare in Udalguri under the rain fed low land sub region, 4,788 kg per hectare in Golaghat under medium deep water sub region and 4,105 kg per hectare in Jorhat district under irrigated sub region. Productivity in respect of non-beneficiaries across the sub regions was at lower level as compared to the beneficiary farmers. Per hectare net return of beneficiary farmers was at higher side than that of non-beneficiary farmers. Combining all sub ecological regions, the average yield rate stood at 4,709 kg and 3,667 kg per hectare for beneficiaries and non-beneficiaries, respectively, registering an increase of 22.13 per cent over the non-beneficiaries. On an average, for all the sub ecological region, the net return per hectare stood at Rs, 17,287 (excluding benefit) and Rs 14,429 (including benefit) in case of beneficiaries and Rs. 10,025 in case of non-beneficiaries. The cost benefit ratio including benefit stood at 1.58 for beneficiary farmers and 1.48 for non-beneficiary farmers. Higher per hectare yield was the main reason behind the differences.

Table- 6.7

Operation-wise productivity and net return per hectare of the beneficiaries and non-beneficiaries in rice (*Kharif*) cultivation (2010-11)

Activity	Rainfed upland		Rainfed lowland (shallow)		Medium deep water		Deep water		Irrigated		All Ecological Regions	
	beneficiary 4 ha	Non- beneficiary 3.51 ha	beneficiary 4ha	Non- beneficiary 3.88 ha	beneficiary 4 ha.	Non- beneficiary 8.07	beneficiary 4ha	Non- beneficiary 7.07	beneficiary 4 ha	Non- beneficiary 2.38 ha	beneficiary 20 ha	Non- beneficiary 24.90 ha
I	Specific to BGREI intervention											
i Deep ploughing and land preparation	6,000	0	6,000	0	6,000	0	0	0	0	0	18,000	0
ii. Seeds	4,000	0	4,000	0	4,000	0	4,000	0	4,000	0	20,000	0
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Weed management	0	0	0	0	0	0	0	0	0	0	0	0
v. Fertiliser	0	0	7,209	0	4,300	0	0	0	8,730	0	20,239	0
vi. Bio fertiliser	0	0	1,490	0	1,500	0	4,020	0	414	0	7,424	0
vii Micro-nutrients	460	0	460	0	460	0	460	0	460	0	2,300	0
viii Direct seeding /transplanting	0	0	0	0	0	0	0	0	0	0	0	0
a. Line sowing by drum seeders	0	0	0	0	0	0	0	0	0	0	0	0
b. Transplanting	0	0	0	0	0	0	0	0	0	0	0	0
ix. Plant protection	0	0	0	0	0	0	0	0	0	0	0	0
II. Inputs used by the farmer at his own cost	10,460	0	19,159	0	16,260	0	8,480	0	13,604	0	67,963	0
i. Land preparation	25,720	21,294	16,400	15,930	23,616	46,238	21,000	36,740	17,050	10,950	103,786	131,152
ii. Seeds	3,840	5,689	6,520	15,190	4,142	4,223	8,070	21,920	5,870	8,130	28,442	55,152
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Manures	5,375	4,435	6,080	3,640	4,665	3,670	16,860	28,250	3,735	2,650	36,715	42,645
v. Transplanting	7,210	3,487	9,690	9,350	7,351	9,145	3,410	6,670	6,500	2,300	34,161	30,952
vi. Soil amendments			0	0	1,200	0	0	0	0	0	1,200	0
vii. Fertilizers	3,344	4,520	3,600	7,621	10,526	7,968	3,440	8,425	3,600	5,367	24,510	33,900
viii. Bio-fertilizers	720	850	600	630	985	0	750	0	614	367	3,669	1,847
ix Micro-nutrients	120	0	120	915	120	1,845	120	4,901	120	0	600	7,661
x Irrigation	0	0	2,650	880	5,761	7,232	0	0	10,880	2,400	19,291	10,512
xi Weeding	1,600	1,250	5,400	1,520	0	0	0	0	2,280	720	9,280	3,490
xii Plant protection	0	0	0	0	0	0	0	0	0	0	0	0
xiii Harvesting	14,205	11,235	17,195	14,100	18,223	34,073	15,000	25,650	9,000	5,750	73,623	90,808
xiv. Threshing	19,450	21,520	15,850	12,100	15,530	18,294	16,030	25,570	13,990	9,430	80,850	86,914
III. Land revenue paid	150	135	109	106	150	302	180	318	109	73	698	934
IV. Interest on capital paid	3,625	3,183	3,378	3,275	3,835	4,589	3,417	6,325	2,641	2,223	16,896	19,595
V. Grand total of cost	95,819	77,598	106,752	85,256	112,364	137,579	96,757	164,769	89,993	50,358	501,685	515,561
VI. Cost per hectare (excluding benefit)	21,340	22,108	21,898	21,973	24,026	17,048	22,069	23,305	19,097	21,088	21,686	20,705
VII. Cost per hectare (including benefit)	23,955	22,108	26,688	21,973	28,091	17,048	24,189	23,305	22,498	21,159	25,084	20,705
VIII. Total quantity produce (Qtl)	196.92	125.51	193.81	160.87	191.52	231.61	195.32	287.89	164.20	89.27	941.77	895.15
a. Grain yield rate (kg./ha)	4,923	3,586	4,845	4,146	4,788	2,870	4,883	4,072	4,105	3,751	4,709	3,667
b. Straw yield (qtl./ha)	207	189	125	116	120	141	141	129	186	121	155	126
IX. Value of the produce	157,536	114,104	155,046	118,548	167,259	211,690	172,269	246,035	138,147	74,807	790,257	765,184
X. Net return per hectare(Excluding benefit)	18,044	10,401	16,864	8,580	17,789	9,184	20,998	11,494	15,440	10,343	17,827	10,025
XI. Net return per hectare(including benefit)	15,429	10,401	12,074	8,580	13,724	9,184	18,878	11,494	12,039	10,273	14,429	10,025
B.C.R	1.64	1.47	1.45	1.39	1.49	1.54	1.78	1.49	1.54	1.49	1.58	1.48

Note: Cost includes all average expenses incurred in terms of money in production process by the farmers.

Table- 6.8
Operation-wise productivity and net return per hectare of the beneficiaries and non-beneficiaries in Pulses cultivation (2010-11)

Activity	Rainfed upland		Rainfed lowland (shallow)		Medium deep water		Deep water		Irrigated		All Ecological Regions	
	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary
			3.88 ha	3.88 ha	4 ha.	8.07	4ha	7.07	4 ha	2.38 ha	20 ha	24.90 ha
I. Specific to BGREI intervention												
i. Deep ploughing and land preparation	0	0	0	0	0	0	0	0	0	0	0	0
ii. Seeds	0	0	5,940	0	4,950	0	9,900	0	9,900	0	30,690	0
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Soil amelioration	0	0	450	0	0	0	1,450	0	0	0	1,900	0
v. Weed management	0	0	0	0	0	0	0	0	0	0	0	0
vi. Fertiliser	0	0	2,818	0	2,150	0	2,710	0	0	0	7,678	0
vii. Bio fertiliser	0	0	109	0	1,888	0	0	0	50	0	2,047	0
viii. Micro-nutrients	0	0	0	0	0	0	0	0	0	0	0	0
ix. Direct seeding/transplanting	0	0	0	0	0	0	0	0	0	0	0	0
a. Line sowing by drum seeders	0	0	0	0	0	0	0	0	0	0	0	0
b. Transplanting	0	0	0	0	0	0	0	0	0	0	0	0
x. Plant protection	0	0	0	0	0	0	0	0	0	0	0	0
II. Inputs used by the farmer at his own cost	0	0	9,317	0	8,988	0	14,060	0	9,950	0	42,315	0
i. Land preparation	0	0	4,200	790	7,900	2,805	10,000	4,000	15,800	6,475	37,900	14,070
ii. Seeds	0	0	700	720	1,230	2,002	3,010	4,703	2,250	3,050	7,190	10,475
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Sowing	0	0	1,525	280	1,080	1,220	3,000	1,125	1,530	800	7,135	3,425
v. Manures	0	0	0	0	1,060	930	8,180	3,200	3,890	1,890	13,130	6,020
vi. Soil amendments	0	0	1,360	340	1,270	690	1,500	0	1,650	575	5,780	1,605
vii. Fertilizers	0	0	200	405	1,625	65	750	1,435	1,225	850	3,800	2,755
viii. Bio-fertilizers	0	0	80	0	900	0	0	0	0	0	980	0
ix. Irrigation	0	0	0	0	475	290	0	0	3,250	1,150	3,725	1,440
x. Weeding	0	0	2,560	440	0	0	1,500	730	4,880	1,890	8,940	3,060
xi. Plant protection	0	0	0	0	0	890	0	0	0	0	0	890
xii. Harvesting	0	0	2,880	560	2,015	856	6,000	2,450	8,220	3,360	19,115	7,226
xiii. Threshing	0	0	8,535	1,600	2,950	760	9,710	4,142	7,550	2,950	28,745	9,452
III. Land revenue paid	0	0	65	13	75	28	180	72	109	73	429	186
IV. Interest on capital paid	0	0	1,105	224	920	304	1,866	906	1,544	985	5,435	2,419
V. Grand total of cost	0	0	32,527	5,372	30,488	10,840	59,756	22,764	61,848	24,048	184,619	63,024
VI. Cost per hectare (Excluding benefit)	0	0	9,671	11,678	10,750	14,649	11,424	14,227	12,975	15,616	11,476	14,522
VII. Cost per hectare (Including benefit)	0	0	13,553	11,678	15,244	14,649	14,939	14,227	15,462	15,616	14,889	14,522
VIII. Total quantity produce (Qtl.)	0	0	15,29	2,53	12,80	4,28	24,64	8,19	32,10	11,76	84,83	26,76
a. Grain yield rate (kg/ha)	0	0	637	549	640	578	616	512	803	764	684	616
b. Straw yield (qtl./ha)	0	0	0	0	0	0	0	0	0	0	0	0
IX. Value of the produce	0	0	39,769	6,544	40,973	12,711	78,861	26,163	83,460	30,576	243,063	75,994
X. Net return per hectare (Excluding benefit)	0	0	6,900	2,548	9,737	2,528	8,291	2,125	7,891	4,239	8,126	2,989
XI. Net return per hectare (Including benefit)	0	0	3,018	2,548	5,243	2,528	4,776	2,125	5,403	4,239	4,713	2,989
B.C.R	0	0	1.22	1.22	1.34	1.17	1.32	1.15	1.35	1.27	1.32	1.21

Note: Cost includes all average expenses incurred in terms of money in production process by the farmers.

Table 6.8 gives the impact of BGREI intervention on pulses (Green gram and Black gram) in terms of operation-wise productivity and net return per hectare against the beneficiaries and non-beneficiaries across the sub ecological regions in 2010-11. In Jorhat under the irrigated sub region has shown the highest productivity of pulses in case of beneficiary farmers was recorded at 803 kg per hectare followed by 640 kg per hectare in Golaghat under the medium deep water sub region, 637 kg per hectare in Udalguri under the rainfed low land sub region, 616 kg per hectare in Karimganj district under rain fed deep water sub ecological region. Productivity in respect of non-beneficiaries across the sub regions was at lower level as compared to the beneficiary farmers. Combining all sub ecological regions, the average yield rate stood at 684 kg and 616 kg per hectare for beneficiaries and non-beneficiaries, respectively with an increase of 9.94 per cent over the non-beneficiaries. The average net return per hectare (excluding benefit) stood at Rs 8,182 in case of beneficiaries and Rs. 2, 989 in case of non-beneficiaries, registering 63 per cent increase in respect of beneficiary farmers over non-beneficiary farmers. The average net return per hectare (including benefit) stood at Rs 4,770 in case of beneficiaries and Rs.2,989 in case of non-beneficiaries, marked by an increase of 37 per cent in respect of beneficiary farmers. The B.C.R. stood at 1.32 and 1.21 for beneficiary farmers and non-beneficiary farmers, respectively. The significant difference in yield rate between the two groups of farmers was due to the impact of BGREI's intervention as reported by the farmers.

Table 6.9 gives the impact of BGREI intervention in summer rice by operation wise productivity and net return per hectare of the beneficiaries and non-beneficiaries across the sub ecological region during 2011-12. The district of Karimganj under rainfed deep water situation recorded the highest productivity of summer paddy in case of beneficiary farmers with 5,921 kg per hectare followed by 5,850 kg per hectare in Golaghat under the medium deep water sub region, 5,775 kg per hectare in Jorhat under the irrigated sub region, 5,432 kg per hectare in Udalguri under the rainfed low land sub region and 5,233 kg per hectare in Kamrup district under the rainfed upland sub region. Productivity in respect of non-beneficiaries across the sub regions was at lower level as compared to the beneficiary farmers. Combining all sub ecological regions, the average yield rate stood at 5,658 kg and 4.504 kg per hectare for beneficiaries and non-beneficiaries, respectively showing 20.40 per cent

Table- 6.9

Operation-wise productivity and net return per hectare of the beneficiaries and non-beneficiaries in Summer Rice cultivation (2011-12)

Activity	Rainfed upland		Rainfed lowland (shallow)		Medium deep water		Deep water		Irrigated		All Ecological Regions	
	Beneficiary 4 ha	Non- beneficiary 3.51 ha	Beneficiary 4ha	Non- beneficiary 3.88 ha	Beneficiary 4 ha.	Non- beneficiary 8.07	Beneficiary 4ha	Non- beneficiary 7.07	Beneficiary 4 ha	Non- beneficiary 2.38 ha	Beneficiary 20 ha	Non- beneficiary 24.90 ha
I. Specific to BGREI intervention												
i. Deep ploughing and land preparation	4,875	0	11,550	0	12,600	0	3,870	0	10,650	0	43,545	0
ii. Seeds	5,613	0	12,225	0	12,950	0	4,105	0	15,975	0	50,868	0
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Weed management	0	0	0	0	0	0	0	0	0	0	0	0
v. Fertiliser	0	0	0	0	0	0	0	0	0	0	0	0
vi. Bio fertiliser	0	0	0	0	0	0	0	0	0	0	0	0
vi. Micro-nutrients	3,738	0	8,855	0	9,660	0	2,967	0	8,165	0	33,385	0
vi. Direct seeding /transplanting	0	0	0	0	0	0	0	0	0	0	0	0
a. Line sowing by drum seeders	0	0	0	0	0	0	0	0	0	0	0	0
b. Transplanting	393	0	931	0	1,015	0	312	0	858	0	3,508	0
vii. Plant protection	0	0	0	0	0	0	0	0	0	0	0	0
II. Inputs used by the farmer at his own cost	14,618	0	33,561	0	36,225	0	11,254	0	35,648	0	131,305	0
i. Land preparation	14,922	2,090	40,430	7,455	45,045	4,024	15,025	10,750	37,549	8,952	152,971	33,271
ii. Seeds	3,107	644	9,697	2,231	8,588	1,385	1,763	2,867	7,636	3,008	30,791	10,135
iii. Seed treatment	0	0	0	0	0	0	0	0	0	0	0	0
iv. Manures	5,589	777	14,545	2,497	15,449	1,215	5,850	3,338	13,965	3,502	55,397	11,330
v. Transplanting	7,582	1,164	16,494	3,738	20,247	2,267	7,228	4,877	20,908	5,117	72,458	17,163
vi. Soil amendments	0	0	0	0	0	0	0	0	0	0	0	0
vii. Fertilizers	6,758	1,158	19,042	4,401	22,600	2,424	7,070	5,681	20,813	5,543	76,283	19,208
viii. Bio-fertilizers	743	214	1,705	755	1,139	0	806	0	1,011	844	5,402	1,813
vi. Micro-nutrients	706	0	1,642	0	1,806	0	981	0	1,031	0	6,165	0
ix. Irrigation	3,874	490	7,862	1,730	10,101	1,329	4,431	3,541	9,801	2,863	36,070	9,953
x. Weeding	767	0	4,027	774	1,899	433	648	1,015	3,936	1,065	11,277	3,287
xi. Plant protection	0	0	0	480	0	269	0	0	0	0	0	748
xii. Harvesting	8,405	1,042	20,263	3,200	21,180	1,792	8,109	4,402	18,719	5,471	76,676	15,907
xiii. Threshing	9,438	1,184	25,369	3,686	23,027	2,192	9,471	5,137	21,270	6,242	88,576	18,441
III. Land revenue paid	124	16	293	59	314	29	99	72	263	72	1,093	248
IV. Interest on capital paid	2,476	350	6,443	1,238	6,843	693	2,335	1,624	6,298	1,704	24,395	5,609
V. Grand total of cost	79,108	9,129	201,373	32,244	214,462	18,050	75,069	43,305	198,848	44,385	768,859	147,113
VI. Cost per hectare (Excluding benefit)	19,843	22,822	21,794	20,938	21,219	22,563	24,734	21,871	22,986	23,735	21,962	22,324
VII. Cost per hectare (Including benefit)	24,341	22,822	26,152	20,938	25,531	22,563	29,096	21,871	28,007	23,735	26,485	22,324
VIII. Total quantity produce (Qtl)	170.08	16.61	418.23	66.13	491.38	35.72	152.76	92.19	410.03	86.14	1,642.48	296.79
a. Grain yield rate (kg./ha)	5,233	4,153	5,432	4,294	5,850	4,465	5,921	4,656	5,775	4,607	5,658	4,504
b. Straw yield (qtl./ha)	152	123	165	145	187	132	149	132	189	162	168	139
IX. Value of the produce	133,145	13,990	330,258	50,428	359,620	28,624	138,150	76,225	339,352	71,689	1,300,525	240,956
X. Net return per hectare (Excluding benefit)	21,125	12,153	21,097	11,808	21,593	13,218	28,812	16,626	24,810	14,601	22,837	14,240
XI. Net return per hectare (Including benefit)	16,627	12,153	16,738	11,808	17,281	13,218	24,450	16,626	19,789	14,601	18,314	14,240
B.C.R	2.06	1.53	1.97	1.56	2.02	1.59	2.16	1.76	2.08	1.62	2.04	1.64

Note: Cost includes all average expenses incurred in terms of money in production process by the farmers.

increase in case of beneficiaries. The average net return per hectare (excluding benefit) stood at Rs, 22,837 in case of beneficiaries and Rs. 14,240 in case of non-beneficiaries. The average net return per hectare (including benefit) stood at Rs, 18,314 in case of beneficiaries and Rs. 14,240 in case of non-beneficiaries. From the cost benefit analysis, on an average, the BCR was found at 2.04 for beneficiary farmers and 1.64 for non-beneficiary farmers. Beneficiary farmers earned more benefit than that of non-beneficiary farmers in terms of yield and net returns.

It would be worthwhile to mention that the price of paddy in open market in Assam has increased from Rs.560/qtl. in 2010-11 to Rs.800/qtl. in 2011-12. However, State's intervention under MSP scheme, is not adequate enough to safeguard the interest of the farmers.

Factors Affecting Yield of *Kharif* paddy, Pulse and Summer paddy

The following multiple regression model was used to find out the factors determining the yield of *Kharif* paddy, summer paddy and pulses under BGREI programme. Here, per hectare yield (Y) is a dependent variable and all other variables from X₁ to X₈ are independent variables. The model is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e_i$$

Where,

Y = Paddy yield (kg/ha, productivity)

a = Constant term

b₁- b₈ = Coefficients

X₁ = Cost of Micro-nutrients (Imputed value in case of beneficiary farms, in Rs.)

X₂ = Cost of Seeds (Imputed value in case of beneficiary farms, in Rs.)

X₃ = Other Costs (Total cost less 1 & 2, in Rupees)

X₄ = Dummy for Ecological Region 1

X₅ = Dummy for Ecological Region 2

X₆ = Dummy for Ecological Region 3

X₇ = Dummy for Ecological Region 4

X₈ = Dummy for Ecological Region 5

e = Error term

The result of the regression analysis indicates that the other cost incurred per hectare had a significant role on productivity of *Kharif* paddy and it was found significant at 5 per cent probability level (Table-6.10) and all other factors did not show significant impact on productivity. It might be due to the effect of some

exogenous factors (Abiotic factors) like rainfall, sunshine hours, relative humidity, wind speed, wind direction, evaporation, radiation *etc.*. However, the average yield per hectare was found higher by 28.42 per cent for beneficiary over non-beneficiary farmers.

Table- 6.10
Results of Regression Model for *Kharif* paddy (2010-11)

Model Summary	
R ²	0.59
Adjusted R ²	0.52
SE of Estimate	230.55
Dependent Variable: Yield per hectare (kg/ha.)	4709
Independent Variables	Coefficients
Constant	799.90
Cost of Micro-nutrients (Rs.)	2.03
Cost of Seed per hectare (Rs.)	0.43
Other Costs per hectare (Rs.)	0.08*
Dummy for Rain-fed Upland Ecology	138.95
Dummy for Rain-fed Lowland Ecology	118.45
Dummy for Rain-fed Medium Deep Water Ecology	130.29
Dummy for Rain-fed Deep Water Ecology	238.28
Dummy for Irrigated Ecology	-286.29

*, indicates significant at 0.01 level

Source: Calculated from field data.

While in case of pulses, the other cost incurred per hectare (at 5% probability level), ecological dummy for Rain-fed Lowland and for Rain-fed Medium Deep Water (both at 1% probability level) had significant impact on productivity of the crop and the rest factors were found insignificant. (Table-6.11). However, the average yield of beneficiary farmers was found higher by 11.04 per cent over the non-beneficiary farmers.

Table- 6.11
Results of Regression Model for Pulses (2010-11)

Model Summary	
R ²	0.69
Adjusted R ²	0.62
SE of Estimate	115.33
Dependent Variable: Yield per hectare (kg/ha.)	684
Independent Variables	Coefficients
Constant	-3.13
Cost of Micro-nutrients (Rs.)	0.09
Cost of Seed per hectare (Rs.)	0.24
Other Costs per hectare (Rs.)	0.05**
Dummy for Rain-fed Lowland Ecology	275.51*
Dummy for Rain-fed Medium Deep Water Ecology	191.10*
Dummy for Rain-fed Deep Water Ecology	51.89
Dummy for Irrigated Ecology	67.88

Note: *and**indicate significant at 0.01 and 0.05 level, respectively

Source: Calculated from field data.

In summer paddy, Constant (at 5% probability level), cost of seed per hectare and other cost incurred per hectare (both at 1% probability level) had a significant impact on productivity and the rest of the factors were found insignificant. Here, the effect of exogenous factors might be there. However, the overall per hectare yield was found higher by 25.62 per cent for beneficiary over the non-beneficiary farmers (Table-6.12).

Table- 6.12
Results of Regression Model for Summer Paddy (2011-12)

Model Summary	
R ²	0.72
Adjusted R ²	0.66
SE of Estimate	181.82
Dependent Variable: Yield per hectare (kg/ha.)	5658
Independent Variables	Coefficients
Constant	1753.37**
Cost of Micro-nutrients (Rs.)	-0.10
Cost of Seed per hectare (Rs.)	1.54*
Other Costs per hectare (Rs.)	0.09*
Dummy for Rain-fed Upland Ecology	167.97
Dummy for Rain-fed Lowland Ecology	39.56
Dummy for Rain-fed Medium Deep Water Ecology	338.37
Dummy for Rain-fed Deep Water Ecology	207.72
Dummy for Irrigated Ecology	137.27

Note: *and**indicate significant at 0.01 and 0.05 level, respectively
Source: Calculated from field data.

Table 6.13
Effectiveness of the progressive farmers in implementation of BGREI programme

Particulars	Responses of the progressive farmers
A. Education (%)	
Illiterate	-
Primary	-
Middle	-
Secondary/Higher Secondary	60
Graduate/Technical	40
Post Graduate and above	-
B. Area for supervision (ha) per progressive farmer	
	100
C. Number of linked farmers per progressive farmer	
	214
D. Status of availability of honorarium (%)	
Received	-
Nor received	100
E. Amount of honorarium received	
	-
F. Mode of payment of honorarium	
Cash	100
Cheque	-
Online	-
G. Status of availability of Drum Seeder (%)	
Received	-
Not received	100
H. Number of farmers per unit of drum seeder	
Kharif	-
Rabi	-
Summer	-
I. Availability in documentation of Information Card	
Available	-
Not available	100

Source: Field Survey

Table 6.13 reflects the effectiveness of progressive farmers in implementation of BGREI programme. In this regard 60 per cent of the progressive farmers had the education upto secondary and higher secondary level and the rest 40 per cent had attained graduate/technical level of education. The area of supervision per progressive farmer was 100 hectares for 6 months. The number of linked farmers per progressive farmer was fixed at 214. There was no report of receipt of honorarium during the field study by the progressive farmers. As reported by the Agriculture Department, honorarium would be paid in cash later. There was no report of receiving drum seeder by the progressive farmers as well. It was also emerged from the field survey that the progressive farmers are not being adequately supported by the implementing agency as per the project guidelines.

Chapter VII

Summary and Conclusion

The Eastern India comprising of Assam, Bihar, Chattisgarh, Jharkhand, Odisha, Eastern Uttar Pradesh & West Bengal is considered to be a food-grain deficit region. Much pressure was on Punjab and Haryana for food grain production basically for rice and wheat since the beginning of first green revolution initiated in mid-sixties. Now, both the states are not in a position to bear the burden more on account of changing soil structure. In this juncture, the country has no option but to look forward to the eastern region to feed the rising population in the days ahead.

In this backdrop and also in order to overcome the probable food crises, the Government of India, on the recommendation of Inter-Ministerial Task Force, launched the programme, “Bringing Green Revolution to Eastern India (BGREI)” in 2010-11. It is a sub-scheme of the Rashtriya Krishi Vikash Yojana (RKVY) implemented in Assam in the same year along with other eastern region states. In Assam, the programme was implemented as “Extending Green Revolution to Assam” in 2010-11 without any specific interventions/guidelines. Under the programme, the demonstration plots are selected in clusters of areas belonging to different types of farmers, so as to create a visible impact of the activities undertaken.

Although, the productivity of most of the field crops except horticulture is below the national average, Assam attained the level of food grain production to the tune of 45.57 lakh tonnes in 2009-10. In 2010-11, the state registered a record of rice production of 50.86 lakh tonnes which was more than 15 per cent over the previous year. In this regard, the farmers opined that the favourable weather condition was the main reason for this record production of rice during 2010-11. There might be some other factors as well which need a thorough investigation to arrive at a conclusive answer.

In 2010-11, the BGREI programme was launched with five components without referring to any sub ecological region viz., i) Scientific Cultivation of HYV paddy, implemented in 13 non-NFSM districts, covering 9410.30 hectares, ii) Scientific Cultivation of Hybrid Maize was implemented in eleven districts covering 4,867 hectares, iii) Scientific Cultivation of pulses (black gram/green gram) implemented in 17 districts covering 6,200 hectares under green gram and 12,582.87 hectares under black gram, iv) Distribution of Hand Compression Sprayers at

subsidized rate to 7937 beneficiaries implemented in 26 districts and v) Amelioration of acid soil implemented in 26 districts covering 50,000 hectares.

In 2011-12, three programmes were undertaken viz., i) Summer Paddy demonstration clusters covering 200 hectares each ii) Asset Building Activities and iii) Site Specific Activities. Summer Paddy demonstration clusters were undertaken in 5 different sub ecological regions. These were Upland rice (irrigated), Shallow Low Land, Medium Deep Water, Deep Water, High Yielding Varieties (irrigated) & Hybrid (irrigated). There were 25 clusters under Upland Rice (irrigated) in 5 districts, 29 clusters under Shallow Low Land in 9 districts, 34 clusters under Medium Deep Water in 7 districts, 25 clusters under Deep Water in 3 districts, 22 clusters under High Yielding Varieties (irrigated) in 8 districts and 21 clusters under Hybrid (Irrigated) in 6 districts. Altogether there were 156 clusters in the state under rice covering 200 hectares in each demonstration in 2011-12 under BGREI.

Farm asset is an important input as it encourages a farmer to go for agricultural operation on time. A few farmers can afford to create their assets on their own. Number of assets per hectare in Assam is still less than the national average. In this regard, special thrust has been given by the state Agriculture Department through the on-going central sector schemes. Per hectare farm power in terms of HP was 0.54 in 2006-07 and it increased to 0.69 HP per hectare in 2009-10 while it was 1.20 HP per hectare at national level. In this backdrop, in order to improve the the situation, some Asset Building Activities were started under BGREI. The programme included distribution of 2 Drum Seeders to each of the progressive farmers under each cluster of size 200 hectares and distribution of Shallow Tube Wells, and Pump Sets among the beneficiaries. The state machineries are at work to fulfill the targets as reported by the concerned district officials during the field investigation.

The Site Specific Activities include installation of power line provision for about 1500 m with transformer at farmers field to operate pump sets for STW/LLP at the rate of 10 number per cluster with a physical target of 29 numbers of such power lines. Distribution of 35 threshers (physical target) with prime mover among community farmers group and 40 (physical target) threshers without prime mover for individual level were also proposed under site specific activities. These activities also include the distribution H.C. Sprayer with a physical target of 10,092 numbers and digging of water harvesting tank/farm pond for irrigation at individual level. Most of

this machinery are lying in the go-down of the district H.Q. and very few farmers expressed their willingness to receive the same. However, no achievement on this count has been reported in the field, and on queries, it was learnt from the officials that all these are in process.

The programme would be completing two years of implementation by the end of the Eleventh Five Year Plan (2011-12). But most of the programmes during 2011-12 are in initiation stage or in the process of implementation. The Ministry of Agriculture, Government of India therefore felt that it is the high time to conduct an evaluation study to assess the actual performance of the programme during the period of its implementation both at macro and micro level. This would help the concerned states to devise strategic action plans in conformity with identified constraints at grass root level.

Objectives of the Study:

The study was proposed with the following objectives.

- To study suitability/correctness of technical interventions/prescriptions and approach adopted at State/district and local levels;
- To observe crop response to technology promoted;
- To make critical evaluation of administrative aspects of implementation;
- To identify status and impact of implementation of various interventions;
- To identify gaps, if any existing between recommended, promoted and implemented strategies;
- To explore effectiveness of scientific backstopping in the form of scientists deployed at the district;
- To examine the effectiveness of the provision of Progressive farmers & SDA staff entrusted with BGREI program and paid honorarium therefor;
- To examine effectiveness of cluster approach adopted during 2011-2012;
- To examine effectiveness of institutional support provided by CRRI, NGOs & BGREI cell established in DAC and
- To examine the effectiveness of monitoring mechanism (DLMTs and SLMTs) at district and State level;

Data-base and Research Methodology

The study was conducted on the basis of the secondary and primary data to fulfill the stated objectives. The secondary level data are the data available at the State, District and Block levels. The primary level data were collected from the sample farmers (beneficiary and non-beneficiary) and other stakeholders in order to capture the grass level impact of the programme. Two sets of data were collected, one for the year 2010-11 in which implementing agency was given free hand to choose the activities as per the State's specific requirements and in 2011-12, there were 3 broad categories of intervention, viz, .i) Summer Paddy demonstration clusters covering 200 hectares each ii) Assets Building activities and iii) Site Specific Activities.

As per guidelines, in the first stage of sampling, five districts viz., Jorhat, Golaghat, Kamrup Metro, Udalguri and Karimganj were selected on the basis of the concentration of units of demonstration under 5 agro-ecological sub regions viz., Rainfed up-land, Rainfed Shallow-Low Land, Rainfed Medium, Rainfed Deep Water and Irrigated land (HYV rice/ Hybrid rice). In the second stage, keeping in view of the concentration of sample units of demonstration, one block from each district was selected for collection of primary level data as per prescribed schedule given by the Coordinating Centre. Accordingly, five different blocks were selected for these purpose were Dergaon, Udalguri, Ramkrishna Nagar, Ujoni Majuli and Rani from Golaghat, Udalguri, Karimganj, Jorhat and Kamrup Metro district, respectively. From each block, the lists of sample beneficiaries and non-beneficiaries were obtained and 10 sample beneficiaries and 5 non-beneficiaries from the nearby cluster, were selected randomly. All the relevant information were collected with the help of a prescribed schedule from each of the sample respondent through personnel interview method. Altogether a total sample of 50 beneficiaries and 25 non-beneficiaries spread over 5 selected districts were covered under the study. In the analysis of data, the Chi square test for homogeneity of sample respondents, mean difference test of yield of crops between beneficiary and non-beneficiary farmers and the factors affecting yield of crops were also worked out for statistical interpretation thereunder.

In addition to this, a series of threadbare discussion was held with the State Govt. officials both at district & State level together with the enlightened people of the study areas and the progressive farmers appointed under each demo to meet the stated objectives of the study.

The study has its own limitations, as the primary level information was collected through interactions with the beneficiaries and non beneficiaries and their responses were mainly based on their recall memory only. There was also possibility of wrong entry on the part of investigators. However, maximum attention was paid during the field investigation to avoid such wrong entry or wrong interpretation. Non-availability of official information was also found to be another limitation of the study.

The State of Assam is divided into three physiographic divisions- the Brahmaputra Valley, Barak Valley and Hills region. The Brahmaputra Valley covers 72 per cent, Barak valley covers 9 per cent and Hills region covers 19 per cent of the total geographical area (78,438 sq. km.) of the state.

The state is divided into 6 agro-climatic zones on the basis of homogeneity of agro-climatic conditions. These are the North Bank Plains, the Upper Brahmaputra Valley, the Central Brahmaputra Valley, the Lower Brahmaputra Valley, the Barak Valley and the Hills zone.

Out of the total reported geographical area of 78.50 lakh hectares (as per village paper), net area sown (28.10 lakh hectares) constitutes 35.80 per cent. The gross cropped area recorded an increase from 38.39 lakh hectares in 2007-08 to 39.99 lakh hectares in 2008-09. The average size of operational holding has been decreasing over the periods. It was recorded at 1.15 hectares in 2000-01 which came down further to 1.11 hectares in 2005-06. The increase in percentage of number of holding in respect marginal and small farmers is also an issue of great concern for the state agriculture. Combining both the groups, the figure stood at 85.25 per cent in 2005-06.

Assam has suitable agro climatic conditions for paddy cultivation, and it occupies 91.9 per cent of the net cropped area and 65.90 per cent of the gross cropped area.

Rainfall is one of the vital ingredients given by the nature free of cost in the production process of crops. It determines whether there will be a bumper harvest or a decline in production of crops in a particular year. Meteorological department has to play an important role in forecasting probable rainfall situation of a region so that the farmers can plan and take appropriate measures. The rainfall pattern in recent years has changed drastically. In the State, while some districts receive abundant rainfall, some others experience acute deficit showing a highly erratic rainfall pattern.

Deficient rainfall increases the cost of cultivation as the farmers have to spend more on diesel as fuel to irrigate water to their field. In Assam, the shortage and erratic supply of power is also a very common problem for the farmers to use electric pump set. Therefore, deficient rainfall has a strong bearing on the economic life of the farmers.

Assam falls under heavy rainfall zone for which it has both positive and negative impact on the State economy as a whole. A great deal of variation of rainfall is observed in different agro-climatic zones and even in the same agro-climatic zone every year. On account of this variation, the state has the experience of frequent flood, erosion and drought like situation in some districts. At present, the problem of erosion is more acute than floods. The flood situation of the State cannot be forecasted on the basis of amount of rainfall in the State alone. It largely depends upon the amount of rainfall in the neighboring State, Arunachal Pradesh as the river Brahmaputra is the main outlet for both the States which cause acute land erosion problem in the downstream of the State. The State has already lost 4.30 lakh hectares of land in erosion since 1954 till date, affecting the socio-economic conditions of a large chunk of population. As per records, the state had experienced deficit rainfall especially during the last few years. It might be due to destruction of natural vegetation of the region along with the change of global natural environment.

Agriculture in Assam is basically a rainfed agriculture. The present irrigation infrastructure of the State is not up to the mark. Without adequate infrastructure, modernization of agriculture is not possible even in the areas known for abundant rainfall. Introduction of multiple cropping pattern, new HYV/Hybrid varieties are not possible without assured irrigation facilities. Therefore, irrigation has to play a significant role in the context of food security of the growing population and towards economic welfare of the farmers in particular and the State in general. As per report of the irrigation department of Assam, the ultimate Gross Irrigation Potential (annual irrigable area) area has been estimated at about 27 lakh hectares which constitutes 67.50 per cent of the gross cropped area of 39.99 lakh hectares. But there is a vast difference between the potential created and actually utilized in the field.

In Assam, irrigation development programmes are going on under two major heads *viz.* Major & Medium Irrigation and Minor Irrigation. The three departments namely Irrigation, Agriculture and the Panchayat & Rural Development Departments

are associated with the development of irrigation facilities in the State. The State Irrigation Department acts as nodal agency for all types of irrigation. The other two departments restrict to only on minor irrigation schemes *viz.*, the Shallow Tube Wells and Low Lift Pumps nearby river/rivulet area.

During 2006-07, the potential actually utilized was 22.85 per cent only. There are certain reasons for lower utilization of irrigation facilities. Heavy rainfall in *Kharif* season, carry away large quantity of sand particles from the rivers and damages the crop field. At times, the systems also fail to provide the required water as and when necessary. Iron toxicity of ground water, shortage of power, high price of fuel, loopholes in management, *etc* are the reasons for lower utilization of irrigation potential created.

The type of soil, the type of agro-climatic condition, the extent of rainfall, the irrigation status, the social back ground, the economic factors of the farmers and the economic return or monetary gain per unit of area basically determine the cropping pattern of a region or a State. Together with these, agricultural/ economic policies of each of the Five Year Plans also do have a significant bearing in changing cropping pattern of a State. As Assam is situated in heavy rainfall zone, it follows a rice based cropping system which is prevailing in the entire Eastern part of India. To ensure good yield, it needs supplemented irrigation if there is any shortfall in growing season of the crops. Reports say that, if crop has to depend solely on rainfall, it requires not less than 30 cm per month of rains over the entire growing period.

The crop season of the State is basically divided into two main seasons- *Kharif* from April to September and *Rabi* from October to March. Some of the crops are grown in particular season while some other crops are grown in both the seasons, depending upon the seed varieties and its suitability to climatic conditions. The main cereals of *Kharif* season of Assam include rice normal *Ahu* (Direct seeded), rice normal *Ahu* (Transplanted), *Sali* rice, *Bao* rice and maize. *Kharif* pulses include black gram, green gram and arhar. Sesamum, groundnut, *etc.* are the oilseed crops of *Kharif* seasons and *Kharif* season fiber crops include jute, mesta, cotton and ramie. Both cotton and ramie cover a very significant area. *Boro* rice (Suumer paddy), early *Ahu* (direct seeded/transplanted), wheat, *Rabi* maize, *etc.* are the cereals grown in the State during *Rabi* season. Summer black gram/green gram, lentil, pea, grass pea (*Khesari*), *etc.*, are the pulses; rapeseed & mustard, linseed, niger, *Rabi* ground nut *etc.*, are the

oilseeds. Among tuber crops, potato tops the list during *Rabi* season. In addition, different types of vegetables and spice crops (ginger and turmeric) are grown in both *Kharif* and *Rabi* season. The area under *Kharif* vegetables and *Rabi* vegetables are also increasing over the years.

Among the cereal crops, rice dominates the cropping pattern of the State. It is the principal crop of Assam. Rice is cultivated in the State in three broad Seasons, *viz.* Autumn, Winter and Summer. Autumn rice is commonly known as ‘Ahu’, winter rice as ‘Sali’ and summer rice as “Boro”. Winter rice occupied the highest proportion of area followed by summer and autumn rice. The area under autumn rice has declined from 11.54 per cent in 2005-06 to 8.42 per cent in 2010-11. Farmers are usually reluctant to go for this crop as pre harvest loss is more as first shower of monsoon comes at the time of harvesting and immediately after harvesting, they are to go for winter rice (*Sali* paddy). Moreover, yield rate of autumn rice is lower than that of the summer rice. Therefore the farmers have a normal tendency to switch over from autumn rice area to summer rice. Winter paddy cultivation is an age old practice of all the farmers of the State. It has a major share in the food dish of all the people of Assam. Although no significant improvement in area has been observed during the period under observation, yet it dominates the cropping pattern of the State. The area under this crop increased marginally from 49.51 per cent in 2005-06 to 49.99 per cent in 2010-11. The area under summer rice has increased from 9.14 per cent in 2005-06 to 10.73 per cent. It is basically due to creation of minor irrigation facility through installation of STW and LLP. Farmers are also benefited due to higher yield obtained through adoption of improved package of practices. In the recent time the farmers have started raising their voice to the effect that price offered by private traders is not at all sufficient and cost effective. In this regard, State’s intervention is not sufficient enough to safeguard the interest of the farmers. If it is not tackled properly, farmers may opt for withdrawing themselves from farm activities and as a result, the State may fall in the grip of shortage of food grain production in the near future.

For total rice, there was no significant improvement in area under operation. It varied in between 70.19 to 69.13 per cent during the period under observation. The area under wheat also showed a decreasing trend from 1.45 per cent in 2005-06 to 1.21 per cent in 2010-11 while area under maize was almost static during the period and so was observed in case of pulses area. In case of total oilseeds, the area

increased marginally from 7.19 per cent in 2005-06 to 7.31 per cent during 2010-11. The area under jute remained almost static with a little bit of variation between 1.77 and 1.65 per cent and so was with mesta. Sugarcane is also an important *Kharif* crop (cash crop) of the State but its area is decreasing over the years due to diversion of sugarcane area in favour of small tea gardens in the State. With the advent of small sugarcane juice vendors in nearby city/ township, the sugarcane growers have started getting reasonable prices for its stick and simultaneously, higher prices for molasses, This has encouraged the farmers to go for sugarcane cultivation. The area under sugarcane has increased marginally from 0.67 per cent in 2005-06 to 0.81 per cent in 2010-11.

As Assam is situated in sub-tropical region, a good number of horticultural crops such as banana, coconut, areca nut, pineapple, orange, papaya, Assam lemon, jack fruits, *etc.*, are also grown in the State, but the area under these crops are scattered and normally attached to the homestead areas of almost all the households. In a few districts, orange, pineapple, areca nut with betel vine and black pepper are grown in garden yards. All these fruit crops have distinct taste and flavour when compared with other States of the country. The area under fruits increased marginally from 3.28 per cent in 2005-06 to 3.55 per cent in 2010-11. Ongoing Central Sector Scheme, the Horticultural Mission might have an impact on it. Major tuber crops include potato, sweet potato, tapioca *etc.* The State is not self sufficient in potato production. It is a highly demanded food item and the State primarily depends on other states of the country. The area under tuber crops increased marginally from 2.32 per cent in 2004-05 to 2.55 per cent in 2010-11. Market and availability of quality seeds are the two major factors for increasing the area of a crop. The farmers of the State do not intend to go for bumper harvesting as the cold storage facilities are still insufficient in the State to protect them from probable loss at the time of glut. Besides, varieties of *Kharif* as well as *Rabi* vegetables are also grown in the State. The State is self sufficient in production of vegetables. It occupied a significant area and has shown a marginally increasing trend from 6.73 per cent in 2005-06 to 6.99 per cent during 2010-11. From market intelligence point of view, a limited number of farmers of the State have started producing off-season vegetables so that they can get higher prices than that of seasonal vegetables. In Assam, spice crops basically include turmeric, ginger, onion, garlic, black peppers/ coriander, chilly, *etc.* Although, there

is a good scope to be self sufficient in this area, the State still depends on outside supply for most of the spice crops. The area under spice crops increased from 2.49 per cent in 2005-06 to 2.61 per cent in 2010-11. It might be due to ongoing schemes under Horticulture Mission, a Central Sector Scheme.

From the analysis of cropping pattern it may be concluded that there were no significant changes in cropping pattern in the State during the period of study. Most of the time, seed is considered to be a major constraint. The available irrigation facilities could not be utilized by the farmers due to some technical loopholes in the system. Further, agriculture in the state is yet to reap the benefits of mechanization. With the increase in input costs, the profit per unit of produce as is on decline with the nearly stagnated yield rate of the crops which are much lower than that of the national averages. The major challenge before the state is to enhance the productivity per unit of land as there is a limitation of increasing the arable area. The gross cropped area can be increased by resorting to double or multiple cropping systems through motivation of the farmers under a conducive policy environment.

All the beneficiaries received technical backstopping for different agricultural activities from the resourceful persons engaged under BGREI across the sub ecological regions. In sample districts, the field observations were recorded against two types of demos in 2010-11 – one for HYV *Sali* paddy and the other for pulses (green gram & black gram) and another demo for summer paddy (HYV & Hybrid) in the year 2011-12. The relevant data as reflected in the compiled Tables present the aggregate picture of technical backstopping in respect of all the demos during 2010-11 and 2011-12. In each demo of 100 hectares, there was one progressive farmer to guide the beneficiary farmers from land preparation to plant protection. Similarly, identified extension workers such as DAO/ADO/SAU Scientist/Scientist entrusted by CRRI/Scientist from KVK supervised all the demos. Performance index has been worked out on the level of satisfaction of the farmers against different stages of operations performed under BGREI. In all the sub ecological regions, farmers accessed technical backstopping in land preparation, sowing/planting and use of micronutrient only. In this regard, significant role was played by the progressive farmers and identified extension personnels. However, performance of the KVK personnels was insignificant. Performance indices were found almost at middle order across the sub regions. For the state as a whole, 72 per cent of the farmers (50)

accessed technical advice from the progressive farmers with performance index of 1.33 and identified extension personnels with performance index of 1.44 while only 8 per cent of the farmers accessed technical guidance from the KVK-scientists with performance index of 1.50 in land preparation. For sowing/planting operations, 42 per cent of the farmers got benefitted from progressive farmers with performance index of 1.48 while 30 per cent of the farmers received support & guidance from the identified extension workers with performance index, 1.33 and only 4 per cent farmers got benefitted by the KVK scientists with performance index, 1.00. Against the use of micronutrient, 44 per cent, 32 per cent and 8 per cent farmers accessed technical backstopping from the progressive farmers, extension personnels and KVK scientist with performance indices 1.50, 1.44 and 1.75, respectively.

During 2010-11, Rice demos (HYV Paddy) were undertaken in 13 BGREI districts (covering 9,410.3 Hectares) and Hybrid Maize demo in 11 districts (covering 4,867 hectares). Scientific cultivation of pulses was implemented covering an area of 6,200 and 12,582.87 hectares under Black Gram and Green Gram, respectively. In 2011-12, there were 156 demos of Summer Rice (HYV / Hybrid) across the five sub ecological regions (covering 31,200 hectares) in 12 BGREI districts.

The changes in cropping pattern in 2011-12 over 2010-11 of the sample beneficiaries and non-beneficiaries across different sub ecological regions of the sample districts were also examined. The area under *Kharif* paddy was increased by 15.12 per cent for beneficiaries and no change was witnessed in case of non-beneficiaries in rainfed upland region of Kamrup district; it was found to decrease by 4.88 per cent for beneficiaries and increase by 1.85 per cent for non-beneficiaries in rainfed shallow low land in Udalguri district; it was found to increase by 1.80 per cent for beneficiaries, 1.17 per cent for non-beneficiaries in rainfed medium land of Golaghat district; the area was decreased by 15.66 per cent for beneficiaries and an insignificant increase of 0.17 per cent was recorded in rainfed deep water region of Karimganj district; it increased by 10.55 per cent for beneficiaries and decreased by 0.69 per cent for non-beneficiaries in irrigated region of Jorhat district. For State as a whole, the area under *Kharif* paddy decreased from 94.59 hectares in 2010-11 to 94.3 hectares in 2011-12 showing a decrease of 0.26 per cent in case of beneficiaries. In case of non-beneficiaries, it increased from 40.47 hectares in 2010-11 to 41.02 hectares in 2011-12 with an increase of 0.58 per cent.

In case of *Kharif* vegetables, area was decreased by 16.67 per cent in Kamrup district, 14.88 per cent in Udalguri district, 18.79 per cent in Golaghat district, 6.45 per cent in Karimganj district and 5.38 per cent in Jorhat district for the beneficiaries and in case of non-beneficiaries, the area was increased by 11.11 per cent in Kamrup district, 15.31 per cent in Udalguri, 41.49 per cent in Golaghat and 4.27 per cent in Jorhat district while it was decreased by 19.35 per cent in Karimganj district. For the State as a whole, the area under *Kharif* vegetables decreased by 35.37 per cent in case of beneficiaries while it increased by 38.68 per cent in case of non-beneficiaries.

The area under pulses (green gram/ black gram), in case of beneficiaries, was found to increase by 45 per cent in Kamrup district, 76.47 per cent in Udalguri district, 25.39 per cent in Karimganj district, 100 per cent in Jorhat district and it decreased by 28.43 per cent in Golaghat district. In case of non-beneficiaries, the area under pulses (green gram/ black gram) was found to increase by 5.42 per cent in Udalguri district, 1.42 per cent in Golaghat district, 28.50 per cent in Jorhat district and it was found to decrease by 2.00 per cent in Karimganj district. For State total, it was found to increase by 34.66 per cent in case of beneficiaries and 7.24 per cent in case of non-beneficiaries.

In case of beneficiaries, the area under *Rabi* vegetables, was found to increase by 112.15 per cent in Golaghat district only and it decreased in the rest of the districts.

The area under summer paddy in case of beneficiaries, was found to increase by 32.65 per cent in Kamrup, 145.22 per cent in Udalguri and 179.53 per cent in Jorhat district while it was found to decrease by 15.66 per cent in Golaghat and 16.77 per cent in Karimganj district. In case of non-beneficiaries, the area remained same in Kamrup and Golaghat district and it increased by 4.42 per cent in Udalguri, 9.44 per cent in Jorhat while it was decreased by 22.48 per cent in Karimganj district. For State as a whole, the area under summer paddy was increased by 36.74 per cent and 1.48 per cent in case of beneficiaries and non-beneficiaries respectively.

The reasons for decrease in area under different crops could be attributed to low price of produces, non availability of quality seeds on time, high cost of labour and other inputs. It has been observed that when there is a programme under the Agricultural Department either at central or state sector, the area under the specific crops increases when the programme continues. From experience it has been

observed that the farmers of Assam can not continue the programme from their own cost once a Govt programme comes to an end. Obviously, there is a need to review the situation to find out the reasons behind. In this regard, the respondent farmers opined that their earning is very limited and they cannot take much risk to spend more. Moreover, there is a constant fear of floods and draught like situation among the farmers of Assam, which prevents them from increasing the area under any crops in *Kharif* as well as in *Rabi* season.

The extent of change of cropping intensity across the sub ecological regions of 5 sample district against beneficiaries and non-beneficiaries during 2010-11 and 2011-12 were also worked out. The highest cropping intensity of 155.03 and 146.72 per cent were recorded in Udalguri and Kamrup district for beneficiaries and non-beneficiaries, respectively in 2010-11 and during the year 2011-12, the highest cropping intensity of 156.28 and 149.93 percent respectively were found in beneficiaries and non-beneficiaries of Udalguri district. For state as a whole, the cropping intensity stood at 146.17 per cent for beneficiaries and 140.94 for non beneficiaries in 2010-11 and it stood at 149.22 and 150.15 per cent for beneficiaries and non beneficiaries respectively in the year 2011-12. Maximum (2.95 per cent) increase in cropping intensity was recorded in Karimganj and the minimum (0.81 per cent) in Udalguri district in respect of beneficiaries. Considering the State total, for non beneficiaries, the highest increase in cropping intensity (3.68 per cent) was found in Golaghat district and the lowest (1.36 per cent) in Kamrup district. The State average of cropping intensity increased by 2.09 per cent for beneficiaries and 2.99 per cent for non beneficiaries in 2011-12 over 2010-11. It might be because of the existence of better irrigation facilities amongst the non beneficiaries as compared to the beneficiaries. On an average, the cropping intensity was found to increase for both the categories of farmers due to increase in area under summer paddy and vegetables.

A significant yield gap was recorded in respect of beneficiary and non-beneficiary farmers in all three crops under demonstration as compared to the estimated State's average (quinquennial) across the sub ecological regions. All the three crops had shown higher yield rate than the State's average in the reference years. In 2010-11, Kamrup district with 34.26 quintal per hectare in terms of paddy, showed the best performance in *Kharif* paddy for beneficiary farmers with an

increase of 49.48 percent over the State's average and the lowest was found in Jorhat district with 28.69 quintal per hectare with the increase of 25.17 per cent over the State's average. In overall, with an average yield of 31.25 quintal per hectare in *Kharif* paddy against beneficiary farmers had shown an increase of 36.34 per cent over the State's average, in 2010-11. In case of non-beneficiary farmers, the highest performance of 35.86 quintal per hectare was recorded by Kamrup district with highly significant increase of 56.46 per cent over the State's average and Jorhat district with 25.51 quintal per hectare had shown the lowest increase of yield of *Kharif* paddy with 11.30 per cent in the reference year.

In 2011-12, Kamrup district continued to perform best in terms of yield of *Kharif* paddy with 39.56 quintal per hectare for beneficiary farmers recording an increase of 63.07 percent over the State's average and the lowest performance was noticed in Jorhat district with 34.25 quintal per hectare with an increase of 41.18 per cent over the State's average. In overall, the average yield of *Kharif* paddy for beneficiary farmers was increased by 48.56 per cent over the State's average, in 2011-12. In case of non-beneficiary farmers, the highest performance was recorded in Jorhat district with 32.56 quintal per hectare with an increase of 34.21 per cent over the State's average and the lowest increase of yield (15.42 per cent) was shown by Golaghat district with 28.00 quintal per hectare.

In 2010-11, Karimganj district with 49.68 quintal per hectare showed the best performance in the yield of summer paddy for beneficiary farmers with significant increase of 60.67 per cent over the State's average and the lowest was found in Golaghat district with 44.32 quintal per hectare with an increase of 43.34 per cent over the State's average. In overall, the average yield of summer paddy against the beneficiary farmers increased by 52.62 per cent over the State's average. In case of non-beneficiary farmers, the highest performance was shown by Kamrup district with 38.56 quintal per hectare with an increase of 24.71 per cent over the State's average while the yield of summer paddy decreased over the State's average by 12.06 per cent in Udalguri district with 27.19 quintal per hectare in the year. In overall, it was found to decrease by 5.40 per cent over the State's average in 2010-11.

In 2011-12, Karimganj district with 59.21 quintal per hectare showed the best performance in the yield of summer paddy for beneficiary farmers with an increase of 77.81 percent over the State's average and the lowest was found in Kamrup district

with 52.33 quintal per hectare with an increase of 57.15 per cent over the State's average. In overall, the average yield of summer paddy for beneficiary farmers was increased by 69.43 per cent over the State's average in 2011-12. In case of non-beneficiary farmers, Karimganj and Kamrup districts showed the highest and the lowest performance with increase of 39.82 and 24.72 per cent respectively. In overall, it was increased by 38.35 per cent over the State's average yield during 2011-12.

In 2010-11, Jorhat district with 7.08 quintal per hectare showed the best performance in the yield of pulse for beneficiary farmers with an increase of 30.87 per cent over the State's average and the lowest was recorded in Udalguri district with 5.56 quintal per hectare with an increase of 2.77 per cent over the State's average. In overall, the average yield of pulses for beneficiary farmers was increased by 18.30 per cent over the State's average in 2010-11. In case of non-beneficiary farmers, the highest performance was shown by the district of Jorhat with 7.64 quintal per hectare with an increase of 41.22 per cent over the State's average while the yield was found to decrease by 5.36 per cent over the State's average in Karimganj district in the reference year. In overall, it was found to increase by 71.22 per cent over the State's average in 2010-11.

In 2011-12, Jorhat district with 7.25 quintal per hectare showed the best performance in productivity of pulse for beneficiary farmers with an increase of 33.27 percent over the State's average and the lowest was recorded in Udalguri district with 5.99 quintal per hectare with an increase of 10.11 per cent over the State's average. In overall, the average yield of pulse for beneficiary farmers was increased by 26.84 per cent over the State's average in 2011-12. In case of non-beneficiary farmers, Golaghat district with 8.05 quintal per hectare showed the highest performance with an increase of 47.98 per cent over the State's average which was the highest of all, even above the beneficiaries and the lowest increase with 28.31 per cent was found in Jorhat district with 6.98 quintal per hectare. In overall, it was increased by 28.31 per cent over the State's average yield of 2011-12.

Thus, almost all the three crops under study showed significant increase in yield over the State's average. In *Kharif* paddy, the average yield (Combining 5 sample districts) was 22.92 quintal (QE) per hectare in terms of paddy in the State and it was 31.25 quintal per hectare in case beneficiary farmers and 29.05 quintal per hectare in case of non-beneficiary farmers in 2010-11. The rate of increase over

the State's yield was at 36.34 per cent for beneficiary farmers and 26.75 per cent for non-beneficiary farmers in the reference year. But in demonstration cluster, the yield was at much higher side in the case of beneficiary farmers as compared to non-beneficiary farmers. It might be due to intervention of BGREI. In 2011-12, the State's average yield of *Kharif* paddy was 24.26 quintal per hectare while it was 36.04 quintal per hectare in sample districts average with an increase of 48.56 per cent over the State's average. In case of non-beneficiary farmers, the average yield of sample district was 29.14 quintal per hectare with an increase of 20.12 per cent over the State's average. In summer paddy, the average yield (Combining 5 sample districts) was 30.92 quintal (QE) per hectare in terms of paddy in the State and it was 47.19 quintal per hectare in case beneficiary farmers and 30.30 quintal per hectare in case of non beneficiary farmers in 2010-11. The rate of increase over the State's yield was at 52.62 per cent for beneficiary farmers and (-) 2.01 per cent for non beneficiary farmers in the reference year. This distinct variations in yield showed that the operated area might be more suitable for growing summer paddy for beneficiary farmers than that of the non beneficiary farmers. The distinction between beneficiary and non beneficiary did not arise here as there was no programme for summer paddy under BGREI in 2010-11. In 2011-12, the average State's yield was 33.30 quintal per hectare and it stood at 56.42 quintal per hectare in respect of beneficiary farmers showing an increase of 69.43 per cent and in case of non-beneficiary farmers, it stood at 44.35 quintal per hectare with an increase 33.18 per cent over the State's average. This might be due to BGREI intervention for summer paddy. In 2010-11, the average yield of pulse was 5.41 quintal per hectare and it was 6.40 quintal for beneficiary farmers and 6.16 quintal for non beneficiary farmers with an increase of 18.30 per cent and 13.86 per cent over State's average, respectively. In 2011-12, it was 5.44 quintal per hectare for the State, 6.90 quintal for beneficiary farmers and 7.63 quintal for non-beneficiary famers. The rate of increase was 26.84 per cent and 40.26 per cent for beneficiary and non-beneficiary farmers, respectively. Variation in yield across the sub ecological regions might have occurred due to prevailing weather condition of the districts. Although, Jorhat district falls under irrigated sub ecological region, its performance was not found satisfactory as compared to other sub ecological region except in pulses.

However, there exists a significant gap between the potential and the actual yield rate of crops under consideration. This is a major issue before the State to be redressed. An attempt was therefore, made to draw a comparative picture on the extent of yield gap of *Kharif* paddy, summer paddy and pulses between the potential and estimated actual yield (aggregate yield of 5 ecological groups) of the beneficiary farmers for the years 2010-11 and 2011-12. The results amply demonstrated that there exists significant yield gap between the actual and potential yield against each of the crops. In 2010-11, the yield gaps in *Kharif* paddy was found at 77.60 per cent and 53.99 per cent in 2011-12. The yield gaps in summer paddy was found at 51.30 per cent in 2010-11 and 26.55 per cent in 2011-12 and in pulses, the gap was 79.69 per cent in 2010-11 and 66.67 per cent in 2011-12.

Comparative analysis between 2010-11(QE) & 2011-12(QE) quinquennial mean (QE) estimates of area, production and yield of winter rice in BGREI districts of Assam showed an overall increase in area, production and yield with 1.62, 6.37 and 4.83 per cent, respectively in the year 2011-12 over 2010-11. In case of summer paddy, it showed an overall increase of 0.54, 8.64 & 9.33 per cent for area, production and yield, respectively in the year 2011-12 over 2010-11.

In case of pulses, it showed an overall increase of 4.70, 4.54 & 0.30 per cent against area, production and yield, respectively in the year 2011-12 over 2010-11.

The extent of variation in yield of targeted crops between the beneficiary farmers and the secondary data for the year 2010-11 and 2011-12 were also worked out. All the mandate crops of the state across the BGREI district had shown significant increase in area, production and yield. In *Kharif* paddy, the overall yield increased by 26.43 per cent in 2010-11 and 39.17 per cent in 2011-12 over the State estimated yield. In case of summer paddy, the overall yield increased by 76.74 per cent in 2010-11 and 115.50 per cent in 2011-12 over the State estimated yield and in pulses, it increased by 27.04 per cent in 2010-11 and 36.90 per cent in 2011-12 over the State estimated yield. This significant increase in yield might be due to the resultant effect of the BGREI programme in all the sample districts. However, there was a distinct variation of yield across the districts which needs to be further investigated to find out the specific reason behind.

The basic aim of the BGREI programme is to make all the States of the eastern region a surplus food grain region. To that effect, the BGREI in Assam is

successful in increasing the yield rate of the major crops through technological intervention and other support. Therefore, an attempt was also made to study the perception profile of the beneficiary farmers specifically on BGREI. Adequate supply of inputs, timeliness of information, expectation of the farmers on technical guidance and assurance for continuance of cultural practices (as prescribed under BGREI) to the next season got very high rating (more than 75 per cent) while performance of BGREI programme, availability of technical guidance from SDA/KVK/SAU/CRRI, problems in supply/availability of inputs, preference for accessing inputs directly from the input dealer and low price of the produce got high rating lying in between 50-75 per cent. Low ratings were reported against technical guidance received from KVK personnel (with 5 per cent) and progressive farmers (with 20 per cent) while medium rating with 25 per cent were found in case of SDA, ADO and VLEW. Expectation of the farmers on technical guidance and in-time supply of inputs got high rating with 50 per cent each. There was no problem in supply/availability of inputs and it got secured high rating by 100 per cent farmers. According to preference towards sources of inputs, input dealer got high rating (75 per cent) and the cooperative society got medium rating (25 per cent). Marketing and transportation of produces got medium rating (40 per cent) and the low price of produces got high rating (60 per cent). The most vulnerable point was that the farmers had to sell their surplus produce (Paddy) below the MSP. Farmer's price of paddy in open market was about 32 per cent less than that of MSP per quintal. Silver lining is that the beneficiary farmers placed very high rating (100 per cent) on continuance of BGREI practices on their own in the next crop season as well.

There were altogether 96 demos under *Kharif* paddy, 188 demos under pulses and 156 demos under summer paddy covering at least one block from each of the selected district. It was reported by the State Agriculture Department that the programme could not be taken up in all blocks of the districts due to some technical and financial problems as well. In *Kharif* paddy, the highest number with 11 demonstrations was found in Kamrup and the lowest with 6 demonstrations in Hailakandi district.

Under pulse programme, the highest cluster of demonstrations with 14 each were found in Kamrup, Lakhimpur and Dhemaji. The lowest cluster of demonstrations with 9 each was found in Karimganj, Sonitpur, N.C. Hills and Karbi-Anglong District.

In summer paddy, the highest cluster of demonstration with 51 was recorded in Kamrup district and the lowest cluster of demonstration with only 1 was recorded in Dibrugarh district.

No records were available in the BGREI cell of Assam about the number of villages covered under the cluster of demonstrations. However, numbers of villages under each district were furnished in the report for general information.

Regarding concentration of demos in relation to block in each district in *Kharif*, 2010-11, more number of demonstrations should have been undertaken to cover at least one demo in each block. The highest concentration of demos was found in Chirang district with 3.50 demos per block and the lowest in Dhubri with 0.47 demos per block. In overall, it stood at 0.88 demos against one block.

The concentration of demos in relation to block in each district in pulses during 2010-11, was examined and the number of demonstration were found to be less than one in 5 districts. The highest concentration of demos with 2 numbers was found in each of the blocks in Kokrajhar and Hailakandi district and the lowest was in Dhubri with 0.56 demo per block. In overall, there were 1.08 demos against each block.

In case of summer paddy, the concentration of demos in relation to block in each district during 2011-12, number of demonstration were less than one in 6 districts. The highest concentration was found in Kamrup district with 3.19 of demos per block and the lowest in Sivasagar with 0.80 demo per block. In overall, there were 1.43 demos against one block.

The concentration of net cropped area in all the BGREI districts for *Kharif* paddy (2010-11) were at lower level as compared to demonstration area. In over all, it stood at 0.0103 hectares. To keep uniformity of concentration of demonstration per net cropped area of each district, more clusters are needed in some of the districts.

Concentration of net cropped area in all the BGREI districts for pulses (2010-11) were at lower level as compared to demonstration area. In over all, it stood at 0.242 hectare only.

Concentration of net cropped area in all the BGREI districts for summer paddy, 2011-12 were also at lower level as compared to demonstration area. In over all, it stood at 0.235 hectare only.

So far as the target and achievement of *Kharif* rice block demonstrations are concerned the highest numbers of demos (11) were observed in Kamrup district. It might be because of the fact that Directorate of Agriculture is located in this district. Number of demos ranged between 6 and 8 in the rest of the districts. In totality, the highest number of demos (23) was found in irrigated land followed by 21 in medium deep water, 19 in irrigated upland, 17 in deep water and 16 in shallow lowland. The status of achievement was 100 per cent as per report of the Directorate.

The block demonstrations of rice (*Kharif* and Summer) in Assam were undertaken with two varieties of seeds – HYV and Hybrid and in case of pulse, it was done with HYV seeds during 2011-12. There was no demonstration on wheat during the reference year. No report of demonstration of hybrid rice could be traced in *Kharif* season. In summer paddy, there were 156 demonstrations of which only 21 demos were under hybrid paddy. It was reported that inadequate seeds, shortage of mechanical device for line showing, inadequate technical support to motivate the farmers were the major constraints which perhaps reduced the number of hybrid demos. Out of the total of 252 rice demos (*Sali & Boro*), 91.67 per cent belonged to HYV demos and only 8.33 per cent belonged to hybrid demos in the State during 2011-12. In case of pulses, there were altogether 188 demos covering all BGREI districts. The highest with 14 demos each was found in Kamrup, Lakhimpur and Dhemaji district and the lowest with 9 demos each in Udalguri, Karimganj, Jorhat, Sonitpur, N.C. Hills and Karbi Anglong district. This might be because of the fact that there was no specific guidelines from the Ministry in 2010-11.

The distribution of inputs (seeds/micronutrient) through different agencies and expenditure incurred therein under block demonstrations (D/C) of *Kharif* paddy in BGREI districts were studied. In Assam, National Seed Corporation (NSC) was the only seed supplying agency through which seeds were distributed among the beneficiary farmers in all the BGREI districts. Quantitatively speaking, 376.41 MT of seeds were distributed covering 96 demos under *Kharif* paddy. The quantity of seed used per demo stood between 4.13 MT and 3.70 MT with an average of 3.92 MT. This variation occurred due to the variation of area under demos in each district. The highest expenditure of Rs.1,207,640.00 was incurred in Kamrup district as the district had the highest number of demos with the highest area of 1,135 hectares. The lowest expenditure of Rs. 590, 520.00 was recorded in Hailakandi district. Sharp decline in

expenditure may be attributed to lesser area under demos & lesser number of demos. The total expenditure incurred to the tune of Rs.10,012,506.00. All the certified seeds were purchased from NSC for all the BGREI districts and supplied to the farmers free of cost. Zinc Sulphate was distributed among the beneficiaries as micronutrient. The total quantity of micronutrient was 94.10 MT and on an average 0.98 MT was distributed per demo with a little bit of variation between 1.03 MT and 0.93 MT per demo. The total expenditure on micronutrient stood at Rs.3,293,605.00.

There were altogether 135 demos of summer paddy with 200 hectares each during 2011-12. The quantity of seeds and micronutrients distributed varied with the number of demos in each district. Precisely, 1080 MT seeds were distributed in 13 districts at the rate of 8 MT per demo and the total value of the seeds was to the tune of Rs.270,00,000. There was no report of distribution of Carbandazim and Pretilachlor. 675 MT of Zinc Sulphate were distributed as micronutrient at the rate of 5 MT per demo. The total expenditure on Zinc Sulphate stood at Rs.2,36,25,000.00

The pattern of distribution of inputs under block demonstration (D/C) of Summer paddy (Hybrid) in 2011-12 was as follows. The block demonstration of hybrid summer rice was implemented in 6 districts only. Altogether, there were 21 demos, 6 in Kamrup district, 2 in Udalguri, 6 in Golaghat, 1 in Jorhat, 1 in Baksa and 5 in Dhubri. A total quantity of 63 MT of seeds was distributed at the rate of 3 MT per demo. The total value stood at Rs. 9,450,000.00. There was no report of distribution of Carbandazim (fungicide) and Boron (micronutrient) in summer paddy (hybrid). A total 105 MT of Zinc Sulphate (micronutrient) was distributed at the rate of 5 MT per demo. The total value stood at Rs.3,675,000. A total quantity of 6720 litres of Pretilachlor was distributed as herbicides at the rate of 320 litres per demo. The total value was to the tune of Rs.26,88,000.00.

The pattern of distribution of inputs in block demonstration of pulses (*Rabi*) were found as follows. There were altogether 188 demos under pulses. A total of 469.58 MT of seeds was distributed at the rate 2.50 MT per demo. The total value of the seeds stood at Rs.4,62,46,275.00. A total quantity of 9,95,499 kg of DAP was distributed at the rate of 5,300 kg per demo. The total value of the DAP was recorded at Rs.1,14,98,013.00. The quantity of MOP distributed was 4,13,226 kg at the rate of 2,200 kg per demo. The total value of MOP was to the tune of Rs. 21,90,098.00.

The quantity of bio fertilizer was 18,783 kg and was distributed at the rate of 100 kg per demo. The total value of bio-fertilizer stood at Rs. 6,76,188.00. To reduce the acidity of soil, 75,132 qtl of lime was also distributed at the rate of about 4 qtl per demo. The total value of lime stood at Rs. 2,59,20,540.00.

The breakup of inputs delivered in block demonstrations by crops was also assessed for all the demonstrations (440 in number). About 1,989 MT of total seeds were delivered which included 376.41 MT of HYV *Sali* paddy 1,080 MT of HYV summer paddy, 63 MT of hybrid summer paddy and 469.58 MT of pulse seeds. The total value of all the seeds stood at Rs. 92,708.781.00. Also, 874 MT of Zinc sulphate, 21,000 kg of boron and 6,720 liters of pretilachlor were delivered in block demonstrations and the total value of inputs stood at Rs. 30,593,605 for Zinc Sulphate, Rs.1,155,000 for boron and Rs. 2,688,000 for pretilachlor.

The detailed package of practices adopted in block demonstrations at the farm level for *Kharif* paddy, summer paddy and pulses across the sub ecological regions of 5 sample districts were as follows-

In *Kharif* paddy demos, there was no report of adoption of full package of practices except for the use of HYV seeds at the rate of 40 kg per hectare and Zinc sulphate at the rate of 10 kg per hectare. All the beneficiary farmers reported that these two inputs were supplied free of cost along with fertilizers. Some gaps were also noticed in case of seed rate per hectare. A gap of 23.50 per cent was found in Kamrup and Golaghat district, 10.75 per cent in Udalguri, Karimganj and Jorhat district. On the whole, the seed gap recorded at 16.33 per cent while in case of use of micronutrient, 100 per cent gap was noticed in all the districts. There was no report of use of HYV seeds and micronutrient at the prescribed rate by the non beneficiaries. In Summer paddy demos, there was also no report of adoption of enlisted package of practices except for land preparation at the rate of Rs. 1500/- per hectare, transplanting at the rate of Rs. 120.85/- per hectare (only in Kamrup district at the time of field visit) and the use of HYV and Hybrid seeds at the rate of 40 kg and 15kg per hectare, respectively. Zinc Sulphate, boron and Pretilachlor were also supplied free of cost at the rate of 25 kg per hectare, 5 kg per hectare and 1.6 lit per hectare, respectively in all the sample districts except for Kamrup. Similar observations were found in case of *Rabi* pulses as well.

The component-wise physical and financial target and achievement in asset building activities in Assam during 2011-12 were found as follows-

As per the programme, there were 5 components. Of the 5 components, only 2 components were undertaken under asset building activities *viz.*, installation of shallow tube well and Pump sets. There was a target of installation of 5000 shallow tube wells and for this, an amount of Rs.600 lakh was sanctioned. This programme was completed successfully as per report of the department. In case of distribution of 500 pump sets, an amount of Rs.50 lakh was sanctioned. It was reported that the pump sets have been received by the respective district head quarters only and it was yet to reach the actual beneficiaries. As such, no comment could be incorporated here regarding percentage of physical achievements. However, 100 per cent achievement was reported against financial target for both the components under asset building activities.

The component wise physical and financial target and achievement in site specific activities in Assam, 2011-12 were as follows-

There were 5 components under this programme to be implemented by Chief Engineer, Department of Agriculture. A sum of Rs 581.84 lakh was sanctioned for 5 components. Rs.373.10 lakh was sanctioned for installation of 29 numbers of power lines for operating STW on cluster basis at the rate 10 numbers per cluster. As per report of the Chief Engineer, Agriculture, the detailed Project Report preparation in consultation with ASEB is under process for installation of power lines for operating STW and it is expected to be completed by December, 2012. An amount of Rs. 31.50 lakh was sanctioned for 35 threshers with prime mover for community farmer group and Rs. 18.00 lakh for 40 numbers of threshers without prime mover for individual farmers. The quotations have already been invited and rates are to be finalized soon for both the components. Rs.159.24 lakh was sanctioned for 38 numbers of water harvesting tanks/ farm ponds for irrigation in the farmer's field (individual). This component is also in progress and expected to be completed by November, 2012. In this regard, it may be mentioned that the site specific activities attained 100 per cent financial achievement as per report. If all these programmes are implemented in due course of time, the farmers will be benefited to a large extent.

The detailed physical and financial progress of BGREI programme in Assam by type of interventions envisaged that the Government of India sanctioned Rs.17.50

crores in 2010-11 and Rs. 33.32 crores in 2011-12. The type of interventions such as block demonstration of HYV *Kharif* paddy with 96 demos, HYV Summer paddy with 135 demos, Hybrid summer paddy with 21 demos, block demonstration of HYV pulses (Blackgram/Greengram) with 188 demos and Hybrid Maize with 49 demos attained 100 per cent physical and financial progress. But in case of asset building and site specific activities, the most of the activities were in process and it would take time to attain 100 per cent achievement in terms physical target. Lengthy administrative procedure is at the root of delay in physical progress as reflected in course of interactions.

It has been observed that there is a District Level Monitoring Team (DLMT) of 5 members with DAO/Dy. Director of the concerned district as chairman to monitor all the activities under BGREI and they are to hold meeting frequently to review the problems faced by the farmers and to suggest all possible remedies. The members of the DLMT include scientist of district level KVK, ATMA consultant of the district, district level representative of Agril. Engineering wing and district representative of Irrigation/Water resource Department. It was reported that there were 5 to 6 number of DLMT meetings held in the sample districts during the interim period.

The State Level Monitoring Team (SLMT) is set up under the Chairmanship of Addl. Secretary /Joint Secretary of the Department of Agriculture & Cooperation. In charge of CRRI sub centre of the state, the Director of Agriculture along with few more resourceful personnel as proposed by the Director are the other members of the SLMT. The team meets once in every month to review the district wise progress of the implementation of various interventions. This monitoring team acts as the main bridge between the CST (Central Steering Committee), and the DLMT. As per report of the concerned officials, there were 12 SLMT meetings in 2010-11 and 6 meetings in 2011-12. The meetings reviewed the ongoing programmes and recommended actions to be taken for proper implementation of the activities where there were gaps. They also emphasized on constant supervision of the activities and coordination with the farmers. The SLMT gets feedback from the district KVKs and the State Agril. University (AAU) as they function in close coordination with the State Directorate of Agriculture.

District Agricultural Officer/ Dy. Director of the concerned district finalize the strategic action plan and ensure its implementation as per plans without any deviation. The inputs like quality seeds, soil amendment materials and machinery are expected to be mobilized in the field as per the schedule fixed by the committee. District Agriculture Officer and his team ensure transparency in preparing the list of beneficiaries for input distribution.

To judge the socio economic condition of the sample farmers, an attempt was made with the help of some important indicators. Average size of holding was 0.77 hectares for beneficiary farmers and 0.79 hectare for non beneficiary farmers in marginal size group, 1.67 hectares for both the categories in small size group, 2.69 hectares for beneficiary farmers and 4.14 hectares for non beneficiary farmers in medium size group and 4.6 hectares in large size group (beneficiary only). There was no non-beneficiary under large size group. The average size of holding was 1.89 hectares for beneficiary farmers and 1.64 hectares for non-beneficiaries. Of the 50 sample beneficiaries, 20 farmers (40%) belonged to marginal size, 16 (32%) belonged to small size group, 12 (24%) farmers belonged to medium size group and 2(4%) farmers belonged to large size group while in case of non beneficiary farmers, 12 farmers (48%) belonged to marginal size, 9 (36%) belonged to small size group and 4 (16%) farmers belonged to medium size group.

On educational status, cent per cent literacy was found in both the categories. But there was a distinct variation in the level of education by different standards. Of 50 beneficiary farmers, 44 per cent (highest) farmers in both the groups were in secondary /higher secondary level and 6 per cent (Lowest) farmers attained the graduate and technical degree level education. As against this, 8 per cent of the non beneficiary farmers had graduate level of education. There were 30 per cent beneficiary farmers in primary standard and it was 28 per cent in case of non-beneficiary farmers. In middle standard, it was 14 per cent for beneficiary farmers and 20 per cent for non beneficiary farmers. No farmers were found to have attained post graduate & above level of education in both the groups.

In case of beneficiary farmers, 78 per cent respondents were found in the self employed category while it was 88 per cent in case of non-beneficiaries which indicate that the cultivation is the main source of their livelihood. Besides cultivation, 8 per cent beneficiary farmers had petty salaried job, 4 per cent were engaged as

agricultural laborer in both the groups who used to work nearby. During off season, 6 per cent beneficiary and 8 per cent non-beneficiary farmers earned an additional income by engaging themselves as non agricultural laborer. No student was engaged in any economic activities of the farm family and there was no report of farmer's engagement in household work.

Test of Homogeneity of the sample farmers

All the respondents belonging to rainfed shallow low land, rainfed medium, and rainfed deep water and the State as a whole were found homogeneous in respect of level of education and size of holding from their correlation co-efficients.

Further, the χ^2 (Chi-square) test for homogeneity of correlation coefficients was also tried with the help of the test statistics. The calculated value of the χ^2 (9.38) at 4 degrees of freedom was less than the table value of χ^2 at 5 per cent level of significance. It indicates that there was a homogeneity of beneficiary samples as a whole across the different ecology in respect of level of education and size of holding.

Econometric Analytical Model for the study:

The particular form is : $Z = (\bar{X}_1 - \bar{X}_2) / \sigma \left(\frac{1}{N_1} + \frac{1}{N_2} \right)^{1/2}$

Where, Z = Standard Normal Variate

\bar{X}_1 = Mean of Series 1 (Say, Beneficiaries)

\bar{X}_2 = Mean of Series 2 (Say, Non-beneficiaries)

σ = Standard Deviation

N_1 = Number of observations in series 1 (Say, Beneficiaries)

N_2 = Number of observations in series 2 (Say, Non-beneficiaries)

The Result of Mean Difference Test:

The test was conducted for three crops viz., *Kharif* Paddy (Table-7.1), Summer Paddy (Table-7.2) and Pulse (Table-7.3) under BGREI programme in the State. The

Table- 7.1
Result of Mean Difference Test for *Kharif* Paddy

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	50	25
Mean	4708.85	3769.10
SD	474.78	486.72
SE of Mean	67.15	97.34
	Equal variance assumed	Equal variance not assumed
t-statistic	8.014*	7.947*
Degree of Freedom	73	47

* indicates significant at 0.01 level

Source: Calculated from field data

Table- 7.2
Result of Mean Difference Test for Summer Paddy

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	50	25
Mean	5733.75	4594.21
SD	480.77	450.34
SE of Mean	68.00	90.07
	Equal variance assumed	Equal variance not assumed
t-statistic	9.878*	10.098*
Degree of Freedom	73	51

* indicates significant at 0.01 level
Source: Calculated from field data

Table- 7.3
Result of Mean Difference Test for Pulses

Particulars	Yield per Hectare (kg/ha.)	
	Beneficiary Farm	Non-beneficiary Farm
N	40	20
Mean	695.76	614.57
SD	187.36	221.23
SE of Mean	29.65	49.49
	Equal variance assumed	Equal variance not assumed
t-statistic	1.489*	1.408*
Degree of Freedom	58	33

* indicates significant at 0.01 level
Source: Calculated from field data

model mentioned herein above was used to test whether there was difference between the yield rate of beneficiary and non beneficiary farmers. The tests clearly spelled out that there was a significant difference in yield rate of each crop between beneficiary and non-beneficiary farmers and were found statistically significant at 0.01 per cent probability level. It also indicated that the yield rate for beneficiary farmers was higher than that of the non beneficiary farmers.

Impact of BGREI intervention on rice-based cropping system was assessed in terms of operation wise productivity and net return per hectare against the beneficiaries and non-beneficiaries of rice (*Kharif*) cultivation across the sub ecological region during the year 2010-11 .

Kamrup district under rainfed upland had shown the highest productivity of *Kharif* paddy in case of beneficiary farmers with 4,923 kg per hectare followed by 4883 kg per hectare in Karimganj under the deep water sub region, 4,845 kg per hectare in Udalguri under the rainfed low land sub region, 4,788 kg in Golaghat under medium deep water sub region and 4,105 kg per hectare in Jorhat under irrigated sub region. The productivity in respect of non beneficiaries across the sub regions was at lower level as compared to the beneficiary farmers. Per hectare net return of beneficiary farmers was at higher side than that of non-beneficiary farmers.

Combining all sub ecological regions, the average yield rate stood at 4,709 kg and 3,667 kg for beneficiaries and non beneficiaries, respectively and there was an increase of 22.13 per cent in case of beneficiaries over the non-beneficiaries. On an average, combining all the sub ecological region, the net return per hectare stood at Rs, 17,287 (excluding benefit) and Rs 14,429 (including benefit) in case of beneficiaries and Rs. 10,025 in case of non-beneficiaries. The cost benefit ratio including benefit stood at 1.58 for beneficiary farmers and 1.48 non-beneficiary farmers. Higher productivity was the main reason behind it.

The impact of BGREI intervention in pulses (Green gram and Black gram) against operation- wise productivity and net return per hectare for the beneficiaries and non beneficiaries across the sub ecological region in 2010-11 was found as follows. Jorhat district under theirrigated sub region had shown the highest productivity of pulses in case of beneficiary farmers with 803 kg per hectare followed by 640 kg per hectare in Golaghat under the medium deep water sub region, 637 kg per hectare in Udalguri under the rainfed low land sub region and 616 kg per hectare in Karimganj district under rainfed deep water. Productivity in respect of non-beneficiaries across the sub regions was at lower level as compared to the beneficiary farmers. Combining all sub ecological regions, the average yield rate stood at 684 kg and 616 kg for beneficiaries and non-beneficiaries, respectively with an increase of 9.94 per cent over the non-beneficiaries. The average net return per hectare (excluding benefit) stood at Rs 8,182 in case of beneficiaries and Rs. 2,989 in case of non-beneficiaries and there was an increase of 63 per cent in respect of beneficiary farmers over the non-beneficiary farmers while the average net return per hectare (including benefit) stood at Rs 4,770 in case of beneficiaries with an increase of 37 per cent in respect of beneficiary farmers over the non-beneficiary. The B.C.R. stood at 1.32 and 1.21 for beneficiary farmers and non beneficiary farmers, respectively. The significant difference in yield rate between the two groups of farmers might be because of the impact of BGREI's intervention as reported by the farmers.

The impact of BGREI intervention in summer rice by operation-wise productivity and net return per hectare against the beneficiaries and non-beneficiaries across the sub ecological region in 2011-12 were also assessed. The district of Karimganj under rainfed deep water had shown the highest productivity of summer paddy in case of beneficiary farmers with 5,921 kg per hectare followed by 5,850 kg

per hectare in Golaghat under the medium deep water sub region, 5,775 kg per hectare in Jorhat under the irrigated sub region, 5,432 kg per hectare in Udalguri under the rainfed low land sub region and 5,233 kg per hectare in Kamrup district under the rainfed upland sub region. Productivity in respect of non-beneficiaries across the sub regions was at a lower level as compared to the beneficiary farmers. Combining all sub ecological regions, the average yield rate stood at 5,658 kg and 4,504 kg for beneficiaries and non-beneficiaries, respectively and the yield rate was found to increase by 20.40 per cent in case of beneficiaries over the non-beneficiaries. The average net return per hectare (excluding benefit) stood at Rs, 22,837 in case of beneficiaries and Rs. 14,240 in case of non-beneficiaries. The average net return per hectare (including benefit) stood at Rs, 18,314 in case of beneficiaries. From the cost benefit analysis, on an average the BCR was recorded to be 2.04 for beneficiary farmers and 1.64 for non beneficiary farmers. The beneficiary farmers earned more benefit than that of non-beneficiary farmers as per hectare yield was higher for beneficiary farmers as compared to the non-beneficiary farmers.

It would be worthwhile to mention that the price of paddy in open market during last two years (2010-11 and 2011-12) has increased from Rs. 560/qlt to Rs.800/qlt. However, State's intervention or the role of FCI is not encouraging and is not sufficient enough to safeguard the interest of the farmers.

Factors Affecting Yield of *Kharif* paddy, pulses and summer paddy

The following multiple regression model was used to find out the factors determining the yield of *Kharif* paddy, summer paddy and pulses under BGREI programme. Here, per hectare yield (Y) is a dependent variable and all other, from X_1 to X_8 are independent variables. The model is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e_i$$

Where,

Y = Paddy yield per hectare (kg/ha)

a = Constant term

b_1 - b_8 = Coefficients

X_1 = Cost of Micro-nutrients (Imputed value in case of beneficiary farms, in rupees.)

X_2 = Cost of Seeds (Imputed value in case of beneficiary farms, in rupees)

X_3 = Other Costs (Total cost less 1 & 2, in rupees.)

X_4 = Dummy for Ecological Region 1

X₅=Dummy for Ecological Region 2

X₆=Dummy for Ecological Region 3

X₇=Dummy for Ecological Region 4

X₈=Dummy for Ecological Region 5

e = Error term

The result of the regression indicated that the other costs incurred per hectare had a significant role for raising productivity of *Kharif* paddy (Table-7.4) and all other factors did not show significant impact on productivity. It might be due to effect of some exogenous factors (Abiotic factors) like rainfall, sunshine hours, relative humidity, wind speed, wind direction, evaporation, radiation *etc.* But the average yield per hectare was found higher by 28.42 per cent for beneficiary farmers over the non-beneficiary farmers. In case of pulses, ecological dummy for Rain-fed Low land and Rain-fed Medium Deep Water had significant impact on productivity of the crop at 1 per cent probability level and the other costs at 5 per cent probability level. The remaining factors were found insignificant (Table-7.4 & 7.5). The average yield of beneficiary farmers was found higher by 11.04 per cent over the non-beneficiary farmers.

Table- 7.4
Results of Regression Model for *Kharif* paddy (2010-11)

Model Summary	
R ²	0.59
Adjusted R ²	0.52
SE of Estimate	230.55
Dependent Variable: Yield per hectare (kg/ha.)	4709
Independent Variables	Coefficients
Constant	799.90
Cost of Micro-nutrients (Rs.)	2.03
Cost of Seed per hectare (Rs.)	0.43
Other Costs per hectare (Rs.)	0.08*
Dummy for Rain-fed Upland Ecology	138.95
Dummy for Rain-fed Lowland Ecology	118.45
Dummy for Rain-fed Medium Deep Water Ecology	130.29
Dummy for Rain-fed Deep Water Ecology	238.28
Dummy for Irrigated Ecology	-286.29

Note: *, indicates significant at 0.01 level
Source: Calculated from field data.

Table- 7.5**Results of Regression Model for Pulses (2010-11)**

Model Summary	
R ²	0.69
Adjusted R ²	0.62
SE of Estimate	115.33
Dependent Variable: Yield per hectare (kg/ha.)	684
Independent Variables	Coefficients
Constant	-3.13
Cost of Micro-nutrients (Rs.)	0.09
Cost of Seed per hectare (Rs.)	0.24
Other Costs per hectare (Rs.)	0.05**
Dummy for Rain-fed Lowland Ecology	275.51*
Dummy for Rain-fed Medium Deep Water Ecology	191.10*
Dummy for Rain-fed Deep Water Ecology	51.89
Dummy for Irrigated Ecology	67.88

Note: *and**indicate significant at 0.01 and 0.05 level, respectively

Source: Calculated from field data.

In summer paddy (Table 7.6), Constant, cost of Seed per hectare and other costs incurred per hectare had a significant impact on productivity and the rest of the factors were found insignificant. Here, the effect of exogenous factors might be there. However, the overall per hectare yield was found higher by 25.62 per cent for beneficiary over the non-beneficiary farmers.

Table- 7.6**Results of Regression Model for Summer Paddy (2011-12)**

Model Summary	
R ²	0.72
Adjusted R ²	0.66
SE of Estimate	181.82
Dependent Variable: Yield per hectare (kg/ha.)	5658
Independent Variables	Coefficients
Constant	1753.37**
Cost of Micro-nutrients (Rs.)	-0.10
Cost of Seed per hectare (Rs.)	1.54*
Other Costs per hectare (Rs.)	0.09*
Dummy for Rain-fed Upland Ecology	167.97
Dummy for Rain-fed Lowland Ecology	39.56
Dummy for Rain-fed Medium Deep Water Ecology	338.37
Dummy for Rain-fed Deep Water Ecology	207.72
Dummy for Irrigated Ecology	137.27

Note: *and**indicate significant at 0.01 and 0.05 level, respectively

Source: Calculated from field data.

As per objectives of the study, the effectiveness of progressive farmers in implementation of BGREI programme was also assessed. Nearly, 60 per cent of the progressive farmers had the education up to secondary and higher secondary level and the remaining 40 per cent had graduate/technical level education. The area of supervision for each progressive farmer was 100 hectares for a period of 6 months. The number of linked farmers per progressive farmer was fixed at 214. No honorarium was paid to any progressive farmers till the date of completion of the study. As per report of the State Agriculture Department, the honorarium would be paid later in cash. There was no report of receiving drum seeders by the progressive farmers at the time of field investigation. Information Card for documentation was also not available, when enquired with.

Chapter -VIII

Recommendations and Policy Suggestions

On the basis of the findings, the following recommendations and policy suggestions are submitted for consideration:

1. The State has high potentiality not only for HYV rice but also for ecology-based Hybrid rice.
2. All type of complexity in procurement of inputs under the BGREI may be eliminated so that it can reach the farmers well on time.
3. Delay in release of fund is a major constraint in implementation of the programme. Some of the works such as Asset Building Activities and Site Specific Activities could not be taken up on account of administrative and financial delays. The problem of spill over works from current financial year to the next is very distinct in some activities. Timely release of fund can only minimize the problem.
4. Since BGREI is a group venture, organization of the farmers is a must to harness the desired benefits. Regular field visits by the appointed scientists and close monitoring of the activities can yield better results.
5. Due weightage should be given to the farmer's practice and experience. It has been observed that the most of the farmers are not aware of the programme in details. Selection of demo area should be done in consultation with the farmers and extensive campaign should be launched to educate the farmers about the programme.
6. Although, the beneficiary farmers obtained higher yield than the State's average yield, there is still a wide gap between potential and actual yield. It is a major issue before the State to be addressed in right earnest otherwise the poor farmers would not be able to thrive in the competitive world.
7. Late plantation of summer paddy (after 15th March) is another reason for reduction in yield. As such, the scheduling of activities should be done on time.
8. More technical support is needed for the farmers to bring in changes in rice-based cropping system.

9. Use of micronutrient is still a new concept among the farmers of the State. They do not have much experience in this line, which requires extensive training especially for accuracy in selection of micronutrients along with its doses.
10. Market is a major constraint in Assam. In the years 2010-11 and 2011-12, the State registered a record quantum of rice production. However, farmer's price of paddy at open market was about 32 per cent less than that of the MSP per quintal. The initiative of the State Government in this regard was far from satisfactory as reported by the farmers. Therefore, mere pressure on farmers to produce more and more will not work if suitable measures are not taken for marketing of the surplus produces.
11. Any kind of political interference especially, in selecting the beneficiary farmers should be discouraged.

**AERC for NE India, AAU, Jorhat
for BGREI – Assam**

Action taken on draft report :

As per proceedings of the “Review Meeting of AERCs” on BGREI evaluation held on 28-07-2012 at AERC, Visva-Bharati, Shantiniketan

Comment 1

Objectives should be clearly spelt out. This relates to the terms of reference of the study as circulated by the Ministry.

Action

Done as per suggestion

Comment 2

Method of sampling adopted for the study is to be described.

Action

Done as per suggestion

Comment 3

In Table-4.1, the Centre should include the number of villages covered under the program in place of number of mouzas

Action

The number of Mouzas has been dropped from the Table. The number of villages covered under the programme could not be included as there was no information available in the BGREI cell. However, numbers of villages in each BGREI district are furnished in the table as general information.

Comment 4

The term, number of block demonstrations should be replaced with number of clusters of block demonstrations.

Action

Done as per suggestion.

Comment 5

The concentration of block D/C needs to be calculated by dividing the demonstration area with the total area of sample district during relevant season (*Kharif* or *Rabi* or Summer as the case may be).

Action

Done as per suggestion.

Comment 6

Access of the participating farmers to technical backstopping has to be assessed on the basis of information received from the sample beneficiaries.

Action

Technical backstopping is assessed on the basis of information received from the sample beneficiary farmers only

Comment 7

In case of non-availability of data of input supply in physical units, the Centre may use the data in value terms.

Action

Complied with

Comment 8

Regarding analysis of changes in cropping pattern, the Centre needs to provide reasons for change in cropping pattern.

Action

Reasons of changes in cropping pattern has been furnished in the report.

Comment 9

With regard to perception profiling, the Centre needs to clarify the abbreviations used in the table.

Action

Done as per suggestion.

Comment 10

Regarding cost of cultivation and gross & net returns along with total production data, cost per hectare and net return per hectare may be incorporated accordingly.

Action

The matter has been reviewed and incorporated the figure as per suggestion.

Comment 11

Latest intervention specific physical and financial allocation *vis-à-vis* achievements for the state as a whole would be provided by the BGREI cell in respect of Assam.

Action

Physical and financial achievement were incorporated in the report as provided by the BGREI cell for the State of Assam.

Comment 12

Appropriate econometric model should be used for analysis of the primary data .

Action

Econometric model devised by AERC, Visva Bharati has been used for analysis of the primary data .

References

1. BGREI –A Retrospective Analysis, 2012-13, Directorate of Agriculture, Govt. of Assam, Khanapara, Guwahati
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3. Economic Survey, Assam , 2011-12, Directorate of Economics and Statistics, Assam, Planning and Development Department, Govt. of Assam
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5. Progress Report on Bringing Green Revolution to Eastern India,2010-11 & 2011-12, Assam
6. Proceedings of the two meetings, held on 22nd May, 2012 in Krishi Bhawan, Department of Agriculture and Cooperation , Ministry of Agriculture, Govt. of India, New Delhi and on 28th July,2012 in A.E.R.C. Visva Bharati , Santiniketon, Kolkata.
7. Statistical Hand book of Assam, Directorate of Economics and Statistics, 2011, Government of Assam.
