

Chapter 3

AGRICULTURAL DEVELOPMENT AND THE INFORMATION NEEDS

This chapter has been divided into two parts. The first part is an overview of agricultural development in Assam and the second part describes the information needs of the farmers in the four villages under the study. This chapter basically discusses the agricultural inputs like fertilizers, seeds, irrigation, high yielding varieties, market and production in Assam.

I

AGRICULTURAL DEVELOPMENT IN ASSAM

Agriculture and its allied activities play an important role in the socio-economic development of the State of Assam as this sector is the major contributor to the State economy as well as providing livelihood to a significant proportion of the population of the State. About 99 percent area of the total land mass of the State is rural and almost 50 per cent of the total land area is utilised for cultivation. The net cultivated area of the State is 28.10 lakh hectares (2008-09) and the per capita availability of net sown area comes to around 0.1 hectare. Above that 23 per cent of the net sown area is flood or drought-prone. The average operational holding is 1.15 hectare only and more than 83 percent of the farmers family are small and marginal farmers (2005-06, Agricultural Census). The contribution of the agriculture sector to the GSDP (at constant 2004-05 prices) was pegged at 4.1 per cent in 2009-10 (Quick estimate), showing a growth from 2005-06 but remained lower than that of 2008-09. However, this sector continues to support more than 75 percent population of the State, directly or indirectly providing employment to more than 53 percent of the workforce (Economic Survey: 2010-11).

After critical analysis of the sectoral growth of the state economy it is revealed that the growth of the agriculture and allied sector was not encouraging during the last three consecutive Five-Year Plan (8th, 9th and 10th Five-Year Plan) periods. This depressing performance was continued even during the first year of 11th Five-Year Plan, but it made some recovery over the average growth of the 10th Five Year Plan. However, the growth of this sector shoot up and reached to a comfortable level at 6.4 percent (GSDP at Constant (2004-05) prices) during 2008-09 surpassing the targeted annual growth of the sector @2.00 percent set for the plan period. The main reason

for achievement of this growth is the bumper production of rice (mainly winter rice). As per 2009-10 quick estimates, the growth of agriculture sector is expected to be moderately lower with 4.1 percent. The declining trend of growth rate is due to the adverse weather condition experienced during 2009-10. The growth of the agriculture and allied sector is projected at 6.6 percent in 2010-11(A) as the State has experienced sufficient rainfall during the kharif season which is congenial for rice cultivation in the State (Directorate of Economics and Statistics: 2010-11).

The State Agriculture Department has focussed more to increase production of foodgrains to provide food security to the growing population through increasing productivity of crops and cropping intensity. Accordingly, the State Agriculture Department has prioritized optimum and efficient use of available resources to enhance the production and productivity of the crops including the horticultural crops by harnessing the best in frontier technologies. The Department has formulated district/state specific plan depending on agro-climatic condition, growth potential and specific requirement of districts through improved farm mechanization and assured irrigation, use of quality certified HYV seeds, popularizing the integrated nutrient and pest management with the special use of bio-fertilizer and bio-pesticides and organic farming etc. The following table shows the trend of agricultural growth in Assam:

Table 3.1
Trend of Growth in Agricultural Sector, Assam
GSDP at Constant (2004-05) Prices
(figures in percentage)

2005-06	2006-07	2007-08	2008-09(P)	2009-10(Q)	2010-11(A)
1.9	1.7	3.0	6.4	4.1	6.6

2005Source: Directorate of Economics and Statistics: 2010-11

Special emphasis has been given by the State Agriculture Department through systematic and schematic effort for providing irrigation facilities, seed replacement, organic farming and development of marketing & market infrastructure so as to encourage the farming community and to create maximum potential for employment generation. The following table shows the trend of food production in Assam during the period from 2001-02 to 2009-10:

Table 3.2
Trend of Production of Food Grains in Assam
(Figures in 000 tones)

Item	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Total Rice	3854	3738	3880	3470	3552	2916	3319	4008	4408
Total Wheat	85	78	73	68	54	67	71	55	65
Total Pulses	66	60	63	61	56	59	61	62	66
Total food grains	4023	3894	4034	3617	3680	3060	3468	4142	4557
Total Oilseeds (excl. coconut)	151	144	152	142	110	129	135	137	142

Source: Directorate of Economics and Statistics, Assam: 2010-11

Agricultural Scenario: 2009-10

From the table 3.3 it is evident that the State had experienced 1735.8 mm rainfall during 2009-10, out of which 1512.4 mm occurred during the Kharif crop season. According to the State Agriculture Department, the acute deficiency of rainfall experienced by the State since March 2009 also continued during the Kharif season of 2009-10, both in terms of total rainfall and its spread. During the peak Kharif period from June 2009 to September 2009, the overall rainfall-deficit in the State of Assam was recorded as (-) 35% by 30th June, (-) 18% by 31st July, (-) 20% by 31st August and (-) 38% by 30th September 2009. Even though the deficit reduced to (-) 13% and (-) 18% by 31st August and 30th September respectively, there was wider variation in rainfall-deficit in various districts in the State ranging from (-) 20% to (-) 65%. This drought-like situation caused serious damage to seedlings and standing Kharif crops, more particularly the winter paddy. However, immediate measures are taken by the Agriculture Department to provide irrigation help to the farmers to save the affected crops from further damage. As the weather condition improved from last part of July the farmers were able to cover most of the Winter Paddy area by late transplanting of fresh winter paddy seedlings. Rainfall in Assam during Kharif and Rabi sessions is given in the following table:

Table 3.3
Rainfall in Assam during Kharif and Rabi Seasons 2009-10

MSeason	Month		Actual Rainfall Received (mm)	Normal rainfall Received (mm)	Departure from Normal
Kharif	April, 2009		145.2	185.1	-22%
	May, 2009		185.3	334.4	-45%
	June, 2009		270.7	419.5	-35%
	July, 2009		341.2	415.9 -	-18%
	August, 2009		409.4	340.7	20%
	September, 2009		160.6	258.0	-38%
	Total		1512.4	1953.6	-23%
Rabi	October 2009		118.1	141.1	-16%
	November 2009		12.6	24.8	-49%
	December 2009		2.9	12.1	-76%
	January 2009		0.2	18.4	-99%
	February 2009		2.4	27.4	-91%
	March 2009		87.1	79.1	10%
Total		223.4	302.9	26%	

Directorate of Economics and Statistics, Assam: 2010-11

Overall rainfall pattern during the Rabi crop season of 2009-10 was deficient.

During the period from October 2009 to March 2010 the State had received 223.4 mm of rainfall against normal rainfall of 302.9mm, a deviation of 26%. This deviation was recorded (-) 76% to (-) 99% during the months of December 2009 to January 2010 as the State had received scanty rainfall ranged between 0.2 mm to 2.9 mm.

Rainfall during Kharif Season, 2010

Table 3.4
Rainfall in Assam during Kharif Season, 2010 Month Actual (mm)

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: Directorate of Agriculture, Assam: 2010-11

The rainfall pattern in the State during the Kharif crop season of 2010 was favourable both in terms of total rainfall and its spread. The overall rainfall recorded during the season was 2066.3 mm against the normal 1976.0 mm (+5% deviation from normal). The State had experienced excessive rainfall in the month of April, but normal during the months from May to September except July. Rainfall was marginally deficient in the month of July. During the season excessive rainfall and down stream water from the neighbouring hill states and countries caused flood in few districts. Immediate steps taken by Agriculture Department helped farmers to save the Kharif crops, mainly Sali Paddy, in most of the flood affected areas (Directorate of Economics and Statistics, Assam).

Area under Crops

In Assam, the soil, topography, rainfall and climate in general are congenial for agricultural activities mainly for paddy cultivation. The paddy cultivation occupied 91.9 percent of the net cropped area and 65.9 percent of the Gross Cropped area in the State during the year 2009-10. As per final estimates, the average area covered for normal paddy cultivation during the year was 25.30 lakh hectares or about 92.5 percent of the total area under food grains in the State. However, there has been a gradual decline in respect of area covered for cultivation of Autumn Rice, which has switched over to the Summer Rice due to its higher productivity and hazard risk.

During the period 2001-02 to 2009-10, the area under Autumn Rice cultivation recorded 30.24 percent decline over the period of nine years. During the year 2005-06, the area under Autumn Rice was 3.98 lakh hectares and declined to 3.79 lakh hectares during 2006-07. Final forecast estimates show that the area under Autumn Rice has declined further to 3.46 lakh hectares during 2009-10. The area covered under Winter Rice, the principal Kharif Crop of the State, which was declined due to serious drought like situation experienced by the State during the year 2006-07 (14.98 lakh hectares) had increased to 16.47 lakh hectares during 2007-08 due to improvement of normal seasonal rainfall, weather condition and irrigation support. However, the area coverage under the crop further increased to 17.89 lakh hectares during 2009-10. The area coverage under the crop recorded 19.43 percent (or 2.91 lakh hectares) increase during 2009-10 compared to the area under the crop during 2006-07. According to the final estimates, the area covered for cultivation of Summer Rice during 2009-10 was 3.94 lakh hectares. This estimated area under Summer Paddy has been recorded highest over the period of last nine years (2001-02 to 2009-10). Compared to the area covered during 2007-08 (3.23 lakh hectares), the area under Summer Rice during 2009-10 was about 22.0 percent more (Directorate of Economics and Statistics, Assam).

The area coverage under Pulses and Oilseeds in 2009-10, as per final estimates, has been expected to reach the level of 1.19 lakh hectares and 2.69 lakh hectares respectively against 1.14 lakh hectares and 2.47 lakh hectares in 2008-09. It is evident from the table 5.5 that while the area under pulses has been gradually increasing from 1.00 lakh hectare in 2005-06 to 1.19 lakh hectares in 2009-10, the area coverage under oilseeds recorded moderate increase from 2.47 lakh hectares in 2008-09 to 2.69 lakh hectares in 2009-10, irrespective of overall scanty/deficient rainfall experienced during the Rabi season of 2009-10.

The trend of crop-wise land utilization in Assam during the 2010-11 may be evident from the following table:

Table 3.5
Area under Crops in Assam during the Period 2001-02 to 2009-10
(in lakh hectares)

Crop	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Autumn Rice	4.96	4.64	4.41	4.36	3.98	3.79	3.54	3.51	3.46
Winter Rice	17.15	17.49	17.69	16.36	17.07	14.98	16.47	17.73	17.89
Summer Rice	3.26	3.27	3.19	3.11	3.15	3.12	3.23	3.60	3.94
Total Rice*	25.37	25.40	25.29	23.83	24.20	21.89	23.24	24.84	25.30
Wheat	0.72	0.69	0.70	0.64	0.50	0.60	0.56	0.50	0.60
Total Pulses	1.18	1.11	1.14	1.08	1.00	1.07	1.13	1.14	1.19
Total Food grains	27.55	27.48	27.41	25.82	25.97	23.82	25.18	26.71	
Total Oilseeds (excl.Coconut)	2.99	2.87	2.89	2.68	2.35	2.60	2.57	2.47	2.69

*Total figure may not be equal due to rounding off to nearest zero.

Source: Directorate of Economics and Statistics, Assam: 2010-11

Production

As per final estimates, the production of rice in the State was 44.08 lakh MT during the year 2009-10 as against 40.08 lakh MT rice during the year 2008-09. Total production of rice in the State recorded 9.98 percent increase during the year over 2008-09. Adverse weather condition at the early part of the Kharif season although affected Kharif crops, more particularly the Winter Paddy, impact of timely measures taken by the Agriculture Department by providing irrigation support to save the standing crops and subsequent improvement of weather condition from the last part of July and increase of area under winter or Sali Rice and Summer Rice influenced the increase of rice production during the year 2009-10. The production of pulses, on the other hand, increased marginally from 0.62 lakh MT in 2008- 09 to 0.66 lakh MT during the year 2009-10. The increase of estimated production of pulses during the year 2009-10 was 11.9 per cent more than the production of pulses during 2006-07(0.59 lakh MT). The increasing trend of production of pulses continued since 2005-06. The oilseeds production was also increased by 4.4 percent during the year 2009-10 with 1.42 lakh MT as against 1.36 lakh MT in 2008-09. The production of oil seeds in the State was 1.10 lakh MT and 1.29 lakh MT during the years 2005-06 and 2006-07 respectively (Directorate of Economics and Statistics, Assam).

Yield Rate

The trend of yield rate of Autumn Rice was erratic. During 2005-06 the yield rate of Autumn Rice increased to 1016 Kg/ hectare from 667 Kg. / hectare in 2004-05. It again decreased to 899 Kg/hectare during 2006-07. The yield rate of the Autumn Rice increased to 999 Kg/hectare during 2007-08 and it further increased to 1084 kg/hectare during 2008-09. During the year 2009-10, the yield rate of Autumn Rice had come down to 982 kg/hectare (Directorate of Economics and Statistics, Assam).

Table 3.6
Yield Rate of Principal Agricultural Crops in Assam
(kg/per hectare)

Name of Crops	2004-05	2005-06	2006-07	2007-08	2008-09
Autumn Rice	667	1016	899	999	1084
Winter Rice	1598	1543	1321	1380	1641
Summer Rice	1959	1780	2017	2267	2133
Total Pulses	569	550	564	555	545

Source: Directorate of Economics and Statistics, Assam: 2010-11

The yield rate of winter rice (kg/ hectare) maintains its decreasing trend during the years from 2004-05 to 2007-08. The yield rate of winter rice was low during the years 2006-07 and 2007-08 over the previous two years mainly due to drought like situation and severe floods that the State had experienced during the peak Sali Paddy season of the aforesaid years respectively. However, due to good seasonal rainfall during the year 2008-09, the yield rate of winter rice has increased about 19.0 percent during the year compared to the yield rate in 2007-08. The yield rate (kg/hectare) of winter rice recorded 11.15 percent increase during the year 2009-10 over 2008-09.

The productivity of Summer Rice, on the other hand, continued to maintain its increasing trend during the period 2004-05 to 2009-10 except in the year 2005-06. However, the yield rate of summer paddy was marginally low during 2009-10 (3.8 percent) compared to the yield rate of 2007-08. The trend of productivity of pulses and oil Seeds was erratic during the period 2004-05 to 2009-10. While the productivity of Oil Seeds recorded 3.64 percent decrease during 2009-10 over 2008-09, the productivity of pulses has shown 2.4 percent recovery during the same period.

(Directorate of Economics and Statistics, Assam)

Area and Productivity under High Yielding Variety (HYV)

Total area under HYV of Autumn Rice, Winter Rice, and Summer Rice has increased from 13.45 lakh hectares in 2006-07 to 16.26 lakh hectares in 2009-10. During the year 2005-06 the area under HYV was 14.5 lakh hectares. The area coverage under HYV rice in 2009-10 was 7.5 per cent which was more over the preceding year i.e., 2008-09. The area coverage of HYV rice to total rice area has been increasing step by step from 59.9 per cent in 2005-06 to 65.0 percent in 2009-10. Considering the productivity, cultivators preferred the seed of HYV rice viz., Mala, IR-36., Lachit, Masuri, Joya, Ranjit, Ratna, China Boro, Biplov, Bahadur, Kaveri,

Krishna etc. The area covered under HYV rice and their productivity is shown in the following table 3.7:

Table 3.7
Area and Productivity under High Yielding Variety Rice
(area in lakh hectares/ productivity in kg /hectares)

Sl. No	Crop	2005-06		2006-07		2007-08		2008-2009		2009-10	
		Area	Productivity	Area	Productivity	Area	Productivity	Area	Productivity	Area	Productivity
1	Autumn	2.35	1866	2.15	1686	2.23	1858	2.24	1959	2.40	1858
2	Winter	9.50	2281	8.63	1990	8.94	2152	9.75	2256	2.40	2152
3	Summer	2.65	2192	2.67	2228	2.78	2509	3.14	2371	3.36	2509

Source: Directorate of Agriculture, Assam: 2010-11

Target of Area, Production & Productivity of Major Crops during 2009-2010

In view of growing food demand and attainment of food and nutrition security, sustainable agricultural development through crop diversification is the need of the hour. To achieve the objective and to attain self sufficiency in food production, the Agriculture Department has set the target to cover 26.65 lakh hectares of area under rice so as to increase the production of rice to 46.31 lakh MT during the year 2010-11. Details of the target set for production of various food crops during the year 2010-11 are shown below.

Table 3.8
Target of Production of Major Crops in 2010-11

Crop	Area (in lakh hect)	Production (in lakh MT)	Average yield (in kg/hect)
Autumn Rice	3.65	4.11	1126
Winter Rice	18.00	30.60	1700
Summer Rice	5.00	11.60	2325
Total Rice	26.65	46.31	1738
Wheat	0.75	1.04	1380
Pulses	1.70	1.10	647
Oilseeds	3.70	2.35	635

Source: Directorate of Economics and Statistics, Assam: 2010-11

Index of Agricultural Production

Index of Agricultural Production (Base: triennium ending 1981-82=100) for the State stands at 186 in 2009- 10 as compared to 170 in 2008-09. The All India Agricultural Production Index, on the other hand, stands at 180 in 2009-10. The table 3.9 shows the trend of Index of agricultural production in the State as well as in the country as a whole, for the last nine years (2001/02-2009/10).

Table 3.9
Index of Agricultural Production in Assam and India
(Base: Triennium ending 1981-82=100)

Year	Assam			India		
	Food	Non-food	All Commodities	Food	Non-food	All Commodities
2001-02	169	160	164	172	190	179
2002-03	164	166	165	140	166	150
2003-04	170	162	166	172	201	183
2004-05	152	154	153	160	206	177
2005-06	155	148	153	169	230	192
2006-07	128	156	142	176	241	200
2007-08	145	161	153	187	247	207
2008-09	174	167	170	190	221	193
2009-10	192	180	186	177	206	180

N. B.: The Agricultural Indices for Assam are constructed only on the crops covered by the Crop Forecast. Figure rounded to nearest zero.

Sources: (1) Directorate of Economics and Statistics, Assam; (2) Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India

Land Utilization Statistics

As per the Land Utilization Statistics for the year 2008-09(Provisional), the total reporting area (Village paper) of the State was 78.50 lakh hectares. Out of the total reporting area, net sown area constituted 35.80 percent (28.10 lakh hectares), 23.61 percent was under forest, land not available for cultivation was 26.26 lakh hectares or 33.45 percent of the total reporting area and other uncultivable area was 4.32 lakh hectares or 5.5 percent . While fallow land constitutes 1.63 percent of the total reporting area with around 1.28 lakh hectares, land under still water and water logged area jointly constitutes 1.78 lakh hectares or 2.27 percent. The area under Social Forestry was only 0.13 lakh hectares or 0.16 percent of the total reporting area. The Gross Cropped Area recorded increase from 38.39 lakh hectares in 2007-08 to 39.99 lakh hectares in 2008-09. The area sown more than once and the net cropped area recorded 9.4 percent and 2.1 percent with 11.88 lakh and 28.10 lakh hectares during the year 2008-09 which were over the figures of 2007-08. Thus, it reveals from the above that the ratio of area sown more than once to the net area sown was 42.28 percent during 2008-09 as against 39.45 percent during the year 2007-08. The ratio of net sown area to gross cropped area, on the other hand, was calculated at 70.28 percent during the year 2008-09 compared to 71.71 percent during the year 2007-08. (Economic Survey, Assam: 2010-11).

Agricultural Holding

According to the Agricultural Census, 2005-06 there were 27.5 lakh operational holdings in Assam covering an area of 30.49 lakh hectares of land as compared to 27.1 lakh operational holdings covering an area of about 31.1 lakh hectares of land in 2000-01. The following table 3.10 depicts the trend of number of holdings and area between the two agricultural censuses, 2000-01 and 2005-06:

Table 3.10
Agricultural Censuses 2000-01 and 2005-06

Size in classes	Number of holding		PC increase/d ecrease over 2000-01	Area operated (in hector)		PC increase/d ecrease over 2000-01
	2000-01	2005-06		2000-01	2005-06	
Marginal (Below 1.0)	1699107	1752989	(+) 3.17	662780	760145	(+) 14.69
Small (1.0-2.0)	561039	591431	(+)5.42	730513	718383	(-) 1.66
Semi-medium (2.0-4.0)	351521	317859	(-)9.6	957959	846006	(-)11.69
Medium (4.0-10.0)	95500	82933	(-) 13.2	498797	425403	(-)14.71
Large (10.0 & above)	4970	4902	(-) 1.4	263529	298606	(+) 13.31
Total	2712137	2750114	(+) 1.4	3113578	3048543	(-) 2.09

Source: Directorate of Economics and Statistics, Assam: 2010-11

As per the Agricultural Census, 2005-06, the marginal holdings with less than one hectare of land accounted for 63.7 per cent of the total holdings and 24.9 per cent of the total operated area of the State in 2005- 06. The small holdings with the size class between 1-2 hectares shared 21.5 per cent of the total holdings and 23.6 per cent of the total operational area. On the other hand, the large holdings (10 hectares and above) constituted only 0.18 per cent of the total number of holdings and 9.8 per cent of the total operated area in the State. The following table 3.11 shows the trend of agricultural holdings and operated area in the State from 1970-71 to 2005-06.

Table 3.11
Agricultural Holdings and Operated Area in Assam
(As per Agricultural Censuses)

Agricultural census year	Number of holdings	Total operated areas (in thousand hect)	Average size of holdings (in hect)
1970-71	1964376	2882	1.47
1976-77	2253654	3079	1.37
1980-81	2297588	3121	1.36
1985-86	2419156	3161	1.31
1990-91	2523379	3205	1.27
1995-96	2682997	3138	1.17
2000-01	2712137	3114	1.15
2005-2006	2750114	3049	1.11

Census year N Source: Directorate of Economics and Statistics, Assam: 2010-11

Agriculture occupies a very important role in the economy of the Sivasagar district and is the major source of income providing livelihood to the 92.76% of rural populations. Winter Paddy which is commonly known as sali is widely cultivated throughout the district. Area under this crop has increased to 7594 hectares than 1997-98 due to absence of flood in the district during the years. Autumn paddy being the next popular major crop in the district covered area 1835 hectares in 1999-2000 against 1420 hect during 1998-99. Other major crops cultivated in the district are jute, potato, sugarcane, mustard, pulses, (Matikali, Masur, Mug, Peas etc.) and wheat.

II

INFORMATION NEEDS OF THE FARMERS

The economy of Assam is mainly rural and agrarian. Agriculture and its allied activities play an important role in the socio-economic development. The information needs of farmers can be measured by analyzing what information they have already adopted and what left. Information is a critical resource in the operation and management of the agricultural enterprise. Access to the right information determines the success and failure of the farmers and, thereby agriculture, the mainstay of rural life, needs proper communication of new ideas and technological innovations for improvement of the life as a whole (Opara 2008).

In order to analyse or examine the development status of agriculture, firstly, it is required to use the parameter like pattern of agriculture, seeds, fertilizers, size of land, agricultural implements or equipments, pesticides, insecticides, irrigational

facilities, marketing and agricultural production in the villages under study. The types of landholding show the production status, economic soundness, resources and sustainability of the families in the four villages. The following table shows the distribution of types of landholding families in the four villages:

Table 3.12
Types of Landholding in Families of the Four Villages
(Percentages in Parentheses)

Types of Landholding	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Households land	26(5.00)	25(4.44)	90(11.58)	50 (11.85)	191(8.37)
Cultivated land	489(94.04)	516(91.48)	673(86.61)	358 (84.83)	2036(89.18)
Uncultivated land	05(0.96)	23(4.08)	14(1.81)	14(3.32)	56(2.45)
Total	520(100)	564(100)	777(100)	422 (100)	2283(100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that out of the total land, about one tenth (8.37%) is household land, and over four fifths (89.18%) of land is cultivated land. Of the total 2.45% is non-cultivated land or forest land. Further, 94.04% of the land is cultivated land in Charal village, 91.48% in Bhuyan, 86.61% in Lahdoigarh and 84.83% in Borbahoni. Thus, Charal (0.96%) has less uncultivated land than other three villages - Bhuyan (4.08%), Borbahoni (3.32%) and Lahdoigarh (1.81%) due to the reserve forest land and occupied by the water in large areas of land.

Thus, cultivated land is more in Charal and Bhuyan than rest of the villages. In Lahdoigarh and Borbahoni cultivated lands are comparatively less due to increasing population in their villages.

By their landholding size, the families in the four villages are divided into four categories; namely, the landless, the marginal landholders who hold land between 3.5-7.5 bighas, the small landholders whose landholding size is 7.5-15 bighas, and the large landholders whose land size is more than 15 bighas. These categories of landholding size have been formulated by the Government of Assam for determining land revenue. The following table shows the distribution of landholding size in the four villages:

Table 3.13
Size of Landholding in the Villages
(Percentages in Parentheses)

Landholding Size (in bighas)	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Landless	06(10.91)	03(5.77)	20(17.39)	35(34.66)	64(19.81)
Marginal (3.5-7.5)	--	18(34.62)	24(20.87)	47(46.53)	87(26.94)
Small (7.5-15)	48(87.28)	16(30.76)	65(56.53)	18(17.82)	147(45.52)
Large (15+)	01(1.81)	15(28.85)	06(5.21)	01(0.99)	23(7.13)
Total	55(100)	52(100)	115(100)	101(100)	323(100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that almost one fifth (19.81%) of the families are landless; 34.66% families in Borbahoni, 17.39% in Lahdoigarh, 10.91% in Charal and 5.77% in Bhuyan village. One fourth (26.94%) of the villagers are marginal land holders; over 46.53% in Borbahoni, one third (34.62%) in Bhuyan and 20.87% in Lahdoigarh village. Over two fifths of the villagers are found as small farmers: over four fifths 87.28% in Charal, 56.53% in Lahdoigarh, 30.76% in Bhuyan and 17.82% in Borbahoni. Only a few villagers (7.13%) are large landholders. However, in Bhuyan, 28.85% of the families have large landholding compare to Borbahoni (0.99%) because rich families in Bhuyan bought land from the neighbouring villages.

Thus, Lahdoigarh has more number of landholding due to more number of households but the number of large landholding is more in Bhuyan.

Types of Seeds

In the villages, depending on the size of landholding, the villagers are cultivated using two types of seeds; namely, local and high yield variety seeds. The following table shows the types of seeds used by the families for agricultural production in the villages:

Table 3.14
Types of Crop Seed Used in Families of the Villages
(Percentages in Parentheses)

Types of Seeds	Charal	Bhuyan	Lahdoigarh	Borbahoni	Grand Total
Home made /Local	8 (16.33)	--	20 (21.06)	37 (56.06)	65 (25.09)
Local & High Yielding Variety	41 (83.67)	49 (100)	75 (78.94)	29 (43.94)	194 (74.91)
Total	49 (100)	49 (100)	95 (100)	66 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that one fourth of the families (25.09%) use local or home-made seeds for cultivation: 56.06% in Borbahoni village, 21.06% in Lahdoigarh and 16.33% in Charal. Of the total families three fourths (74.91%) use HYV as well as local seeds: 100% in Bhuyan village use it, 83.67% in Charal and one third families in Lahdoigarh. In Borbahoni village four fifths (43.94%) of families use both seeds.

Thus, it is found that less HYV seeds are used in Borbahoni than any other villages because most of the villagers are tea garden labourer and less cultivable land. They also not give much important about HYV seeds. So, they need information on HYV seeds. Besides, the villagers of Borbahoni and Lahdoigarh use more local seeds as they prepare liquor (aapong) from them.

In Assam, villagers use common local seeds in their fields. The common names of the local seeds used by the farmers in the villages are given in the following table:

Table 3.15
Types of Local Seeds Used by Families in the Villages
(Percentages in Parentheses)

Name of Local Seed	Charal N=49	Bhuyan N=49	Lahdoigarh N=95	Borbahoni N=66	Total N=259
Hali	49(100)	14(28.57)	95(100)	66(100)	224(86.48)
Bora	21(42.85)	12(24.48)	11(11.57)	15(22.72)	59(22.77)
Sokua	13(26.53)	17(34.69)	21(22.10)	9(13.63)	60(23.16)
Joha	22(44.89)	24(48.97)	4(4.21)	14(21.21)	64(24.71)
Betguti	5(10.20)	8(16.32)	1(1.05)	4(6.06)	18(6.94)
Kon-Joha	2(4.08)	4(8.16)	4(4.21)	6(9.09)	16(6.17)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that over four fifth of the families (86.48%) use Hali seeds: all the villagers of Charal, Bhuyan and Borbahoni and 28.57% in Bhuyan. Over one

fifth (22.77%) of families use Bora seed in their fields and a little more than it that is 23.16% families are found using Sakua seeds for cultivation: one third (34.69%) in Charal. Joha is also popular local seed among the villages and about one fourth of the families use it in their fields. About half of the families (48.97%) in Bhuyan use this variety in their fields, followed by Charal village (44.89%), Borbahoni village (21.21%) and Lahdoigarh (4.21%). Almost equal percentages of families use Betguti and Kon-joha seeds.

Thus, Hali seeds are mostly used by the villagers that make them easier to cultivate without using fertilizer and they trust on it. As, most of the families of Borbahoni and Lahdoigarh cultivate local seeds to make liquor either for their own consumption or sale in markets.

Other than local seeds, the villagers also use high yield varieties seed for more production. The following table shows the HYV seeds used by the villagers:

Table 3.16
Types of High Yield Variety Seeds in Families of the Villagers
(Percentages in Parentheses)

High Yield Variety Seeds	Charal N=41	Bhuyan N=49	Lahdoigarh N=75	Borbahoni N=29	Total N=194
Masoori	41(100)	49(100)	75(100)	29(100)	194(100)
Pankaj	23(56.07)	28(57.15)	4(5.34)	--	55(28.35)
Basmati	12(29.26)	14(28.57)	2(2.67)	8(27.58)	36(18.55)
Joha775	2(4.87)	--	--	--	2(1.03)
Piyoli	--	3(6.12)	--	--	3(1.54)
Bahadur	5(12.19)	11(22.44)	--	2(6.89)	18(9.27)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that Masoori is used in all families for crops. Similarly the seeds like Pankaj and Basmati are also used by them. More than one fourth (28.35%) of the families use Pankaj seed and less than one fifth (18.55%) of the families use Basmati seed. The other seeds like Joha 775 (1.03% families), Piyoli (1.54% families) and Bahadur (9.27% families) are found very less used in four villages. It is found that all the families in four villages use Masoori seeds and the other seeds are comparatively less. However, Basmati and Joha varieties product are higher price than the other seeds in the market; therefore, the villagers need information of these seeds.

Thus, farmers' families of Lahdoigarh, Borbahoni and Charal need information on HYV seeds like Basmati, Joha 775 etc. as these types of seeds have more demand in any markets.

Using varieties of seeds, the villagers of Charal, Bhuyan, Lahdoigarh and Borbahoni grow Kharif and Rabi crops in their cultivated land. Kharif crop refers to the planting, cultivation and harvesting of any domesticated plant sown in the rainy (monsoon) season on the Asian subcontinent. Such crops are planted for autumn harvest and may also be called the summer or monsoon crop in India and Pakistan. Kharif crops are usually sown with the beginning of the first rains in July, during the south-west monsoon season. In Pakistan the Kharif season starts on April 16 and lasts until October 15. In India the Kharif season varies by crop and state. Kharif starts at the earliest in May and ending at the latest in January, but it generally considered to start in June and to end in October. Examples include millet, paddy, etc. Rabi and Kharif are the two agricultural crops; related words have come with the Mughals in the Indian subcontinent and are widely used ever-since.

The Kharif crops are better known as the monsoon crops in Indian sub continent (India, Pakistan, Sri Lanka, and Nepal). Kharif crops are usually sown with the beginning of the first rains towards the end of May in the state of Kerala during the advent of south-west monsoon season. As the Monsoon rains advance towards the North India the sowing dates accordingly vary and it is done in July in North Indian states. These crops are totally dependent on the quantity of rain water as well as its timing. Too much, too little or at wrong time may lay waste the whole year's efforts. The harvesting begins with Diwali days or slightly earlier during Vijayadashmi days, since this period coincides with the beginning of autumn / winter in the Indian sub-continent. It is called Kharif period and the crops are Kharif crops (Directorate of Economics and Statistics: Ministry of Agriculture, Govt. of India (http://eands.dacnet.nic.in/At_A_Glance-2011/Appendix-IV.xls)).

The term Rabi means spring in Arabic, and the Rabi crops are grown between the months mid-November to April. The water that has percolated in the ground during the rains is main source of water for these crops. Rabi crops require irrigation. So, a good or bountiful rain may tend to spoil the Kharif crops but it is good for Rabi crops. These crops are taken after the departure of monsoon rains. The seeds are sown

after the rains have gone and harvesting begins in April/May. Major Rabi crop is wheat in India followed by barley, mustard, sesame and peas (They are harvested early as they are ready early). So Indian markets are flooded with Green Peas from January to March (Peak is February). The Rabi season starts with the onset of north-east monsoon in October. Many crops are cultivated in both Kharif and Rabi seasons. The agriculture crops produced in India are seasonal in nature and highly dependent on these two monsoons. Examples of Rabi crops are wheat, gram, mustard, linseed, barley, peas etc. The following table shows the seasonwise distribution of area under Kharif and Rabi crops in the four villages:

Table 3.17
Season-wise Area Distribution under Kharif and Rabi Crops in the Villages
(in bighas)
(Percentage in Parenthesis)

Crop Season	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total Area
Kharif	459(96.03)	486(94.18)	472(70.13)	300(88.23)	1717(85.55)
Rabi	19(3.97)	30(5.82)	201(29.87)	40(11.77)	290(14.45)
Total	478(100)	516(100)	673(100)	340(100)	2007(100)

Source: Field Data Collected from the Villages during March/April 2011

In these four villages, 2007 bighas of land are cultivated: Kharif crops (85.55%) and Rabi crops (14.45%). In Charal 478 bighas (Kharif 96.03% and Rabi 3.97%), 516 in Bhuyan (Kharif 94.18% and Rabi 5.82%), 673 in Lahdoigarh (Kharif 70.13% and Rabi 29.87%) and 340 bighas in Borbahoni (Kharif 88.23% and Rabi 11.77%) are found in under Kharif and Rabi crops.

Thus, the villagers preferred Kharif than Rabi crops in the villages due to small size of landholding and lack of irrigation facilities. The Rabi crops like-potato, beans, tomato, mustard, cabbage etc need adequate irrigation. Therefore, the villagers need information on irrigation system to grow more crops that the villagers depend on mosoon rain. The farmers' families of Lahdoigarh grow more Rabi crops as they have fertile land near Janjhi River. So, villagers like Borbahoni, Charal and Bhuyan need more irrigational facilities to grow Rabi crops.

Preferred Crops of Farmers

All the villagers are not growing the same types of crop. On the basis of size of landholdings they grow Kharif and Rabi crops in their fields. This distribution of the villagers is shown in the following table:

Table 3.18
Preferred Types of Crops among Families of the Villagers
(Percentage in Parentheses)

Type of Farmers	Charal			Bhuyan			Lahdoigarh			Borbahoni					Grand Total
	Kharif	Rabi	Total	Kharif	Rabi	Total	Kharif	Rabi	Total	Kharif	Rabi	Total	Total Kharif	Total Rabi	Total
Marginal	-	-	-	12 (42.86)	4 (19.05)	16 (32.66)	12 (25)	10 (21.28)	22 (23.15)	35 (71.42)	12 (70.59)	47 (71.22)	59 (38.82)	26 (24.29)	85 (32.82)
Small	27 (100)	21 (95.45)	48 (97.95)	16 (57.14)	5 (23.80)	21 (42.86)	32 (66.66)	35 (74.46)	67 (70.53)	13 (26.53)	5 (29.41)	18 (27.27)	88 (57.89)	66 (61.69)	154 (59.45)
Large	-	1 (4.56)	1 (2.05)	-	12 (57.15)	12 (24.48)	4 (8.34)	2 (4.26)	6 (6.32)	1 (2.05)	-	1 (1.51)	5 (3.29)	15 (14.02)	20 (7.73)
Total	27 (100)	22 (100)	49 (100)	28 (100)	21 (100)	49 (100)	48 (100)	47 (100)	95 (100)	49 (100)	17 (100)	66 (100)	152 (100)	107 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows the families into landholding categories and their preferred crops in the four villages. About three fifth (59.45%) of small farmers cultivate crops; 57.89% families prefer Kharif and 61.69% families prefer Rabi crops in the four villages. Among the marginal group of farmers (32.82%) cultivate crops; almost two fifths (38.82%) of the families prefer to grow Kharif and 24.29% grow Rabi crops. Out of total (7.73%) large landholders, 3.29% families prefer to grow Kharif and 14.02% grow Rabi crops.

In comparison to four villages, Lahdoigarh grow more Rabi crops than other three villages due to irrigation facilities getting from Janji River. Besides, the small land holding farmers grow more Rabi crops as most of families are purely depend on agriculture for livelihoods.

Thus, small landholding farmers grow both Rabi and Kharif crops in four villages.

Crops

In Charal, Bhuyan, Lahdoigarh and Borbahoni villages, the villagers have grown food grains, oilseeds and vegetables. The villagers grow three types of crops; namely, (i) food grains, (ii) oilseeds and (iii) vegetables. Food grains and oilseeds are rice and mustard respectively. Vegetables are grown such as potato, pumpkin, tomato, cabbage, chilly, ladies finger, ginger, turmeric. The following table presents the types of the crops grown in the four villages:

Table 3.19
Crop Grown by Families of the Four Villages
(Percentage in Parentheses)

Crops Grown	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Food grains	24(48.98)	10(20.41)	40 (42.10)	34(51.51)	108(41.70)
Food grains and oil seeds	4 (8.16)	-	-	-	4 (1.54)
Food grains and vegetables	21(42.86)	34(69.39)	38(40.00)	22(33.33)	115(44.40)
Food grains, oil seeds and vegetables	-	5 (10.20)	17(17.90)	10(15.16)	32 (12.36)
Total	49 (100)	49 (100)	95 (100)	66 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The data indicate that in the four villages 259 families are growing crops. Of these, large sections (44.40%) are growing foodgrain as well as vegetable crops followed by only food grains (41.70%); foodgrains, oilseeds and vegetables (12.36%) and 1.54% of families growing foodgrains and oilseeds in the four villages.

In Charal 48.98% of the families grow only food grains, 42.86% grow food grains and vegetables, and the rests (8.16%) grow food grains and oilseeds. In Bhuyan 69.39% of the families grow food grains and vegetables, 20.41% grow only food grains and the rests (10.20%) grow food grains, oilseeds and vegetables. In Lahdoigarh 42.10% of the families grow only food grains, 40% grow foodgrains and vegetables, and the rests (17.90%) of the families grow food grains, oilseeds and vegetables. In Borbahoni 51.51% grow only food grains, 33.33% grow food grains and vegetables and the rests (15.16%) of the families grow foodgrains, oilseeds and vegetables.

Thus, due to suitability of land, majority of the families grow foodgrains and vegetables in the villages. It also observed that villagers of lahdoigarh grow more vegetables for selling purposes in markets than rest of the villages. Besides, the villagers need information on growing oil seeds as the land is favourable for it.

Uses of Crops Grown

The villagers require information on best farming practices to decide, sow, prepare and grow a crop. The uses of crops grown in the families of Charal, Bhuyan, Lahdoigarh and Borbahoni are such as domestic use and domestic as well as marketing. The use of growing the crops in the four villages is shown in the following table:

Table 3.20
Uses of Crops in Families of the Villages
(Percentage in Parentheses)

Uses of Growing Crops	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Domestic	23 (46.93)	18 (36.73)	53 (55.79)	55 (83.33)	149 (57.52)
Domestic as well as Marketing	26 (53.07)	31 (63.27)	42 (44.21)	11 (16.67)	110 (42.48)
Total	49 (100)	49 (100)	95 (100)	66 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table indicates that of the total families in the villages 57.52% are growing crops for domestic purpose and the rests (42.48%) grow for domestic use as well as marketing. In Charal 53.07% families grow for domestic as well as marketing purposes and 46.93% grow crops for domestic use only. In Bhuyan 63.27% of the families are growing for domestic and marketing purposes and the remaining 36.73% grow only for domestic purposes. In Lahdoigarh village, 55.79% of the families have grown crops for domestic use and the rests (44.21%) grow for domestic as well as marketing purposes. In Borbahoni 83.33% families grow crops for domestic use and the rests (16.67%) grow for domestic as well as marketing purposes.

Thus, growing crops for marketing is low as compare to grow for domestic purposes. Hence, the villagers' still lacking behind on commercial crops, therefore, they also need information of crops production for commercial purposes. It is also observed that in the villages like Bhuyan, Lahdoigarh, Charal have enough opportunity to grow chillies, bittergaud, pumpkin, potato, cucumber, cabbages etc.

Animal Farming

Farms are maintained purely on economic purposes especially for extra income over addition to agricultural income. The families having animal farming are as follows:

Table 3.21
Status of Animal Farming in Families of the Villages
(Percentage in Parentheses)

Status of Animal Farming	Charal	Bhuyan	Lahdoigarh	Borbahoni	Grand Total
Yes	5 (9.10)	9 (17.30)	4 (3.48)	4 (3.96)	22 (6.81)
No	50 (90.90)	43 (82.70)	111 (96.52)	97 (96.04)	301 (93.19)
Total	55 (100)	52 (100)	115 (100)	101 (100)	323 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that most (93.19%) of the families have no animal-farming. Only 6.81% of families have animal farming in the four villages. In Bhuyan 17.30% of the families have animal farming, followed by Charal (9.10%), Borbahoni (3.96%) and Lahdoigarh (3.48%).

Thus, the villagers are engaged in business by rearing animals. It indicates that Bhuyan has more interest on animal-farm business than any other villages.

The families having farms (commercial purpose) such as broiler, piggery and fishery are found in the Charal, Bhuyan, Lahdoigarh and Borbahoni villages which are distributed in the following table:

Table 3.22
Types of Animal Farming in Families of the Villages

Type of Animal Farming	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Broiler	2 (40)	3 (33.33)	1 (25)	1(25)	7(31.82)
Piggery	--	--	2 (50)	1 (25)	3(13.64)
Fishery	3 (60)	6 (66.67)	1 (25)	2(50)	12(54.54)
Total	5 (100)	9 (100)	4 (100)	4 (100)	22(100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that of the total families engaged in animal farming, 54.54% have fishery, broiler farm (31.81%) and piggery farm (13.64%). In Charal families 60% are engaged in fishery and 40% in broiler. In Bhuyan out of 9 families 66.67% are engaged in fishery and 33.33% in broiler. One fourth (25%) are engaged in broiler and fishery; whereas 50% of the families engaged in piggery in Lahdoigarh. In Borbahoni, of the total four families 50% engaged in fishery and 25% each of the families engaged in broiler and piggery.

Thus, Bhuyan has more numbers of animal farming as compare to other villages especially in fishery due to availability of water bodies; it is convenient for them to rear it. It is important to note that half of villagers have habits of rearing duck, goat, cock, hen, pig etc. for their own consumption in the four villages.

The sources of information to engage in the animal farming in four villages are friends, neighbours, relatives and local dealer. The distribution of families to the sources of information in the villages is given in the following table:

Table 3.23
Sources of Information on Animal Breed for Farming in Families of the Villages

Information on Breed	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Friends	2	3	1	1	7
Neighbour	--	--	2	1	3
Relatives	2	2	1	--	5
Local Dealer	1	4	--	2	7
Total	5	9	4	4	22

Source: Field Data Collected from the Villages during March/April 2011

The table indicates that of the total families 31.81% each of the families are getting information from friends and local dealer, 22.74% families from relatives and 13.64% from neighbour. In Borbahoni, 18.18% of the families are getting information regarding breed from local dealer and 25%, each, of the families are getting information from friend and neighbour. In Charal, of the total families engaged in farm 40%, each, of the families are getting information from friends and relatives and 20% of the families are getting from local dealer. In Bhuyan village, of the total families (9) engaged in farm 44.45% of the families are getting information from local dealer, 33.33% families from friends and 22.22% of the families from relatives. In Lahdoigarh village, of the total families (4), 50% of the families are getting from neighbour and 25% each of the families are getting from friends and relatives respectively.

It seems that different sources are important such as friends and relatives in Charal, friends and dealer in Bhuyan, neighbours in Lahdoigarh and dealer in Borbahoni village. Thus, most of the villagers are getting information from friends and local dealer and none of them are getting information about animal breed for farming from the other means of communication like mass media in the villages. Therefore, the villagers also need information from mass media other than inter-communication to seek new methods of animal rearing for more products in the four villages.

Fertilizers

Fertilizer is another important input for agricultural production and development. The farmers, not only in Assam but also in other parts of the country use cow-dung as a basic fertilizer. There are two types of fertilizers which are generally used by the cultivators; namely, (i) the chemical fertilizers like urea, DAP,

potash, super phosphate and (ii) the natural fertilizers like cow dung etc. The following table shows the types of fertilizers used by cultivators in the four villages:

Table 3.24
Types of Fertilizers Use by Families in the Villages
(Percentage in Parentheses)

Type of fertilizers	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Chemical Fertilizers	40 (81.63)	45 (91.83)	83 (87.36)	50 (75.75)	218 (84.16)
Natural & Chemical Fertilizers	9 (18.37)	4 (8.17)	12 (12.64)	16 (24.25)	41 (15.84)
Total	49 (100)	49 (100)	95 (100)	66 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that over four fifth (84.16%) families use chemical fertilizer in their fields and over one tenth (15.84%) use both natural and chemical fertilizers for more productions.

Most (91.83%) of the families in Bhuyan use chemical fertilizer than other villages such as Lahdoigarh (87.36%), Charal (81.63%) and Borbahoni (75.75%). The use of natural chemical is very less in the villages. In Borbahoni almost one fourth of the families (24.25%) use natural as well as chemical fertilizer, in Charal nearabout one fifth (18.37%) use both types of fertilizer and Bhuyan and Lahdoigarh village have used comparatively less natural as well as chemical fertilizer in their fields such as 8.17% and 12.64% respectively.

It is found that Bhuyan has more percentage of using fertilizer than the rest of the villages because most of the farmers grow vegetable or cash crops in their cultivated land to produce more products. Thus, habits of using chemical fertilizers are almost equal in the four villages.

Mere utilization of fertilizers does not mean that the farmers use modern crop practices in their fields. The following table shows the extent to which the villagers use recommended fertilizers in their fields:

Table no. 3.25
 Knowledge Status of Families on Recommended Doses of Fertilizers in the Villages
 (Percentage in Parentheses)

Types of Farmer Family	Charal		Bhuyan		Lahdoigar		Borbahoni		Grand Total
	Knowledge		Knowledge		Knowledge		Knowledge		
	Yes	No	Yes	No	Yes	No	Yes	No	
Marginal	--	--	8 (24.24)	10 (62.5)	5 (31.25)	19 (24.05)	2 (16.66)	45 (83.33)	89 (34.36)
Small	12 (92.31)	36 (100)	10 (30.31)	6 (37.5)	5 (31.25)	60 (75.94)	9 (75)	9 (16.66)	147 (56.75)
Large	01 (7.69)	--	15 (45.45)	--	6 (37.5)	--	1 (8.34)	--	23 (8.89)
Total	13 (100)	36 (100)	33 (100)	16 (100)	16 (100)	79 (100)	12 (100)	54 (100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that the recommended knowledge on utilization of fertilizers among families of the four villages is found 56.75% from small group followed by marginal group (34.36%), and large group (8.89%). In Lahdoigarh, of the total farmers 30.50% donot have much knowledge on recommended fertilizers followed by 20.84% in Borbahoni, 13.89% in Bhuyan and 6.17% in Charal.

When examined further it is found that the families in Bhuyan village is using more recommended fertilizer than in other villages such as Charal, Lahdoigarh and Borbahoni. However, all the villagers have traditional knowledge on use of fertilizer. Thus, farmer families are using same method and amount of fertilizer in case of hyv, local hybrid. So, information on recommended fertilizers is strongly required to the farmers in all the four villages.

Although the villagers use cow dung they also use chemical fertilizers; namely, urea, D.A.P, potash and super phosphates. The following table shows the types of chemical fertilizers used by cultivators in the four villages:

Table 3.26
Types of Chemical Fertilizers Used by Farmer Families in the Villages
(Percentage in Parentheses)

Name of Chemical Fertilizer	Charal				Bhuyan				Lahdoigarh				Borbahoni				Grand Total
	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Marginal	Small	Large	Total	
Urea & DAP	--	1 (2.08)	--	--	2 (11.12)	--	--	2 (4.09)	14 (58.33)	18 (27.69)	--	32 (36.68)	32 (68.08)	2 (11.11)	--	68 (26.25)	
Urea, DAP & Potash	--	24 (50)	--	20 (40.81)	9 (50)	2 (12.5)	--	11 (22.45)	10 (41.66)	43 (66.15)	--	53 (55.78)	15 (31.92)	12 (66.66)	--	115 (44.40)	
Urea, Potash, Super, phosphate & DAP	--	15 (31.25)	--	20 (40.81)	7 (38.88)	5 (31.25)	--	12 (24.48)	--	4 (6.16)	4 (66.66)	8 (8.42)	--	4 (22.23)	1 (100)	40 (15.44)	
Urea, DAP, Potash, Super, phosphate & NPK	--	8 (16.67)	1 (100)	9 (18.38)	--	9 (56.25)	15 (100)	24 (48.98)	--	--	2 (33.34)	2 (2.10)	--	--	--	35 (13.51)	
Total	--	48 (100)	1 (100)	49 (100)	18 (100)	16 (100)	15 (100)	49 (100)	24 (100)	65 (100)	6 (100)	95 (100)	47 (100)	18 (100)	1 (100)	259 (100)	

Source: Field Data Collected from the Villages during March/April 2011

The table shows that over one fourth (26.25%) of families use Urea and DAP in their fields, 44.40% use a combination of Urea, DAP and Potash, 15.44% use a combination of fertilizers like Urea, Potash, Super Phosphate and DAP (15.44%). Some villagers (13.51%) use NPK in addition to all the above mentioned fertilizers.

In Charal, 40.81% of the families use Urea, DAP and Potash on their fields and also equal numbers of families use Super Phosphate in addition to them while 8.38% use all the fertilizers.

In Bhuyan the rate of fertilizer using is higher than in other villagers. About half of the families (48.98%) use all the fertilizers- Urea, Potash, Super, DAP and NPK. Over one fifth (22.45%) use Urea, DAP and Potash and one fourth (24.48%) use Urea, Potash, DAP and Super Phosphate. Only 4.09% of the families use Urea and DAP in Bhuyan.

In Lahdoigarh, majority of the families (55.78%) use minimum needed fertilizer such as Urea, DAP and Potash. Another second largest group of families (36.68%) use Urea and DAP. About one tenth of the families use four types of fertilizer and only 2.10% use all the fertilizers.

Thus, chemical fertilizers like Urea, DAP, Potash and Super phosphaste are used in all villages. However, in Borbahoni Super phosphaste is found less use than other villages and none of the families use NPK due to the lack of information in the village.

Urea is a common fertilizer in the villages of Assam. The farmers in the four villages also use it at various stages on their cultivation field. However, the following table shows the status of application of urea in four villages:

Table 3.27
Urea Application Status among Farmer-Families in the Villages
(Percentage in Parentheses)

Urea Application Status	Charal				Bhuyan				Lahdoigarh				Borbahoni				Grand Total	
	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Total	Total
Yes	--	36 (75)	1 (100)	37 (75.52)	9 (50)	16 (100)	15 (100)	40 (81.63)	5 (20.83)	23 (35.38)	6 (100)	34 (35.78)	16 (34.05)	14 (77.78)	1 (100)	31 (46.97)	142 (54.83)	
No	--	12 (25)	--	12 (24.48)	9 (50)	--	--	9 (18.37)	19 (79.17)	42 (64.62)	--	61 (64.22)	31 (65.95)	4 (22.22)	--	35 (53.03)	117 (45.17)	
Total	--	48 (100)	1 (100)	49 (100)	18 (100)	16 (100)	15 (100)	49 (100)	24 (100)	65 (100)	6 (100)	95 (100)	47 (100)	18 (100)	1 (100)	66 (100)	259 (100)	

Source: Field Data Collected from the Villages during March/April 2011

The table shows that over one half of the families (54.83%) apply urea after planting seeds on the cultivated ground and the rests do not. The urea user families are 34% of the marginal farmers, 60% of small farmers and all of the large farmers. Thus, in all the villages, marginal farmers are less applied of Urea after transplanting seeds due to monetary problems than the small and large landholder farmers. In Lahdoigarh, nearabout four fifths (79.17%) of marginal, 65.95% in Borbahoni, 50% in bhuyan and 25% in Charal families do not use urea at growing stage in four villages. So, marginal farmers need information on this matter.

Application of urea is discussed on the basis of size of land holding and time of using urea in the four villages. The time of using urea is categorized into three groups, namely, (i) after four weeks in a month, (ii) after five week in a month and (iii) after six week in a month. The distribution is shown below:

Table 3.28
Time of Urea Application by Farmer families Transplantation in the Villages
(Percentage in Parentheses)

Time Of Using Urea (in Weeks)	Charal			Bhuyan			Lahdoigarth			Borbahoni						Grand Total			
	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Marginal	Small	Large	Total	Total marginal	Total Small	Total large				
After Four Weeks	--	24 (66.66)	1 (100)	25 (67.57)	9 (100)	10 (62.5)	7 (46.66)	26 (65)	--	16 (69.56)	6 (100)	6 (64.71)	22 (37.5)	6 (50)	9 (66.29)	1 (15)	16 (51.62)	15 (65.22)	89 (62.67)
After Five Weeks	--	12 (33.34)	--	12 (32.43)	--	5 (31.25)	4 (26.66)	9 (22.5)	5 (100)	7 (30.44)	--	12 (35.29)	10 (62.5)	15 (50)	5 (35.72)	29 (32.58)	15 (48.38)	4 (17.39)	48 (33.80)
After Six Weeks	--	--	--	--	--	1 (6.25)	4 (26.66)	5 (12.5)	--	--	--	--	--	--	1 (1.13)	4 (17.39)	--	4 (3.53)	5 (3.53)
Total		36 (100)	1 (100)	37 (100)	9 (100)	16 (100)	15 (100)	40 (100)	5 (100)	23 (100)	6 (100)	34 (100)	16 (100)	30 (100)	89 (100)	23 (100)	31 (100)	23 (100)	142 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that 62.67% of families use urea after four weeks of transplantation; of total families, 33.80% use urea after five weeks followed by after six weeks (3.53%). Among the large farming group, majority of families, 66.29% use it after four weeks followed by after five and six weeks (17.39%), each. Of the total, 66.29% of small farmers, 32.58% use in five and 1.13% use urea in six weeks.

In Borbahoni, majority (51.26%) of farmer families use Urea after four weeks and 48.38% of them use it in after five weeks. Over three fifths (64.71%) use Urea after four weeks and 35.29% of families use it after five weeks in Lahdoigarh village. In Bhuyan, 65% use Urea after four weeks, 22.5% in five weeks and 12.5% use it after six weeks for more productions. The famers of charal also use Urea after four weeks (67.57%) and 32.43% of them use it after five weeks of transplantation.

Thus, in all the villages Urea is applied after transplantation in four or five weeks but it is found that only in Bhuyan applying Urea after six weeks because the villagers are more aware about commercial activities of product than the rest of villages.

Time and Method of Fertilizers Application

Di-ammonium phosphate (DAP) in combination with rock phosphate or alone at the recommended level of nutrients (40:20:20) can be applied as substitute for SSP and MRP or their combinations as an economic source of phosphate. For Hill Zone, reduction of 50% chemical fertilizer by incorporating 10 t of FYM/ha is recommended. As per the recommendations by Assam Government, time of application of fertilizers is: 1. Apply full dose of phosphatic fertilizer at the time of final ploughing; 2. apply half of nitrogenous and half of potassic fertilizer 15- 25 days after germination or after first weeding and 3. The second top dressing with the remaining N and K₂O is to be done 40-50 days after germination or after second weeding.

The villagers use various methods for application of fertilizers in the villages. The following table shows the method, time and doses of fertilizer application in the villages:

Table 3.29
Fertilizers and Methods of Application among Families in the Villages

Name of Fertilizer	Charal		Bhuyan		Lahdoigarth		Borbahoni		Total	
	Dose Per Bigha (in kg)	Method	Time	Dose (in kg)	Method	Time	Dose (in kg)	Method		Time
Urca	2	Mixing	Late tilling/Milky stage	3	Mixing	Late tilling/Milky stage	2	Mixing	Late tilling/Milky stage	9
DAP	1	Mixing	Late tilling	4	Mixing	Late tilling	2	Mixing	Late tilling	9
Super	1	Mixing	Late tilling	3	Mixing	Late tilling	2	Mixing	Late tilling	8
NPK	1	Mixing	Late tilling	3	Mixing	Late tilling	2	Mixing	Late tilling	8
Potash	1	Mixing	Late tilling	1	Mixing	Late tilling	1	Mixing	Late tilling	4
Total	6			14			9			38

Source: Field Data Collected from the Villages during March/April 2011

The farmers' families have well responded to adoption of fertilizers for more production. But they have used it as usual as they learnt it from previous generations. They used it by mixing all the manure and sprinkling it without measuring properly, so they do not know exactly how much fertilizer is used per bigha at a particular time. Thus, the size of landholding is not a factor related with use of fertilizer but it depends on farmer's intension, awareness and level of income. So, all the farmers need the information about proper measurement of using fertilizers.

Agricultural Implements

Agricultural implements also show the developmental scenario in a village. Agricultural implements include the power tiller, tractor, spray machine, thrasher, disc harrow etc.

Table 3.30
Agricultural Implements among Families in the Villages
(Percentage in Parentheses)

Name of Implements	Charal N=49	Bhuyan N=49	Lahdoigarh N=95	Borbahoni N=66	Total N=259
Wooden Plough	47(95.92)	45(91.83)	94(98.95)	65(98.48)	251(96.91)
Tractor	--	1(2.04)	--	--	1(0.38)
Power Tiller	2(4.05)	3(6.12)	1(1.05)	1(1.51)	7(2.70)
Spray Machine	3(6.13)	4(8.16)	1(1.05)	5(7.57)	13(5.01)
Disc Harrow	--	1(2.04)	--	--	1(0.38)
Pump set	-	1(2.04)	--	-	1(0.38)

Source: Field Data Collected from the Villages during March/April 2011

Most of the families (96.91%) have bullocks for cultivation in their fields and they use bamboo-made harrow for leveling the soil. It is noticed that only 2.70% of families have power tillers and 0.38% of families have tractors. 5.01% use spray machines in their cultivation, especially in tea gardens and only few (0.38%) families use disc harrow in cultivation. Pump set is with only 2.04% of the families. Thus, due to the low income and small cultivated landholding in the villages, the famers do not purchase all those implements or some of them have no need of these. It can be assumed that income and size of land are closely related to the adoption of new technology. Only those who have small tea gardens have spray machines. So, the villagers use spray machine mostly in their tea gardens than in paddy fields.

Thus, most of the villagers use traditional methods for cultivation. Only Bhuyan farmers' families are found having all the categories of agricultural implements. So, information on farming machinery/ equipment and associated costs are needed for rest of three farming families of the villages.

Insecticides

Insecticide is an important component for agricultural production. The villagers are not so much aware about insecticides. However, the families having tea gardens and growing vegetables use insecticides in the villages. The following table shows the knowledge status on insecticides among the families of the villages:

Table 3.31
Knowledge Status on Insecticides among Families of the Villages
(Percentage in Parentheses)

Problems of Insects	Charal	Bhuyan	Lahtoigarh	Borbahoni	Total
Yes	10(20.41)	18(36.73)	8(8.42)	11(16.66)	47(18.14)
No	39(79.59)	31(63.26)	87(91.57)	55(83.34)	212(81.86)
Total	49(100)	49(100)	95(100)	66(100)	259(100)

Source: Field Data Collected from the Villages during March/April 2011

Pesticides and insecticides are another modern input used for agricultural development. Use of these is not common in the villages. Until they face extreme problem they do not use insecticides. Nearabout one fifth (18.14%) of the families use pesticides only on vegetables like arum, potato, turmeric, gingers etc but not in paddy fields. The villagers do not know the names of diseases creating problem in their cultivated field or in vegetables. They use pesticides like melathyne, furaton, eldex etc. for saving the seeds from red ants, earth worm etc. None of the families from the villages approaches to anybody for disease-control. Knowledge on insecticide is very limited among farmers in all the four villages. Only 11 families are using insecticides like Sulfex, Forsa, Thiodine, Dasis etc. in their tea gardens. The following table shows the distribution of insecticides used by villagers:

Table 3.32
Types of Insecticides Used among Families in the Villages

Name of Insecticides	Charal			Borbahoni		
	Dose (in ml/gm)	Method	Time (in days)	Dose (in ml/gm)	Method	Time (in days)
Sulfex	25-50	Spraying	1-10	Dose (in kg)	Method	Time
Forsa	2-5	Spraying	1-10	25-50	Spraying	1-10
Dasis	2-5	Spraying	1-10	2-5	Spraying	1-10
Thiodine	5-10	Spraying	1-10	2-5	Spraying	1-10

Source: Field Data Collected from the Villages during March/April 2011

The farming families do not use insecticides on paddy crops. Besides, the families having tea gardens used these types of insecticides to protect green leaves from plant parasites. In Charal and Borbahoni, tea garden farmers have knowledge on

diseases related to tea leaves. So, villagers need information on use of insecticides on paddy crop for quality and high production.

Thus, tea farming families use insecticides in the Charal and Bhuyan village. The distribution of families having knowledge of crop diseases in these villages is given in the following table:

Table 3.33
Knowledge on Crop Diseases among Families of the Villages
(Percentage in Parentheses)

Name of Disease	Charal N=49	Bhuyan N=49	Lahdoigarh N=95	Borbahoni N=66	Total N=259
Blast	--	1 (2.04)	--	--	1(0.38)
Stem rot	--	2 (4.08)	--	--	2(0.77)
Blight	1 (2.04)	4 (8.16)	--	--	5(1.93)
Rice Hispa (<i>Saraha</i>)	49 (100)	49 (100)	95 (100)	66 (100)	259(100)

Source: Field Data Collected from the Villages during March/April 2011

The data indicate that all the families have knowledge of rice hispa (*saraha*), only 1.93% of the families have knowledge of blight, followed by Stem rot (0.77%) and Blast (0.38%). In Bhuyan, all the families have knowledge of rice hispa (*saraha*), blight (8.16%), stem rot (4.08%) and blast (2.04%) that the villagers are cultivate mainly for commercial purpose and the rest villages do not have.

So, the farmers specially in Charal, Borbahoni and Lahdoigarh need more information on crop diseases at the time of deciding, seeding, preparing of crops.

Bank Accounts, Loans and Subsidies

Information or knowledge on bank, loans and subsidies show the communication with modern institutions among the villagers. Generally bank account indicates economic soundness of the villagers. The following table shows the bank accounts of villagers in the four villages:

Table 3.34
Bank Accounts of Families in the Villages
(Percentage in Parentheses)

Name of Bank	Charal N=55	Bhuyan N=52	Lahdoigarh N=115	Borbahoni N=101	Total N=323
Indian	4 (7.27)	--	8 (6.95)	11 (10.89)	23 (7.12)
SBI	14 (25.45)	10 (19.23)	15 (13.04)	14 (13.86)	53(16.40)
UBI	50 (90.90)	52 (100)	101 (87.82)	31 (30.69)	234 (72.44)
Canara	4 (7.27)	9 (17.30)	2 (1.73)	--	15 (4.64)
Lakhimi Gaolia Bank	2 (3.63)	1 (1.92)	6 (5.21)	27 (26.73)	36 (11.14)

Source: Field Data Collected from the Villages during March/April 2011

The table reveals that 71.44% of the families have bank account in UBI, followed by SBI (16.40%) and LGB (11.14%). 7.12% families have bank account in Indian Bank and a few (4.64%) of them have bank accounts in Canara Bank. Thus, in all the villages different banks are operated for saving their income but only Bhuyan 100% of the families have bank account and the rest villages do not have bank account in all the families because some of the families are poor and did not aware of saving income. So, the villagers need information of the benefits of bank.

Government has given the facility of various loans for development of different sectors, including agriculture, fishery, poultry farm, horticulture and others. Only few of the villagers have taken loan for different purposes. The following table shows the types of loan taken by the families in four villages:

Table 3.35
Loan Status among Families of the Villagers
(Percentage in Parentheses)

Taken Loan	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Yes	2(3.64)	6(11.53)	1(0.86)	2(1.98)	11(3.41)
No	53(96.36)	46(88.47)	114(99.14)	99(98.02)	312(96.59)
Total	55(100)	52(100)	115(100)	101(100)	323(100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that most of families have not taken loans for any purpose, only 3.41% have taken. It is also found that 11.53% of the families in Bhuyan, 3.64% in Charal, 1.98% in Borbahoni and 0.86% in Lahdoigarh have taken loans. It is found that Bhuyan has higher number of families taken loan than the rest of the villages for various purposes but it is still lacking behind as compare to the rest parts of the country.

Thus, not a significant number of the villagers are taking loans perhaps due to lack of information on loans. So, they need more information on loan in the villages. Of the families taken loan, is used for different purposes and different types. The following table shows the types of loans taken by families in the four villages:

Table 3.36
Types of Loans Taken by Families in the Villages

Type of Loan	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Agricultural	2	3	--	1	6
Broiler	--	1	1	--	2
Cow/bullock	--	1	--	--	1
Housing	--	1	--	1	2
Total	2	6	1	2	11

Source: Field Data Collected from the Villages during March/April 2011

The table reveals that of the total, 6 families for agriculture, 2 for broiler and housing and only 1 family have taken loan for buying cow/bullock. In Borahoni, out of 2 families, 1 family has taken loan on agriculture and another one has taken loan for housing. In Bhuyan, out of total 6, 3 families took it for agricultural purpose and rests of 3 families took it for broiler, cow and housing. In Charal, 2 families have taken it for agricultural puposes whereas, in Lahdoigarh, only 1 family taken it for housing.

Thus, of the 11 families who have taken loan, only over half loan took it for agriculture purpose, it is quite less in the context of its population size. Therefore, all the farmers' families need information on agricultural loans in the four villages.

Agricultural schemes are important in modern agricultural communication or in development. Schemes such as AACP, KCC are popular projects for development of farmers. The following table shows the families' knowledge status on agricultural schemes:

Table 3.37
Knowledge Status of Families on Agricultural Schemes in the Villages
(Percentage in Parentheses)

Knowledge Satus on Agricultural Scheme	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
Yes	7(12.72)	14(26.92)	5(4.35)	2(1.98)	28(8.67)
No	48(87.28)	38(73.08)	110(95.65)	99(98.02)	295(91.33)
Total	55(100)	52(100)	115(100)	101(100)	323(100)

Source: Field Data Collected from the Villages during March/April 2011

The table reveals that 91.33% of families do not have knowledge about agricultural schemes, except KCC. The villagers heard about KCC because it is common loan for growing agricultural production, fisheries, veterinary, implements etc. Due to lack of exposure, sources of information and announcement, the villagers do not know the important agricultural programme, schemes, projects etc. Gradually the farmers are also being fad up with agricultural messages or meetings. So, 8.67% families are aware about agricultural schemes in the villages. The socio-economic condition, high literacy and awareness make Bhuyan village more advantageous than others whereas over one fourth (26.92%) of families know about agricultural schemes, followed by Charal (12.72%), Lahdoigarh (4.35%) and Borbahoni (1.98%). The basic reason behind lack of knowledge is related to size of land, education and

income of the villagers. Of the farmers having knowledge of agricultural loans and schemes, it is distributed gender-wise in the following table:

Table 3.38
Gender and Knowledge of the Villagers on Agricultural Schemes and Loans
(Percentage in Parentheses)

Knowledge on	Charal N=31		Bhuyan N=39		Lahdoigarh N=12		Borbahoni N=10		GrandTotal N=92		
	M N=23	F N=8	M N=28	F N=11	M N=8	F N=4	M N=6	F N=4	T M N=65	T F N=27	Total N=92
Schemes	14 (60.86)	5 (62.5)	16 (57.15)	5 (45.45)	4 (50)	2 (50)	3 (50)	1 (25)	37 (56.92)	13 (48.14)	50 (54.35)
Loans	9 (39.14)	3 (37.5)	12 (42.85)	6 (54.54)	4 (50)	2 (50)	3 (50)	3 (75)	28 (43.08)	14 (51.86)	42 (45.65)
Both	14 (60.86)	4 (50.0)	25 (89.28)	5 (45.45)	3 (37.5)	2 (50)	2 (33.33)	1 (25.00)	44 (67.69)	12 (44.44)	56 (60.86)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that three fifths (60.86%) of villagers have knowledge on agricultural schemes and loans. Over half of villagers (54.35%) have knowledge on agricultural schemes and over two fifth (45.65%) of them knowledge on loans. A total 48.14% of females and 56.92% of males have knowledge on schemes and 51.86% of females and 43.08% of males have knowledge on loans because these females are member of self help groups. Over three fifths (67.69%) of males and 44.44% of females have knowledge on both categories.

The villagers need information on government schemes (including subsidies and minimum support price) & policies on agriculture (current as well as changes) at deciding, seeding, preparing and planting stage. The following table shows the irrigation status among different types of farmers:

Table 3.39
Farmer-Families' Regular Irrigation Status in the Villages
(Percentage in Parentheses)

Type of Farmers	Charal			Bhuyan			Lahdoigarh			Borbahoni			Total		
	Irrigate			Irrigate			Irrigate			Irrigate					
	Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total	Total Yes	Total No	
Marginal	-	-	-	7 (14.28)	11 (22.44)	18 (36.73)	12 (12.63)	12 (12.63)	24 (25.26)	19 (28.78)	28 (42.42)	47 (71.21)	38(28.78)	51(40.16)	89 (34.36)
Small	28 (57.14)	20 (40.81)	48 (97.96)	12 (24.48)	4 (8.16)	16 (32.65)	23 (24.21)	42 (44.21)	65 (68.42)	8 (12.12)	10 (15.15)	18 (27.27)	71(53.79)	76(59.84)	147 (56.75)
Large	1 (2.04)	--	1 (2.04)	15 (30.61)	--	15 (30.61)	6 (6.31)	--	6 (6.31)	1 (1.51)	--	1 (1.51)	23(17.43)	--	23 (8.88)
Total	29 (59.18)	20 (40.81)	49 (100)	34 (69.38)	15 (30.61)	49 (100)	41 (43.15)	54 (56.84)	95 (100)	28 (42.42)	38 (57.57)	66 (100)	132(100)	127(100)	259 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that of the families over one half (56.75%) are small, 34.36% are marginal and 8.88% are large landholding farmers in the villages. In Borbahoni, of the total families 71.21% have marginal, 27.27% small and 1.51% large groups of farmers who irrigate the land regularly. In Lahdoigarh, over two third (68.42%) are small, 28.78% marginal and 6.31% are large landholding farmers' families and they irrigate the land.

In Bhuyan, 36.73% of marginal, 32.65% of small and 30.61% of the farmers' families irrigate regularly followed by Charal whereas 97.96% of small and 2.04% of large farmers regularly irrigate the land.

Although among large cultivated land holders all of them (17.43%) try to irrigate cultivated land but they do not use any modern implements as the land is far away from their houses. Information on water availability is needed at the growing stage of seeding and planting. The villagers use different sources for irrigation in the villages; namely, i. Canal, ii. River water, iii. Rain water and iv. Ponds. The following table shows the distribution of sources:

Table 3.40
Sources of Irrigation among Families in the Villages
(Percentage in Parentheses)

Sources of irrigation	Charal N=49	Bhuyan N=49	Lahdoigarh N=95	Borbahoni N=66	Grand Total N=259
Canal	--	40(81.63)	--	--	40(15.44)
River	10(20.40)	--	95(100)	--	105(40.54)
Rain	49(100)	49(100)	95(100)	66(100)	259(100)
Ponds	--	3(6.12)	--	--	3(1.15)

Source: Field Data Collected from the Villages during March/April 2011

The table shows that all the families mainly depend on rain water. Besides, two fifths (40.54%) depend on river water, 15.44% on canal water from Janji River and a few (1.15%) of the families use pond water for irrigation.

In Borbahoni, all the families depend on rain water due to lack of unavailability irrigational sources such as pond, river, nallah etc. In Lahdoigarh (100%) and Charal farmer families depend on both river (20.40%) and rain water (100%). The farmer families of Bhuyan have a facility of Canal (81.63%) and pond (6.12%).

Thus, irrigational sources show that all of the villagers use rain water for agricultural activities. Bhuyan farmers used canal irrigation and the rest do not, so, the

farmers need information regarding irrigation facilities provided by the government instead of waiting rain water for cultivation.

Production and Marketing

Production and marketing is one of the important inputs in agricultural activities which not only indicate the farmers' economic condition but also show their total labour including adoption of modern techniques, knowledge and awareness. Besides, agricultural production relates with adoption of seeds. The following table show the farmers' quantity of production on local seeds:

Table 3.41
Distribution of Families with their Annual Crop Production of Local Seeds (Sali)
(Percentage in Parentheses)

Quantity of Product (in mun)	Value	Charal	Bhuyan	Lahdoigarh	Borbahoni	Total
4-8	8000-10000	--	49(100)	--	37(100)	86 (69.92)
9-13	10000-12000	8 (100)	--	--	--	8(6.51)
14-18	12000-14000	--	--	--	--	--
19-23	14000-16000	--	--	--	--	--
24-28	16000-18000	--	--	29(100)	--	29(23.57)
Total		8(100)	49(100)	29(100)	37(100)	123(100)

1 Mun=40 kg, Rs. 10/- kg

Source: Field Data Collected from the Villages during March/April 2011

The table reveals that out of cultivating families, majority (69.92%) produce 4-8 mun of paddy per bigha, and two thirds (23.57%) produce 24-28 mun local paddies. A few of (6.51%) them produce (9-13) mun paddy per bigha. 39.83% families in Bhuyan, 30.08% in Borbahoni, 23.57% in Lahdoigarh and 6.50% in Charal village product it. It is found that Lahdoigarh produce more on local seeds production than the other villages because they do not depend much on HYV seeds due to lack of information and limited land size. Other than local seeds production, the villagers also produce crops from HYV seeds in the villages. The following table shows the annual HYV crop seeds production in the four villages:

Table 3.42
Annual Crop Production of HYV Seeds among Families in the Villages
(Percentage in Parentheses)

Quantity of Products (in mun)	Charal N=41	Bhuyan N=49	Lahdoigarh N=75	Borbahoni N=29	Total N=194
100-500	-	18 (36.73)		10 (5.15)	28 (14.43)
500-900	1 (2.43)	-	6 (8)	18 (96.55)	25 (12.88)
900-1300			-	1(3.44)	1(0.51)
1300-1700	40 (97.57)	-	-	-	40 (20.61)
2500-2900	-	31(36.26)	24 (32)	-	55 (28.35)
2100-2500	-	-	45(60)	-	45 (23.19)
Total	4 (100)	49 (100)	75 (100)	29 (100)	194 (100)

1 Mun=40 kg, Rs. 14/- kg

Source: Field Data Collected from the Villages during March/April 2011

The table reveals that over one fourth (28.35%) of families produce 2500-2900 mun of HYV paddy in a season and over two fifths (23.19%) produce 2100-2500 mun followed by 1300-1700 mun by 20.61% and 100-500 by 14.43% families. A few (12.88%) of them produce 500-900 mun and a very few (0.51%) produce 900-1300 mun in a season. Of the total families, 38.65% in Lahdoigarh, 25.25% in Bhuyan, 21.13% in Charal, and 14.94% of families in Borbahoni produce HYV seeds. It is found that Lahdoigarh produce more from HYV seeds as compare to the rest of the villages.

Thus, the farmer families quantity of products by using HYV seeds show not much satisfied result in the four villages perhaps due to dependency on natural irrigation etc.

Table 3.43
Land into Size of Landholding on Area under HYV and Local Seeds
(Percentage in Parentheses)

Size of Landholding	Charal			Bhuyan			Lahdoigarh			Borbahoni				Grand Total
	Areas under Seeds (in bighas) Tea=11			Areas under Seeds (in bighas)			Areas under Seeds (in bighas)			Areas under Seeds (in bighas) Tea=18		Total		
	HYV	Local	Total	HYV	Local	Total	HYV	Local	Total	HYV	Local	HYV	Local	
Marginal	--	--	--	30 (9.68)	42 (20.38)	72 (13.95)	24 (6.02)	72 (26.28)	96 (14.26)	82 (50.93)	98 (54.75)	136 (10.70)	212 (28.81)	348 (17.33)
Small	376 (93.76)	72 (93.51)	396 (82.84)	80 (25.81)	64 (31.07)	144 (27.91)	325 (81.45)	162 (59.13)	487 (72.36)	69 (42.85)	75 (41.89)	850 (66.87)	373 (50.67)	1223 (60.94)
Large	25 (6.24)	5 (6.49)	82 (17.16)	200 (64.51)	100 (48.55)	300 (58.14)	50 (12.53)	40 (14.59)	90 (13.38)	10 (6.22)	6 (3.36)	285 (22.43)	151 (20.52)	436 (21.73)
Total	401 (100)	77 (100)	478 (100)	310 (100)	206 (100)	516 (100)	399 (100)	274 (100)	673 (100)	161 (100)	179 (100)	1271 (100)	736 (100)	2007 (100)

Source: Field Data Collected from the Villages during March/April 2011

The table on distribution of villagers into size of lands under HYV and local crops shows that out of cultivated families 17.33% are found as marginal, three fifth (60.94%) of families are small land holders and 21.73% are large land holders in four villages. Among marginal groups 28.81% bighas of land is used for local seeds and one tenth (10.70%) use it for HYV seeds. Over three fifth (66.87%) bighas of land is used for HYV cultivation and 50.67% of land is used for local seeds. Among large landholders almost same percentages of land i.e. 22.43% for HYV and 20.52% of land are used for local seeds in four villages.

Thus, highest land are using in Lahdoigarh for HYV seeds followed by Bhuyan, Charal and Borbahoni village. It is because of having more cultivated land in Lahdoigarh than the rest of three villages. The basic reason of using local seeds among the four villagers is to make *sira*, *pitha*, *laru* in many occasions such as Bihu, puja etc.

Now, the following are the major patterns of the agricultural development and information needs of farmers in the four villages:

1. The State Agriculture Department helps through systematic and schematic effort for providing irrigation facilities, seed replacement, organic farming and development of marketing & market infrastructure so as to encourage the farming community and to create maximum potential for employment generation.
2. The paddy cultivation occupied 91.9 per cent of the net cropped area and 65.9 per cent of the Gross Cropped area in the State during the year 2009-10. As per final estimates, the average area covered for normal paddy cultivation during the year was 25.30 lakh hectares or about 92.5 percent of the total area under food grains in the State.
3. Overall rainfall pattern during the Rabi crop season of 2009-10 was deficient. During the period from October 2009 to March 2010 the State had received 223.4 mm of rainfall against normal rainfall of 302.9mm, a deviation of 26%. This deviation was recorded (-) 76% to (-) 99% during the months of December 2009 to January 2010 as the State had received scanty rainfall ranged between 0.2 mm to 2.9 mm.
4. The State during the Kharif crop season of 2010 was favourable both in terms of total rainfall and its spread. The overall rainfall recorded during the season was 2066.3 mm against the normal 1976.0 mm (+5% deviation from normal).

The State had experienced excessive rainfall in the month of April, normal during the months from May to September except July. Rainfall was marginally deficient in the month of July. During the season excessive rainfall and down stream water from the neighbouring hill states and countries caused flood in few districts. Immediate steps taken by Agriculture Department helped farmers save the Kharif crops, mainly Sali Paddy, in most of the flood affected areas.

5. The production of rice in the State was 44.08 lakh MT during the year 2009-10 as against 40.08 lakh MT rice during the year 2008-09. Total production of rice in the State recorded 9.98 percent increase during the year over 2008-09.
6. The yield rate of winter rice (kg/ hectare) maintains its decreasing trend during the years from 2004-05 to 2007-08. The yield rate of winter rice was low during the years 2006-07 and 2007-08 over the previous two years mainly due to drought like situation and severe floods that the State had experienced during the peak Sali Paddy season of the aforesaid years respectively.
7. The total reporting area of the State was 78.50 lakh hectares. Of the total reporting area, net sown area constituted 35.80 percent (28.10 lakh hectares), 23.61 percent was under forest, land not available for cultivation 26.26 lakh hectares or 33.45 percent of the total reporting area and other uncultivable area was 4.32 lakh hectares or 5.5 percent . While fallow land constitutes 1.63 percent of the total reporting area with around 1.28 lakh hectares, land under still water and water logged area jointly constitutes 1.78 lakh hectares or 2.27 percent. The area under Social Forestry was only 0.13 lakh hectares or 0.16 percent of the total reporting area. The Gross Cropped Area recorded increase from 38.39 lakh hectares in 2007-08 to 39.99 lakh hectares in 2008-09.
8. Of the total landholding in the four villages, about one tenth (8.37%) is used as household land, and over four fifths (89.18%) is cultivated and 2.45% is non-cultivated land or forest land. Further, 94.04% of the land is cultivated land in Charal village, 91.48% in Bhuyan, 86.61% in Lahdoigarh and 84.83% in Borbahoni. Thus, Charal (0.96%) has less uncultivated land than other three villages-Bhuyan village (4.08%), Borbahoni (3.32%) and Lahdoigarh (1.81%).
9. Cultivated land is more in Charal and Bhuyan than rest of the villages. In Lahdoigarh and Borbahoni cultivated lands are comparatively less due to increasing population in their villages.
10. One fifth (19.81%) of the families are landless; 34.66% families in Borbahoni, 17.39% in Lahdoigarh, 10.91% in Charal and 5.77% in Bhuyan village. One

fourth (26.94%) of the villagers are marginal land holders; over 46.53% in Borbahoni, one third (34.62%) in Bhuyan and 20.87% in Lahdoigarh village. Over two fifths of the villagers are found as small farmers: over four fifths 87.28% in Charal, 56.53% in Lahdoigarh, 30.76% in Bhuyan and 17.82% in Borbahoni. Only a few villagers (7.13%) are large landholders. However, in Bhuyan, 28.85% of the families have large landholding compare to Borbahoni (0.99%) because rich families in Bhuyan bought land from the neighbouring villages.

11. One fourth of the families (25.09%) use local or homemade seeds for cultivation: 56.06% in Borbahoni village, 21.06% in Lahdoigarh and 16.33% in Charal. Of the total families three fourths (74.91%) use HYV as well as local seeds: 100% in Bhuyan village use it, 83.67% in Charal and one third families in Lahdoigarh. In Borbahoni village, four fifths (43.94%) of families use both seeds.
12. Over four fifth of the families (86.48%) use Hali seeds: all the villagers of Charal, Bhuyan and Borbahoni and 28.57% in Bhuyan. Over one fifth (22.77%) of families use Bora seed in their fields and a little more than it or 23.16% families are found using Sakua seeds for cultivation: one third (34.69%) in Charal. Joha is also popular local seed among the villages and about one fourth of the families use it in their fields. About half of the families (48.97%) in Bhuyan use this variety in their fields, followed by Charal village (44.89%), Borbahoni village (21.21%) and Lahdoigarh (4.21%). Almost equal percentages of families use Betguti and Kon-joha seeds.
13. Less HYV seeds are used in Borbahoni than any other villages because most of the villagers are tea garden labourer and less cultivable land. Besides, they do not give much importance to HYV seeds. So, they need information on HYV seeds. Besides, the villagers of Borbahoni and Lahdoigarh use more local seeds as they prepare liquor (*aapong*) from them.
14. Masoori is used in all families for crops. Similarly the seeds like Pankaj and Basmati are also used by them whereas more than one fourth (28.35%) use Pankaj seed and less than one fifth (18.55%) of families use Basmati seed. The other seeds like Joha 775(1.03%), Piyoli (1.54%) and Bahadur (9.27%) are found very less used seeds in four villages. Comparatively, Bhuyan villagers used higher yield varieties than other.

15. Farmers' families of Lahdoigarh, Borbahoni and Charal need information on HYV seeds like Basmati, Joha 775 etc. as these types of seeds have more demand in any markets.
16. In these four villages, 2007 bighas of land are cultivated: Kharif crops (85.55%) and Rabi crops (14.45%). 478 bighas (Kharif 96.03% and Rabi 3.97%) are cultivated in Charal village, 516 bighas (Kharif 94.18% and Rabi 5.82%) in Bhuyan village, 673 bighas (Kharif 70.13% and Rabi 29.87%) Lahdoigarh and 340 bighas (Kharif 88.23% and Rabi 11.77%) in Borbahoni.
17. The villagers preferred Kharif than Rabi crops in the villages due to small size of landholding and lack of irrigation facilities. The Rabi crops like-potato, beans, tomato, mustard, cabbage etc need adequate irrigation. Therefore, the villagers need information on irrigation system to grow more crops that the villagers depend on mosoon rain.
18. The farmers' families of Lahdoigarh grow more Rabi crops as they have fertile land near Janjhi River. So, villagers like Borbahoni, Charal and Bhuyan more need irrigation facilities to grow Rabi crops.
19. The families into landholding categories and their preferred crops in villages show that about three fifth (59.45%) of small farmers cultivate 57.89% kharif and 61.69% cultivate Rabi crops in the villages. Among the marginal group of farmers (32.82%): around two fifth (38.82%) grow kharif and 24.29% grow Rabi crops. Out of total (7.73%) of large land holders, 3.29% farmers grow kharif crops and 14.02% grow Rabi crops. It is also important to say that those who have grown kharif crops grow Rabi crops also. The data regarding Rabi crops show only those villagers who pay more attention to Rabi crops specially on vegetables.
20. Large sections (44.40%) are growing foodgrain as well as vegetable crops followed by only food grains (41.70%); foodgrains, oilseeds and vegetables (12.36%) and 1.54% of families growing foodgrains and oilseeds in the four villages. Due to suitability of land, majority of the families grow foodgrains and vegetables in the villages. In Lahdoigarh, villagers grow more vegetables for selling in markets than rest of the villages. Besides, the villagers need information on growing oil seeds as the land is favourable for it.
21. Growing crops for marketing is low as compare to grow for domestic purposes. Hence, the villagers' still lacking behind on commercial crops, therefore, they also need information of crops production for commercial purposes. In the villages like Bhuyan, Lahdoigarh, Charal have enough

- opportunity to grow chilies, bitter gourd, pumpkin, potato, cucumber, cabbages etc.
22. The villagers are engaged in business by rearing animals. It indicates that Bhuyan has more interest on animal-farm business than any other villages. Half of villagers have habits of rearing duck, goat, cock, hen, pig etc. for their own consumption in the four villages.
 23. Largest sections (44.40%) are growing foodgrain as well as vegetable crops followed by 41.70% families growing only food grains, 12.36% families growing foodgrains, oilseeds and vegetables, and 1.54% the families growing foodgrains and oilseeds. growing crops for marketing is low as compare to grow for domestic purposes. Hence, the villagers' still lacking behind on commercial crops, therefore, they also need information of crops production for commercial purposes. In the villages like Bhuyan, Lahdoigarh, Charal have enough opportunity to grow chilies, bitter gourd, pumpkin, potato, cucumber, cabbages etc.
 24. Most (93.19%) of the families have no animal farming. Only 6.81% of families have animal farming in the villages. In Bhuyan 17.30% of the families have animal farming, followed by Charal (9.10%), Borbahoni (3.96%) and Lahdoigarh (3.48%).
 25. Bhuyan has more numbers of animal farming as compare to other villages especially in fishery due to availability of water bodies; it is convenient for them to rear it. It is important to note that half of villagers have habits of rearing duck, goat, cock, hen, pig etc. for their own consumption in the four villages.
 26. Different sources are important such as friends and relatives in Charal, friends and dealer in Bhuyan, neighbours in Lahdoigarh and dealer in Borbahoni village. Thus, most of the villagers are getting information from friends and local dealer and none of them are getting information about animal breed for farming from the other means of communication like mass media in the villages. Therefore, the villagers also need information from mass media other than inter-communication to seek new methods of animal rearing for more products in the four villages.
 27. Over four fifths (84.16%) families use chemical fertilizer in their fields and over one tenth (15.84%) use both natural and chemical fertilizers for more productions. Bhuyan has more percentage of using fertilizer than the rest of the villages because most of the farmers grow vegetable or cash crops in their

cultivated land to produce more products. Thus, habits of using chemical fertilizers are almost equal in the four villages.

28. The recommended knowledge on utilization of fertilizers among families of the four villages is found 56.75% from small group followed by marginal group (34.36%) and large group (8.89%). Thus, in all the villages, marginal farmers are less applied of Urea after transplanting seeds due to monetary problems than the small and large landholder farmers. In Lahdoigarh, nearabout four fifths (79.17%) of marginal, 65.95% in Borbahoni, 50% in Bhuyan and 25% in Charal families do not use urea at growing stage in four villages. So, marginal farmers need information on this matter.
29. Over one fourth (26.25%) of families use Urea and DAP in their fields, 44.40% use a combination of Urea, DAP and Potash, 15.44% use a combination of fertilizers like Urea, Potash, Super, Phosphate and DAP (15.44%). Some villagers (13.51%) use NPK in addition to all the above mentioned fertilizers.
30. Chemical fertilizers like Urea, DAP, Potash and Super Phosphaste are used in all villages. However, in Borbahoni Super phosphaste is found less use than other villages and none of the families use NPK due to the lack of information in the village.
31. The Bhuyan village is using more recommended fertilizer than in other villages such as Charal, Lahdoigarh and Borbahoni. However, all the farmers have traditional knowledge on use of fertilizer. Thus, farmer families are using same method and amount of fertilizers in case of HYV, local hybrid. So, information on recommended fertilizers is strongly required to the farmers in all the four villages.
32. The size of landholding is not a factor related to use of fertilizer but it depends on farmer's intension, awareness and level of income.
33. Most of the villagers use traditional method for cultivation. Only Bhuyan farmer families are found having all the categories of agricultural implements. So, information on farming machinery/ equipment and associated costs are needed for rest of three farming families of the villages.
34. 62.67% of families use urea after four weeks of transplantation; of total families, 33.80% use urea after five weeks followed by after six weeks (3.53%). In all the four villages, Urea is applied after transplantation in four or five weeks but only in Bhuyan is applying Urea after six weeks because the

villagers are more aware about commercial activities of product than the rest of villages.

35. Most of the families (96.91%) have bullocks for cultivation in their fields and they use bamboo-made harrow for leveling the soil. Only 2.70% of families have power tillers and 0.38% of families have tractors. 5.01% use spray machines in their cultivation, especially in tea gardens and only a few (0.38%) families use disc harrow in cultivation.
36. All the families have knowledge of rice hispa (saraha), only 1.93% of the families have knowledge of blight, followed by Stem rot (0.77%) and Blast (0.38%). The farmers specially in Charal, Borbahoni and Lahdoigarh need more information on crop diseases at the time of deciding, seeding, preparing of crops.
37. Nearabout, less than one fifth (18.14%) of the families use pesticides only on vegetables like arum, potato, turmeric, gingers etc. but not in paddy fields.
38. 71.44% of the families have bank account in UBI, followed by SBI (16.40%) and LGB (11.14%). 7.12% families have bank account in Indian Bank and a few (4.64%) of them have bank accounts in Canara Bank.
39. Most of families have not taken loans for any purpose but only 3.41% have taken. It is also found that 11.53% of the families in Bhuyan, 3.64% in Charal, 1.98% in Borbahoni and 0.86% in Lahdoigarh have taken loans.
40. Over half of the loan taking families took it for agricultural purpose; nearabout two fifth have taken it for broiler, housing and one tenth have taken it for cow-farming. Of the total 54.54% of families have taken loans in Bhuyan, followed by 18.18% in Charal and Borbahoni and 9.09% in Lahdoigarh.
41. Information on finance (formal and informal sources, the cost involved, etc.) deciding; seeding; preparing and planting; growing are needed.
42. 91.33% of families do not have knowledge about agricultural schemes, except KCC. The villagers heard about KCC because it is common loan for growing agricultural production, fisheries, veterinary, implements etc. The basic reason behind lack of knowledge is related to size of land, education and income of the villagers.
43. Two fifths (40.54%) of the villagers depend on river water, 15.44% on canal water from Janji River and a few (1.15%) uses pond water. irrigational sources show that all of the villagers use rain water for agricultural activities. Bhuyan farmers used canal irrigation and the rest do not, so, the farmers need

information regarding irrigation facilities provided by the government instead of waiting rain water for cultivation.

44. Of the cultivating families, majority (69.92%) produce 4-8 mun of paddy per bighas, and two thirds (23.57%) produce 24-28 mun local paddies. A few of (6.51%) them produce (9-13) mun paddy per bigha. 39.83% in Bhuyan, 30.08% in Borbahoni, 23.57% in Lahdoigarh and 6.50% in Charal village families product it.
45. Over one fourth (28.35%) of the families produce 2500-2900 mun of HYV paddy in a season and over two fifths (23.19%) produce 2100-2500 mun followed by 1300-1700 mun by 20.61% and 100-500 by 14.43% families. The farmer families quantity of products by using HYV seeds show not much satisfied result in the four villages perhaps due to dependency on natural irrigation etc.

In sum, although, overall agricultural production of Assam is admirable in some aspects, the villagers still need knowledge for quality production. Most of the villagers use traditional method such as ploughing, seed transplanting, proportion of using fertilizers, water logging etc. The villagers need knowledge on transplanting of HYV seeds, where the farmers of Bhuyan village use hybrid seed among four villages. The farmers' families do not know the recommended utilizations of fertilizers, production of any seeds especially (HYV and hybrid), governmental schemes and loans. The information needs are found more in Lahdoigarh and Borbahoni due to low level of income, education and size of land etc.