TECHNOLOGICAL RESOURCES AND SOCIO-ECONOMIC STATUS OF RICE FARMERS IN JOYDEVPUR AND OTHER SELECTED AREAS OF BANGLADESH

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADGSH
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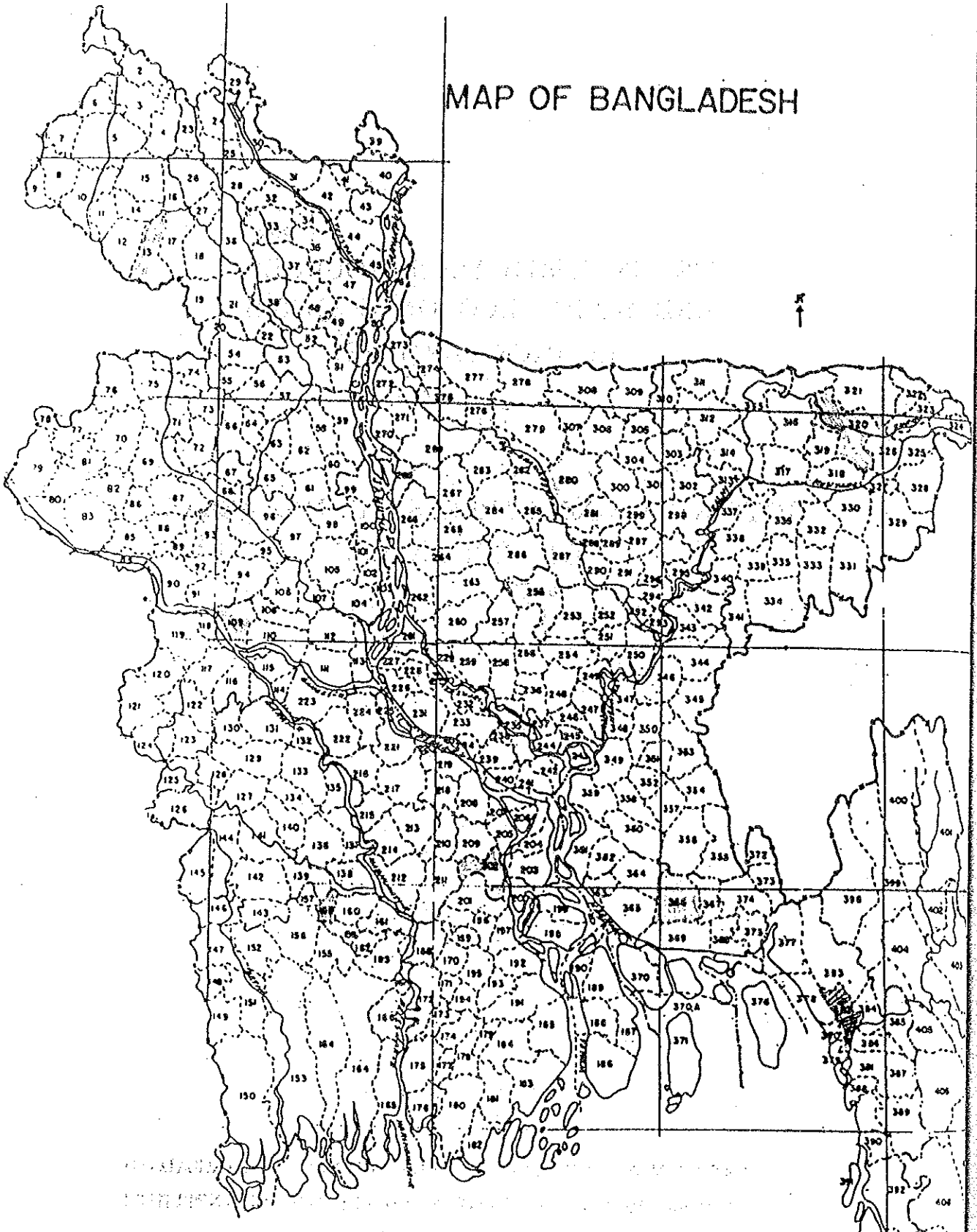
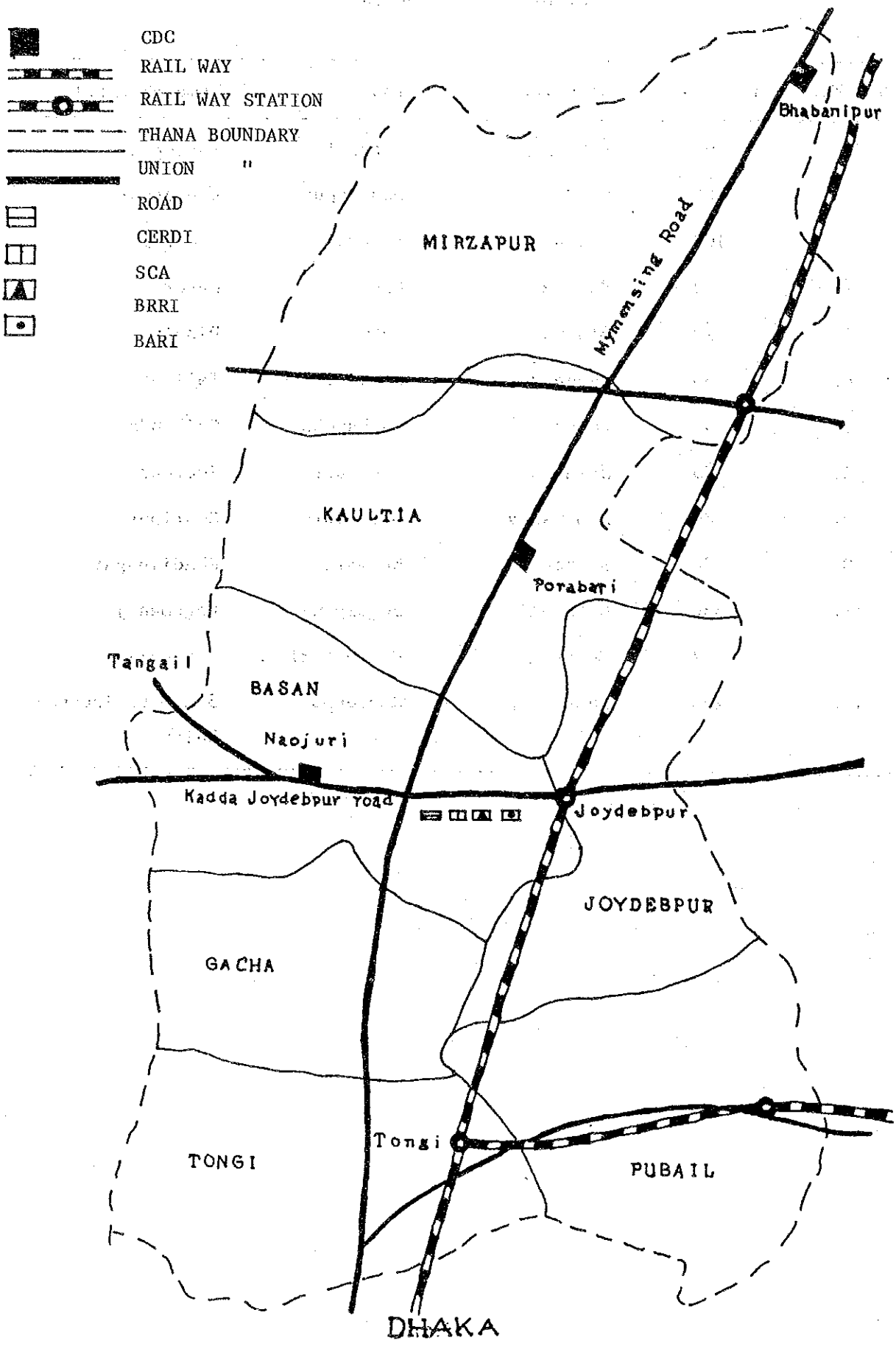


* Red mark is study area
and detail is following page.

STUDY AREA on the MAP

Sl. No.	Thana No.	District	Thana	Name of A.E.T.I.
1.	202	Faridpur	Kotwali	Faridpur
2.	158	Khulna	Daulatpur	Daulatpur
3.	109	Pabna	Ishurdi	Ishurdi
4.	93	Rajshahi	Natore	Natore
5.	13	Dinajpur	Kotwali	Dinajpur
6.	33	Rangpur	Kotwali	Tajihat
7.	49	Rangpur	Gaibandha	Gaibandha
8.	275	Jamalpur	Sher-pur	Sherpur
9.	280	Mymensingh	Gouripur	Gouripur
10.	320	Sylhet	Kotwali	Khadimnagar
11.	366	Noakhali	Begumganj	Begumganj
12.	382	Chittagong	Hat Hazari	Hat Hazari
13.	256	Dhaka	Joydebpur	3 C.D.C. located Union

LOCATION OF CDC



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LIST OF ABBREVIATIONS

AAS	All Agency Score
Ac.	Acre
AETI	Agricultural Extension Training Institute
AMS	All Media Score
ASS	All Source-use Score
Av.	Average
BADC	Bangladesh Agricultural Development Corporation
BAEC	Bangladesh Atomic Energy Commission
BARI	Bangladesh Agricultural Research Institute
BKB	Bangladesh Krishi (Agricultural) Bank
BR	Bangladesh Rice (from BRRI)
BRDB	Bangladesh Rural Development Board
BRRI	Bangladesh Rice Research Institute
CDC	Community Development Centre
CERDI	Central Extension Resource Development Institute
Cm	Centimetre
DAT	Days After Transplanting
DTW	Deep Tubewell
FYM	Farm Yard Manure
GDP	Gross Domestic Product
HTW	Hand-operated Tubewell
HYV	High Yielding Variety
INA	Institute of Nuclear Agriculture
IR	International Rice (from IRRI)
IRDP	Integrated Rural Development Programme
IRRI	International Rice Research Institute
LLP	Lowlift Pump
LV	Local Variety
MCS	Media Contact Score
Md.	Maund
Md/Ac	Maund per Acre
Md/H	Maund per Household
MP	Muriate of Potash
NPK	Urea (Nitrogen) + TSP (Phosphate) + MP (Potash)
PDB	Power Development Board
PI	Panicle Initiation

PSU	Primary Sampling Unit
REB	Rural Electrification Board
Sq. Cm.	Square Centimetre
Sq. In.	Square Inch
STW	Shallow Tubewell
SUS	Source Use Score
TAO	Thana Agricultural Officer
TD	Topdressing
TEO	Thana Extension Officer
TSP	Triple Super-Phosphate
TV	Television
UAA	Union Agricultural Assistant
VEA	Village Extension Agent

CHAPTER I

INTRODUCTION

1.1 Preliminary

Bangladesh economy is characteristically dominated by agricultural sector, being the largest contributor to gross domestic product (GDP) and providing the largest quantum of the financial resource support to the development of the country.

The agro-climatic conditions of Bangladesh are conductive to a year-round production of a wide range of crops. The crop production activity however centres around growing of cereals; and among all cereals production of rice, being the staple food of the country, receives the foremost priority from farmers in respect of resource investment.

In spite of having a favourable agro-climatic setting and farmers' sustained interest in rice production, the country remained beset with a chronic shortage of foodgrains. This situation calls for extensive country-wide studies in order to discover the farm-level constraints to higher production and to evolve new strategies capable of creating impetus to produce more.

1.2 Central Extension Resources Development Institute

The Central Extension Resources Development Institute (CERDI) was established as a joint venture between the governments of the People's Republic of Bangladesh and Japan through a Record of Discussion signed on 14-3-75. The CERDI complex, built in 1978 with the Japanese government grant, is located about 22 miles north of Dhaka City in Joydevpur thana.

CERDI was established with the following objectives in view:

- To function as an institution of minimize the gap between agencies concerned with research and extension. It will also act as a bridge up organization for smooth flow of information and communication between different Government agencies and farmers.

- o To act as the central organization for coordination of all the extension training programmes to be conducted by different agencies and to train the Instructors of AETI, TEO/TAO, SDAO, field officials of BADC and BKB, Plant Protection Mechanic, Sprayer Mechanic of BADC, and BKB's Operator etc.

- o To carry out adoptive trials for evolving suitable field techniques in its own demonstration plots in collaboration with other research institutes.

- o To develop extension methods and materials and to arrange for their publication and dissemination through the trainees.

1.3 Community Development Centres

CERDI felt an imperative need to have its own pilot project area where its professional knowhow and extension methodology could be given farm-level trial and dissemination, for solving farmer's technical and socio-economic problems and for developing the area through community approach. Thus, six months after the establishment of CERDI, three Community Development Centres (CDC) were established and started operating at Bhabanipur (Mirzapur union) Porabari (Kaultia union) and Naojore (Basan union) under Joydevpur thana of Dhaka district. Najore, Porabari and Bhabanipur are communicated by road and located at 2, 7 and 13 miles, from CERDI, respectively.

The existing relationship of the 3 (three) Community Development Centres with CERDI is as under:

- o CERDI approaches the farmers for integrated development of agriculture through diversification of farming for increased production and income from his land.

- o CERDI imparts training to the farmers to improve their nutrition status through a balanced diet.

- o Technical resources and extension methods developed by CERDI are disseminated within the farmer community and which, on being established as suitable tools for development of rural communities, are be made available for diffusion in other areas of the country.

- All these trials are conducted in an intensive way in small areas and the results undergo a continuous process of evaluation and results of trials conducted at several spots of different villages are integrated and compared before formulating recommendations.

1.4 Study Objectives

The present study undertaken by CERDI within and outside CDC areas set forth a broad objective of eliciting information resource and empirical data, through an exploratory research undertaking, for investigating into socio-agro-economic profile of the community of farmers, more particularly of rice growers in Bangladesh, for assessment of farm-level resource availability and requirements and for identification of constraints to rice technology absorption. All these exercises are expected to lead to achieving the ultimate goal of evolution and development of appropriate and effective strategies and action plans implementable by extension workers.

During the formative stage of this research undertaking, some specific objectives were considered pertient to the study and capable of providing proper direction to the whole operation. These are:

1. To identify the rice farmers as individuals with their traits.
2. To investigate into the socio-economic profile of the community where farmers belong to.
3. To assess the status of rice technology at farm level.
4. To study the farmers' participation in and exposure to institutions, organizations and development agencies.
5. To compare different aspects of cultivation practices followed by rice farmers in CDC areas and other representative areas of the country.
6. To enquire into rice farming communities' resource base and constraints.
7. To compare the CDC and non-CDC area farmers with reference to each important factor of the study.

8. To draw inferences for consideration and use of the planners and policy makers in formulating future strategies and programmes.

1.5 Scopes and Limitations

The study was undertaken in 12 thanas where 12 (twelve) Agricultural Extension Training Institutes (AETI) are located and also in Joydevpur thana where CERDI and its 3 Community Development Centres are located. CERDI's resource constraints in terms of time, manpower and logistic support restricted the study to the thana around each of the AETIs. The selection of these thanas in the AETI network was made also in consideration of the necessity to pulse the impact of the presence of AETI in the neighbourhood. Since AETIs are well scattered in eleven of the districts of the country, it can be fairly assumed that this survey is capable of yielding information and data resource representative of the country at large and that the inferences will have a general country-wide applicability.

Sinde the inception of the CDC project in Joydevpur thana in late-1978 no study of the present survey's nature has been done neither in the CDC areas nor elsewhere. The present study was conceptualized in consideration of the long-felt necessity for base-line data required for disseminating and implementing CERDI's own extension recommendations.

CHAPTER II

STUDY METHODOLOGY

2.1 General

This chapter delineates the study design and procedures followed right from the conceptualization and phasing of the whole endeavour. The schedule of activities including preparation of questionnaire, selection of study area, sampling of respondent households, household survey and data collection, data processing and analysis, and preparation of the study report is presented in the following sections.

2.2 Questionnaire Preparation

A team of extension professionals working in CERDI prepared the draft questionnaire in early 1982. This draft questionnaire was subsequently reviewed by specialists and experts, both expatriate and local, of all technical divisions of CERDI and was pretested in the Bhabanipur union under CERDI's CDC project. The final 35-page questionnaire incorporating necessary modifications resulting from its pretesting was printed in adequate number for use in household surveys conducted in the study area.

2.3 Study Area

There are twelve Agricultural Extension Training Institutes (AETI) located in eleven districts of the country. Two of these AETIs are located in the same district. District-wise AETI locations are shown below:

Table 2.1: AETI Locations

District	AETI Locations (Thana)
Faridpur	Kotwali
Khulna	Daulatpur
Pabna	Ishwardi
Rajshahi	Natore
Dinajpur	Kotwali
Rangpur	Kotwali
Rangpur	Gaibandha
Jamalpur	Sherpur
Mymensingh	Gouripur
Sylhet	Kotwali
Noakhali	Begumganj
Chittagong	Hathazari

The Central Extension Resource Development Institute (CERDI) is located in Joydevpur thana, of Dhaka District, where CERDI operates three Community Development Centres in three unions of Basan, Kaultia and Mirzapur. The area chosen for the present study constituted 12 local thanas of the AETIs scattered all over the country and the Joydevpur thana. Due to the dispersed distribution of thanas in all the major agro-climatic zones of Bangladesh, the study area is fairly representative of the country. The only distinction is being the presence and impact, if any, of AETIs in the locality. The selection of Joydevpur as a part of the study area was dictated by the necessity to compare its conditions to that of other areas and also to have an insight into impact of activities of CERDI in the CDC areas.

2.4 Survey Universe and Sample

The survey universe of the present study was constituted from four unions randomly selected from each of the twelve AETI thanas and three unions in the CDC area of Joydevpur thana. A two-stage stratified sampling procedure was adopted in arriving at the final sample to which the survey questionnaire was administered.

From each of the AETI thanas 4 villages and from the CDC area 9 villages formed the primary sampling units (PSU) where a complete enumeration of households was later undertaken. Ten percent of these households in each of the sample villages constituted the final survey sample. The final sample consisted of 814 respondents. Table 2.2 persents the distribution of sample with number of village-wise respondents representing the survey universe.

2.5 Field Survey and Collection of Data

The first phase of survey involved a complete enumeration of farm households in each of the sampled villages. The second phase involving the actual administering of the interview schedule preceded by several training and orientation sessions in the AETI thanas and in Joydevpur.

The whole country-wide field survey was directed by two CERDI teams comprising expatriate and local extension specialists and experts. These two teams travelled extensively throughout the country to orient, about

Table 2.2: Distribution of Study Area Sample

Name of Thana	Name of Selected Union	Name of Selected Village Mouza	No. of Farm Family in Selected Village	No. of Sampled Respondent
Faridpur Kotwali	Ambikapur	Shovarampur	88	9
	Ishangopalpur	Ishangopalpur	192	19
	Kanaipur	Mrigi	247	25
	Kaijuri	Kalaroyer Kaijuri	70	7
				60
Daulatpur (Khulna Dist.)	Barakpur	Barakpur	217	22
	Digholia	Masherpur	140	14
	Deana	Teligati	138	14
	Senhati	Bativita	98	10
				60
Ishwardi (Pabna Dist.)	Muladuli	Saraikandi	136	14
	Laxikanda	Kamalpur	140	14
	Paksey	Shorruppur	123	13
	Dasuria	Maruni	112	12
				53
Natore (Rajshahi Dist.)	Bramapur	Naldaugerhat	62	6
	Kafuria	Chandpur	90	9
	BoroHarishpur	BoroHarishpur	220	22
	Chatni	Pandithgram	75	7
				44
Dinajpur Kotwali	Chehelgazi	Barail	148	15
	Sheikpura	Madhabpur	120	12
	Auliapur	Mababbatpur	159	16
	Ashokpur	Tajpur	161	16
				59
Rangpur Kotwali (Tajhat AETI)	Uttam	Ranachandi	183	18
	Parshurampur	Harati	116	12
	Tampat	Arjiman Khamar	107	11
	Chandanpat	Jalkoria	116	12
				53
Gaibandha (Rangpur Dist.)	RamChandrapur	Bhogabanpur	194	20
	Sonahati	Chalkmamrajpur	204	21
	Boalia	Piara Rampur	269	27
	Badiakhali	Fulbari	175	18
				86

Table 2.2: Distribution of Study Area Sample

Name of Thana	Name of Selected Union	Name of Selected Village Mouza	No. of Farm Family in Selected Village	No. of Sampled Respondent
Sherpur (Jamalpur Dist.)	Charshepur	Jutkashba	136	14
	Pakuria	Tilkandi	165	17
	GhazirKhamar	Girdapara	195	20
	Charpokhimari	Chaniar Char	119	12
				63
Gouripur (Mymensingh Dist.)	Gouripur	Gajanda	171	17
	Bakainagar	Gobindanagar	76	8
	Ramgopalpur	Ramgopalpur	222	22
	Dowhakhola	Takpur	65	7
				54
Sylhet Kotwali (Khadimnagar AETI)	Kandigaon	Kandirgaon	145	15
	Tokerbazar	Mayer Char	150	15
	Baraikandi	Gudrail	108	11
	Jalalpur	Azmatpur	170	17
				58
Begumganj (Noakhali Dist.)	Sonaimori	Kathali	235	24
	Nateshwar	GhoseKainta	136	14
	Aliarpur	Sujatpur	79	8
	Eklashpur	Anantapur	257	26
				62
Hathazari (Chittagong Dist.)	Hathazari	Alipur	121	12
	Mekhal	Mekhal	228	23
	Fatehpur	Mithachara	65	7
	South Madarsha	Dakkhin Madarsha	138	14
				56
Joydevpur (Dhaka Dist.)	Mirzapur	Lutiarchala	28	3
		Baniarchala	92	9
		Bhabanipur	177	18
	Kaultia	Uttar Salna	214	21
		Bhaoraid	279	28
		Bhowragala	20	2
		Porabari	126	13
	Basan	Kalaikur	76	8
		Kodda	43	4
				106

task schedule, to the Extension Instructors of AETIs, Thana Extension Officers (TEO) and Thana Agricultural Officers (TAO) who were entrusted with supervision of the field data enumerators. Services of local union Agricultural Assistants (UAA) and Village Extension Agents (VEA) were utilized for house-to-house survey and recording of data on the questionnaire.

The collection and recording of data proceeded concurrently in all thanas and was completed in two months by end-July of 1982.

2.6 Method of Data Analysis

A substantial delay in analyzing data was caused by several factors. In view of CERDI's constraints in terms of appropriate manpower and support service, this part of the work was assigned to consultants.

At the first stage, the recorded data were coded and transferred to thana-wise master sheets to facilitate tabulation. The households in each thana were divided into four strata on the basis of size of operational land holding. Adequate number of categories were developed for all study parameters. In appropriate cases, qualitative statements of the respondents were transformed into quantitative data by means of statistical scoring procedures. The final tables using averages and percentages in majority of cases and actual numerical data in several unavoidable cases were prepared and presented in two-way and three-way tabular forms.

2.7 Study Parameters and Variables

The parameters considered relevant to the objectives and scopes of this study broadly represent two areas of empirical investigation; namely current status of farm technology particularly on the rice cultivation; and personal, socio-economic and institutional profile of the farming Community. The principal variables representing the parameter of rice technology status include seedbed and land management, use of fertilizer, irrigation, implements, credit and other farm production inputs, pest management, and post-harvest operations, etc. The major variables identified with the farmers' individual, socio-economic and institutional profile involved, inter alia, literacy status, land tenure status, farmland, resource and movable asset possession, problem confrontation,

perception of problems and training needs, occupational dependencies, income and expenditure scheduling, organizational and extension contact, health and medication, etc.

CHAPTER III

FARMERS' TRAIT TYPOLOGY

3.1 General

This chapter describes, on the basis of field data, the variables that characterize the farmer as individual beings and describe his status in terms of his personal and family enlightenment and possessions, and facility endowment.

3.2 Age of Household Heads

Analysis of age distribution of rice of farmers revealed that largest proportion (39%) belongs to the 26-40 year age-group in the entire study area. The age-group of 41-55 years comes next with 33% or one-third of farmers. Old farmers of above 55 years represent one-fifth of the population. Youngest farmers (age below 25 years) representing in the sample as the household heads are only 8%.

Thana-wise distribution of farmers according to age-group shows that Hathazari thana stands out at top with highest number old farmers (34%). This thana is closely followed by Begumganj (31%), Faridpur (30%), Ishwardi (26%), Natore (25%), and Rangpur (25%). Daulatpur has the unique distinction of having half of the farmers under 41-55 year age-group. Other thanas where this age group numerically dominates are Hathazari (41%), Sylhet (40%), Ishwardi (40%), and Gouripur (39%). The middled aged group (26-40 years) is represented by 51% in Sherpur thana, followed by Gaibandha, Joydevpur, Sylhet, Rangpur, Dinajpur and Gouripur representing 48, 45, 43, 40, 39 and 39 percent respectively. Young aged (Upto 25) household heads represent a small portion of the farming Community in all thanas.

In Joydevpur thana, where CDC areas are located, age-group distribution is fairly close to national averages.

Thana-wise and nation-wide age-group distribution is presented in Table 3.1.

3.3 Family Type and Size

In the study area unitary families consisting of parents and their offspring only have been found to predominate. Joint families consisting of more than two generations and having near-relatives like uncles, aunts etc. are very small in number. The CDC area (Joydevpur) has the smallest number (8.5%) of joint families while Faridpur has the highest proportion of joint families. Among other thanas, Rangpur and Sherpur have less than 10% joint families.

Average family size for the unitary families does not vary much among thanas, but among joint families size variation is remarkable.

Family size data are presented in Table 3.2.

3.4 Literacy and Education

Among all thanas, Sylhet has largest numbers (53%) of illiterates, where another 21% can sign only as shown in Table 3.3. Coming next in order of illiteracy are Sherpur, Gouripur and Ishwardi where about half of the population is illiterate & another a quarter can sign their names. It appears that Dinajpur has the highest rate of literacy (60%) in the study area and the CDC area ranks third (44%) being superseded by Begumganj (45%).

3.5 Occupational Pattern

Thana-wise variations in occupational pattern of farmers in the study are presented in Table 3.4. It is observed that pure farmers, i.e. having no other subsidiary occupations, constitute the majority everywhere in the study area, with highest proportion in Daulatpur (over 78%) closely followed by Natore (more than 77%). Gouripur and Rangpur rank next having 73.6% and 71.7% respectively. Thanas having half or less than half of rice farmers purely dependent on farming are Begumganj, Gaibandha and Sylhet. Joydevpur CDC area occupies a somewhat median position having 63% pure farmers.

Farmers with trading as subsidiary occupation are 23.8% in Sherpur and 23.4% in Joydevpur. In other thanas representation of this occupational category is less, Daulatpur having the lowest (10%).

Farmer category having farming-cum-service as occupation represent as high as 35.5% in Begumganj, followed by Hathazari (20.9%) and Dinajpur (20.3%) from far behind. In CDC area this category represents only 4.7%. Sherpur appears at the bottom with only 3.2% representation.

The occupational pattern of farming-cum-any of occupations other than trading and service represents a large section in Sylhet (24%) and Faridpur (about 22%). In most of the other thanas this pattern occurs in less than 10%.

The category of farmers having three occupations, farming, trading and service is not found in the CDC area, but is present in other 5 thanas as a negligible segment.

3.6 Land Tenure Status

As observed in Table 3.5, during field enumeration, no pure tenant farmer was encountered in Joydevpur, Gaibandha, Sherpur, Faridpur and Daulatpur thanas, and in other areas as well this category's representation is not more than 6%.

Owner-cum-tenant farmers predominate in 5 thanas including the CDC area having represented by more than half of the farming community. In Sherpur, this category is worth 11% only, where pure owner farmers constitute the largest segment (about 89%). This thana also tops all thanas of the study area in respect of predominance of pure owner farmers. In 8 thanas including Joydevpur, pure owners represent 50% or less. Amongst these 8 thanas, Dinajpur and Natore are worse where only a third of the farmers is full owner.

3.7 Land Utilization

Table 3.5 shows the summary of the land utilization data at the study area. Only analysis of data it has been observed that about 80% of the land outside the CDC areas is under cultivation whereas within the CDC area land in agricultural use occupies 84%. Area under homestead use is about 4.9% in the CDC area while it is 9.6% elsewhere. Ponds and ditches occupy only 1.74% in Joydevpur, but 5% in other areas. Joydevpur still has a large area (about 9%) under wasteland category. In the non-CDC thana, wasteland represents only about 5.5% of the total land area.

The inter-thana distribution of land utilization patterns shows that cultivable land occupies only about 68% where homesteads have engulfed a large area (19.5%). In any other thana, proportion of land under farming is at or above 75%, with the highest utilization of above 92% in Sherpur thana. In Joydevpur, land use as homestead is minimum (4.9%) while it is maximum in Begumganj (over 19%), followed by Faridpur (over 16%) and Sylhet (approaching 14%). Ponds and ditches seem to abound in Begumganj representing above 9%, while they occupy less than 1% in Sherpur and Faridpur thanas. Field data show Ishwardi having the largest area of wasteland (15.7%), followed by Gaibandha (11.7%). Joydevpur area also shows as large as 9.3% wasteland.

Further analysis of land utilization data revealed that cultivable land per household is 2.72 acres in Joydevpur and 2.82 acres elsewhere and the difference is not substantial. However, in other uses of land, large differences were found. In case of homestead, per household use is 0.16 acre in the CDC area while it is double of that in the AETI thanas. Pond and ditch size averages at 0.19 acre per household outside CDC areas whereas it is one-third within.

3.8 Possession of Land

Table 3.5 presents the thana-wise land holding patterns in the study area. The average land holding per household varies from a scanty 1.05 acres in Hathazari and 1.99 in Begumganj to 6.18 acres in Gouripur. Joydevpur CDC area land holding over ages at 3.24 acres which approaches the study area average.

The strata-wise analysis for the entire study area reveals that most of the land property is possessed by farmers belonging to Stratum III (medium farmer). Medium farmer category is closely followed by big farmer group. Inter-strata and inter-thana variations are fairly consistent with marked exceptions in case of Sylhet, Natore and Begumganj thanas. The analysis shows a grim picture of the landless class (stratum I).

3.9 Possession of Implements and Animals

Farmers' possession of conventional implements, mechanized equipment and animals is analysed in Table 3.8. Conventional implements considered for

eliciting field data were plough, ladder, sickle, shovel, spade, hand weeder, bucket, sieve, done and sheuti. The equipment complement consisted of mechanized weeder, sprayer, thresher, powertiller, hand tubewell, deep tubewell and shallow tubewell.

On the basis of computed possession scores, Dinajpur thana is ranked first due to possession of largest number of implements and draft animals per farmer household. Ishwardi, Hathazari and Sylhet also scored high, but lower than Dinajpur. CDC area ranks fifth in order. Lowest in order is Natore scoring only 7.52. All other thanas scored above 10. Itemized possession pattern within thanas may be seen in Table 3.8.

3.10 Possession of Household Amenities

Household utility items considered relevant to this study on rice growers are radio, bicycle, motor cycle, television, bullock cart and electricity. The thana-wise analysis of possession data as summarized in Table 3.9 reveals that Dinajpur scored 1.53 and ranked first where bullock cart, cycle and radio are possessed by about 56%, 53% and 29% farmers respectively. The next thana on the basis of possession score is Ishwardi which however has scored less than half of what Dinajpur scored. Gouripur, Sherpur and Gaibandha are found among the poorest scores. Joydevpur stands seventh, scoring 0.45, where some 24% possess radio.

A close look into the item-wise data indicate that bicycle and motor cycle possession is highest in Dinajpur and Ishwardi respectively. Radio use is highest in Hathazari where 32% possess it. Television possession among farmers is insignificant. Even though far behind Rangpur (21%) and Daulatpur (20%) follow Dinajpur (56%) in respect of bullock cart possession. Electricity user farmers are highest (above 20%) in Natore thana trailed by Dinajpur (10%) a way behind. In half of the AETI thanas, farmers do not consume electricity for any purpose.

3.11 Farmers' Health and Medication

Status of medical treatment facilities is presented in Table 3.10 which shows that more than one-third of farmers do not enjoy medical facilities within their own village. The situation is most precarious in Sherpur where over 98% reported non-existence of any treatment facilities nearby. The situation in CDC area is also far from satisfactory as 84% of farmers

are deprived of facilities within village. In terms of medical facilities Daulatpur thana is most privileged for having three-fourth of farmers under medical care within locality.

Among different types of practitioners paramedics are most frequently called (Table 3.10). Homoeopaths are very popular, called 37%. Kabiraj, the indigenous verbal medicine dispenser, is consulted by one-third of farmers. Thirty percent farmers mentioned mollah, preacher of Islamic religious teachings, as a source of treatment.

Last 5 years' birth and death data are summarized in Table 3.11. It appears highest number of birth was recorded for the period in Gaibandha followed next by Joydevpur. Occurrence of death also was highest in Gaibandha, half of the dead aged below 10 years.

Death at birth was not very frequent as reported, but infantile death had a heavy toll in last 5 years. Death due to old age was also not an infrequent phenomenon, but number of birth in every thana far superseded it and contributed to increasing population at a very fast rate.

From farmers' statement, it is found that 42% in the study area presently suffers from diseases of one kind or another (Table 3.12). In Joydevpur along with 3 other thanas, sick farmers are the majority, most of whom complaining of stomach ailments. More than 80% of all reported health complaints of the entire study area are stomach troubles.

Table 3.1: Age of Respondent Farmers

(Figures in No. of Households)

Thana	Age Group			
	Upto 25	26 - 40	41 - 55	Above 55
Dinajpur	7(11.9)	23(38.9)	21(35.6)	8(13.6)
Rangpur	4(7.5)	21(39.6)	15(28.3)	13(24.6)
Gouripur	7(12.9)	21(38.9)	21(38.9)	5(9.3)
Sylhet	2(3.4)	25(43.1)	23(39.7)	8(13.8)
Natore	6(13.6)	14(31.8)	13(29.6)	11(25.0)
Ishwardi	3(5.7)	15(28.3)	21(39.6)	14(26.4)
Gaibandha	6(6.69)	41(47.7)	26(30.3)	13(15.1)
Sherpur	5(7.9)	32(50.8)	16(25.4)	10(15.9)
Faridpur	4(6.7)	24(40.0)	14(23.3)	18(30.0)
Daulatpur	2(3.3)	18(30.0)	30(50.0)	10(16.7)
Begumganj	4(6.4)	21(33.9)	18(29.0)	19(30.7)
Hathazari	4(7.1)	10(17.9)	23(41.1)	19(33.9)
Joydevpur	12(11.3)	48(45.4)	28(26.4)	18(16.9)
All	66(8.1)	313(38.5)	269(33.0)	166(20.4)

Note: Figures in parentheses are percentages.

Table 3.2: Family Type and Size

Thana	Unitary Family (%)	Joint Family (%)	Average Family Size Unitary	Joint
Dinajpur	86.44	13.56	7.35	9.38
Rangpur	90.57	9.43	7.08	8.17
Gouripur	74.07	25.93	7.45	9.62
Sylhet	86.21	13.79	6.56	9.12
Natore	85.19	14.81	6.74	14.00
Ishwardi	83.02	16.98	8.20	13.00
Gaibandha	87.21	11.62	7.03	9.90
Sherpur	90.48	9.52	6.76	10.67
Faridpur	60.00	40.00	5.76	10.17
Daulatpur	65.00	35.00	7.39	11.13
Begumganj	77.42	22.58	6.27	11.14
Hathazari	69.64	30.36	7.66	11.71
Joydevpur	91.51	8.49	8.17	9.88

Table 3.3: Literacy and Education

(Figures in %)

Thana	No Schooling	Can Sign Only	School/College Levels				Madrasah Attended
			Primary	Secondary	Higher Secondary	Degree	
Dinajpur	8.5	30.5	33.9	17.0	10.2	0	0
Rangpur	35.9	22.6	20.8	17.0	3.8	0	0
Gouripur	48.8	22.2	20.4	7.4	0	0	1.9
Sylhet	52.6	21.1	12.3	7.0	7.0	0	0
Natore	29.6	31.8	22.7	13.6	0	0	2.3
Ishwardi	48.5	18.9	9.4	11.3	0	1.9	0
Gaibandha	40.5	17.9	21.4	13.1	3.6	0	3.6
Sherpur	51.7	23.3	15.0	3.3	5.0	1.7	0
Faridpur	37.7	31.2	18.0	11.5	1.6	0	0
Daulatpur	17.2	56.2	3.5	15.5	5.2	1.7	0
Begumganj	10.0	43.3	21.7	23.3	0	1.7	0
Hathazari	23.2	17.9	21.4	30.4	3.6	1.8	1.8
Joydevpur	25.5	30.2	25.5	15.1	3.8	0	0

Table 3.4: Occupational Pattern

(Figures in %)

Thana	Only Farming	Farming & Trading	Farming & Service	Farming & Other	Farming, Trading & Service
Dinajpur	62.7	11.86	20.34	5.08	0
Rangpur	71.70	13.21	3.77	11.32	0
Gouripur	73.61	18.05	5.56	2.78	0
Sylhet	50.00	18.97	5.17	24.14	1.72
Natore	77.27	13.64	6.82	2.27	0
Ishurdi	67.93	16.98	15.09	0	0
Gaibandha	48.84	17.43	15.12	16.28	2.33
Sherpur	58.73	23.82	3.17	9.52	4.76
Faridpur	53.33	18.33	5.00	21.67	1.67
Daulatpur	78.33	10.00	6.67	5.00	0
Begumganj	40.32	17.74	35.48	3.23	3.23
Hathazari	65.12	13.95	20.93	0	0
Joydevpur	63.21	23.36	4.72	4.71	0

Table 3.5: Land Tenure

(Figures in %)

Thana	Full Owner	Owner -cum- Tenant	Full Tenant
Dinajpur	35.59	62.72	1.69
Rangpur	45.28	49.06	5.66
Gouripur	46.30	48.14	5.56
Sylhet	77.59	18.97	3.44
Natore	31.82	63.64	4.54
Ishwardi	45.28	52.83	1.89
Gaibandha	56.98	43.02	0
Sherpur	88.89	11.11	0
Faridpur	43.33	56.67	0
Daulatpur	53.33	46.67	0
Begumganj	66.13	30.65	3.22
Hathazari	50.00	48.21	1.79
Joydevpur	49.06	50.94	0

Table 3.6: Land Utilization

(Figures in %)

Thana	Cultivable Land	Home- stead	Pond/ Ditch	Waste Land
Dinajpur	77.83	8.06	4.42	9.69
Rangpur	91.25	5.29	1.34	2.15
Gouripur	84.61	8.33	2.05	5.01
Sylhet	79.77	13.66	4.64	1.93
Natore	82.40	8.14	2.58	6.88
Ishwardi	75.16	6.93	2.20	15.71
Gaibandha	74.94	7.84	5.48	11.73
Sherpur	91.98	7.05	0.08	0.98
Faridpur	78.91	16.47	3.70	0.91
Daulatpur	86.48	6.05	4.03	2.67
Begumganj	67.81	19.46	9.24	3.49
Hathazari	80.66	8.73	6.39	4.51
Joydevpur	84.06	4.88	1.74	9.32
Non-CDC Thanas	79.90	9.60	5.01	5.49
Land Utilization per Household (Acre)-				
Joydevpur	2.72	0.16	0.06	0.30
Non-CDC Thanas	2.82	0.32	0.19	0.20

Table 3.7: Land Possession

(Figures in %)

Thana	Land Holding among Strata				Average Holding (Acre)
		II	III	IV	
Dinajpur	1.43	24.80	28.08	45.69	3.20
Rangpur	0.40	8.97	33.00	57.53	5.14
Gouripur	3.39	26.50	45.24	24.87	6.18
Sylhet	15.56	37.49	35.84	25.11	2.67
Natore	0.09	28.10	5.91	20.90	3.09
Ishwardi	0.35	6.10	46.07	47.48	5.29
Gaibandha	0.05	22.67	61.73	15.55	2.60
Sherpur	1.03	28.13	41.89	28.95	2.69
Faridpur	0	21.64	42.93	35.43	2.94
Daulatpur	0.33	4.23	48.50	46.94	4.31
Begumganj	4.74	44.72	34.41	16.13	1.99
Hathazari	5.30	41.93	52.77	0	1.85
Joydevpur	2.80	15.50	38.87	42.83	3.24

Table 3.8: Farm Implement and Animal Possession

Item	Dinaj-pur	Rang-pur	Gouri-pur	Sylhet	Natore	Ishwardi	Gai-bandha
Plough	1.8	1.1	1.5	2.0	0.8	1.5	1.2
Ladder	1.1	1.2	1.2	1.5	0.7	1.1	1.0
Sickle	3.0	1.5	1.6	2.1	1.1	3.1	1.6
Shovel	0.9	1.0	0.9	1.0	0.5	1.1	1.0
Spade	1.6	1.0	0.8	1.3	0.4	1.2	1.0
Hand Weeder (Nirani)	2.8	1.3	1.6	0.5	1.0	2.8	1.0
Bucket	1.7	1.1	0.7	0.9	0.5	1.2	1.0
Sieve	0.1	0.4	0.2	0.1	0.1	0.1	0.1
Done	0.4 (23)	0.04(2)	0.02(1)	0.2 (11)	0	0.04(2)	0.03 (3)
Sheuti	0.6 (37)	0.3(14)	0.04(2)	1.01(62)	0.2 (9)	0.2 (9)	0.5 (44)
Weeder	0.02 (1)	0.2(10)	0.04(2)	0.1 (8)	0	0.02(1)	0.1 (12)
Sprayer	0.1 (4)	0	0.02(1)	0.05 (3)	0.1 (3)	0	0.01 (8)
Thresher	0.03 (2)	0	0	0	0	0	0.01 (1)
Tiller	0	0	0	0	0.05(2)	0.1 (3)	0.02 (2)
HTW	0.4 (21)	0.02(1)	0	0.02 (1)	0	0.1 (6)	0.1 (9)
DTW	0.04 (2)	0.04(2)	0	0	0.02(1)	0	0.1 (4)
STW	0.1 (5)	0.04(2)	0.02(1)	0	0.05(2)	0.1 (5)	0.12(10)
Draft Animal	3.3	0.7	1.7	2.8	1.7	2.3	2.0
Others	0.9	1.1	0.2	0.03	0.1	1.1	0.3
Score	18.84	11.04	10.64	13.70	7.52	15.86	11.28
Rank	1	9	11	4	13	2	8

Note: Open figures are No. of item per household and figures in parentheses are total for the thana.

Table 3.8: Farm Implement and Animal Possession

Item	Sherpur	Faridpur	Daulatpur	Begumganj	Hathazari	Joydevpur
Plough	1.2	0.9	1.0	0.8	1.8	1.8
Ladder	1.3	0.8	1.1	0.8	1.6	1.7
Sickle	1.6	2.6	2.6	2.3	2.5	1.6
Shovel	1.0	0.9	0.7	0.9	1.5	1.3
Spade	1.0	1.1	1.0	1.1	1.7	1.4
Hand Weeder (Nirani)	1.8	2.4	0.7	1.2	0.3	1.4
Bucket	0.7	0.3	0.5	0.9	1.5	0.5
Sieve	0.02	0.03	0.03	0.1	0.2	0.05
Done	0.3 (19)	0.02(1)	0.03(2)	0.3(17)	0.2(11)	0.2(17)
Sheuti	0.4 (26)	0.02(1)	0.02(1)	0.5(28)	1.0(53)	0.4(46)
Weeder	0.1 (4)	0.02(1)	0	0.2(11)	0	0
Sprayer	0	0.02(1)	0	0.2(12)	0.05(3)	0.1 (9)
Thresher	0	0	0	0.02(1)	0.1 (6)	0
Tiller	0	0	0	0.02(1)	0	0
HTW	0	0.02(1)	0	0	0	0.01(1)
DTW	0.02(10)	0.1 (4)	0.02(1)	0	0	0.02(2)
STW	0.03 (2)	0.9(55)	0	0.02(1)	0.02(1)	0.2(17)
Draft Animal	1.6	1.1	2.6	1.1	1.1	2.2
Others	0.1	0.2	0.4	0	2.8	0.4
Score	11.34	11.53	10.90	10.46	16.37	13.23
Rank	7	6	10	12	3	5

Note: Open figures are No. of item per household and figures in parentheses are total for the thana.

Table 3.9: Household Amenity Possession

(Figures in % of Households)

Thana	Radio	Cycle	Motor Cycle	TV	Bullock Cart	Electri-city	Score	Rank
Dinajpur	28.81	52.54	3.39	1.69	55.93	10.17	(1.53)	1
Rangpur	18.87	26.42	0	0	20.75	0	(0.66)	3
Gouripur	3.70	3.70	0	0	1.85	0	(0.09)	12
Sylhet	29.31	6.90	1.72	0	0	5.17	(0.43)	8
Natore	20.45	13.64	0	0	11.36	20.45	(0.66)	3
Ishwardi	13.21	32.08	15.09	0	13.21	0	(0.73)	2
Gaibandha	11.63	13.95	1.16	0	0	0	(0.27)	10
Sherpur	11.11	9.52	1.59	0	1.59	1.59	(0.25)	11
Faridpur	30.00	13.33	0	0	0	3.33	(0.47)	6
Daulatpur	16.67	8.33	3.33	0	20.00	0	(0.48)	5
Begumganj	22.58	4.84	1.61	0	0	3.23	(0.32)	9
Hathazari	32.14	14.29	0	1.79	1.79	0	(0.50)	4
Joydevpur	23.58	7.55	0	0	16.98	0.94	(0.45)	7

Table 3.10: Medical Facilities

(Figures in %)

Thana	In-Village Facilities		Consulted for Treatment								
	Yes	No	Para-medic	Comp-ounder	Nurse	Homoeo-path	Kabi-raj	Mollah	Thana Doctor	Specia-list	Other
Dinajpur	64.4	35.6	69.5	6.8	8.5	32.2	25.4	22.0	13.6	47.5	1.7
Rangpur	18.9	81.1	58.5	11.3	3.8	34.0	18.9	18.9	20.8	15.1	0
Gouripur	51.9	48.2	50.0	37.0	1.9	18.5	42.6	48.2	38.9	16.7	3.7
Sylhet	6.9	93.1	32.8	17.2	3.5	61.2	46.6	55.2	24.1	5.2	1.7
Natore	31.8	68.9	2.5	49.1	0	27.3	25.0	18.2	29.6	6.8	0
Ishwardi	26.4	73.6	84.9	11.3	0	32.1	7.6	11.3	26.4	7.6	0
Gaibandha	41.9	58.1	64.0	3.5	9.3	44.2	37.1	19.8	20.9	20.9	0
Sherpur	1.6	98.4	42.9	22.2	6.4	11.1	36.5	15.9	66.7	6.4	1.6
Faridpur	53.3	46.7	86.7	3.3	0	28.3	33.3	43.3	8.3	8.3	1.7
Daultpur	26.7	23.3	70.0	5.0	6.7	68.3	43.3	43.3	15.0	16.7	0
Begumganj	50.0	50.0	71.0	6.5	3.2	14.5	83.9	61.3	19.4	4.8	0
Hathazari	28.6	71.4	57.1	21.4	0	64.3	33.9	30.4	26.8	14.3	0
Joydevpur	16.0	84.0	70.8	5.7	1.9	36.8	27.4	14.2	6.6	15.1	1.9
All Thana	35.1	64.9	60.9	11.5	3.7	37.1	32.9	30.0	23.2	14.6	.01

Table 3.11: Birth and Death in Last Five Years

Thana	No. of Birth			Number of Death							
	Male	Fe-male	Total	At-Birth	Below 5 Yrs	6-10 Yrs	11-20 Yrs	21-35 Yrs	36-45 Yrs	46-60 Yrs	Above 60 Yrs	Total
Dinajpur	27	23	50	3	3	–	–	–	–	–	2	8
Rangpur	11	18	29	–	4	1	–	–	–	–	1	6
Gouripur	27	27	54	4	4	1	–	1	1	3	3	17
Sylhet	15	17	32	–	10	3	–	–	–	2	4	9
Natore	15	10	25	3	2	–	–	–	–	–	1	6
Ishwardi	36	22	68	4	10	3	–	1	2	1	2	23
Gaibandha	34	50	84	2	13	5	1	–	2	–	10	33
Sherpur	21	21	42	3	2	–	–	2	1	2	5	15
Faridpur	35	26	61	–	11	–	–	–	–	2	5	18
Daulatpur	27	24	51	–	6	–	3	1	–	3	1	11
Begumganj	25	21	46	–	5	1	–	1	–	–	5	12
Hathazari	21	23	44	1	1	–	1	1	–	–	3	7
Joydevpur	34	45	79	4	2	–	–	1	–	1	2	10

Table 3.12: Present Ailments

(Figures in %)

Thana	Any Member of Farm Family Ailing	
	Yes	No
Dinajpur	33.9	66.1
Rangpur	41.5	58.5
Gouripur	48.1	51.9
Sylhet	17.2	82.8
Natore	20.5	79.5
Ishwardi	52.8	47.2
Gaibandha	32.6	67.3
Sherpur	36.5	63.5
Faridpur	30.0	70.0
Daulatpur	38.3	61.7
Begumganj	58.1	41.9
Hathazari	67.9	32.1
Joydevpur	56.6	43.4
All Thana	41.9	58.1

CHAPTER IV

PRICE VARIETIES, YIELD AND PRODUCTION

4.1 General

The typical climatological and topographical situation has created a three-crop rice growing calendar in Bangladesh. The variations in the agroclimatological conditions within country have generated, over the ages, thousands of rice varieties suiting particular soil and environmental conditions. Then the decade of sixties saw the introduction of the IRRI-released varieties having higher yield potentials. This created a new dimension in cultivation practices with changes in farmers' varietal preferences coupled with a higher demand for labour and material inputs.

This chapter will examine the farm-level local and high yield variety status, varietal yield attainment and crop production in the study area thanas.

4.2 Local Variety Inventory

An inventory of paddy varieties made for the study area revealed that farmers' varietal preferences among thanas differed to a wide extent. Only a handful of varieties were found to be under cultivation in more than a thana. Some varieties were found to have adaptability in different seasons.

The following local varieties were cultivated in different seasons in the thanas:

	Aus	Aman	Boro
Dinajpur	Gorpai, Kalam, Joshoa, Agurbad, Sadashail.	Joshoa, Kalam, Nizershail, Dudhshar.	Kartikshail.
Rangpur	Gorpai, Kalamgocha, Agurbad, Sadashail, Jama.	Joshoa, Kalam, Surjamukli, Malshira, Nizershail.	Kartikshail,
Gaibandha	Garia, Dharial, Thukri, Dhukri, Kashidanga, Kashiabanna, Thukri, Bakri, Zakar.	Malshira, Betu, Panishail, Bangaldari.	Kali Boro.

	Aus	Aman	Boro
Ishwardi	Kalamaton, Kalabakri, Dudhkathal.	Shanropa, Kajalvari, Nizershail, Sadaropalal, Sheelkomar, Jhingashail, Pakri.	-
Natore	Shanibalam, Shani, Zali, Gaira, Hizla.	Gandhishail, Gocha, Tilkapur, Dhalgucha, Dighashail, Batraj, Takishail, Surjamukhi.	Shaita.
Daulatpur	Parangi, Bakoi, Kalmilata, Hashikalmi.	Zabra, Birshail, Sadazamir, Deppo, Lalzabra, Nizershail.	Kali Boro
Faridpur	Parangi, Lakshmilata, Hashkalmi, Manikmandal.	Bashiral, Hajaldigha, Sonadigha, Baradigha, Ashwinadigha, Laxmidigha, Latishail, Kabiraj, Malabhat, Dudhmoni.	-
Begumganj	Diar, Kheri, Balam, Maricha, Kataktara, Bora, Sita, Kalimarich.	Kartikshail, Gocha, Balam, Zatohar, Leisha.	Kali Boro, Deshi Boro, Latishail.
Hathazari	Barachiklal, Nayachiklal, Chotochiklal.	Balam, Chakmal, Latishail.	-
Sylhet	Murali, China, Chengi, Shaita, Dumai.	Nizershail, Moynashail, Latishail, Balam, Bagdar.	Tepi Boro, Bagdar, Khea Boro.
Gouripur	Hashikalmi, Agali, Kataktara, Dolkachari.	Biroi, Tulsimala, Bil Bhadai, Kalizira.	Tepi Boro
Sherpur	Kaila, Hashikalmi, Dharial, Chapila.	Binni, Malati Karma, Chandana.	Chandni, Garia, Kali Boro.
Joydevpur	Dharial, Puika, Hashikalmi, Fulbadam, Chakulia, Falhaita.	Chandrashail, Nizershail, Tilkalachand, Kaima, Kaishabinni.	Muktabahar.

Aman being the major rice crop had the largest number of local varieties under cultivation. Boro having the lowest acreage was cropped with a few varieties.

4.3 HYV Inventory

High Yielding Varieties developed at the International Rice Research Institute (IRRI), Philippines, were released for farm-level adoption in Bangladesh in mid-sixties. Bangladesh Rice Research Institute (BRRI), founded in 1970, later released several HYVs with greater adaptability to local conditions. These modern varieties mostly originated by IRRI and BRRI gained a gradual acceptance among farmers and replaced local varieties in many farms, by now, where favourable conditions exist.

Farmers' preference for varieties, when investigated, showed to vary from one thana to another. Seasonal variations in varietal selection were also there as expected, based on varieties' seasonal adaptability. In aus season, farmers in the study area reported to have grown IR8, Purbachi, BR1 (Chandina), BR2 (Mala), BR3 (Biplab), BR6 and Pajam. In aman season, farmers grew IR5, IR20 (Irrisail), BR3 (Biplab), BR4 (Brrisail) BR5 (Dulhabhog), and Pajam. Boro varieties on farmer's field included IR8, Purbachi, Irratom, BR1 (Chandina), BR2 (Mala), BR3 (Biplab), BR8 (Asha) and Pajam. Some interesting points worthnoting in respect of varietal preference are Pajam in farmers' opinion is an all-season modern variety even though BRRI has not yet recognized it, Irratom - developed by Institute of Nuclear Agriculture (INA) of Bangladesh Atomic Energy Commission (BAEC) not endorsed by BRRI - was recognized by farmers in some areas as an HYV, and farmers have not yet been familiar with HYVs namely BR7 (Brribalam), BR9 (Suphala), BR10 (Pragati), BR11 (Mukta), etc.

Variety-wise diffusion in the thanas are presented in Tables 4.1, 4.2 and 4.3 for aus, aman and boro respectively. Among all aus HYVs, Purbachi ranked first due to its widest diffusion found in nine thanas (Table 4.1). IR8 was cultivated in eight thanas and followed by BR varieties, remarkably Biplab and Chandina. Pajam was not very popular and followed Mala (BR2), one of the earliest BR varieties, in the thana diffusion ranking.

Brrisail had the highest thana coverage as an aman crop grown in all thanas except only in Begumganj and relegated IR20 to a much lower rank (Table 4.2). Pajam, a farmer-accepted exotic variety, was however the second diffused variety grown in ten thanas including the CDC area with a mass recognition as a modern variety. No. BR variety except BR4 (Brrisail) could supersede it and could even come close to Pajam's mass acceptability in aman season. IR5 and BR3 (Biplab) followed Pajam and both were ranked third.

Purbachi and Biplab were grown in boro season in seven thanas and both ranked at the top (Table 4.3). IR8 was cultivated in five thanas. None of the other boro varieties were recognizable in more than three thanas. Irratom growers were found in Hathazari only.

Thana-wise aus varietal diffusion presented in Table 4.1 indicates that five out of seven identified HYVs were grown in Sylhet, Sherpur and Gaibandha. Among other thanas, Gouripur and Joydevpur had four varieties fielded. Respondents of Ishwardi cultivated only BR3 while those of Daulatpur did not grow any modern variety. Five out of the six aman varieties identified with rice growers were cultivated by the CDC area farmers in the survey year (Table 4.2). Aman farmers of Gouripur and Hathazari grew four HYVs. BR4 was the common variety everywhere except in Begumganj where there was no HYV growers except some Pajam adopters. Dulhabhog (BR5) growers were met in the CDC area only.

Of eight modern varieties grown in boro season, as many as five were grown in Hathazari (Table 4.3). Sherpur had four varieties on field and other thanas including Joydevpur had three or less number of varieties. Daulatpur farmers did not grow any modern variety.

4.4 HYV Adoption among Farmers

High yield varietal coverages vis-a-vis that of local varieties were analysed in order to ascertain the extent of HYV adoption among farmers of the study area. All-thana HYV adoption among three rice crop growers was found highest in case of boro. About 79 percent of boro farmers grew HYV in the study area in 1981-82 (Table 4.4). HYV adoption in aus and boro was about 32 and 35 percent respectively.

Thana-wise analysis indicated that HYV adoption was remarkably large in the CDC area due mainly to be being in the vicinity of BRRI (Table 4.4). Other thanas with fairly extensive HYV farmer coverage were Hathazari, Dinajpur and Gouripur. Medium level of coverage of HYV among farmers was observed in Natore, Ishwardi, Sherpur and Gaibandha. In the remaining 5 thanas HYV adopters represented a minor fragment. None of the boro farmers was local variety grower in four thanas, namely Hathazari a characteristically boro growing area, Ishwardi, Faridpur and Rangpur. Thanas where local boro was also grown but HYV adopters dominated were Joydevpur, Gaibandha, Natore and Dinajpur. In only two thanas (Dinajpur and Hathazari) HYV growers outnumbered local variety growers in aus season, whereas in case of aman crop local variety growers dominated throughout the study area. However, HYV aman adopters were visibly larger in the CDC area, Gouripur and Natore than in other areas.

4.5 Aus Yields

Productivity of aus variety, be it local or modern, is lower than that of other two crops. Yield data obtained through the present survey are amply corroborative of that.

4.5.1 Local Varieties

Among all local aus varieties, Kalamgoch, Lema, Dolkachari and Zakar yielded around 20 maund per acre in average and gave highest average yields (Table 4.5). A Dolkachari grower in Gouripur obtained 35 maunds and recorded highest yield in the study area among all local varieties. Kalamgoch also gave a farmer 32 maunds in Rngpur. Parangi, Sita, Kheri, Manik and Murali were comparatively lower yielder. In the CDC area Dharial and Fulbadam's yield performance was better than other varieties. Dharial however gave even better yield on one farmer's field in Sherpur, but averaged lower in the thana.

4.5.2 Modern Varieties

Among seven aus varieties identified as adopted by farmers, average yield performance of IR8 was best in the AETI areas with maximum recorded yield being astonishing 90 maunds in Rangpur (Table 4.8). All-thana yield of IR8 outside CDC area averaged only 30 maunds. BR3 showed best performance in the CDC area with the maximum yield record of 70 maunds and area average of about 54 maunds. BR3 yielded a

minimum of 22 maunds in Gouripur. Purbachi, the most popular aus HYV, gave consistently good yield and appeared stable enough to be superseded by another HYV in near future. Its yields average 41.9 maunds in the CDC area and 42.25 maunds outside. BR2 (Mala) and BR6 gave moderately good yields in the AETI thanas and were not encountered in Joydevpur. Pajam was not very popular in most of the thanas due to its yield being lower than other HYVs in aus season.

4.6 Aman Yields

As anticipated, aman yields in farmers' field were better than that of aus. But yield divergences were remarkable particularly among the identified indigenous varieties. Table 4.6 lists more than fifity such varieties.

4.6.1 Local Varieties

Table 4.6 indicates that among all local aman varieties Surjomukhi had best performance in the AETI areas (30 md/ac). Other varieties deserving mention for yielding a good harvest were Leisha (24 md/ac) in Begumganj and Balam (25 md/ac) in Hathazari. In the CDC area, all the aman varieties gave moderate to good yields, notable among them were Kaima (30 md/ac), Chiniguri (28 md/ac) and Tilkalachand (28 md/ac). Nizershail, the most extensively cultivated local variety, yielded in average 20.75 md/ac in the AETI areas and 26.75 md/ac in the CDC area. However its highest varietal record was 30 maunds with a farmer in Rangpur.

4.6.2 Modern Varieties

In general high yielding aman varieties performed better in Joydevpur than other thanas (Table 4.9). Four out of six varieties were cultivated in both AETI and CDC areas; and all the four recorded highest yields in the CDC area, foremost among them was BR4 (65 mds). However BR3 gave a better average yield in both CDC area (46.25 md/ac) and outside (37.71 md/ac). Pajam, cultivated in ten thanas, yielded on average 37.5 maunds in Joydevpur and 29 maunds in other thanas. IR20, gradually becoming extinct, averaged 30 maunds in two thanas where they were grown and was not reportedly cultivated by any respondent in Joydevpur.

4.7 Boro Yields

Field yields reflected boro varieties' yield potential even though a wide gap between actual and potential yields was noticeable.

4.7.1 Local Varieties

Shaita, Kali Boro, Latishail and Chandni were most prominent among local boro varieties in consideration of yield performance. Highest registered per acre yield was 42 maunds obtained by Kali Boro in Gaibandha (Table 4.7). However average study area performance of Shaita was better (35 md/ac). Muktabahar, the only boro variety grown by Joydevpur respondents, yielded 30 maunds an acre.

4.7.2 Modern Varieties

Purbachi and Biplab (BR3), the two most widely adopted boro HYVs, yielded on average 53.26 and 44 maunds per acre respectively in AETI areas (Table 4.10). In the CDC area, where Purbachi was not grown, yield of Biplab averaged about 54 maunds. IR8 gave an average yield of about 53 maunds in Joydevpur and 37 maunds outside. Pajam also performed better in Joydevpur than everywhere else. The highest boro yield registered was 67.5 maunds by a Purbachi grower in Natore and 70 maunds by a BR8 (Asha) grower in Faridpur. Among all respondents only one adopter of Asha variety was met during survey.

4.8 Annual Crop Production

For the purpose of analysis, production data were classified into rice and non-rice categories. Table 4.11 summarizes the production data of the study area for the survey year.

As per recorded information the quantified all-thana average production of all crops amounted to 101.58 maunds per farmer. The highest production level was attained by Dinajpur (171.64 md/farmer). Other than Dinajpur in each of the seven thanas including Joydevpur annual production averaged above the all-thana figure. The variance between Dinajpur and the other thanas is however very large. In the five remaining thanas, thana-wise production average was lower than the all-thana average. The crop production was lowest in Begumganj, being only about 31 maunds per farmer.

4.9 Rice and Non-Rice Production

A closer look into the production data reveals that per farmer rice production was highest in Dinajpur (133.34 mds), followed by Joydevpur (109.54 mds) and Hathazari (104.78 mds). Table 4.11 also identifies three more moderately high rice producing thanas. They were Sylhet, Sherpur, Rangpur and Daulatpur (average ranging from 96.38 to 80.33 maunds). The all-thana rice production was 79.39 maunds per household in 1981-82.

As regards non-rice crop production the highest average was obtained in Faridpur (86.45 mds). With an average of about 58 maunds Dinajpur was placed next. Non-rice crops in the CDC area totalled only about seven maunds per farmer, whereas they on an all-thana basis averaged 22.19 maunds which was also low.

A production level comparison between rice and non-rice crops was also made and it was found that only in case of Faridpur production of non-rice superseded that of rice. In all other thanas rice crop dominated the farm production. In Joydevpur, Hathazari, Begumganj, Sherpur and Gouripur agricultural production was overwhelmingly dominated by rice representing over 90 percent. Natore was remarkable due to being the only area where rice and non-rice production levels were proximate. However, the all-thana average depicts the overall dominance of rice (78.2%) in the study area.

Table 4.1: High Yield Variety Diffusion - Aus

Thana	IR8	Purbachi	BR1	BR2	BR3	BR6	Pajam
Dinajpur	x	x					
Rangpur	x	x				x	
Gouripur	x	x		x	x		
Sylhet	x	x	x	x	x		
Natore		x	x		x		
Ishwardi					x		
Gaibandha	x	x		x	x		x
Sherpur		x	x	x	x		x
Faridpur	x						
Daulatpur							
Begumganj	x						x
Hathazari		x	x				
Joydevpur	x	x	x		x		
Rank	2	1	4	5	3	7	6

Table 4.2: High Yield Variety Diffusion - Aman

Thana	IR8	IR20	BR3	BR4	BR5	Pajam
Dinajpur				x		
Rangpur				x		x
Gouripur	x		x	x		x
Sylhet			x	x		x
Natore				x		
Ishwardi			x	x		
Gaibandha	x			x		x
Sherpur	x			x		x
Faridpur	x			x		x
Daulatpur		x		x		x
Begumganj						x
Hathazari		x	x	x		x
Joydevpur	x		x	x	x	x
Rank	3	4	3	1	5	2

Table 4.3: High Yield Variety Diffusion - Boro

Thana	IR8	Purbachi	Irratom	BR1	BR2	BR3	BR8	Pajam
Dinajpur		x						x
Rangpur		x						
Gouripur		x			x	x		
Sylhet								x
Natore		x				x		
Ishwardi						x		
Gaibandha	x	x				x		
Sherpur		x		x	x	x		
Faridpur	x						x	
Daulatpur								
Begumganj	x							x
Hathazari	x	x	x	x		x		
Joydevpur	x			x		x		
Rank	2	1	5	3	4	1	5	3

Table 4.4: Modern and Local Variety Growers

(Figures in No. of Households)

Thana	Aus			Aman		
	HYV	Local	Total	HYV	Local	Total
Dinajpur	36(63.2)	32(56.1)	57(96.6)	23(40.4)	57(110)	57(96.6)
Rangpur	1(22.4)	48(98.0)	49(92.5)	18(36.7)	46(93.9)	49(92.5)
Gouripur	31(60.8)	51(100)	51(94.4)	26(51.0)	51(100)	51(94.4)
Sylhet	10(17.2)	55(94.8)	58(100)	8(13.8)	56(96.6)	58(100)
Natore	6(16.7)	34(4.4)	36(81.8)	20(47.6)	39(92.9)	42(95.5)
Ishwardi	11(22.9)	48(100)	48(90.6)	21(80.7)	23(88.5)	26(49.1)
Gaibandha	15(18.8)	80(100)	80(93.0)	19(22.9)	80(96.4)	83(96.5)
Sherpur	16(28.6)	49(88.9)	56(88.9)	12(20.0)	58(96.7)	60(95.2)
Faridpur	9(16.1)	46(82.1)	56(93.3)	3(6.1)	49(100)	49(81.7)
Daulatpur	0	46(97.9)	47(78.3)	30(52.6)	56(98.2)	57(95.0)
Begumganj	6(15.4)	38(97.4)	39(62.9)	5(10.4)	46(95.8)	48(77.4)
Hathazari	24(82.8)	21(72.4)	29(51.8)	20(35.7)	52(92.9)	56(100)
Joydevpur	49(55.1)	78(87.6)	89(84.0)	56(63.6)	80(90.9)	88(83.0)
All Thana	223(32.1)	626(90.1)	695(85.4)	251(34.7)	693(95.7)	724(88.9)

Note: Figures in parentheses under "Total" columns are percentages of all households.

Figures in parentheses under other columns are percentages of total growers of respective crops.

Table 4.4: Modern and Local Variety Growers

(Figures in No. of Households)

Thana	Boro		
	HYV	Local	Total
Dinajpur	4(80.0)	1(10.0)	5(8.5)
Rangpur	4(100)	0	4(7.5)
Gouripur	3(37.5)	8(100)	8(14.8)
Sylhet	2(28.6)	7(100)	7(12.1)
Natore	10(100)	2(20.0)	10(22.7)
Ishwardi	11(100)	0	11(20.8)
Gaibandha	27(100)	1(3.7)	27(31.4)
Sherpur	22(48.9)	39(86.7)	45(71.4)
Faridpur	7(100)	0	7(11.7)
Daulatpur	0	6(100)	6(10.0)
Begumganj	20(52.6)	34(89.5)	38(61.3)
Hathazari	42(100)	0	42(75.0)
Joydevpur	66(100)	11(16.7)	66(62.3)
All Thana	219(79.3)	109(39.5)	276(33.9)

Note: Figures in parentheses under "Total" columns are percentages of all households.

Figures in parentheses under other columns are percentages of total growers of respective crops.

Table 4.5: Paddy Varieties and Yields - Aus LV

(Figures in Maund/Acre)

	Variety	Maximum Yield		Minimum Yield		Avg. Yield in	
		Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1.	Garia	17.50	Natore	12.00	Gaibandha	14.75	-
2.	Dharial	20.60	Sherpur	15.00	"	15.84	18.00
3.	Thukri	20.00	Gaibandha	10.00	"	13.00	-
4.	Kashidanga	20.00	"	8.00	"	11.00	-
5.	Bakri	20.00	"	12.00	Ishwarid	16.00	-
6.	Zakar	20.00	"	-	-	20.00	-
7.	Parangi	10.15	Faridpur	9.24	Baulatpur	9.69	-
8.	Bakai	15.58	"	8.00	"	10.50	-
9.	Kalmilata	18.50	"	10.00	"	11.80	-
10.	Hashikalmi	15.50	"	10.00	Faridpur	13.73	12.00
11.	Chapila	19.00	Sherpur	6.00	Sherpur	13.20	-
12.	Kaila	23.00	"	9.00	"	15.65	-
13.	Agali	18.00	Gouripur	9.00	Gouripur	15.00	-
14.	Kataktara	20.00	Begumganj	8.00	"	14.00	-
15.	Dolkachari	35.00	Gouripur	10.00	"	19.80	-
16.	Lema	27.00	"	15.00	"	21.35	-
17.	Barachiknal	20.00	Hathazari	10.00	Hathazari	14.25	-
18.	Nayachiknal	25.00	"	12.00	"	16.40	-
19.	Chotochiknal	19.00	"	10.00	"	13.35	-
20.	Shani	21.25	Natore	15.00	Ishwardi	15.99	-
21.	Hizli	20.00	"	9.00	Natore	15.50	-
22.	Zali	22.00	"	10.00	"	16.50	-
23.	Gorbai	20.00	Rangpur	9.00	Rangpur	15.00	-
24.	Kalamgoch	32.00	"	15.00	"	22.00	-
25.	Agurbad	18.00	Rangpur	10.00	Rangpur	14.00	-
26.	Sadashail	20.00	"	10.00	"	16.00	-
27.	Dudhkanthal	21.00	Ishwardi	10.00	Ishwardi	13.80	-
28.	Kalamaton	27.00	"	13.00	"	16.85	-
29.	Murali	20.00	Sylhet	7.00	Sylhet	11.92	-
30.	China	20.00	"	9.00	"	15.00	-
31.	Chengri	25.80	"	10.00	"	17.80	-
32.	Falhata	22.00	Joydevpur	10.00	Joydevpur	15.00	13.50
33.	Dumai	26.00	Sylhet	9.00	Sylhet	16.08	-
34.	Diar	26.00	Begumganj	6.00	Begumganj	17.00	-
35.	Kheri	19.00	"	7.00	"	9.00	-
36.	Maricha	20.00	"	8.40	"	11.42	-
37.	Bora	21.00	"	6.00	"	12.10	-
38.	Sita	17.00	"	5.00	"	7.00	-
39.	Lakshmilata	18.00	Faridpur	5.00	Faridpur	11.00	-
40.	Manik	15.00	"	4.00	"	8.50	-
41.	Fulbadam	18.00	Joydevpur	15.00	Joydevpur	-	16.50
42.	Chakulia	-	-	-	-	-	15.00
43.	Puika	22.86	Joydevpur	10.00	Joydevpur	-	14.50
44.	Shaita	20.00	Sylhet	12.00	Sylhet	15.00	-

Table 4.6: Paddy Varieties and Yields - Aman LV

(Figures in Maund/Acre)

	Variety	Maximum Yield		Minimum Yield		Avg. Yield in	
		Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1.	Malshira	21.00	Gaibandha	18.00	Rangpur	19.50	-
2.	Panishail	25.00	"	10.00	Gaibandha	20.50	-
3.	Betu	20.00	"	18.00	"	18.75	-
4.	Bangal Dari	18.00	"	-	-	18.00	-
5.	Zabra	15.00	Daulatpur	8.00	Daulatpur	12.00	-
6.	Birshail	25.00	"	10.00	"	15.00	-
7.	Sada Zamir	27.00	"	15.00	"	17.50	-
8.	Deppo	18.00	"	8.00	"	10.00	-
9.	Lalzabra	29.00	"	15.00	"	19.80	-
10.	Nizershall	30.00	Rangpur	6.00	"	20.75	26.75
11.	Binni	22.00	Sherpur	10.00	Sherpur	17.50	19.70
12.	Malati	27.00	"	15.00	"	22.70	-
13.	Malancha	28.00	"	18.00	"	23.00	-
14.	Chandana	20.00	"	14.00	"	18.00	-
15.	Latishail	31.00	Hathazari	22.00	"	22.67	-
16.	Biroi	24.00	Gouripur	16.00	Gouripur	22.00	-
17.	Tulshimala	20.00	"	15.00	"	17.00	-
18.	Bil Bhadai	24.00	"	18.00	"	20.00	-
19.	Kalizira	25.00	"	16.00	"	18.00	-
20.	Dudhmar	24.00	"	22.00	Sylhet	17.33	-
21.	Chakmal	19.00	Hathazari	10.00	Hathazari	15.00	-
22.	Balam	30.00	"	10.00	"	25.00	-
23.	Kalam	28.00	Rangpur	20.00	Rangpur	22.00	-
24.	Jashoa	29.00	"	16.00	"	19.00	-
25.	Dudhshar	25.00	"	20.00	"	22.00	-
26.	Surjomukhi	35.00	"	20.00	"	30.00	-
27.	Kazalvari	27.00	Ishwardi	14.00	Ishwardi	20.00	-
28.	Sheelkomar	25.00	Ishwardi	9.00	Ishwardi	17.00	-
29.	Sada Ropalal	24.50	"	12.50	"	17.50	-
30.	Zingashail	16.00	"	10.00	"	12.00	-
31.	Pakri	15.00	"	10.00	"	12.00	-
32.	Moynashail	20.00	"	10.00	"	15.00	-
33.	Leisha	28.00	Begumganj	20.00	Begumganj	24.00	-
34.	Zatohor	19.00	"	9.00	"	15.00	-
35.	Bagdar	26.00	Sylhet	15.00	Sylhet	20.00	-
36.	Chandrashail	30.00	Joydevpur	19.50	Joydevpur	-	24.00
37.	Tilkalachand	30.00	"	24.00	"	-	28.00
38.	Kaima	31.80	"	25.00	"	-	30.00
39.	Chiniguri	33.00	"	24.00	"	-	28.00
40.	Shanropa	25.00	Ishwardi	9.00	Ishwardi	20.00	-
41.	Gandhishail	19.00	Natore	16.00	Natore	17.50	-
42.	Gocha	22.50	"	6.00	"	15.00	-
43.	Tilkapur	30.00	"	13.00	"	16.00	-
44.	Dalgocha	15.00	"	10.00	"	12.50	-
45.	Batraj	22.00	"	12.00	"	17.00	-
46.	Takishail	28.00	"	14.00	"	16.50	-
47.	Dighashail	23.00	"	15.75	"	18.25	-
48.	Madhumalati	25.00	Hathazari	14.00	Hathazari	18.00	-

Table 4.6: Paddy Varieties and Yields - Aman LV

(Figures in Maund/Acre)

Variety		Maximum Yield		Minimum Yield		Avg. Yield in	
		Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
49.	Kartikshail	24.50	Begumganj	16.67	Begumganj	21.50	-
50.	Motihari	16.50	"	11.33	"	13.00	-
51.	Bashiral	15.00	Faridpur	9.30	Faridpur	11.25	-
52.	Hijaldigha	15.17	"	10.00	"	12.00	-
53.	Sonadigha	12.00	"	11.00	"	11.50	-
54.	Ashwinadigha	16.00	"	12.00	"	14.00	-
55.	Laksmidigha	15.50	"	11.00	"	13.00	-
56.	Baradigha	20.00	"	12.00	"	15.00	-
57.	Malabhat	11.50	"	7.00	"	9.50	-
58.	Dudhmoni	10.00	"	7.00	"	8.50	-
59.	Kaishabinni	23.00	Joydevpur	19.40	Joydevpur	-	20.75

Table 4.7: Paddy Varieties and Yields - Boro LV

(Figures in Maund/Acre)

Variety		Maximum Yield		Minimum Yield		Avg. Yield in	
		Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1.	Deshi Boro	25.00	Begumganj	13.00	Sherpur	19.00	-
2.	Latishail	35.00	"	20.00	Begumganj	28.67	-
3.	Kali Boro	42.00	Gaibandha	19.62	"	30.20	-
4.	Tepi Boro	20.00	Sylhet	14.00	Sylhet	15.00	-
5.	Kheya Boro	29.00	"	20.00	"	23.00	-
6.	Kartikshail	28.00	Rangpur	15.00	Rangpur	20.00	-
7.	Nizershail	22.00	"	13.00	"	16.00	-
8.	Chandni	28.00	Sherpur	20.00	Sherpur	27.66	-
9.	Garia	25.00	"	18.00	"	21.00	-
10.	Shaita	40.00	Natore	30.00	Natore	35.00	-
11.	Muktabahar	36.00	Joydevpur	24.00	Joydevpur	-	30.00
12.	Bagdar	25.00	Sylhet	14.00	Sylhet	20.50	-

Table 4.8: Paddy Varieties and Yields - Aus HYV

(Figures in Maund/Acre)

Variety	Maximum Yield		Minimum Yield		Avg. Yield in	
	Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1. Purbachi	56.23	Gaibandha	30.00	Sylhet	42.25	41.90
2. IR8	90.00	Rangpur	24.67	Begumganj	45.90	30.00
3. Mala (BR2)	46.66	Gouripur	35.00	Sherpur	38.78	-
4. Chandina (BR1)	45.00	Natore	20.00	Hathazari	31.40	34.31
5. Biplab (BR3)	70.00	Joydevpur	22.00	Gouripur	38.65	54.13
6. BR6	55.00	Rangpur	25.00	Rangpur	40.00	-
7. Pajam	23.00	Sherpur	10.00	Sherpur	20.08	-

Table 4.9: Paddy Varieties and Yields - Aman HYV

(Figures in Maund/Acre)

Variety	Maximum Yield		Minimum Yield		Avg. Yield in	
	Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1. IR20	40.00	Daulatpur	25.00	Daulatpur	30.00	-
2. Biplab (BR3)	60.00	Joydevpur	25.00	Gouripur	37.71	46.25
3. Brrisail (BR4)	65.00	Joydevpur	26.67	Sylhet	35.44	45.81
4. Dulhabhog(BR5)	43.00	Joydevpur	35.00	Joydevpur	-	40.67
5. IR5	42.00	Joydevpur	27.00	Gouripur	31.60	36.91
6. Pajam	50.00	Joydevpur	15.00	Gouripur	29.00	37.50

Table 4.10: Paddy Varieties and Yields - Boro HYV

(Figures in Maund/Acre)

Variety	Maximum Yield		Minimum Yield		Avg. Yield in	
	Quantity	Thana	Quantity	Thana	AETI Thana	CDC Area
1. IR8	56.00	Joydevpur	20.00	Faridpur	37.09	52.71
2. Purbachi	67.50	Natore	45.52	Sherpur	53.26	-
3. Irratom	35.00	Hathazari	20.00	Hathazari	30.50	-
4. Chandina (BR1)	35.00	Hathazari	26.00	Hathazari	31.80	-
5. Mala (BR2)	30.00	Sherpur	-	-	30.00	-
6. Biplab (BR3)	60.00	Joydevpur	36.00	Gaibandha	40.00	53.86
7. Asha (BR8)	70.00	Faridpur	-	-	70.00	-
8. Pajam	42.00	Joydevpur	25.00	Sylhet	28.57	35.00

Table 4.11: Annual Rice and Non-Rice Production

(Figures in Md/Household)

Thana	All Rice Total	Non-Rice Total	All Crop	Price	Non-Price
Dinajpur	133.34	57.94	171.64	77.7	22.3
Rangpur	90.21	25.87	116.08	77.7	22.3
Gouripur	57.85	4.69	62.55	92.5	7.5
Sylhet	96.38	15.47	111.85	86.2	13.8
Natore	49.54	45.20	94.74	52.3	47.7
Ishwardi	72.83	28.79	101.62	71.7	28.3
Gaibandha	59.31	12.81	72.12	82.2	17.8
Sherpur	92.76	7.78	100.54	92.3	7.7
Faridpur	35.05	86.45	121.50	28.8	71.2
Daulatpur	80.33	30.95	111.28	72.2	27.8
Begumganj	30.20	0.62	30.82	98.0	2.0
Hathazari	104.78	5.92	110.70	94.7	5.3
Joydevpur	109.54	7.15	116.69	93.8	6.2
All Thana	79.39	22.19	101.58	78.2	21.8

CHAPTER V

SEED SOURCES AND SEEDBED MANAGEMENT

5.1 General

This chapter presents farmers' paddy seed sources, preferences for seed sources and seedbed type, seed selection procedures adopted by farmers, seedling raising, seedbed care and pest control.

5.2 Seed Procurement

Farmers procure paddy seed from several sources. One of the outstanding reasons for obtaining low yields even from high yield varieties is the poor quality seed used at farm level. Farmers' dependence on own farm and neighbouring markets for procuring seed has now, to an extent, shifted on to BADC. BADC attempts to control and maintain seed quality through its distribution channel of own farms/godowns and appointed dealers. Paddy seed source-use data thana-wise and strata-wise are presented in Table 5.1. BADC's coverage in paddy seed distribution in the study are for AETI thanas is found to be only about 13.8% and for the CDC area slightly higher (about 17.7%). BADC-approved seed dealers supply still less, only 1.5% in the CDC area and 4.2% in other areas.

About 17.5% of paddy seed in the AETI thanas and CDC thana is procured from the open market which is traditionally the principal source of low quality seeds. About half of the seed requirement is met from farmer's own harvest. CDC farmers show a slight edge over the AETI area farmers in respect of quantity of seed used from own source. BADC is the principal source of seed in Sylhet (38%), while it supplied on 1% of local requirement in 1981-82 in Sherpur where farmers used over 86% of seed from own source.

Table 5.2 presents farmer's preference scores for different seed sources. It is observed that own farm as a paddy seed source secured highest score in both CDC area & AETI thanas. Open market was ranked the second preferred source by farmers. It is interesting to note that farmers considered high quality is the foremost of the characteristics associated with the open market seed in the thanas other than Joydevpur. In Joydevpur however most of farmers buying from market expressed that seed is bought from open market only when no alternative source is found.

BADC farms, godowns and dealers together scored only 0.18 and 0.16 in the AETI thanas and Joydevpur respectively. Farmers buying from BADC opined that paddy seeds of BADC sources although are reliable and of good quality, but not reasonably priced. Neighbour, a minor source in the CDC area, is the second preferred source elsewhere in the study area.

5.3 Seed Selection

It is evident from Table 5.3 that more than three-fourth of farmers in the study area used one or the other seed selection method. In Gaibandha and Begumganj, method users exceed 95 percent of rice growers. It is interesting to note that in the Joydevpur CDC area majority of farmers do not adopt any seed selection procedure. Faridpur closely follows Joydevpur in respect of method use.

Farmers were also asked about their preferences for different seed selection methods in practice in Bangladesh. It was observed that in many areas same farmers used more than one method of seed selection. Table 5.4 shows that farmers in general prefer wind blowing to other three methods. All the four methods are in practice in various degrees in only six of the surveyed thanas including Joydevpur. Nevertheless the two recommended seed treatment methods of urea-mixed water and salt solution are not very popular practices. Next to wind blowing, treatment by water is extensively practised.

5.4 Seedling Production

Production of good seedling in case of transplanted rice crops is a precondition to having good production. Seedlings are raised on seedbeds of a variety of sizes in the study area. Model sized seedbed, with recommended width of 4 feet and length according to individual farmer's need and convenience, represented only 7 percent in the survey year (Table 5.5) Seedbeds of big and mixed sizes prodominate everywhere even in the CDC area. Model seedbed has gained some acceptance in Sylhet where one-third of respondents reported to have raised seedlings on model type.

Fertilizer application on seedbed in all thanas is an accepted practice in varying degrees in all thanas. Overall fertilizer use on seedbed in the study area as a whole was about 38 percent (Table 5.6). About 85 percent of rice farmers in Dinajpur use fertilizer on seedbed. This

practice is popular also in Gouripur and Hathazari and accepted by 70 and 52 percent of rice growers respectively. In contrast, about two-third of CDC area farmers' seedbeds do not receive fertilizer. However, in six other thanas of the study area this practice is less popular than in Joydevpur.

The use of pesticide on seedbed is practised less than that of fertilizer in the study area. Only one-sixth of farmers confirmed that they adopted this practice (Table 5.6). However, the CDC area's performance on this practice was better than the all thana average. Only Hathazari thana showed a wider acceptance. Pesticide was not at all used in four thanas.

Replying to a direct question, majority of farmers opined that manure made of cowdung in the farmyard give better seedlings (Table 5.7). Joydevpur is one of the three thanas where farmers held a contrary view. These diametrical opposite views require further enquiry and research.

5.5 Seedbed Infestations

Disease and insect infestation patterns in seedbed, and farmer's observations are recorded in Table 5.8. About 31 percent farmers confirmed that their seedbeds were infested with diseases and/or insects and 22.4 percent confirmed that their seedbeds were free from infestations. Farmers affirming infestation were classified according to three different infestation patterns namely disease only, insect only and disease & insect. Only 3 percent of farmers under study reported incidence of disease only, on their seedbed. Another 18.6 percent had insect only, and joint disease and insect infestation occurred on 9.4 percent of seedbeds. Infestation was reportedly highest in Daulatpur (80%) and lowest in Joydevpur (6.6%). The CDC area interestingly had the largest section (86.8%) of non-observing farmers. In most of the thanas these non-observers preponderated and contributed to a very high cumulative total of non-observing farmers, in the study area, who probably do not even visit their seedbeds after sown. This situation is indicative of farmers' non-performance on seedbed care and should make anybody suspicious of a much higher actual infestation.

Table 5.1: Paddy Seed Sources

(Figures in %)

Thana	BADC Godown	Seed Dealer	Open Market	Own Farmer	Neighbour & Others
Dinajpur	18.64	3.39	12.71	44.07	21.19
Rangpur	26.61	7.34	22.02	18.35	25.68
Gouripur	10.17	2.54	22.88	51.69	12.72
Sylhet	37.91	7.19	33.33	5.23	16.34
Natore	6.12	13.27	5.10	70.41	5.10
Ishwardi	16.85	-	16.85	52.81	13.49
Gaibandha	25.21	2.52	20.17	34.34	17.65
Sherpur	1.03	-	7.22	86.60	5.15
Faridpur	8.79	2.20	26.37	40.66	21.98
Daulatpur	4.71	3.52	14.12	60.00	17.65
Begumganj	5.31	4.42	19.47	51.33	19.47
Hathazari	2.97	-	4.95	60.40	31.68
Outside CDC	13.82	4.21	17.56	48.48	15.93
CDC Area	17.69	1.54	17.69	55.38	7.70

Table 5.2: Seed Source Preference

Seed Source	No. of Farmer Giving Reasons for Selecting Sources							
	High Quality	Low Price	Reliable	No Other Way	Available when needed	Easty to get	Total	Score
AETI Thanas-								
BADC Farm/Godown	38	9	17	15	7	-	86	0.12
BADC Seed Dealer	13	6	12	5	3	3	42	0.06
Open Market	58	25	35	50	44	20	232	0.33
Own Farm	226	37	142	130	110	79	724	1.02
Neighbour	33	30	32	24	34	7	160	0.23
Other	11	-	2	4	3	3	13	0.02
CDC Area Joydevpur-								
BADC Farm/Godown	7	1	3	2	-	1	14	0.13
BADC Seed Dealer	1	1	-	-	-	1	3	0.03
Open Market	3	1	4	7	2	3	20	0.19
Own Farm	37	5	14	12	12	-	80	0.75
Neighbour	8	-	1	2	1	-	12	0.11
Other	1	-	-	-	-	-	1	0.01

Table 5.3: Use of Seed Selection Methods

(Figures in %)

Thana	User of Method	Non-User of Method
Dinajpur	84.75	15.25
Rangpur	60.38	39.62
Gouripur	77.78	22.22
Sylhet	87.93	12.07
Natore	50.00	50.00
Ishwardi	62.26	37.74
Gaibandha	94.19	5.81
Sherpur	65.08	34.92
Faridpur	41.67	58.33
Daulatpur	88.33	11.67
Begumganj	96.77	3.23
Hathazari	89.29	10.71
Joydevpur	41.51	58.49
All Thanas	76.23	23.73

Table 5.4: Seed Selection Method Preference

Thana	Water + Urea	Water + Salt	Water Only	Wind Blowing
Dinajpur	26.0	8.0	38.0	28.0
Rangpur	0	0	65.6	34.4
Gouripur	2.4	2.4	47.6	43.0
Sylhet	1.4	0	55.6	43.0
Natore	0	0	78.6	21.4
Ishwardi	2.3	2.3	39.5	55.8
Gaibandha	0	2.8	31.8	65.4
Sherpur	0	0	44.6	55.8
Faridpur	0	0	18.8	81.3
Daulatpur	2.7	0	43.2	54.1
Begumganj	0	0	29.5	70.5
Hathazari	0	0	44.8	55.2
Joydevpur	4.6	6.8	20.5	68.2
All Thana	0.8	0.8	43.2	55.2

Table 5.5: Seedbed Type

(Figures in %)

Thana	Model Size	Big Size	Mixed Sizes
Dinajpur	1.8	64.3	33.9
Rangpur	0	50.0	50.0
Gouripur	1.9	5.7	92.5
Sylhet	32.7	8.2	59.2
Natore	0	16.1	83.9
Ishwardi	0	0	100.0
Gaibandha	4.6	34.1	61.4
Sherpur	0	11.3	88.7
Faridpur	5.9	0	94.1
Daulatpur	10.1	46.0	34.9
Begumganj	1.9	45.2	52.8
Hathazari	12.5	67.9	19.6
Joydevpur	2.1	22.9	75.0
All Thana	7.1	34.3	58.6

Table 5.6: Seedbed Use of Chemicals

(Figures in No. of Household)

Thana	Fertilizer		Pesticide	
	User	Non-User	User	Non-User
Dinajpur	50(84.8)	9(15.2)		59(100.0)
Rangpur	16(30.2)	37(69.8)	9(17.0)	44(83.0)
Gouripur	38(70.4)	16(29.6)	15(27.8)	39(72.2)
Sylhet	15(25.9)	43(74.1)	15(25.9)	43(74.1)
Natore	16(36.4)	28(63.6)	0	44(100.0)
Ishwardi	9(17.0)	44(83.0)	7(13.2)	46(86.8)
Gaibandha	36(41.9)	50(58.1)	9(10.5)	77(89.5)
Sherpur	19(30.2)	44(69.8)	13(20.6)	50(79.4)
Faridpur	6(10.0)	54(90.0)	4(16.7)	56(83.3)
Daulatpur	22(36.7)	38(63.3)	0	60(100.0)
Begumganj	16(25.8)	46(74.2)	0	62(100.0)
Hathazari	29(51.8)	27(48.2)	29(51.8)	27(48.2)
Joydevpur	36(34.0)	70(66.0)	35(33.0)	71(67.0)
All Thana	308(37.8)	506(62.2)	136(16.7)	678(83.3)

Note: Figures in parentheses are percentages.

Table 5.7: Seedling Production with Cowdung/FYM

Thana	Better Seedlings with Cowdung/FYM	
	No. of "Yes" (%)	No. of "No" (%)
Dinajpur	53 (89.8)	66 (10.2)
Rangpur	44 (83.0)	9 (17.0)
Gouripur	52 (56.3)	2 (3.7)
Sylhet	47 (81.0)	11 (19.0)
Natore	32 (72.7)	12 (27.3)
Ishwardi	24 (45.3)	29 (54.7)
Gaibandha	79 (91.9)	7 (8.1)
Sherpur	60 (95.2)	3 (4.8)
Faridpur	8 (13.3)	52 (86.7)
Daulatpur	47 (78.3)	13 (11.7)
Begumganj	15 (24.2)	47 (75.8)
Hathazari	43 (76.8)	13 (23.2)
Joydevpur	16 (15.1)	90 (84.9)
All Thanas	520 (63.9)	294 (36.1)

Table 5.8: Disease and Insect Infestation

(Figures in No. of Household)

Thana	Disease only(a)	Insect only(b)	Disease & Insect (c)	Total a+b+C	No Attack	Did not notice
Dinajpur	5	14	1	20(33.9)	15(25.4)	24(40.7)
Rangpur	4	5	3	12(22.6)	6(11.3)	35(66.1)
Gouripur	1	3	3	7(13.0)	29(53.7)	18(33.3)
Sylhet	-	6	9	15(25.9)	22(37.9)	21(36.2)
Natore	3	6	3	12(27.3)	17(38.6)	15(34.1)
Ishwardi	-	13	1	14(26.4)	13(24.5)	26(49.1)
Gaibandha	2	6	23	31(36.0)	14(16.3)	41(47.7)
Sherpur	-	11	11	22(34.9)	15(23.8)	26(41.3)
Faridpur	1	2	1	4(6.7)	8(13.3)	48(80.0)
Daulatpur	3	42	3	48(80.0)	5(8.3)	5(11.7)
Begumganj	1	24	4	29(46.8)	10(16.1)	23(37.1)
Hathazari	2	18	12	32(57.1)	21(37.5)	3(5.4)
Joydevpur	3	1	3	7(6.6)	7(6.6)	92(86.8)
All Thana	25(3.1)	151(18.6)	77(9.4)	253(31.1)	182(22.4)	379(46.5)

Note: Figures in parentheses are percentages.

CHAPTER VI

CULTURAL PRACTICES AND CROP PROTECTION

6.1 General

In growing crops farmers practise a number of cultural operations, starting right from prepairing their land. Each of these operations, individually as well as collectively with others, exerts a significant influence on the crops' growth and overall field performance, and ultimately contributes to quantum of yields obtained by farmers. Cultural practices as followed by farmers are mostly legacies handed down by ancestors. Most practices have undergone gradual evolutionary process of alterations and modifications resulting largely from pressure of necessity. Some changes however emanated partly from relatively recent motivational efforts of different extension agencies. This chapter will investigate into the present status of major cultural practices at farmer level and also attempt to observe perceptible deviations from standard practices.

6.2 Land Preparation

Cultivation of field crops including rice begins with tillage of land as a fore-cultural operation. Plough and ladder drawn by animals are traditionally used everywhere in the country for this purpose. The ploughing and laddering of soil is important for not only creating favourable soil structures, but also burying and decomposing weeds and crop residues.

Ploughing and laddering was found to vary reasonably among thanas and between seasons (see Table 6.1). Number of ploughings averaged at 8 as maximum for aus in Dinajpur and 3 as minimum for boro in Sylhet and Daulatpur thanas. In the Joydevpur CDC area number of ploughings was found to range between 4-5 in aus, and 5-6 in aman and boro seasons. Highest number of ploughings was given to soil in Dinajpur, among all thanas, where 7 to 8 times ploughing was a general practice in all the three rice cropping seasons. Lowest number of ploughings was applied to Daulatpur soil (3-5 times all-season average).

Traditional bamboo-made ladders are designed almost identically in all thanas. Ploughings are alternately followed by ladderings and both

operations are done in the same fashion. The present study reveals that Dinajpur farmers had lowest ladderings averaging 3,4 and 4-5 in aman, boro and aus seasons (Table 6.1). Number of ladderings was however highest in Joydevpur, averaging 8-9 in aus and aman, and 9-10 in boro season. Individual season-wise analysis shows that aus crop land in Gouripur received most intensive ladderings whose average ranged between 12 to 13 times. Number of ladderings was quite high also in Sylhet for aus growing soil and averaged 9 times for the thana. In the same area, however, ladderings averaged only 2 in boro season, which sounds incredibly low. Such a low number of laddering does not necessarily indicate that soil condition was satisfactory enough for restricting application of ladder, but rather reflects a general under-rating of an essential operation among the sample farmers.

In an attempt to compare between the ideal and actual ploughing depths, the study area farmers were asked to indicate their own estimate of depth at which their ploughs penetrated. Table 6.2 summarizes thana-wise responses of farmers. It is found that most of the farmers in 5 thanas including Joydevpur, Dinajpur, Rangpur, Gouripur and Sylhet had ploughing close to the recommended depth of 15 cm (about 6 inches). The deepest ploughing was applied in Faridpur, estimated to be 9 inches in average. In other thanas ploughing depths varied narrowly around the optimum level. The encounter, during survey, of a sizeable number of farmers unable to give any estimate of ploughing depth renders the above inferences subject to certain amount of ambiguity. In the CDC area more than one third of the farmers could not estimate depth (Table 6.2). Other thanas where such a large segment of rice farmers found unable to measure depth are Gouripur, Begumganj, Rangpur, Faridpur, Dinajpur and Daulatpur.

6.3 Implement and Equipment Use

Traditional nature of farming in the study area is characterized by a preponderant use of farm implement and equipment of indigenous origin. All farm operations and cultural practices, except irrigation of boro rice, have undergone little changes in utilization of modern implements. Among land tilling implements, use of wooden plough and ladder was universal, and that of rake and spade was widespread. All these implements barring spade are animal-drawn. Use of ploughs with metal moldboard attachment was rare due to its heavy weight and high cost factors. Use

of power-drawn tractor was reported in a very small number by farmers of Rangpur and Ishwardi. Power tiller was used by only one respondent in Rangpur thana.

Among weeding equipment, hand weeder (nirani) was used by more than 80 percent farmers in most of thanas (Table 6.3). The mechanical weeder was in use in a limited number in eight thanas, among which Sylhet had largest and Joydevpur had lowest number of users.

Among irrigation devices, indigenous done and sheuti were most commonly used and bucket also enjoyed a wide acceptance among small farms (Table 6.3). Deep tubewell users were largest (48%) in Joydevpur and nil in Gouripur, Sylhet, Daulatpur and Bengumganj. Power pumps had the highest proportion of users in Hathazari (26.8%) and no user in Dinajpur, Gouripur, Daulatpur and Sherpur, the last-mentioned thana had the highest 14.3 percent shallow tubewell water users. Bamboo tubewell was found to be gaining a gradual acceptance, noticeably in Gaibandha.

Sprayer users, numerically small everywhere, were dominated by hand sprayer users (Table 6.3). Use of seed drill was almost unencountered in the study area.

6.4 Planting Practices

Various practices associated with planting of rice for having significant impact on plant growth and crop yield were subjected to intensive observations during the present study.

6.4.1 Age of Seedlings

Farmers' responses to queries on seedling transplanting time reveal a general propensity of farmers to use overaged seedlings in most of the areas (Table 6.4). In case of transplanted aus crop more than half of the farmers transplanted seedlings of 26-30 day age. All farmers of Daulatpur planted seedlings of this age. In the CDC area about 62 percent had this practice. More than half of aus growers in Rangpur, Natore, Ishwardi, Gaibandha, Faridpur and Begumganj used seedlings of still older age (31-35 days). Aus farmers transplanting seedling at 21-25 days were the majority (55%) in only one thana, i.e. Sylhet.

In aman farms, the major portion of growers used 31-35 day aged seedlings (Table 6.4), with the highest proportion in Gaibandha (89.7%), closely followed by the CDC area (89.3%). The 26-30 day old seedlings were planted by the majority in only Dinajpur, Sylhet and Natore and by the minority in all other thanas.

Boro farms were classified into 5 groups, on the basis of planting time, into 30, 31-35, 36-40, 41-45 and 45+ age group and the classification showed completely different modes of clustering of farms in different thanas (Table 6.4). Joydevpur is the only thana where majority of farmers (58.5%) planted over 45-day seedlings, whereas Rangpur is the only area where half of the farmers used one-month old boro seedlings. Four thanas Dinajpur, Sylhet, Natore and Faridpur used 31-35 day-old seedlings most extensively. The 36-40 day old seedling transplantation was not a major practice anywhere, but 41-45 day old seedlings were planted by the majority in Gouripur and Daulatpur and by a good proportion in Ishwardi and Faridpur.

Even though most of the CDC area farmers planted the oldest seedlings, interestingly they perceived their timing as proper (Table 6.5). All-thana average also shows that about 64 percent farmer's response was affirmative when they were asked if they considered their seedlings (aus, aman and boro) transplanted at ideal age. This proves that most of the farmers are unaware of relevant recommendations.

6.4.2 Type of Planting

Random seedling transplantation was observed to be the general practice over the line planting method. Adopters of random planting as the singular method in 1981-82 were the majority in all thanas except only in Natore (Table 6.6). The random planters were largest in proportion in Gouripur (86.3%), followed by Dinajpur (83%). In Natore, line planters constituted about 41 percent and represented about one third in Gaibandha, Sherpur, Hathazari and Joydevpur.

About 10 percent of the study area farmers used both methods in the same year. This category is represented by 15 percent in the CDC are and Faridpur thana. Only three other areas had larger segments of double-method users, viz. Natore, Ishwardi and Sherpur having 29.5

percent, 22.1 percent and 17.4 percent respectively. Rangpur and Hathazari had no farmer planting by both methods.

6.4.3 Seedling Density in Hill

Even though the recommended number of seedling per hill is 2-3 for the transplanted aus, aman and boro crops, farmers' actual practice is observed to vary widely from one area to another. In the CDC area, where adoption of this cultural practice in the recommended manner ought to have been most extensive, farmers' field practice showed an extensive wastage of seedlings by means of using high seedling density per hill (Table 6.7). In fact adoption of the recommended seedling density was lowest nowhere but in the CDC area. In any other thana away from CERDI, BRRI, BARI (all located in Joydevpur), farmers' on-farm practice was found more consistent with the ideal practice. Thanas where a large-scale adoption of ideal density was observed are Ishwardi, Gouripur, Sylhet, Daulatpur, Sherpur and Hathazari. Contrarily, use of 5 to 6 seedlings was a major practice in Gaibandha and Begumganj.

6.4.4 Plant Population Density

For transplanted rice growing the optimum plant spacings are generally 20x15 sq.cm.(8x6 sq.in.) for aman and boro plants. But field data collected during the survey indicate most of the farmers' propensity towards planting in higher density (Table 6.8). This has exposed a general ignorance about the tendency of rice varieties to adjust available field space by means of tiller production. Only 12, 18 and 12 percent of aus, aman and boro farms respectively had the optimum plant to plant distance. A distance of 4 to 5 inches between plants was almost universal.

On the other hand, the recommended row to row distance in aus, aman and boro farms was maintained by only 6.3, 10.9 and 11.4 percent farmers respectively (Table 6.8). On nearly half of the transplanted farms rows were only 5-6 inches apart. Since the prevalent inter-cultural operations are not mechanized, but rather hand-operated and labour-intensive in the study area, the practised spacing of rows cannot be considered inadequate.

6.5 Weed Control and Methods

Weed for their own survival compete and share nutruents with crops, harbour other pests and ultimately affect yields. Farmers, in the study area, from their experience were found aware of the menace of weeds and reported to have been carrying out weedings in their farms (Table 6.9). Only a small proportion refrained from weeding operation.

Average number of weedings in aman ranged from once in Dinajpur to more than twice Daulatpur (Table 6.9). Inter-thana weeding data show a similar range in case of boro crops also, but the average was found minimum in Sylhet and maximum in Natore. Number of weeding on Rangpur aus farms averaged at three, which was the study area maximum during the survey period, while aus farms received minimum weeding in Sylhet.

No single instance of weedicide application was reported from the sampled respondents. Table 6.9 indicates that prevalent weed control methods were weedings by hand and by nirani, an indigenous implement made of iron. Mechanical weeder use was a rarer practice. Survey data reveal that most of the farmers used both hand and nirani for weeding purpose. Nirani use was found to have a slight edge over the use of hand in the study area (72% and 66%). Both these methods were very extensively used in a simultaneous manner in the CDC area, Daulatpur, Sherpur, Gaibandha and Gouripur. Use of nirani was found not at all popular in Sylhet where mechanical weeder has obtained some acceptance, of late. Among other areas, Hathazari, and Begumganji also had a very large number of non-users of nirani.

6.6 Pests Control Practices

Protection from the onslaught of pests is considered an important operational necessity of rice crops by farmers. The general control measures adopted at farm level are of curative nature. Preventive measures have yet to gain desired acceptance. Use of curative methods is associated with chemical control of rice pests. The chemical control by pesticides has been widely adopted in the country due to its less complexity in application and clearer visibility of results. In the study area it was observed that pesticide application by farmers for insect control was more frequent than for disease control (Table 6.10). This does not however indicate a higher infestation of insects than diseases, but rather

reflects farmers' greater vigilance in respect of combating insects resulting from their perception of insect as a deadlier enemy.

In general aus crop was subject to more frequent insecticide treatment than the other two rice crops. Highest application was 3 times in average in Gouripur, closely followed by Dinajpur (Table 6.10). In Ishwardi only aus farms received insecticide treatment whereas in Begumganj, the only treated crop was boro. As regards disease also, it was observed that aus crop as subject to more frequent control measures in terms of fungicide application. Gouripur farmers were found to have highest number of fungicide application (3 times) both in aus and aman seasons (Table 6.10). Interestingly in five thanas no fungicide was applied on boro crop.

Table 6.11 indicates that a sizeable proportion of farmers did not spray any pesticide on their rice crops, in other words, did not use any spraying device as well. In the whole study area they constituted 42.3 percent and CDC area considered alone had 31.1 percent. The device non-users totalled more than two-third farmers in Gouripur and a little less in Ishwardi (62.3%), Rangpur (62.3%) and Faridpur (61.7%). Other areas where non-spraying farmers formed the major segment included Daulatpur (58.3%) and Sherpur (52.8%). Contrarily, 89 percent of Hathazari farmers used one or the other spraying method. Frequency or magnitude of use was not considered for user enumeration. A farmer spraying any of his crops even once in the survey year was credited as a user.

Sixty percent of pesticide users (or 35% of all farmers) used indigenous devices for spraying purpose. These devices were locally made. Brooms made of different materials, varying in design, size and shape constituted the bulk of the indigenous devices. Sprayer users constituted about 39 percent of pesticide using (or 22.4% of all) farmers. Power sprayer use, though sporadic, was reported in only two thanas, namely Gaibandha, and Begumganj. Hand sprayer users were outnumbered by indigenous device users everywhere except Gouripur, Natore and Gaibandha where a reverse situation existed. Sprayers were not in use in Rangpur, Ishwardi, Sherpur and Daulatpur where pesticide was sprayed only with indigenous devices. Hand sprayer use among pesticide users was most intensive in Natore (88%), followed by Gaibandha (72.3%). In Gouripur two-third of pesticide users used hand sprayers. In other areas hand sprayer uses was

much lower. Notable low use was reported from Sylhet (24.4%) and Hathazari 28%). All the sprayer users were not necessarily possessors. Bulk of these users were in fact borrowers from possessors. Thana-wise sprayer possession was shown before in Table 3.8 (Chapter III).

Most of the non-spraying farmers complained about high prices of pesticides and their inability to afford them. The second most important reason behind non-spraying was the want of any kind of spraying device, especially hand sprayers in which farmers had more explicit interests. Some farmers had reportedly stopped applying pesticides due to widespread adulteration rendering them hardly effective against any rice pest.

6.7 Advisory Service on Pest Control

In the study area as a whole, neighbours were the most contacted source for advice on pests identification and control. Table 6.12 shows that 62 percent relied on this source. The second source of advice was Union Agricultural Assistants, who advised 59.1 percent farmers. The other used sources, in order of farmer's preference, were radio/television, contact farmer, Thana Agricultural/Extension Officer (TAO/TEO) and printed material. Nearly half of the farmers indicated to have received advice from radio/television and contact farmer. Printed material was scarcely used due to illiteracy of farmers. One unexpected revelation was that 70 percent of the study area farmers never contacted TAO/TEO for advice on pest control. TAO/TEO's role as past control advice source was critically low in the CDC area and in Begumganj, where non-contacting farmers represent 94.3 and 98.4 percent respectively. In only one thana (Dinajpur), TEO's performance was worth reckoning.

Neighbour was the most used source everywhere, except in Daulatpur and Dinajpur where four other sources superseded it; in Natore and Begumganj, where UAA superseded; and Rangpur where UAA and radio-TV superseded. UAA was reportedly the most used source in 4 thanas and the second most used source in most of the other thanas. Per survey information, except only in Daulatpur TEO superseded UAA, in all thanas UAA overshadowed and forced TEO to the ignominious point of diminution. These data are liable to raise eyebrows as TEO's higher education and training are remaining largely unutilized. One may also suspect a certain degree of over-magnification of UAAs' role in rendering advisory service since the present survey was conducted by them.

The computed all source-use score (ASS) was found highest (4.98) in Sylhet. Other areas with high ASS were Dinajpur (4.80) and Gaibandha (4.70). ASS on pest control was in the most deporable state in the CDC area (2.03) and calls for further investigation.

The computed source use score (SUS) was highest for both UAA and TEO in Dinajpur, for both contact farmer and neighbour in Sylhet, for printed material in Faridpur and for radio/television in Sherpur.

6.8 Rodent Attack

Rat was mentioned the most destructive rodent in the study area and causing damages before harvest in the rice field and also after harvest in storage. Only about 17 percent farmers affirmed that their rice crops and harvests remained free from rodent attack in the survey year (Table 6.13). Some 70 percent farmers detected rodent attack on their paddy field. About 40 percent farmers' storage bins were under ravage by rats. CDC area averages are fairly close to that of all-thana data. About 27 percent overlap among the above respondent categories suggests an existence of another category of respondents who suffered rodent attack both on the paddy field and in the storage bins. This overlap, being 55 percent, was most noticeable in Dinajpur. Sylhet farms were barely attacked by rats. The rat problem was most serious in field in Dinajpur (91.5%) and in bins in Gouripur (64.8%). Field data were not collected on rodent control practices since it was beyond the scope of present study. But the aggravating nature of the problem justifies its claim for a more elaborate treatment in further research.

Table 6.1: Ploughing and Laddering

Thana	Drop	Av. No. of Ploughing	Av. No. of Laddering
Dinajpur	Aus	8.00	4.47
	Aman	7.10	3.00
	Boro	7.99	4.00
Rangpur	Aus	5.93	8.00
	Aman	5.00	5.25
	Boro	6.50	7.25
Gouripur	Aus	6.39	12.50
	Aman	6.58	8.41
	Boro	3.33	5.00
Sylhet	Aus	5.50	9.00
	Aman	6.00	7.00
	Boro	3.00	2.00
Natore	Aus	5.10	6.70
	Aman	5.30	6.70
	Boro	4.00	4.60
Ishwardi	Aus	5.03	6.51
	Aman	4.34	6.72
	Boro	4.52	6.82
Gaibandha	Aus	6.00	6.00
	Aman	5.00	7.00
	Boro	5.00	4.00
Sherpur	Aus	6.00	6.00
	Aman	6.00	5.00
	Boro	4.00	4.00
Faridpur	Aus	7.50	7.00
	Aman	6.50	6.00
	Boro	4.50	3.50
Daulatpur	Aus	4.86	5.63
	Aman	4.41	5.24
	Boro	3.00	3.00
Begumganj	Aus	5.00	5.00
	Aman	6.00	6.00
	Boro	4.00	3.00
Hathazari	Aus	6.00	5.00
	Aman	5.00	4.00
	Boro	4.00	3.00
Joydevpur	Aus	4.86	8.39
	Aman	5.33	8.99
	Boro	5.23	9.53

Table 6.2: Ploughing Depth

Thana	Range of Depth (Inch)	Average Depth (Inch)	No. (%) of Farmers could not estimate depth
Dinajpur	5 - 6.5	5.79	17 (28.81)
Rangpur	5.5 - 6.5	6.00	18 (33.96)
Gouripur	5.5 - 6.5	6.00	23 (42.59)
Sylhet	4.25- 7	6.00	6 (10.34)
Natore	4 - 6	5.17	8 (18.18)
Ishwardi	4.5 - 5	5.03	11 (20.93)
Gaibandha	4 - 5	4.60	18 (20.93)
Sherpur	4.5 - 6	5.34	14 (22.22)
Faridpur	6 - 10	9.00	19 (31.67)
Daulatpur	5 - 7	6.50	14 (23.33)
Begumganj	4.5 - 5.5	5.00	23 (37.10)
Hathazari	5 - 7.5	6.86	1 (1.79)
Joydevpur	5 - 6.5	6.00	37 (34.91)

Table 6.3: Farm Implement Use

(% of Households)

Implement	Dinaj-pur	Rang-pur	Gouri-pur	Sylhet	Natore	Ish-wardi	Gai-bandha
Indigenous							
Wooden Plough	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Moldboard Plough	0	1.9	0	1.7	0	0	1.2
Rake	93.2	86.8	57.4	15.5	79.6	96.3	91.9
Ladder	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Spade	91.5	88.7	96.3	86.2	88.6	98.1	75.6
Done/Sheuti	72.9	43.4	22.2	79.3	34.1	35.9	75.6
Sickle	88.1	88.7	90.7	98.3	95.5	94.4	96.5
Weeder	86.4	86.8	63.0	22.4	95.5	98.1	98.8
Bucket	64.4	69.8	72.2	46.6	56.8	47.2	62.8
Bamboo Tubewell	11.9	1.9	3.7	5.2	4.6	7.6	23.3
Other	0	0	5.6	1.7	0	0	0
Modern							
Tractor	0	1.9	0	0	0	1.9	0
Power Tiller	0	0	0	0	0	1.9	0
Weeder	1.7	1.9	5.6	15.5	0	1.9	8.1
Power Pump	0	7.6	0	1.7	6.8	7.6	2.3
DTW	17.0	18.9	0	0	9.1	13.2	7.0
STW	10.2	0	0	0	2.3	5.7	4.7
Hand Sprayer	0	5.7	7.4	6.9	11.4	22.6	12.8
Power Sprayer	1.7	1.9	0	0	0	1.9	1.2
Seed Drill	0	0	0	0	0	1.9	2.3
Other	0	0	1.9	1.7	0	5.7	1.2

Table 6.3: Farm Implement Use

(% of Household)

Implement	Sher-pur	Farid-pur	Daulat-pur	Begum-ganj	Hat-hazari	Joy-devpur
Indigenous						
Wooden Plough	100.0	100.0	100.0	100.0	100.0	100.0
Moldboard Plough	0	0	0	1.6	46.4	0
Rake	77.8	77.0	96.7	51.6	17.5	50.0
Ladder	100.0	100.0	100.0	100.0	100.0	100.0
Spade	95.2	90.2	98.3	90.3	98.2	90.6
Done/Sheuti	68.3	1.6	8.3	75.8	80.4	34.9
Sickle	95.2	90.1	91.7	87.1	86.4	90.8
Weeder	95.2	90.1	71.7	67.7	21.4	84.0
Bucket	36.5	9.8	48.3	63.0	76.8	30.0
Bamboo Tubewell	1.8	0	3.3	11.3	0	0.9
Other	0	1.6	1.6	1.6	9.0	0
Modern						
Tractor	0	0	0	0	0	0
Power Tiller	0	0	0	0	0	0
Weeder	4.8	0	0	0	0	0.9
Power Pump	0	3.3	0	11.3	26.8	7.6
DTW	22.2	3.3	0	0	1.8	48.1
STW	14.3	6.7	0	0	1.8	0
Hand Sprayer	1.6	6.6	0	4.9	9.0	1.0
Power Sprayer	0	0	0	0	0	2.8
Seed Drill	0	0	0	0	0	0
Other	1.6	0	0	0	0	0

Table 6.4: Age of Seedlings at Transplanting Time

(Figures in %)

Age of Seedling	Dinajpur	Rangpur	Gouripur	Sylhet	Natore
Aus:-					
20 days	3.33	-	3.70	3.92	-
21-25 "	26.67	-	25.93	54.90	-
26-30 "	56.67	35.29	48.15	33.33	40.00
31-35 "	13.33	64.71	22.22	7.85	60.00
Aman:-					
20 days	-	-	-	-	-
21-25 "	11.54	-	-	5.18	-
26-30 "	57.69	13.21	32.79	51.72	53.85
31-35 "	33.77	86.79	67.21	43.10	46.15
Boro:-					
30 days	20.00	50.00	12.50	8.33	25.00
31-35 "	60.00	-	12.50	66.67	50.00
36-40 "	-	25.00	-	16.67	-
41-45 "	20.00	-	62.50	8.33	-
46+ "	-	25.00	12.50	-	25.00

Table 6.4: Age of Seedlings at Transplanting Time

(Figures in %)

Age of Seedling	Ishwardi	Gaibandha	Sherpur	Faridpur
Aus:-				
20 days	-	5.26	7.69	-
21-25 "	8.33	10.53	11.55	-
26-30 "	41.67	31.58	36.53	14.29
31-35 "	50.00	52.63	44.23	85.71
Aman:-				
20 days	-	-	3.90	-
21-25 "	3.57	1.15	7.79	-
26-30 "	46.42	9.20	16.88	18.18
31-35 "	50.01	89.65	71.43	81.82
Boro:-				
30 days	5.26	37.04	20.00	-
31-35 "	31.58	40.74	31.42	50.00
36-40 "	26.32	-	24.29	16.67
41-45 "	31.58	3.70	12.86	33.33
46+ "	5.26	18.52	11.43	-

Table 6.4: Age of Seedlings at Transplanting Time

(Figures in %)

Age of Seedling	Daulatpur	Begumganj	Hathazari	Joydevpur
Aus:-				
20 days	-	16.66	-	-
21-25 "	-	-	23.08	26.76
26-30 "	100.00	16.67	57.69	61.97
31-35 "	-	66.67	19.23	11.27
Aman:-				
20 days	-	-	-	-
21-25 "	5.56	3.12	-	11.90
26-30 "	37.04	21.88	37.50	9.52
31-35 "	57.40	75.00	62.50	89.28
Boro:-				
30 days	-	38.60	21.06	7.69
31-35 "	33.33	33.33	39.47	6.15
36-40 "	16.67	5.26	15.79	9.24
41-45 "	50.00	7.02	7.89	18.46
46+ "	-	15.79	15.79	58.46

Table 6.5: Rice Planting Time Farmer's Perception

Thana	Transplanted in Time	
	Yes	No
Dinajpur	47 (79.7)	12 (20.3)
Rangpur	43 (81.1)	10 (18.9)
Gouripur	50 (92.6)	4 (7.4)
Sylhet	53 (91.4)	5 (8.6)
Natore	31 (70.5)	13 (29.5)
Ishwardi	27 (50.9)	26 (49.1)
Gaibandha	65 (75.6)	21 (24.4)
Sherpur	48 (76.2)	15 (23.8)
Faridpur	15 (25.0)	45 (75.0)
Daulatpur	46 (76.7)	14 (23.3)
Begumganj	43 (69.4)	19 (30.6)
Hathazari	50 (89.3)	6 (10.7)
Joydevpur	90 (84.9)	16 (15.1)
All Thana	518 (63.6)	190 (36.4)

Note: Figures in parentheses are percentages.

Table 6.6: Rice Planting Methods

(Figures in %)

Thana	Line Planting	Random Planting	Line + Random Planting
Dinajpur	11.86	83.05	5.09
Rangpur	28.30	71.70	0
Gouripur	10.82	86.30	2.88
Sylhet	20.00	71.38	8.62
Natore	40.91	29.55	29.54
Ishwardi	20.75	57.17	22.08
Gaibandha	32.56	62.94	4.50
Sherpur	31.83	50.79	17.38
Faridpur	21.67	63.33	15.00
Daulatpur	26.67	64.57	8.76
Begumganj	20.59	77.41	2.00
Hathazari	33.00	66.00	0
Joydevpur	33.77	51.23	15.00
All Thana	25.36	64.75	9.89

Table 6.7: Seedlings Per Hill

(% of Households)

Thana	Number of Seedlings				
	2	3	4	5	6
Dinajpur	6.78	18.64	50.85	20.34	3.39
	25.42				
Rangpur	6.50	16.74	51.94	17.91	6.91
	23.24				
Gouripur	42.00	20.00	38.00	0	0
	62.00				
Sylhet	0	56.36	41.82	1.82	0
	56.36				
Natore	0	25.00	50.00	16.67	8.33
	25.00				
Ishwardi	18.86	50.94	26.98	1.89	1.33
	69.80				
Gaibandha	4.11	12.33	27.40	41.10	16.44
	16.44				
Sherpur	0	53.97	30.16	15.87	0
	53.97				
Faridpur	4.17	33.33	41.67	20.83	0
	37.50				
Daulatpur	3.33	50.67	29.33	16.67	0
	54.00				
Begumganj	0	12.64	18.39	29.89	39.08
	12.64				
Hathazari	8.70	32.61	28.26	30.43	0
	41.31				
Joydevpur	0	10.38	53.01	34.53	2.08
	10.38				

Table 6.8: Planting Depth and Density

(Figures in %)

Item	Aus	Aman	Boro
Planting Depth -			
1" - 1 1/2"	4.5	2.6	0
1 1/2" - 2"	13.6	15.5	13.8
2" - 2 1/2"	37.4	33.0	24.5
2 1/2" - 3"	28.2	35.7	44.1
Over 3"	16.3	13.2	17.6
Plant to Plant -			
3"	14.6	6.3	10.7
4"	22.8	26.4	31.5
5"	50.7	49.1	45.7
6"	11.9	18.2	12.1
Row to Row -			
4" - 5"	28.2	17.7	5.9
5" - 6"	46.7	52.1	40.1
6" - 8"	18.8	23.5	42.6
8" - 10"	6.3	10.9	11.4

Table 6.9: Weed Control

Thana	Weeding Done		Av. No. of Weeding			Weed Controlled By		
	Yes (%)	No (%)	Aus	Aman	Boro	Hand	Nirani	Weeder
Dinajpur	59 (100)	0	2.00	1.00	2.00	33 (55.9)	51 (86.4)	1 (1.7)
Rangpur	43 (81.1)	10 (18.9)	3.00	1.30	2.50	30 (56.7)	42 (79.2)	0
Gouripur	54 (100)	0	2.00	1.50	1.50	33 (61.1)	52 (96.3)	2 (3.7)
Natore	26 (59.1)	18 (40.9)	2.25	2.20	2.60	7 (15.9)	22 (55.0)	1 (2.3)
Sylhet	52 (89.7)	6 (10.3)	1.50	2.00	1.00	42 (72.4)	5 (8.6)	7 (12.0)
Ishwardi	51 (96.2)	2 (3.8)	2.50	1.50	2.30	22 (41.5)	51 (96.2)	1 (1.9)
Gaibandha	85 (98.8)	1 (1.2)	2.75	1.75	2.00	53 (61.6)	79 (91.9)	7 (8.1)
Sherpur	59 (93.7)	4 (6.3)	2.50	2.00	1.80	58 (92.0)	60 (95.2)	1 (1.6)
Begumganj	57 (91.9)	5 (8.1)	2.00	2.00	2.50	51 (82.2)	17 (27.4)	1 (1.6)
Hathazari	55 (98.0)	1 (2.0)	1.55	1.57	2.17	54 (96.4)	8 (14.3)	0
Faridpur	55 (91.7)	5 (8.3)	2.50	2.25	2.30	5 (8.3)	57 (95.0)	0
Daulatpur	60 (100)	0	2.41	2.46	1.80	55 (91.7)	53 (88.3)	0
Joydevpur	105 (99.1)	1 (0.9)	1.75	1.50	2.00	95 (89.6)	89 (84.0)	3 (2.3)
All Thana	761 (93.5)	53 (6.5)				538 (66.1)	586 (72.0)	24 (2.9)

Note: Figures in parentheses are percentages.

Table 6.10: Pesticide Application Frequency

(Figures in No./Household)

Thana	Insect Control			Disease Control		
	Aus	Aman	Boro	Aus	Aman	Boro
Dinajpur	2.59	1.86	1.00	2.00	1.80	-
Rangpur	2.00	1.60	2.00	1.00	-	-
Gouripur	3.00	2.00	1.00	3.00	3.00	-
Sylhet	1.50	1.00	-	2.00	1.00	-
Natore	2.50	3.00	2.00	-	-	1.00
Ishwardi	2.00	-	-	2.00	2.00	2.50
Gaibandha	1.28	1.34	1.77	-	1.25	2.00
Sherpur	2.50	2.00	2.00	-	-	-
Faridpur	2.00	1.80	2.25	2.00	1.85	1.50
Daulatpur	2.00	1.80	1.50	2.00	2.00	2.25
Begumganj	-	-	1.60	1.33	1.33	2.25
Hathazari	2.00	2.00	2.25	2.00	2.00	2.25
Joydevpur	1.50	1.50	2.00	1.33	1.33	1.25

Table 6.11: Spraying Method Use

(Figures in %)

Thana	Hand Sprayer	Power Sprayer	Indigenous Device	User Total	Non-User
Dinajpur	25.4(37.5)	0	42.4 (62.5)	67.8	32.2
Rangpur	0	0	37.7(100.0)	37.7	62.3
Gouripur	22.2(66.7)	0	11.1 (33.3)	33.3	66.7
Natore	50.0(88.0)	0	6.8 (12.0)	56.8	43.2
Sylhet	17.3(24.4)	0	53.4 (75.6)	70.7	29.3
Ishwardi	0	0	37.7(100.0)	37.7	62.3
Gaibandha	54.7(72.3)	2.3(3.1)	18.6 (27.7)	75.6	24.4
Sherpur	0	0	47.6 (69.8)	47.6	52.8
Begumganj	29.0(45.0)	3.2(5.0)	32.3 (50.0)	64.5	35.5
Hathazari	25.0(28.0)	0	64.3 (72.0)	89.3	10.7
Faridpur	15.0(39.1)	0	23.3 (60.9)	38.3	61.7
Daulatpur	0	0	41.7 (65.8)	41.7	58.3
Joydevpur	34.9(50.7)	0	34.0 (49.3)	68.9	31.1
All Thana	22.4(39.1)	.005(.009)	35.1 (60.0)	57.7	42.3

Note: Figures in parentheses are percentages of user households.

Table 6.12: Source of Advice on Pest Control

Source of Advice	Source User Category	Dinajpur	Rangpur	Gouripur	Sylhet
TAO/TEO	A	16(27.1)	38(71.7)	45(83.3)	33(56.9)
	B	43(.73)	22.42)	12(.22)	28(.63)
UAA	A	6(10.2)	20(37.7)	31(57.4)	22(37.9)
	B	85(1.44)	51(.96)	28(.52)	48(1.09)
Contact Farmer	A	24(40.7)	36(67.9)	30(55.6)	22(37.9)
	B	45(.76)	21(.40)	29(.54)	46(1.05)
Neighbour	A	26(44.1)	29(54.7)	13(24.1)	9(15.5)
	B	43(.73)	32(.60)	53(.98)	68(1.55)
Radio/TV	A	24(40.7)	27(50.9)	29(53.7)	34(58.6)
	B	36(.61)	32(.60)	32(.59)	24(.55)
Printed Material	A	42(71.2)	47(88.7)	45(83.3)	55(94.8)
	B	17(.29)	7(.13)	9(.17)	3(.07)
Others	A	46(78.0)	52(98.1)	54(100)	56(96.6)
	B	14(.24)	1(.02)	0	2(.05)
Total (Av. Score)	B	283(4.80)	166(3.13)	163(3.02)	219(4.98)

Note: A = No. of farmers not using source.

B = Farmers' source use score.

Figures in parentheses under A are percentage of household without contact.

Figures in parentheses under B are average source use scores.

Table 6.12: Source of Advice on Pest Control

Source of Advice	Source User Category	Natore	Gaibandha	Sherpur	Daulatpur	Ishwardi
TAO/TEO	A	35(79.5)	57(66.3)	33(52.4)	31(51.7)	45(84.9)
	B	13(.29)	32(.37)	36(.57)	33(.55)	9(.17)
UAA	A	21(47.7)	13(15.1)	9(14.3)	35(58.3)	15(28.3)
	B	43(.98)	92(1.07)	81(1.29)	28(.47)	62(1.17)
Contact Farmer	A	27(61.4)	18(20.9)	34(54.0)	40(66.7)	32(60.4)
	B	18(.41)	83(.97)	29(.46)	22(.37)	23(.43)
Neighbour	A	25(56.8)	12(14.0)	12(19.0)	41(68.3)	25(47.2)
	B	21(.48)	100(1.16)	55(.87)	22(.37)	28(.52)
Radio/TV	A	20(45.5)	35(40.7)	24(38.1)	36(60.0)	37(69.8)
	B	26(59)	53(.62)	40(.63)	28(.47)	16(.30)
Printed Material	A	39(88.6)	68(79.1)	49(77.8)	43(71.7)	53(100)
	B	5(.11)	19(.22)	15(.23)	19(.32)	0
Others	A	43(97.7)	64(74.4)	57(90.4)	57(95.0)	53(100)
	B	1(.02)	25(.29)	17(.11)	4(.07)	0
Total (Av. Score)	B	127(2.89)	404(4.70)	263(4.17)	156(2.60)	138(2.60)

Note: A = No. of farmers not using source.

B = Farmers' source use score.

Figures in parentheses under A are percentage of household without contact.

Figures in parentheses under B are average source use scores.

Table 6.12: Source of Advice on Pest Control

Source of Advice	Source User Category	Begumganj	Faridpur	Hathazari	Joydevpur	All Thana
TAO/TEO	A	61(98.4)	28(46.7)	48(85.7)	100(94.3)	(70.0)
	B	2(.03)	34(.57)	9(.16)	8(.08)	
UAA	A	22(35.5)	35(58.3)	26(46.4)	78(7 .6)	(40.9)
	B	54(.87)	30(.50)	35(.63)	40(.63)	
Contact Farmer	A	28(45.2)	23(38.3)	30(53.6)	89(84.0)	(53.2)
	B	37(.60)	44(.73)	35(.63)	24(.23)	
Neighbour	A	24(38.7)	30(50.0)	14(25.0)	49(46.2)	(38.0)
	B	46(.74)	33(.55)	53(.95)	64(.60)	
Radio/TV	A	44(71.0)	32(53.3)	35(62.5)	50(47.2)	(52.5)
	B	18(.29)	31(.52)	24(.43)	62(.58)	
Printed Material	A	51(82.3)	36(60.0)	53(94.6)	96(90.6)	(83.2)
	B	11(.18)	30(.50)	4(.07)	14(.13)	
Others	A	57(91.9)	45(75.0)	56(100)	103(97.2)	(91.3)
	B	5(.08)	18(.30)	0	3(.03)	
Total (Av. Score)	B	173(2.79)	220(3.67)	160(2.88)	215(2.03)	

Note: A = No. of farmers not using source.

B = Farmers' source use score.

Figures in parentheses under A are percentage of household without contact.

Figures in parentheses under B are average source use scores.

Table 6.13: Rodent Attack

(Figures in No. of Households)

Thana	In Paddy Field	In Storage	Nowhere
Dinajpur	54 (91.5)	37 (62.7)	1 (1.7)
Rangpur	55 (66.0)	16 (30.1)	16 (30.2)
Gouripur	46 (85.2)	25 (64.8)	1 (1.9)
Natore	32 (42.7)	12 (27.3)	7 (15.9)
Sylhet	5 (8.6)	2 (3.4)	51 (87.9)
Ishwardi	37 (69.8)	31 (58.5)	6 (11.3)
Raibandha	75 (87.2)	38 (44.1)	0
Sherpur	55 (87.3)	14 (22.2)	1 (1.6)
Begumganj	45 (72.6)	32 (51.6)	5 (8.1)
Hathazari	35 (62.5)	15 (26.8)	10 (17.9)
Faridpur	37 (61.7)	19 (31.7)	10 (16.7)
Daulatpur	22 (36.7)	35 (58.3)	14 (23.3)
Joydevpur	69 (65.1)	41 (38.7)	20 (18.9)
All Thana	567 (69.7)	327 (40.2)	142 (17.4)

Note: Figures in parentheses are percentages.

CHAPTER VII

FERTILIZER MANAGEMENT AND NUTRIENT DEFICIENCY

7.1 General

The "green revolution", initiated in the sixties, brought in a new package of input-intensive technological innovation including an intensive use of fertilizer. Fertilizer is the second most important component, of the package, only next to the HYV seed. The new varieties' response to chemical fertilizer considerably accelerated, inter alia, the use of fertilizer among farmers and thus created a new fertilizer management system. This chapter will principally deal with farmlevel management of fertilizer, and will as well examine sulphur and zinc deficiency status in the study area farmers' paddy land.

7.2 Fertilizer Use Adoption

Findings of the present study confirmed that fertilizer use on farmers' field started accelerating on introduction of the HYV seed technology in the country some sixteen years back (Table 7.1). Innovator farmers who almost instantaneously adopted the HYV rice cultivation also accepted fertilizer use as an essential practice associated with HYV farming. Other farmers, who passed through various stages of adoption in a slower pace and also who were constrained by personal or farm factors, adopted later. Table 7.1 shows that highest adoption of Urea and TSP occurred in the 1968-72 period (11-15 year ago) and of MP in the 1973-77 period (6-10 years ago). The adoption process has somewhat slowed afterwards. By 1981-82 (survey year), about three-fourth farmers adopted urea in the entire study area, 61 percent adopted TSP and 47 percent MP.

Thana-wise analysis indicates that the CDC area upto 1981-82 and 87 percent urea, 81 percent TSP and 64 percent MP adopters. Four other than as, Hathazari, Ishwardi, Sherpur and Dinajpur hand higher proportion of urea adopters. In case of TSP, however, only Hathazari superseded Joydevpur. But Joydevpur had the highest proportion of MP adopters, a feat equalled by Hathazari only. Field data on urea adopters within or beyond 16-20 years are suspected to have included other nitrogenous fertilizer (ammonium sulphate, ammonium phosphate, etc.) adopters also. Adoption took place relatively faster in Joydevpur, Dinajpur, Gaibandha and Gouripur.

Most sluggish pace of adoption was observed in Daulatpur. On the other hand number of non-adopters was highest in Begumganj.

7.3 Urea Application Time

In case of both HYV and local varieties basal dose of urea was generally applied 1 to 2 days before planting of aus, aman and boro (Table 7.2 and 7.3). However, in some thanas some deviations were also noted. In growing local varieties Faridpur aus and aman farmers, and Gouripur aus farmers reported to have applied basal dose seven days before planting. HYV aus and aman growers in Gouripur and Begumganj largely deviated from the timing generally followed in other places.

Most farmers growing HYV had the general propensity to apply first top dressing about a week earlier than at the recommended 30-day age of the transplanted crop. HYV crops were topdressed at the youngest age (20, 18 and 16 days for aus, aman and boro) in Hathazari. Joydevpur farmers topdressed first dose on HYV aus, aman and boro at 23, 25 and 24 days respectively. But local varieties were topdressed by Joydevpur farmers earlier at 26, 21 and 21 days for aus, aman and boro. But in most of the other areas, older local crops were applied the first topdressing.

The second topdressing was applied by farmers of Joydevpur and everywhere else except in Gouripur and Begumganj generally within or around the recommended 40-45 day range for aus and aman crops. The second topdressing for boro crop recommended at 70-75 day age was nowhere given.

7.4 TSP and MP Application Time

In the CDC area, TSP and MP were applied to both HYV and local varieties, in general, one day before planting. In other areas average application time ranged between 2 to 8 days before planting (Tables 7.2 and 7.3). MP dose was not split anywhere, though splitting is particularly recommended for sandy soils.

7.5 Cowdung/FYM Application Time

Extensive variations in timing of cowdung/farmyard manure application were observed in the study area (Tables 7.2 and 7.3). In the CDC area, farmers applied them 3-7 days before planting time, while the application time among Dinajpur farmers (30 days for aman and 27 days for boro) was

among the earliest. However, the major practice was application in between 8 and 16 days before transplantation.

7.6 Basal Application Practice

Farmers were generally found to use a part of urea and full amount of TSP and MP as basal applications. Table 7.4 indicates that about two-third farmers in the study area applied basal fertilizer during the recommended time, i.e. last ploughing of the main field. In the CDC area this practice was common with about 72 percent farmers. The second largest group of farmers used fertilizer before ploughing which was not the desirable application time. Fewer farmers applied during laddering, which is considered not an ideal but acceptable practice. None in the CDC area however applied basal dose before ploughing. Some farmers in five thanas reported that they applied the entire basal dose after laddering at a stage when fertilizer incorporation into the soil is rather imperceptible.

7.7 Splitting of Urea Dose

Urea dose was split by the most of urea users in all thanas. Split urea users represented about 79 percent in HYV aus, 78 percent in aman and 72 percent in boro reasons (Table 7.5). The dominant pattern of splitting was basal plus one topdressing representing over a half of urea users. Farmers not splitting urea i.e. applying all as basal were about 19 percent in aus, 19 percent in aman and 23 percent in boro seasons in case of HYV farming. In local variety farming also similar trends prevailed (Table 7.6). Percent distribution of splitter and non-splitter categories in the CDC area was comparable with the all-thana data. A small but percentible group of farmers was discovered, in some of the thanas, using no basal dose, but topdressing rice crops.

About sixty-eight percent farmers claimed to be knowing about the ideal time of urea topdressing. In the CDC area these farmers represented 82 percent, in Daulatpur and Gaibandha they were even greater in proportion. In only Natore the majority (57%) expressed their ignorance about the proper timing of topdressing. Determination of panicle initiation (P.I.) time is crucial in applying the second topdressing to the rice crop. On enquiry, it was found that more than three-fourth farmers could determine the time of panicle initiation (Table 7.8). In Joydevpur about 92

percent farmers claimed as knowing whereas Daulatpur had over 98 percent claimant farmers. It is worthnoting that all farmers knowing about P.I. time did not topdress urea at that time (see, Tables 7.2 & 7.3). This discrepancy obviously deserves further investigation.

7.8 Urea Incorporation

One of the most unexpected findings on fertilizer application in farmer's field was that more than half of the farmers did not practise the incorporation of urea into the muddy soil (Table 7.9). This non-performance of the recommended practice has been depriving both paddy land and farmer of reaping the full benefit of applied urea. Even in the CDC area, only 45 percent mixed urea into the soil. The situation was however more exasperating in many other places among which Daulatpur and Faridpur appeared worst.

7.9 Fertilizer Application in HYV Farming

As anticipated, boro farms received most intensive fertilizer treatment in the study area (Table 7.10). About 96 percent boro farmers applied urea, 82 percent applied TSP and 68 percent MP. Farmers using NPK (urea+ TSP+MP) consituted 68 percent. A section of farmers (37%) applied cowdung/farm yard manure (FYM) along with fertilizer on bore farms.

Among aus and aman farms urea was applied on about 86 and 82 percent respectively (Table 7.10). TSP and MP were applied on a lesser number of farms indicating some farms using only urea. This was also confirmed by a relatively small number of farms receiving NPK (49% aus and 42% aman). Seasonal variations among urea users, TSP users and MP users were insignificant.

Among all thanas, Joydevpur, Natore and Ishwardi farms had most intensive fertilizer application in terms of proportion of recipient farms. None of these thanas' farms was applied cowdung alone. Proportion of fertilizer consumers was smallest in Begumganj particularly on aus and aman farms. FYM and fertilizer combinations were found in practice on many farms of some thanas including the CDC area.

7.10 Fertilizer Application in Local Rice Farming

As in HYV farming, local varieties also received most intensive fertilizer treatment on boro farms, (Table 7.11). Cowdung/FYM was used on 74 percent of aus farms, 57 percent of whom also received fertilizer. Both fertilizer and FYM usage was very high in the CDC area. Some of the other thanas however had higher proportion of FYM users, but none could exceed Joydevpur with respect to fertilizer consumer farms. Fertilizer using farms represented a very small proportion in Faridpur, Daulatpur and Begumganj.

7.11 Fertilizer Dose

Nowhere in the study area, farmers used the recommended fertilizer dose; even though in some areas applied dose appeared to be close to the desired level. Highest fertilizer doses were applied to the HYV boro crop being most fertilizer-responsible, (Table 7.12). Hathazari, Ishwardi, Natore and Gaibandha topped among high fertilizer dose users on boro. Dinajpur and Daulatpur farmers used higher dose on HYV aman crops than in other thanas. Natore and Dinajpur had high dose usage on aus crop. Although Joydevpur had the highest proportion of fertilizer users among farmers, their application doses were found moderate.

Two maunds per acre was the highest dose of urea per farmer averaged in Gailbandha and Ishwardi. Highest average dose of TSP was 1.30 maunds per acre computed for Natore and Faridpur. About 1 maund per acre was the highest average dose of MP among HYV boro farmers of Hathazari.

Farmer use of fertilizer on local varieties was generally low for obvious reasons.

7.12 Zinc and Sulphur Deficiency

Rice crop on sulphur and zinc deficient soil occurring in the swampy area show some distinctive symptoms. During the survey, farmers were asked to indicate if they observed these symptoms in their field. A considerable number of farmers were non-specific in their responses as they did not observe them. But among the observing farmers, the majority confirmed that they saw these symptoms. Above 70 percent farmers observed zinc dificiency symptoms in Faridpur, Gaibandha and Gouripur (Table 7.13). On the other hand, sulphur deficiency symptoms were observed by 91 percent

in Gouripur, 78 percent in Dinajpur and 77 percent in Daulatpur (Table 7.14). In Natore both zinc and sulphur deficiency symptoms were not noticed by most farmers. Everywhere else observers constituted the bulk of the rice growers. If farmers' observations were correct, the situation must be admitted as precarious. The situation also calls for urgent remedial measures like application of zinc sulphate and gypsum.

Farmers' perceived need for zinc and sulphur application was found only about 7 and 9 percent respectively (Table 7.15). This low perception level is attributable to lack of knowledge about causes of the symptoms and remedies of the deficiencies. Half of the study area farmers conceded that they did not understand the necessity of any fertilizer other than usual urea, TSP and MP. This statement further confirms the existence of another vulnerable area where advisory and input delivery services have to be directed.

Table 7.1: Fertilizer Adoption

(Figures in Nos.)

Thana	Fertilizer	Years Since Adopted						Adopters
		1 - 5	6 - 10	11-15	16 - 20	21 - 25	26+	
Dinajpur	Urea	7	12	19	11	5	-	(91.5)
	TSP	5	12	17	4	4	-	(71.2)
	MP	12	9	10	3	-	-	(57.6)
Rangpur	Urea	2	10	15	4	-	-	(48.5)
	TSP	3	8	12	4	1	2	(56.6)
	MP	5	7	5	3	2	1	(43.4)
Gouripur	Urea	4	13	15	4	-	-	(66.7)
	TSP	5	10	11	2	3	-	(57.4)
	MP	2	3	12	4	4	-	(46.3)
Sylhet	Urea	7	10	8	6	-	-	(53.4)
	TSP	2	9	7	3	2	-	(39.7)
	MP	5	3	q	1	5	-	(27.6)
Natore	Urea	3	9	11	4	2	-	(65.9)
	TSP	1	8	11	5	6	-	(70.5)
	MP	4	6	7	2	5	-	(54.5)
Ishwardi	Urea	5	27	20	1	-	-	(98.1)
	TSP	8	14	11	-	-	-	(62.3)
	MP	8	14	9	-	-	-	(58.5)
Gaibandha	Urea	7	21	31	8	-	1	(77.9)
	TSP	5	20	29	2	-	2	(65.1)
	MP	6	21	7	2	-	1	(41.9)
Sherpur	Urea	8	22	10	6	3	2	(96.8)
	TSP	6	14	16	3	-	2	(65.1)
	MP	4	8	4	3	-	2	(30.2)
Faridpur	Urea	12	23	5	3	-	-	(71.7)
	TSP	11	14	7	2	-	-	(56.7)
	MP	7	19	2	2	-	-	(50.0)
Daulatpur	Urea	8	10	10	5	-	-	(55.0)
	TSP	5	4	6	2	-	-	(28.3)
	MP	1	3	4	2	-	-	(16.7)
Begumganj	Urea	7	3	5	5	3	-	(37.1)
	TSP	3	2	3	3	8	3	(35.5)
	MP	3	2	3	2	1	-	(17.7)
Hathazari	Urea	2	18	32	3	-	-	(98.2)
	TSP	9	25	13	1	-	-	(85.7)
	MP	14	12	9	1	-	-	(64.3)
Joydevpur	Urea	10	20	29	23	5	6	(87.3)
	TSP	11	18	32	19	5	1	(81.1)
	MP	9	18	33	19	6	1	(64.3)
All Thana	Urea	82(10.1)	198(24.3)	220(27.0)	83(10.3)	18(2.2)	9	(74.9)
	TSP	74(9.1)	158(19.4)	175(21.5)	50(6.1)	29(3.6)	10	(60.9)
	MP	80(9.8)	125(15.4)	107(13.1)	44(5.4)	23(2.8)	5	(47.2)

Note: Figures in parentheses are percentages of total households.

Table 7.2: Fertilizer Application Schedule - HYV

(Figures in Number)

Thana	Crop	Urea			TSP	MP	FYM
		Days Before Planting	Days After Planting	Days After Planting	Days Before Planting	Days Before Planting	Days Before Planting
Dinajpur	Aus	1.17	24.33	37.33	2.33	2.63	26.67
	Aman	1.17	23.33	43.00	3.00	3.00	30.00
	Boro	2.00	20.00	45.00	2.00	4.00	12.00
Rangpur	Aus	3.50	21.75	38.89	2.90	4.00	15.83
	Aman	2.67	23.50	54.22	6.35	5.17	14.50
	Boro	1.00	20.00	43.00	1.50	2.00	5.00
Gouripur	Aus	12.00	22.60	50.34	5.73	3.59	10.85
	Aman	5.67	27.17	56.10	3.86	5.33	10.90
	Boro	1.00	30.83	43.00	2.33	1.00	1.00
Sylhet	Aus	1.00	23.00	41.00	2.19	2.00	10.03
	Aman	1.00	25.00	43.00	2.00	2.00	10.00
	Boro	1.00	20.00	40.00	1.50	1.00	0
Natore	Aus	3.00	20.00	39.00	2.75	2.75	16.50
	Aman	2.50	23.50	43.50	1.93	2.01	9.75
	Boro	1.97	22.18	46.72	1.83	1.83	12.00
Ishwardi	Aus	1.00	28.33	45.50	1.00	1.00	0
	Aman	1.25	25.00	47.33	1.00	1.00	15.00
	Boro	1.67	23.67	46.00	1.00	1.00	3.00
Gaibandha	Aus	3.00	23.50	38.60	3.30	2.70	20.00
	Aman	2.00	26.50	39.70	2.72	2.00	25.60
	Boro	1.50	30.00	43.56	3.70	3.13	15.00
Sherpur	Aus	1.25	25.13	32.00	1.00	1.30	14.00
	Aman	1.00	25.17	35.56	1.15	1.67	0
	Boro	1.15	25.00	43.33	1.15	1.00	10.33
Faridpur	Aus	3.00	24.50	37.50	2.50	3.00	0
	Aman	2.00	27.50	60.00	1.50	1.50	0
	Boro	2.25	25.67	30.00	2.59	2.59	15.00
Daulatpur	Aus	0	0	0	1.00	0	0
	Aman	4.00	29.75	45.75	3.00	2.00	7.25
	Boro	0	20.00	40.00	1.00	0	0
Begumganj	Aus	6.00	22.50	55.00	3.50	6.00	10.00
	Aman	12.00	31.50	40.00	7.00	8.00	11.00
	Boro	2.00	23.33	50.67	2.58	2.60	8.87
Hathazari	Aus	1.00	19.81	45.00	7.69	4.00	6.11
	Aman	1.00	17.79	38.13	7.21	2.56	1.79
	Boro	1.00	16.29	47.71	2.84	1.80	6.59
Joydevpur	Aus	1.00	23.25	39.00	1.00	1.00	7.00
	Aman	1.00	25.25	46.75	1.00	1.00	3.25
	Boro	1.00	24.25	43.75	1.00	1.00	6.50

Table 7.3: Fertilizer Application Schedule – LV

(Figures in Number)

Thana	Crop	Urea			TSP	MP	FYM
		Days Before Planting	Days After Planting	Days After Planting	Days Before Planting	Days Before Planting	Days Before Planting
Dinajpur	Aug	1.00	39.25	42.50	4.00	6.00	20.50
	Aman	1.00	27.40	44.00	1.60	3.00	28.00
	Boro	0	20.00	50.00	1.00	0	1.00
Rangpur	Aus	2.50	26.67	46.94	5.55	3.92	13.46
	Aman	1.69	22.84	43.47	1.75	3.71	12.83
	Boro	0	0	0	0	0	0
Gouripur	Aus	7.00	30.55	50.32	3.22	3.25	11.86
	Aman	0	26.13	56.13	3.25	5.75	12.81
	Boro	0	28.33	60.00	0	0	0
Sylhet	Aus	1.40	21.14	40.72	1.58	1.49	9.67
	Aman	1.42	22.94	40.89	3.41	3.92	9.63
	Boro	1.00	29.44	45.00	2.00	2.00	0
Natore	Aus	2.63	25.23	34.62	3.00	2.48	8.56
	Aman	3.92	21.85	34.03	2.86	3.00	18.50
	Boro	2.00	21.00	45.00	2.00	2.00	0
Ishwardi	Aus	0	23.50	38.33	1.33	1.33	12.67
	Aman	1.00	30.00	43.13	1.50	1.75	8.00
	Boro	1.00	30.00	40.00	1.00	1.00	5.00
Gaibandha	Aus	1.00	45.00	60.00	8.00	1.00	9.50
	Aman	1.00	32.50	47.50	2.00	1.13	9.67
	Boro	1.00	27.50	42.00	1.00	1.00	7.00
Sherpur	Aus	1.33	27.69	48.50	1.44	1.38	13.75
	Aman	1.19	28.61	40.94	1.17	1.13	8.27
	Boro	2.00	26.54	37.50	1.15	1.20	9.89
Faridpur	Aus	7.00	30.98	35.00	1.50	2.00	16.00
	Aman	4.50	30.00	41.25	2.00	0	18.25
	Boro	2.50	30.00	40.00	3.00	1.50	0
Daulatpur	Aus	1.00	20.50	42.00	1.00	0	1.50
	Aman	1.25	29.00	33.50	1.25	0	9.00
	Boro	0	35.00	60.00	0	0	0
Begumganj	Aus	0	22.56	60.00	2.67	3.00	8.25
	Aman	1.00	24.00	50.00	2.33	1.00	2.00
	Boro	3.00	18.00	46.25	2.50	4.00	15.00
Hathazari	Aus	1.00	17.42	60.00	1.00	1.00	5.66
	Aman	1.00	24.97	42.85	1.35	3.67	6.05
	Boro	1.00	15.00	0	1.00	0	6.00
Joydevpur	Aus	1.00	25.67	40.00	1.00	1.00	4.67
	Aman	1.00	21.25	42.50	1.00	1.00	5.50
	Boro	1.00	21.29	42.60	1.00	1.00	2.00

Table 7.4: Basal Fertilizer Application Time

(Figures in %)

Thana	Before Ploughing	Last Ploughing	During Laddering	After Laddering
Dinajpur	34.18	40.50	16.46	8.86
Rangpur	25.00	62.50	12.50	-
Gouripur	22.00	56.00	4.00	18.00
Sylhet	6.90	77.58	5.17	10.35
Natore	32.00	68.00	-	-
Ishwardi	23.08	56.41	20.51	-
Gaibandha	22.62	63.10	14.28	-
Sherpur	27.27	68.18	4.55	-
Faridpur	22.50	72.50	5.00	-
Daulatpur	11.90	88.10	-	-
Begumganj	7.14	71.43	10.71	10.72
Hathazari	4.84	87.66	8.06	-
Joydevpur	-	71.57	24.45	.98

Table 7.5 Splitting of Urea on HYV

(Figures in No. of Households)

Thana	Crop	Urea User				
		Basal Only	Basal +1TD	Basal +2TD	No Basal	Total Users
Dinajpur	Aus	7(20.0)	20(57.1)	5(14.3)	3(8.6)	35
	Aman	5(21.7)	13(56.5)	5(21.7)	-	23
	Boro	-	3(75.0)	1(25.0)	-	4
Rangpur	Aus	2(18.2)	7(63.6)	2(18.2)	1(6.3)	11
	Aman	4(25.0)	8(50.0)	3(18.8)	-	16
	Boro	1(25.0)	2(50.0)	1(25.0)	-	4
Gouripur	Aus	5(18.5)	18(66.7)	4(14.8)	-	27
	Aman	4(17.4)	15(65.2)	3(13.0	1(4.3)	23
	Boro	-	3(100)	-	-	3
Sylhet	Aus	4(10.3)	28(71.8)	7(17.9)	-	39
	Aman	-	30(83.3)	6(16.7)	-	36
	Boro	1(50.0)	-	1(50.0)	-	2
Natore	Aus	1(16.7)	3(50.0)	2(33.3)	-	6
	Aman	4(20.0)	12(60.0)	4(20.0)	- -	20
	Boro	2(20.0)	6(60.0)	2(20.0)	-	10
Ishwardi	Aus	3(27.3)	6(54.5)	2(18.2)	-	11
	Aman	6(28.6)	12(57.1)	3(14.3)	-	21
	Boro	2(18.2)	6(54.5)	3(27.3)	-	11
Gaibandha	Aus	2(15.4)	7(53.8)	4(30.8)	-	13
	Aman	5(26.3)	10(52.6)	4(21.1)	-	19
	Boro	7(26.9)	15(57.7)	2(7.9)	2(7.9)	26
Sherpur	Aus	-	12(75.0)	4(25.0)	-	16
	Aman	2(16.7)	6(50.0)	4(33.3)	-	12
	Boro	5(26.3)	8(42.1)	4(21.1)	2(10.5)	19
Faridpur	Aus	3(33.3)	6(66.7)	-	-	9
	Aman	1(33.3)	2(66.7)	-	-	3
	Boro	2(28.6)	4(57.1)	1(14.3)	-	7
Daulatpur	Aus	-	-	-	-	-
	Aman	7(22.6)	17(54.8)	5(16.1)	2(6.5)	31
	Boro	-	-	-	-	-
Begumganj	Aus	3(37.5)	4(50.0)	1(12.5)	-	8
	Aman	1(25.0)	2(50.0)	1(25.0)	-	4
	Boro	6(33.3)	10(55.6)	2(11.1)	-	18
Hathazari	Aus	4(16.7)	15(62.5)	5(20.8)	-	24
	Aman	5(12.5)	22(55.0)	10(25.0)	3(7.5)	40
	Boro	7(18.4)	20(52.6)	10(26.3)	1(2.6)	38
Joydevpur	Aus	12(24.5)	25(51.0)	10(20.4)	2(4.1)	49
	Aman	13(23.2)	24(42.8)	15(26.8)	4(7.1)	56
	Boro	16(24.2)	34(51.5)	13(19.7)	3(4.5)	66
All Thana	Aus	46(18.6)	151(61.1)	45(18.2)	5(2.0)	247
	Aman	57(18.8)	173(56.9)	63(20.7)	11(3.6)	304
	Boro	49(23.3)	111(52.9)	40(19.0)	10(4.8)	210

Note: Figures in parentheses are percentages of total users.

Table 7.6: Splitting of Urea on LV

(Figures in No. of Households)

Thana	Crop	Urea User				
		Basal Only	Basal +1TD	Basal +2TD	No Basal	Total Users
Dinajpur	Aus	2(9.5)	12(75.1)	5(23.8)	2(9.5)	21
	Aman	5(17.9)	13(46.4)	7(25.0)	3(10.7)	28
	Boro	-	1(100)	-	-	1
Rangpur	Aus	6(18.2)	18(54.5)	7(21.2)	2(6.1)	33
	Aman	3(9.4)	15(46.9)	10(31.3)	4(12.5)	32
	Boro	-	-	-	-	-
Gouripur	Aus	8(32.0)	12(48.0)	4(16.0)	1(4.0)	25
	Aman	4(28.6)	9(64.3)	1(7.1)	-	14
	Boro	2(40.0)	3(60.0)	-	-	5
Sylhet	Aus	7(21.2)	15(45.4)	6(18.2)	5(15.2)	33
	Aman	4(11.8)	18(52.9)	9(26.5)	3(8.8)	34
	Boro	1(14.3)	4(57.1)	2(28.6)	-	7
Natore	Aus	5(20.0)	15(60.0)	5(20.0)	-	25
	Aman	6(18.7)	14(43.8)	7(22.9)	5(15.6)	32
	Boro	-	2(100)	-	-	2
Ishwardi	Aus	5(26.3)	10(52.6)	3(15.8)	1(5.3)	19
	Aman	4(25.0)	10(62/5)	2(12.5)	-	16
	Boro	-	-	-	-	-
Gaibandha	Aus	18(45.0)	20(50.0)	2(5.0)	-	40
	Aman	10(23.3)	22(51.2)	8(18.6)	3(7.0)	43
	Boro	-	1(100)	-	-	1
Sherpur	Aus	7(18.9)	20(54.1)	8(21.6)	2(5.4)	37
	Aman	8(20.5)	25(64.1)	5(12.8)	1(2.6)	39
	Boro	6(20.7)	20(69.0)	3(10.3)	-	29
Faridpur	Aus	9(23.7)	25(65.8)	3(7.9)	1(2.6)	38
	Aman	4(15.4)	20(76.9)	2(7.7)	-	26
	Boro	-	-	-	-	-
Daulatpur	Aus	2(20.0)	6(60.0)	2(20.0)	-	10
	Aman	4(26.7P	10(66.7)	1(6.6)	-	15
	Boro	-	1(100)	-	-	1
Begumganj	Aus	-	-	-	-	-
	Aman	-	-	-	-	-
	Boro	8(25.0)	17(53.1)	7(21.9)	-	32
Hathazari	Aus	1(6.3)	10(62.5)	4(25.0)	1(6.3)	16
	Aman	5(8.3)	24(66.7)	4(11.1)	3(8.3)	36
	Boro	-	-	-	-	-
Joydevpur	Aus	10(15.4)	40(61.5)]	12(18.5)	3(4.6)	65
	Aman	8(10.8)	47(63.5)	15(20.3)	4(5.4)	74
	Boro	2(20.0)	7(70.0)	1(10.0)	-	10
All Thana	Aus	80(22.1)	203(56.1)	61(16.9)	18(5.0)	362
	Aman	63(16.3)	227(58.8)	69(17.9)	27(7.0)	386
	Boro	22(27.2)	46(56.8)	13(16.0)	-	81

Note: Figures in parentheses are percentages of total users.

Table 7.7: Urea Topdressing Time

(Figures in %)

Thana	Farmers knowing	Farmers not knowing
Dinajpur	77.97	22.03
Rangpur	47.17	52.83
Gouripur	70.37	29.63
Sylhet	62.07	37.93
Natore	43.18	56.82
Ishwardi	77.36	22.64
Gaibandha	87.21	12.79
Sherpur	73.02	26.98
Faridpur	41.67	58.33
Begumganj	59.67	40.33
Hathazari	53.57	46.43
Daulatpur	83.33	16.67
Joydevpur	82.07	17.93
All Thana	68.18	31.82

Table 7.8: Determination of P.I. Time

(Figures in %)

Thana	Can	Cannot	Do not understand
Dinajpur	71.19	6.78	22.03
Rangpur	49.06	24.53	26.41
Gouripur	75.92	7.41	16.67
Sylhet	86.21	0	13.79
Natore	36.36	59.09	4.55
Ishwardi	79.24	15.09	5.67
Gaibandha	91.86	3.49	4.65
Sherpur	82.53	6.35	11.12
Faridpur	60.00	31.67	8.33
Begumganj	64.52	25.80	9.68
Hathazari	62.50	17.85	19.64
Daulatpur	98.33	1.67	0
Joydevpur	91.51	4.71	3.78
All Thana	75.55	13.88	10.57

Table 7.9: Mixing Urea with Mud

(Figures in %)

Thana	Yss	No.
Dinajpur	61.02	38.98
Rangpur	66.17	33.83
Gouripur	33.33	66.67
Sylhet	53.45	46.55
Natore	50.00	50.00
Ishwardi	32.08	67.92
Gaibandha	33.72	66.28
Sherpur	71.43	28.57
Faridpur	28.33	71.67
Daulatpur	23.33	76.67
Begumganj	51.61	41.39
Hathazari	41.07	58.95
Joydevpur	41.51	58.49
All Thana	44.59	55.41

Table 7.10: Fertilizer Application Pattern on HYV

(Figures in No. of Households)

Thana	Crop	Urea User	TSP User	MP User	NPK user	FYM User	
						Alone	With Fertilizer
Dinaj-	Aus	35(97.2)	31(86.1)	16(44.4)	16(14.4)	1(2.8)	0
pur	Aman	23(100)	8(34.8)	11(47.8)	8(34.8)	0	8(34.8)
	Boro	4(100)	4(100)	1(25.0)	1(25.0)	0	4(100)
Rang-	Aus	11(100)	7(63.6)	7(63.6)	7(63.6)	1(11.1)	6(33.3)
pur	Aman	16(88.9)	12(66.7)	8(44.4)	6(33.3)	2(11.1)	6(33.3)
	Boro	4(100)	2(50.0)	1(25.0)	1(25.0)	0	1(25.0)
Gouri-	Aus	27(87.9)	10(32.3)	9(29.0)	9(29.0)	4(12.9)	19(61.3)
pur	Aman	23(62.2)	10(27.0)	10(27.0)	10(27.0)	14(37.8)	14(37.8)
	Boro	3(100)	3(100)	2(66.7)	2(66.7)	0	1(33.3)
Sylhet	Aus	39(100)	37(94.9)	32(82.1)	32(82.1)	4(10.3)	18(46.2)
	Aman	36(100)	32(88.9)	31(86.1)	31(86.1)	5(13.9)	15(41.7)
	Boro	2(100)	2(100)	2(100)	2(100)	0	0
Natore	Aus	6(100)	5(83.3)	5(83.3)	5(83.3)	0	2(33.3)
	Aman	20(100)	19(95.0)	18(90.0)	18(90.0)	0	3(15.0)
	Boro	10(100)	10(100)	10(100)	10(100)	0	2(20.0)
Ish-	Aus	11(100)	10(90.9)	9£81.8)	9(90.9)	0	2(18.2)
wardi	Aman	21(100)	18(85.7)	16(76.2)	16(76.2)	0	0
	Boro	11(100)	10(90.9)	10(90.9)	10(90.9)	0	6(54.5)
Gai-	Aus	13(86.7)	8(53.3)	6(40.0)	6(40.0)	2(13.3)	10(66.7)
bandha	Aman	19(100)	8(42.1)	5(26.3)	5(26.3)	0	3(15.8)
	Boro	26(96.3)	15(55.6)	14(51.9)	14(51.9)	1(3.7)	11(40.7)
Sher-	Aus	16(100)	12(75.0)	6(37.5)	6(37.5)	0	10(62.5)
pur	Aman	12(100)	10(83.3)	6(50.0)	6(50.0)	0	0
	Boro		18(81.8)	5(22.7)	5(22.7)	3(13.6)	11(50.0)
Farid-	Aus	9(100)	3(33.3)	3(33.3)	3(33.3)	0	0
pur	Aman	3(100)	2(66.7)	2(66.7)	2(66.7)	0	0
	Boro	7(100)	5(71.4)	5(71.4)	5(71.4)	0	0
Daulat-	Aus	0	0	0	0	1(100)	0
pur	Aman	31(100)	17(54.8)	4(12.9)	4(12.9)	2(6.5)	11(35.5)
	Boro	0	0	0	0	0	0
Begum	Aus	8(21.1)	3(7.9)	2(5.3)	2(5.3)	2(5.3)	2(5.3)
ganj	Aman	4(8.7)	3(6.5)	1(2.2)	1(2.2)	3(6.5)	3(6.5)
	Boro	18(90.0)	15(75.0)	13(65.0)	13(65.0)	2(10.0)	5(25.0)
Hat-	Aus	24(100)	13(54.2)	4(16.7)	4(16.7)	0	11(45.9)
hazari	Aman	40(83.3)	24(50.0)	12(25.0)	12(25.0)	8(16.7)	25(52.1)
	Boro	38(90.5)	27(64.3)	20(47.6)	20(47.6)	4(9.5)	14(33.3)
Joy	Aus	49(100)	48(98.0)	40(81.6)	40(81.6)	0	30(61.2)
devpur	Aman	56(100)	53(94.6)	31(55.4)	31(55.4)	0	12(21.4)
	Boro	66(100)	66(100)	65(98.5)	65(98.5)	0	26(39.4)
All	Aus	247(86.4)	187(65.4)	139(48.6)	139(48.6)	11(3.8)	108(37.8)
Thana	Aman	304(82.2)	216(58.4)	155(41.9)	155(41.9)	34(9.2)	100(27.0)
	Boro	210(96.3)	178(81.7)	148(67.9)	148(67.9)	10(4.6)	81(37.2)

Note: Figures in parentheses are percentages of crop growers.

Table 7.11: Fertilizer Application Pattern on LV

(Figures in No. of Households)

Thana	Crop	Ures User	TSP User	MP User	FYM User		
					NPK User	FYM Alone	With Fertilizer
Dinajpur	Aus	21(65.6)	6(18.8)	4(12.5)	4(12.5)	11(34.4)	28(87.5)
	Aman	28(49.1)	33(57.9)	17(29.8)	17(29.8)	8(14.0)	42(73.7)
	Boro	1(100)	1(100)	0	0	0	0
Rangpur	Aus	33(68.8)	10(20.8)	7(14.6)	7(14.6)	6(12.5)	26(54.2)
	Aman	32(69.6)	23(50.0)	18(39.1)	18(39.1)	7(15.2)	15(32.6)
	Boro	0	0	0	0	0	0
Gouripur	Aus	25(49.0)	4(7.8)	4(7.8)	4(7.8)	12(23.5)	37(72.5)
	Aman	14(27.5)	5(9.8)	6(11.8)	5(9.8)	3(5.9)	12(23.5)
	Boro	5(62.5)	0	1(12.5)	0	0	0
Sylhet	Aus	33(60.0)	17(30.9)	16(29.1)	16(29.1)	11(20.0)	36(65.5)
	Aman	34(60.7)	19(33.9)	17(30.4)	17(30.4)	8(14.3)	30(53.6)
	Boro	7(100)	3(42.9)	2(28.6)	2(28.6)	0	0
Natore	Aus	25(73.5)	19(55.9)	18(52.9)	18(52.9)	4(11.7)	14(41.2)
	Aman	32(82.1)	20(51.3)	25(64.1)	25(64.1)	3(7.7)	5(12.8)
	Boro	2(100)	2(100)	2(100)	2(100)	0	0
Ishwardi	Aus	19(39.6)	7(14.6)	7(14.6)	7(14.6)	7(14.6)	28(58.3)
	Aman	16(69.6)	7(30.4)	5(21.7)	4(21.7)	4(17.4)	10(43.5)
	Boro	0	0	0	0	0	0
Gaibandha	Aus	40(49.4)	2(2.5)	1(1.2)	1(1.2)	11(13.6)	32(39.5)
	Aman	43(53.8)	9(11.3)	7(8.8)	7(8.8)	7(8.8)	17(21.3)
	Boro	1(100)	0	0	0	0	0
Sherpur	Aus	37(75.5)	18(36.7)	14(28.6)	14(28.6)	10(20.4)	37(75.5)
	Aman	39(67.4)	23(39.7)	13(22.4)	13(22.4)	3(5.2)	9(15.5)
	Boro	29(74.5)	15(38.5)	7(17.9)	7(17.9)	3(7.7)	8(20.5)
Farid	Aus	38(82.6)	5(10.9)	4(8.7)	4(8.7)	8(17.4)	26(56.5)
	Aman	26(52.0)	2(4.0)	5(10.0)	2(4.0)	0	1(5.0)
	Boro	0	0	0	0	0	0
Daulatpur	Aus	10(21.7)]	10(21.7)	0	0	1(2.2)	4(8.7)
	Aman	15(26.8)	13(23.2)	0	0	4(7.1)	9(16.1)
	Boro	1(16.7)	0	0	0	0	0
Begumganj	Aus	0	0	0	0	6(100)	0
	Aman	0	0	0	0	5(100)	0
	Boro	32(94.1)	4(11.8)	2(5.9)	2(5.9)	2(5.9)	4(11.8)
Hathazari	Aus	16(76.2)	10(47.6)	2(9.5)	2(9.5)	4(19.0)	16(76.2)
	Aman	36(69.2)	24(46.2)	8(15.4)	8(15.4)	10(19.2)	21(40.4)
	Boro	0	0	0	0	0	0
Joydevpur	Aus	65(83.3)	63(80.8)	30(38.5)	30(39.5)	11(14.1)	55(70.5)
	Aman	74(92.5)	70(87.5)	47(58.8)	47(58.8)	4(5.0)	33(41.3)
	Boro	10(90.9)	10(90.9)	10(90.9)	10(90.9)	1(9.1)	3(27.3)
All Thana	Aus	36](60.8)	171(28.7)	107(18.0)	107(18.0)	102(17.1)	339(57.0)
	Aman	386(59.1)	248(38.0)	168(25.7)	168(25.7)	66(10.1)	204(31.2)
	Boro	81(73.6)	36(32.7)	24(21.8)	24(21.8)	7(6.4)	15(13.6)

Note: Figures in parentheses are percentages of crop growers.

Table 7.12: Fertilizer Application Dose

(Figures in Maund/Acre/Farmer)

Thana	Crop	Modern Variety				Local Variety			
		Urea	TSP	MP	Total	Urea	TSP	MP	Total
Dinajpur	Aus	1.50	1.00	.25	2.75	.16	.34	.04	.54
	Aman	1.50	1.25	.25	3.00	.96	.62	.15	1.73
	Boro	1.75	1.00	.25	3.00	-	-	-	-
Rangpur	Aus	1.10	.62	.25	1.97	.43	.25	.17	.85
	Aman	1.38	.75	.19	2.32	.63	.25	.18	1.06
	Boro	-	-	-	-	-	-	-	-
Gouripur	Aus	.63	.15	.15	.93	.16	.08	.05	.29
	Aman	.85	.39	.15	1.39	.29	.11	.09	.49
	Boro	1.50	.50	.25	2.25	-	-	-	-
Sylhet	Aus	.85	.67	.25	1.77	.33	.23	.09	.65
	Aman	1.00	.83	.13	1.96	.35	.18	.28	.81
	Boro	1.57	.50	.41	2.48	.44	.12	.06	.62
Natore	Aus	1.50	.75	.20	2.45	.69	.43	.18	1.30
	Aman	1.33	.65	.32	2.30	.42	.27	.23	.92
	Boro	1.85	1.30	.61	3.76	1.80	.51	.36	1.67
Ishwardi	Aus	.63	.35	.13	1.11	.38	.07	.05	.50
	Aman	.98	.68	.29	1.95	.42	.14	.16	.72
	Boro	2.00	1.25	.65	3.90	.97	.37	-	1.34
Gaibandha	Aus	1.12	.45	.16	1.73	.56	.11	.04	.71
	Aman	1.25	.50	.15	1.90	.94	.29	.12	1.35
	Boro	2.00	1.18	.47	3.65	1.19	.60	.25	2.04
Sherpur	Aus	1.05	.80	.28	2.13	.53	.34	.10	.97
	Aman	1.00	.73	.31	2.04	.44	.33	.10	.87
	Boro	1.63	.86	.11	2.60	1.20	.42	.25	1.87
Feridpur	Aus	.75	.50	.50	1.75	.40	.25	.10	.75
	Aman	1.25	1.00	.50	2.70	.71	.02	.04	.77
	Boro	1.28	1.30	.60	3.18	1.16	.70	.10	1.96
Daulatpur	Aus	-	1.00	-	1.00	.20	-	-	.20
	Aman	1.73	1.17	.57	3.47	.28	.30	.30	.88
	Boro	-	-	-	-	.75	.50	.30	1.55
Begumganj	Aus	.84	.52	.03	1.39	.26	.21	.02	.49
	Aman	1.50	.96	.19	2.65	.85	.74	-	1.59
	Boro	.90	.60	.35	1.85	.70	.32	.15	1.07
Hathazari	Aus	1.16	.54	.06	1.76	.40	.20	.04	.64
	Aman	1.50	.69	.16	2.35	.32	.68	.08	1.08
	Boro	1.98	1.03	.96	3.97	1.10	.50	-	1.60
Joydevpur	Aus	.89	.62	.23	1.74	.33	.46	.13	.92
	Aman	.88	.64	.26	1.68	.45	.30	.12	.87
	Boro	1.65	.88	.31	2.84	1.00	.52	.17	1.69

Table 7.13: Stunted Growth of Plants During Tillering and Discolouration of Leaves

(Figures in %)

Thana	Yes	No	Did not notice
Dinajpur	47.28	21.81	30.91
Rangpur	49.06	7.55	43.39
Gouripur	72.22	0	27.78
Sylhet	15.51	8.6]	75.87
Natore	40.91	52.27	6.82
Ishwardi	43.39	5.66	50.95
Gaibandha	72.09	9.30	18.61
Sherpur	23.81	11.11	65.08
Faridpur	71.67	8.33	20.00
Begumgani	46.77	29.03	24.20
Hathazari	48.39	9.68	41.93
Daulatpur	50.00	3.33	46.67
Joydevpur	54.72	14.15	31.13

Table 7.14: Plants' Irregular Growth and Leaves' Irregular Colouration in Patches.

(Figures in %)

Thana	Yes	No	Did not notice
Dinajpur	77.77	9.26	12.97
Rangpur	60.38	11.32	28.30
Gouripur	90.74	3.70	5.56
Sylhet	41.38	22.41	36.21
Natore	29.55	68.18	2.27
Ishwardi	66.03	7.55	24.42
Gaibandha	74.42	10.46	15.12
Sherpur	47.62	19.05	33.33
Fardpur	61.67	8.33	30.00
Begumganj	64.52	22.58	12.90
Hathazari	59.68	8.06	32.26
Daulatpur	76.67	8.33	15.00
Joydevpur	53.77	15.09	31.14

Table 7.15: Zinc and Sulphur Need Perception

(Figures in %)

Thana	Need	Feel need	Don't need	Don't know
Dinajpur	Zine	0	74.6	25.4
	Sulphur	50.8	23.7	25.4
Rangpur	Zine	9.4	37.7	52.8
	Sulphur	9.4	32.1	58.5
Gouripur	Zinc	1.9	9.3	88.9
	Sulphur	1.9	33.3	64.8
Sylhet	Zinc	0	27.6	72.4
	Sulphur	0	39.7	60.3
Natore	Zinc	6.8	50.0	43.2
	Sulphur	0	54.5	45.5
Ishwardi	Zinc	18.9	49.1	32.1
	Sulphur	0	62.3	37.8
Gaibandha	Zinc	2.3	53.5	44.2
	Sulphur	4.7	53.5	41.9
Sherpur	Zinc	7.9	38.1	54.0
	Sulphur	6.3	31.7	61.9
Faridpur	Zinc	25.0	25.0	50.0
	Sulphur	20.0	41.7	38.3
Begumganj	Zinc	1.6	54.8	43.6
	Sulphur	1.6	54.8	43.6
Hathazari	Zinc	0	66.1	33.9
	Sulphur	0	25.0	75.0
Daulatpur	Zinc	3.3	51.7	45.0
	Sulphur	6.7	31.7	61.7
Joydevpur	Zinc	10.4	45.3	44.3
	Sulphur	10.4	44.3	45.3
All Thana	Zinc	6.8	45.2	48.0
	Sulphur	8.8	41.0	50.1

CHAPTER VIII

IRRIGATION AND DRAINAGE

8.1 General

When natural water precipitation fails to supply the requisite moisture to the soil for crop production, other water sources are located and used. On the contrary, presence of water in excess of requirements is detrimental to healthy growth of crops and requires control. In this chapter an analysis will be made of data obtained on irrigation water sources in the study area, irrigation devices in use and drainage problems confronting the farmers.

8.2 Irrigation Source Proximity

The operation involving bringing water to the crop land requiring water is more capital and labour-intensive than any other farm input dispensation. Hence farm-level irrigation water use is, to a large extent, determined by closeness of farmer's land to one and/or the other source of irrigation.

In the study area, eighty percent of farmers considered themselves close to one or the other irrigation source when they were asked about nearest source of irrigation in their locality (See Table 8.1). It was noted that a large number of farmer's land was located near natural water reservoirs called tank. In Hathazari thana about 79 percent mentioned their proximity to this source.

Among non-mechanised natural sources, canal was the nearest source next to tank. Paddy-land close to river represented about 12 percent of farmers. Beel, the large natural depression with seasonal supply of surface water, and indigenous well were sources close to onlu 5.4 and 4.4 percent farmers respectively.

Among mechanised ground water sources, namely deep tubewell, shallow tubewell and hand-operated tubewell, deep tubewell was the closest source for 18 percent farmers. Shallow tubewell was close to 5 percent respondents' land, whereas hand-driven tubewell was in the neighbourhood of only 2.2 percent farmers.

A close look into the thana-wise distribution of farmers in the neighbourhood of sources reveals different patterns of concentration of irrigation sources at places. In the CDC area, 49 percent of farmer's land was located within deep tubewells' command area. With 30.5 percent farmer's land near deep tubewell Dinajpur came next. Sherpur and Ishwardi farmers (28.6% and 28.3%) were close behind. About 21 percent of farmer's land was found on or near riverbank in Joydevpur. Among other thanas, Sherpur data show a larger number of farms close to river (25.4%). Gaibandha and Rangpur also were found to have a large number of river-bank farms belonging to respondents (19.8% and 18.9%). A large portion of respondents in Sherpur (25.4%) reported their farms located near beel. Shallow tubewell proximity was reported by a large number in Sherpur (16%) and Faridpur (13.3%). Hand tubewell, although exist everywhere, is barely utilized for irrigation purpose. A notable number of farmers were found in proximity of hand tubewells in only two thanas, e.g. Dinajpur (8.5%) and Gaibandha (8.17%).

8.3 Irrigation Source Utilization

For the purposes of analysis, irrigation sources were divided into two broad categories, namely ground water sources and surface water sources. The main surface water sources identified in utilization in the study area were tank, canal, river and beel, and altogether accounted for 45.8 percent representation among all thana farmers (Table 8.2). The ground water irrigation sources were tubewells of deep, shallow and hand-driven types and were mentioned by 22.4 percent as using. There existed a certain amont of overlaping between two categories. Also notable is an existence of a large number of non-irrigating farmers in the study area. Tank stands out most prominent among all surface water sources with 17 percent coverage. River water was used by only about 6 percent farmers though Table 8.1 showed about 21 percent farms located near river-bank. This discrepancy is quite large and points out to an enormous under-utilization of this resource. Deep tubewell was also under-utilized to some extent according to the survey data; but it is more reasonable to suspect that actual under-utilization was much higher. Shallow tubewell and hand-driven tubewell though representing a small proportion of sources were, however, optimum utilized. Thana-wise source utilization table (Table 8.2) shows that there was some overlaping in between the ground and surface water users i.e. some farmers used both categories of water

sources. Sources within the categories (ground water and surface water), also overlapped with one another. Begumganj and Hathazari showed very high surface water utilization (125.8% and 112.5%). Medium level utilization was found in Sherpur (76.2%), Sylhet (69%) and Dinajpur (47.5%). CDC area was placed in the group of thanas having low utilization of surface water, i.e. only 30.2 percent farmers, mostly using river source, Lowest surface water utilization (5%, all from river) was evidenced in Faridpur.

Ground water utilization was nil in 4 thanas of Gouripur, Sylhet, Hathazari and Daulatpur, where farms had no access to deep tubewell, shallow tubewell or hand-driven tubewell. CDC area (47.2%) along with Dinajpur (54.2%) and Sherpur (44.4%) had the widest coverage of ground water sources. Among remaining thanas Ishwardi, Gaibandha, Faridpur, Rangpur and Natore had medium level of utilization. Begumganj had the lowest coverage. Most of the farmers in areas where irrigation source utilization was lower mentioned non-existence of surface water source nearby and expressed their desire to irrigate their crops if facilities are provided to exploit the local ground water resource potential.

8.4 Irrigation Device Use

Irrigation devices in use in study area were divided into indigenous and mechanised categories. Mechanised devices were tubewells and power pumps. Indigenous devices included done, sheuti, bucket and bamboo tubewell.

Table 8.3 depicts the variations of irrigation device use among thanas. In many areas, devices overlapped one another. This in Dinajpur made indigenous device coverage 142.4 percent, highest in study area. Overall all-thana coverage of indigenous devices was 59 percent. CDC area farms together with that of Begumganj and Sherpur had a high coverage of indigenous device. CDC area also had highest mechanised device use among all thanas.

Sheuti was the most popular indigenous device in the study area and used by majority of farmers in Begumganj. Faridpur and Daulatpur farmer samples had no sheuti in use in the survey season. Farm coverages of bucket and done were proximate so far as all-thana data were concerned but varied greatly within thanas. In the CDC area number of done in

use was larger than any other indigenous device. Bamboo tubewell, an innovation introduced recently in our country, was encountered in a small number in 4 thanas, namely Natore, Rangpur, Dinajpur and Gaibandha. From CDC area and eight other thanas, no report came in on operation of bamboo tubewell.

Power pump used for lifting surface water from river, canal and beel had an all-thana coverage of only 6.6 percent (Table 8.3). Hathazari, where no other mechanised device was in use and also no ground water utilization was there, had largest power pump coverage. CDC are had power pump operational on only 12.3 percent farms, nevertheless it had Second highest coverage as other thana coverages were still less. Mechanised devices lifting ground water are not discussed here as their status was adequately analysed in the preceeding section of this chapter.

Above discussions testify that surface water use for irrigating crops has been the dominant feature of irrigation in the survey area as elsewhere in Bangladesh. Installation as well as operation of ground water lifting devices is a highly technical job. Besides, ground water potential is not equal everywhere. In case of device use also, it is found that traditional devices cover more farms than mechanised ones. Notwithstanding the fact that traditional systems' dependability is low and efficiency of water use poor, mechanization of irrigation has been very sluggish due principally to high investment and complexity associated with mechanized devices.

Farmers in proximity of rivers, canals and thanks showed explicit eagerness to use mechanized means especially power pumps. Farmers' resource constraint and government's inability to provide them with the required support have been the major bottlenecks in expansion of irrigated area.

8.5 Drainage Problem and Causes

Adequate water use help maximize crop yields. But too much water is an impediment to plant growth and contributes to reducing yields. As the present survey reveals, more than one-third farmers in the AETI thanas reported to have drainage problem in their rice field (See Table 8.4).

In the CDC area this problem was not so alarming (9.4%). The drainage stituation in Daulatpur, where about 93 percent farms reportedly has this problem, deserves further enquiry. In Gaibandha this problem was reported by more than half of the farmers and also requires an exclusive investigation. Outside CDC area, drainage problem was minor in Dinajpur, Rangpur, Natore and Begumganj.

Of four reasons cited by farmers, excessive rain was the most important factor (52.8%). Except in Dinajpur, it created drainage problem everywhere. Flood caused a problem in varying degrees in all thanas except in Gouripur, Natore, Sylhet and Begumganj. Over-irrigation created, albeit to a small extent, problem in Rangpur, Gaibandha, Hathazari and Joydevpur. In Gouripur and Gaibandha many farms due to lower elevation suffered from drainage problem. It was also reported by other thanas' farmers, but in smaller number. In CDC area none faced this type of drainage hazard.

Table 8.1: Farms in Neighbourhood of Water Sources

(Figures in %)

Thana	River	Canal	Tank	Beel	Well
Dinajpur	10.2	11.9	49.2	0	6.8
Rangpur	18.9	5.7	15.1	0	7.5
Gouripur	0	1.9	13.0	13.0	3.7
Sylhet	3.5	46.6	24.1	1.7	1.7
Natore	13.6	4.5	4.5	9.0	11.4
Ishwardi	17.0	5.7	5.7	3.8	3.8
Gaibandha	19.8	7.0	16.3	7.0	2.3
Sherpur	25.4	23.8	3.2	25.4	19.0
Faridpur	5.0	3.3	1.7	5.0	0
Begumganj	1.6	17.7	17.7	3.2	0
Hathazari	0	48.2	78.6	1.8	3.6
Daulatpur	5.4	21.4	5.4	3.6	1.8
Joydevpur	20.8	0.9	10.4	0	0.9
All Thana	11.7	14.4	18.3	5.4	4.4

Table 8.1: Farms in Neighbourhood of Water Sources

(Figures in %)

Thana	DTW	STW	HTW	Other	Total
Dinajpur	30.5	10.2	8.5	0	127.3
Rangpur	13.2	3.8	1.9	0	66.0
Gouripur	0	0	0	3.7	35.2
Sylhet	0	0	1.7	0	79.3
Natore	9.0	4.5	4.5	2.3	63.6
Ishwardi	28.3	3.8	0	0	67.9
Gaibandha	23.3	9.3	8.1	3.5	96.5
Sherpur	28.6	15.9	0	4.8	146.1
Faridpur	18.3	13.3	0	0	48.3
Begumganj	3.2	1.6	0	0	45.1
Hathazari	0	0	0	1.8	132.1
Daulatpur	0	0	0	0	35.0
Joydevpur	49.1	1.9	0.9	0.9	85.8
All Thana	18.1	5.0	2.2	1.4	80.1

Table 8.2: Irrigation Source Utilization

(Figures in %)

Thana	River	Canal	Tank	Beel	Well	Other	Sub-Total(A)
Dinajpur	1.7	8.5	28.8	0	8.5	0	47.5
Rangpur	9.4	1.9	5.7	0	1.9	0	18.9
Gouripur	1.9	3.7	7.4	3.7	0	0	16.7
Sylhet	3.4	43.1	22.4	0	0	0	69.0
Natore	2.5	2.5	2.5	7.5	0	2.5	17.5
Ishwardi	1.9	0	1.9	1.9	1.9	0	7.5
Gaibandha	7.0	10.5	9.3	4.7	5.8	1.2	38.4
Sherpur	12.7	17.5	1.6	25.4	11.1	7.9	76.2
Faridpur	5.0	0	0	0	0	0	5.0
Begumganj	0	56.5	61.3	4.8	3.2	0	125.8
Hathazari	0	33.9	75.0	1.8	1.8	0	112.5
Daulatpur	0	8.3	1.7	1.7	1.7	0	13.3
Joydevpur	18.9	0.9	9.4	8.5	1.9	0	30.2
All Thana	5.9	14.0	17.1	4.9	3.1	0.9	45.8

Table 8.2: Irrigation Source Utilization

(Figures in %)

Thana	DTW	STW	HTW	Sub-Total(B)	Total (A+B)	Rain
Dinajpur	28.8	13.6	11.9	54.2	101.7	22.0
Rangpur	13.2	3.8	1.9	18.9	37.8	60.4
Gouripur	0	0	0	0	16.7	64.8
Sylhet	0	0	0	0	69.0	29.3
Natore	10.0	2.5	2.5	15.0	32.5	2.5
Ishwardi	24.5	1.9	0	26.4	33.9	13.2
Gaibandha	17.4	7.0	7.0	31.4	69.8	16.3
Sherpur	28.6	15.9	0	44.4	120.6	28.6
Faridpur	13.3	6.7	0	20.0	25.0	53.3
Begumganj	3.2	1.6	0	4.8	130.6	59.7
Hathazari	0	0	0	0	112.5	51.8
Daulatpur	0	0	0	0	13.3	56.7
Joydevpur	45.3	1.9	0	47.2	77.4	19.8
All Thana	16.2	4.3	1.8	22.4	68.2	35.6

Table 8.3: Irrigation Device Use

(Figures in % of Households)

Thana	Indigenous				
	Done	Sheuti	Bucket	Bamboo Tubewell	Sub-Total(A)
Dinajpur	47.5	44.1	49.2	1.7	142.4
Rangpur	11.3	9.4	20.8	1.9	43.4
Gouripur	1.9	3.7	5.6	0	11.1
Sylhet	13.8	44.8	10.3	0	68.9
Natore	9.1	9.1	2.3	2.3	22.7
Ishwardi	3.8	13.2	7.5	0	24.5
Gaibandha	1.2	22.1	8.1	1.2	32.6
Sherpur	44.4	49.2	0	0	93.6
Faridpur	0	0	18.3	0	18.3
Daulatpur	10.0	0	15.0	0	25.0
Begumganji	8.1	54.8	37.1	0	100.0
Hathazari	5.4	28.6	25.0	0	59.0
Joydevpur	38.7	32.1	20.8	0	91.6
All Thana	16.3	25.1	17.2	0.5	59.1

Table 8.3: Irrigation Device Use

(Figures in % of Households)

Thana	Mechanised					Total (A+B)
	Power Pump	DTW	STW	HTW	Sub-Total(B)	
Dinajpur	0	28.8	13.6	11.9	54.2	196.6
Rangpur	7.5	13.2	3.8	1.9	26.4	69.8
Gouripur	0	0	0	0	0	11.1
Sylhet	1.7	0	0	0	1.7	70.6
Natore	9.1	9.1	2.3	2.3	22.7	45.4
Ishwardi	0	24.5	1.9	0	26.4	50.9
Gaibandha	4.7	17.4	7.0	7.0	36.1	68.7
Sherpur	0	28.6	15.9	0	44.5	138.1
Faridpur	5.0	13.3	6.7	0	25.0	43.3
Daulatpur	0	0	0	0	0	25.0
Begumganj	6.4	3.2	1.6	0	11.2	111.2
Hathazari	37.5	0	0	0	37.5	96.5
Joydevpur	12.3	45.3	1.9	0	59.5	151.1
All Thana	6.6	16.2	4.3	1.8	29.0	88.1

Table 8.4: Drainage Problem and Causes

(Figures in No. of Households)

Dinajpur	Drainage Problem		Problem Caused By			
	Yes	No	Flood	Excessive Rain	Over Irrigation	Low Elevation & Other
Dinajpur	10(16.9)	49(83.1)	2	-	-	8
Rangpur	11(20.7)	42(97.3)	6	7	1	5
Gouripur	18(33.3)	36(66.7)	-	17	-	12
Natore	7(15.9)	37(84.1)	-	5	-	1
Sylhet	12(20.7)	46(79.3)	-	8	-	3
Ishwardi	20(37.7)	33(62.3)	2	17	-	6
Gaibandha	46(53.5)	40(46.5)	30	25	2	17
Sherpur	27(42.9)	36(57.1)	17	26	-	2
Begumganj	12(19.4)	50(80.6)	-	7	-	7
Hathazari	18(32.1)	38(67.9)	2	13	8	6
Faridpur	17(28.3)	43(71.7)	2	15	-	3
Daulatpur	56(93.3)	4(6.7)	21	51	-	6
AETI Areas	264(37.9)	444(62.1)	84(23.2)	191(52.8)	11(3.0)	76(21.0)
CDC Areas	10(9.4)	96(90.6)	2	4	4	-

Note: Figures in parentheses are percentages