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Management of Community Based Low Cost Multi-purpose Deep Tube Well: A Case Study of Mahasthangorh Project in Bangladesh

Md. Khalid Aurangozeb[1]

Abstract

The objectives of this research were to study the management of water user group in Mahasthangorh community based low cost multi-purpose deep tube well project and to assess extension activities provided for the water user group which was implemented by Centre for Irrigation and Water Management (CIWM) of Rural Development Academy (RDA) Bogra.

This was a case study which carried out by the qualitative research methodology approach. It was conducted in one community Water User Group (WUG) in Mahasthangorh village, Shibgonj Upazila, Bogra, Bangladesh. Data were collected from 23rd September to 23rd October 2009. The findings revealed that the WUG of Mahasthangorh community based low cost multi-purpose deep tube well project irrigation system partially managed by them. The WUG received very few number of training on irrigation management. The farmers were aware of the importance of community based irrigation system as it revealed in the study that the group performed its activities at quite satisfactorily and systematically. This was because of the community ownership and strong solidarity among the group members, the members actively participated and continuously contributed to the group activities, thus they were able to operate the irrigation system and keep facilities in good condition. All beneficiaries mentioned that they had enough water for both domestic and agricultural purposes and also for income generating activities. They have diversified livelihood opportunities due to the irrigation project and their level of income increased. The group received very limited extension services from other government organizations and NGOs. CIWM is the major extension service provider. Electricity supply is a major problem for the group to operate the irrigation system continuously, mainly in the Boro season rice cultivation.

1. Introduction

The major portion of irrigation system in Bangladesh is run by the private owners. The major irrigation equipment is shallow tube well and very small number of deep tube well is run by the private owners.

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In the dry season most of the shallow tube wells become malfunction due to reduction of ground water table level. As a result, loss of crop production and low productivity is a common phenomenon in the Northern part of Bangladesh. On the other hand profit making is the main motto of the private owners of deep and shallow tube wells.

They want to get investment back as possible early by charging higher rate for water by keeping eye on market rate. Moreover, they are not accountable to the water users. Absence of competition within the command area is also an important factor.

In Bangladesh, the use of deep tube well is based on season and mainly for irrigated rice production and rest of the time it is just idle but the owners has to bear the maintenance cost of the machine and cost of electricity supply. As a result the deep tube well owners impose high charge on water to recover their off season loss. In most of the cases the farmers are exploited by the private tube well owners. To address said problem of rural people, Rural Development Academy (RDA), Bogra developed the community based low cost multi-purpose deep tube well model in1998. In this model, the installation cost of deep tube well is lower than traditional system and it is demand driven. The deep tube well runs round the year and the community can use its water for their income generating activities like poultry farming, fish culture, dairy farming and domestic purposes along with agriculture. RDA, Bogra implemented the project at Mahasthangorh village in Bogra district to examine the feasibility of the model for replicating it in other parts of the country. Mahasthangorh project was established in 2004 with the support of the government fund.

2. Objectives

Within the water user community of Mahasthangorh low cost deep tube well project, some problems were found such as management of deep tube well in operating and maintaining of irrigation system, support services provided to the community including agricultural extension and farmers' field school. Hence, the study has the following objectives:

i. To study the management system of water user group in Mahasthangorh community based low cost multi-purpose deep tube well action research project; and

ii. To assess extension activities provided for the water user group of Mahasthangorh project.

3. Research methodology

The study was conducted at Mahasthangorh irrigation project in Bogra district of Rajshahi division. Research method was qualitative; interviews and direct observations were used to explore people's views, opinions and their level of satisfaction on their skills and knowledge in water distributing, operating and managing activities in their organization. The following tools and methods were used to collect data for the study. Respondents for the guided interviews, key informant interviews and group discussions were selected by purposive sampling and conducted as follows:

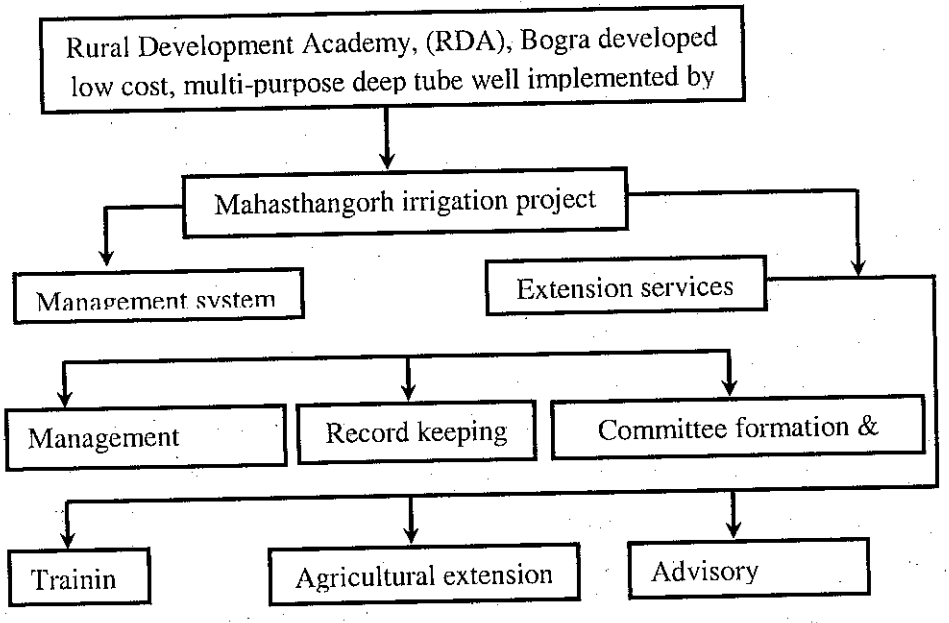
1. Guided interviews (2 official from CIWM);
2. Key informant's interviews (20 persons were interviewed);
3. Group discussions (One group discussion was conducted with 15 persons); and
4. Direct observations.

Descriptive case study approach was applied for this study. The approach was based on documentation of the Mahasthangorh irrigation project. That was the management of the low cost multi-purpose deep tube well and extension services received by the community members of the village.

Primary data for the study were collected through direct observations and in-depth interviews with the beneficiaries, the CIWM officials, stakeholders and the local village leaders from the target village. For in-depth interviews, the researcher discussed with the committee leaders and members of the irrigation project and 20 beneficiaries of WUG member's from 4 sub-groups (3 from each sub-groups=12) officials from CIWM and 3 stakeholder were the key informants. Head of CIWM and two staffs were interviewed. These data were collected from 23 September to 23 October 2009. The secondary data used in this study were collected from the members, from relevant sources, from project documents, from management committee and from CIWM the specialized wing for irrigation and water management of Rural Development Academy, Bogra. During study, the secondary data were collected from the relevant documents and concerned offices by the researcher.

3.1 Conceptual framework

According to the literature reviewed earlier, the conceptual framework of this study would cover the main aspects as follows:



3.2 Data analysis

Data were analyzed qualitatively and through content analysis as proposed in the conceptual framework. During primary and secondary data collection from different sources, methods and concepts based on triangulation principles was applied.

Analysis was based on comparisons between 3 sub-groups within community with 5 members from each sub-group. The analysis focused on the effectiveness of management of the irrigation project and extension activities provided in the Mahasthangorh low cost multi-purpose community based irrigation project.

4. Results and Discussions

4.1 Self- evaluation of committee members

During the interviews, 3 committee members of the WUG of Mahasthangorh irrigation project were asked to evaluate/ estimate their knowledge and skills in performing the

management tasks and utilization of knowledge and skills for each activity according to their roles and responsibilities. Table-1 indicates the results.

Table-1: Self- Evaluation of Committee Members of WUG

Activities/ Skills	Very poor	Poor	Average	Good	Very good	Total
Planning Process	-	-	1	2	-	3
Implementation	-	-	-	3	-	3
Supervision/ Guidance	-	-	-	3	1	3
Monitoring	-	-	-	2	-	3
Evaluation	-	-	1	2	-	3
Economic Resource Management	-	1	1	1	-	3
Resource Mobilization	-	2	1	-	-	3
Resource Utilization	-	-	1	2	-	3
Problem solving	-	-	-	3	-	3
Reporting	-	-	1	2	-	3

Source: Field Survey, 2009

According to the self-evaluation of the committee members of WUG on knowledge and skills in performing duties and responsibilities of irrigation operation and management within their group, above table shows the statements made by them.

Most of the members rated themselves as good in 3 topics (implementation, supervising and problem solving). Out of three, two topics were rated themselves and rated as good in five topics. One of them rated themselves as poor in the same topic (resource mobilization) and one of them rated himself as poor in economic resource management.

4.2 Members' views and satisfaction

Fifteen Beneficiary farmers of WUG were asked to express their opinions and responses regarding the satisfaction of their own views about the management performed within the group in providing services to its members which can summarize as in the following figure-01.

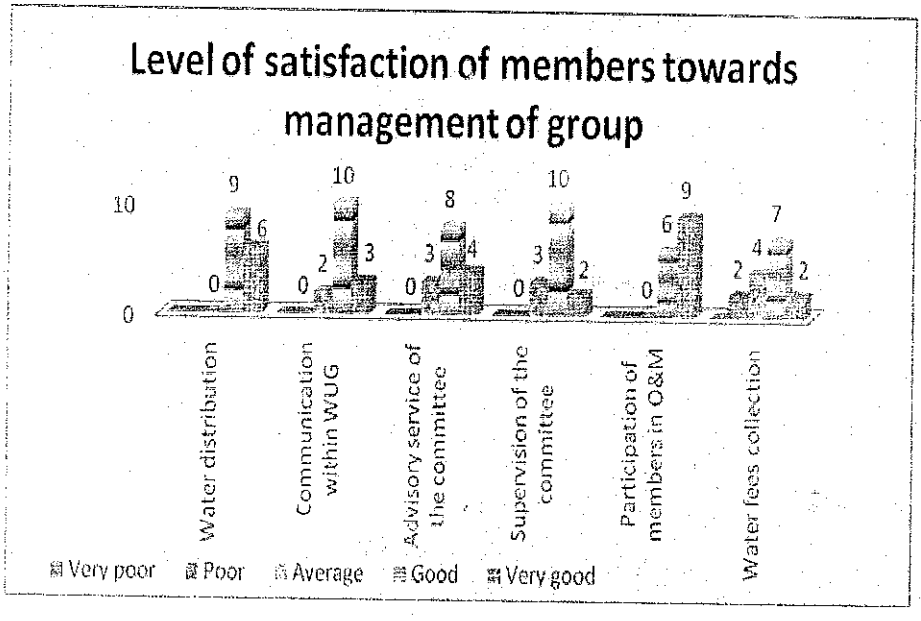


Figure-1: Members' View and Level of Satisfaction towards the Management of Their Group

All beneficiaries who were interviewed during the data collection mentioned that they get enough water for both domestic and agriculture purposes, thus among fifteen members, nine of them rated as good and six rated as very good in water distribution. Ten rated as good in communication within the group, three rated as very good and only two rated as average. In case of advisory service eight rated as good, four rated as very good and three rated as average. There were ten of them rated as good in supervision, two rated as very good and three rated as average in supervision of the committee. The members of WUG strongly agreed that they participated highly in operation and maintenance of irrigation system as it is found that among 15 members 6 rated as good and 9 rated as very good in the topic participation in O&M. There are 7

out of 15 rated as good, 4 rated as average and on the other hand 2 reported as poor and as very good in the same topic water fees collection.

4.3 Committee formation and disposal

4.3.1 Committee formation

Uphoof (1984) stated that organization can function through various organizational networks which bridges community with institutions, controlling resources and politics. Committee formation of the water user group is participatory and it is formed in the annual general meeting for two years tenure. Any member who fulfills the membership criteria can participate in the election process for the post of president, secretary, treasurer and member. The committee is comprised of 8 persons.

4.3.2 Disposal of the committee

Normally the term of the committee is two years, when the term is over, in the annual meeting; the former committee presents their two years statement at a glance and arranges election for new committee. After the election of new committee, former committee hands over its duties and responsibilities for newly appointed committee members. If there is any conflict or disagreement among the members of the group then they request the president to call for an especial meeting to solve the problem and inform CIWM officials to help to sort out the problem. From the inception period up to now no committee has removed during its tenure.

Section 1.014.3.3 Extension services provided to Water User Group (WUG)

According to the national rural development priority program, the CIWM, specialized wing for water and irrigation management of Rural Development Academy, Bogra made an extension strategy for the Mahasthangorh irrigation project which has already been implemented through specific plans, they are as follows:

i. High value crop production;
ii. Human resource development through training, field visits and field days;
iii. Irrigation extension;
iv. Providing safe drinking water and improving sanitation of the community;
v. Creating additional employment opportunities in the project area;
vi. Technology transfer in the field of agricultural production; and
vii. Providing credit facilities at very low interest.

CIWM is the implementing agency who actually plays the key roles in extension services for the beneficiaries of the water user group. Major activities of CIWM are monitoring the progress of irrigation project and providing consultative services to the concerned parties. The main activities for the field staff are monitoring water supply, selecting eligible members for credit, credit distribution, collection of credit installment, selecting members for training, statistics collection and disseminate within CIWM and the project.

4.3.3.1 Agricultural extension

The author of the FAO's agriculture extension, a reference manual defines: "a service or system which assists farm people through educational procedures in improving farming methods and techniques, increasing production efficiency and income, improving their levels of the living and lifting the social and educational standards of rural life". This definition includes the whole environment, in which a farmer lives and operates as a legitimate field for extension activities (FAO, 1994).

Before establishment of the project, the villagers of the Mahasthangorh had very little support in the field of agricultural extension and irrigation management. After completion the irrigation project CIWM starts their work with extension activities by their own agriculture specialists and made the village link with other service delivery agencies. The CIWM organized training courses in the Academy and on the spot farmers' field schools for different aspects of agricultural and income generating activities such as modern crop production technology, crop protection, seed production, soil, organic matter management, introduce high value crop, training nursery establishment, cattle rearing and treatment, psiculture, poultry rearing, electrical and plumbing training and irrigation equipments maintenance and training on delivery of services.

Though there is some limitation in extension activities but the villagers are quite happy with these extension activities especially with the farmers' field school. The farmers' field school is organized in the community thus a large number of participants can participate in the training program. The training program is divided in package like agriculture, livestock, fisheries and poultry rearing. The CIWM is responsible for the training and they invited guest trainer from different government agencies and their own specialists. For each training package required three days to complete the training. In 2008 the villagers of Mahasthangorh received three trainings in the field of

agriculture, livestock and fisheries. In this training program anybody can join although he or she is not a community member.

4.3.3.2 Advisory services

During the field research, it was found that CIWM provide advisory services to the community but it is concentrate on the pump operation and irrigation system. In the field of income generating activities and agriculture, CIWM can not provide advisory service according to the demand of community members due to lack of staff.

4.4 Sustainability issues of the Water User Group (WUG) of Mahastangorh irrigation project

Based on the result of this study, it can be highlighted that the WUG of Mahasthangorh project has a strong probability to sustain in the future for the following reasons:

4.4.1 Strength of the Water User Group of Mahasthangorh

As per the strength of the WUG, it could cover the majority portion of household for supply water for domestic and irrigation purposes. The WUG created self-employment opportunities, developed social harmony, efficient irrigation management, increased household economy, increase cropping intensity, adopted modern technologies and significantly increased the crop yield. Above all, the WUG works on a formal organizational structure and decisions are taken democratically with the active participation of the common members. The study point out the following specific strengths of the group:

- Sense of ownership;
- Membership discipline;
- Participation, transparency and accountability in management;
- Dynamic leadership; and
- Community awareness and solidarity.

4.5 Problems related to management of Water User Group (WUG)

As many problems as mentioned by the committee members and beneficiaries during the discussions and interviews concerning operational management and the problems that they are facing which can be pointed out as follows:

i. Due to lack of experience and knowledge, it is difficult for them in record keeping and accounting as it was found that the group has very few reports, only credit supervision report to the CIWM and the money spent for repairing the pumps and extension of irrigation cannels and administrative fee for the committee of the group;

ii. The committee members and beneficiaries had responded almost the same answers that they are lack of knowledge about effective resource mobilization and select member to mobilize resource;

iii. After construction of the irrigation facilities, there are very few extension services provided to the WUG;

iv. The beneficiary members received very few training and sometimes the training topics were not relevant to their livelihood;

v. The committee members received very little training about irrigation management and how to manage finance;

vi. Due to scarcity of electricity (load shedding), the pump operation is disrupted and as a result water delivery also disturbed specifically at the Summer season and dry season rice cultivation (Boro season);

vii. Electricity bill is very high but supply is not satisfactory for pump operation and no provision of reimbursement of water fee due to crop loss; and

viii. There is no provision of input supply like seed, fertilizer and making market linkage with the market for the farmers.

4.6 Members opinions for future improvement

From the group discussions and interviews of the committee and some beneficiaries of WUG, they made suggestions for better improvement in the future. Though the group members are satisfied of operational management of their group and their committee members, they believe that they perform better than before the project started for their water sufficiency for domestic and agricultural purposes. However, they expect the CIWM staffs to visit regularly and help them in different aspects, the following list is the training topics and extension activities that they need:

i. Water management and group management;
ii. Marketing/ building market linkages;
iii. Training on resource management and mobilization;
iv. Provide inputs like improved seed, fertilizer etc.;
v. More training on income generation activities like nursery establishment, dairy farm, poultry rearing, plumbing etc.;
vi. The group should establish linkage with other groups and organizations; and
vii. The beneficiaries who have not participated in any training should get chances for training.

5. Conclusion

The following conclusions are drawn based on the findings of the study related to various factors influencing management and provided extension services for the Mahasthangorh water user group.

5.1.1 Management of the group

Findings of the study indicate that, it is quite possible for the WUG of Mahasthangorh community to partially manage irrigation system by themselves. The implementing agency CIWM is playing a significant role to achieve the group independent management and support the group in various ways to establish the group as an institution for long time community benefit. Though the group has limitation but they are trying to make close network with other community development institution for their future improvement.

5.1.2 Extension activities provided to the group

From the field observations and interviewing of the committee and group members it was found that the extension services provided for the group from implementing agency CIWM and other agencies are very limited. The committee and the members still lack of knowledge in many aspects such as management skill, resource mobilization, financial management and record keeping. The group has lack abilities to do specific activities related to income generation for socio-economic development.

Literature review indicates that community development and community organization theories suggest that the target group must be considered first hand and motivates them

in "self help" approach. No matter how much effort and inputs spend for the group, it will not be sustainable if they are not aware and try to solve their problem by own. The government agencies or other nation building organizations should ensure technical and financial supports to strengthen the capacity of community members. The development worker and officials should consult with the members and motivate them to achieve their goals. At the time of working with the community members, the change agents should prove that they are real friend and partner of development for the community.

6. Recommendations

The recommendations are made on the basis of the study findings to provide feedback to the implementing agency and the WUG of Mahasthangorh for their betterment according to the study objectives.

6.1 Recommendations to CIWM

Based on the findings of the study, the following recommendations are presented below:

The study recommends the CIWM as implementing agency should cooperate with the Group for establishing data base in group level. More training should be provided in the field of group management of the community. In fact the resource mobilization activities of the group is limited due to lack of own money and skills of resource mobilization of the committee thus more attention should be given in the field to save the group from financial crisis. The government sector should support in marketing issue to provide proper price of agricultural products of the group as a means of stable production. CIWM should asses the farmers needs at first then provide the extension service.

From the study findings, it is clear that the group has lack of management skills. Therefore, the researcher recommends that CIWM should provide training to the group titled as farmers group management training, accounting and book keeping for irrigation management, training on knowledge management and record keeping and local institution management.

6.2 Recommendation to the Water User Group (WUG) of Mahasthangorh

The proposed recommendations for the WUG are as below:

The group should try to achieve the self sufficiency in terms of decision making, planning, implementation, resource mobilization, monitoring and evaluation their

performance by their own. The researcher would like to recommend that the farmers should form a self help group and the farmers who attended any kind of training and they should share their knowledge with the farmers who do not attend training. In order to preventing of unexpected events which can occur at any time and to solve such a problem on time the group must utilize their resource and make judicious use of water of the project. Concerning this resource mobilization issue the committee and the members have to be trained how/ where the resource should be mobilized.

6.3 Recommendations for further studies

The present study was carried out in a small part of the issue about the management of community based WUG. Similar studies should be conducted in other WUGs which could be helpful for effective policy formation to operate this kind of project. The study could not come to firm conclusions about the management skills of WUG. Further studies should be conducted on the following aspects:

i. To study the factors affecting on the management of WUG; and

ii. Roles of WUG in O&M and Resource Mobilization in the Irrigation Management Transfer System (IMT).

References

FAO. (1994). "*Agricultural Extension*": A reference manual, 2nd edition. FAO, Rome

Uphoff, N. (1984). "*Analyzing option for Local Institutional development*": Rural Development Committee, Cornell University: New York

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Yield Performance of the Seven Indigenous Potato Varieties Under Different Storage Condition

Md. Feroz Hossain[1]

Abstract

In order to maximize the yield of Indigenous Potato Varieties (IPV) through selection of cultivar and methods of storage for seed tubers, an investigation was undertaken at the demonstration farm of Rural Development Academy, Bogra during the period from November, 2007 to March, 2008. The experiment included seven different indigenous potato varieties and two types of sources of seed (diffuse light store and cold store). In this study, seed potatoes were planted on November 14, 2007 in a Randomized Complete Block Design with three replications. The influence of potato varieties and type of seeds under different storage conditions, yield and yield contributing characteristics were found significant. The tallest plant (78.2 cm) and maximum number (7.0) of stems per hill were produced by the variety Dohazari lal, but Dohazari lal required the maximum days(107) for maturity and the shortest (81) variety was found Challisha. In respect of seed type, it showed that seed stored under diffused light and cold storage required minimum days (97) for maturity. The highest tuber yield (27.8 kg) per plot (3x2.4 sq.m) and per hectare (38.6 ton) was obtained from the combined effect of cold stored seeds of Ausha variety. When independent effect of varieties and seed type in relation to tuber yield per hectare was taken into consideration, Ausha variety (36.9 t/ha) and cold stored seeds (32.7 t/ha) were found to be produced maximum tuber yield respectively. From the above study, it can be concluded here that the cold stored seeds of most of the indigenous potato varieties gave over all better performance in respect of yield and other characteristics, but in some cases it was identical to diffuse light stored seeds. Considering the shortage of cold storage facilities, transport problem and economic condition of the farmers of Bangladesh, diffused light storage seed tubers would be acceptable to many farmers.

Introduction

Potato (*Solanum tuberosum*) is a member of the family Solanaceae. The crop has been cultivated in Bangladesh for more than a century. At present, the area under potato in Bangladesh is about 4 lakh hectares, out of which nearly 2.8 lakh hectares are under modern varieties and the rest are covered by Indigenous Potato Varieties (IPV).

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IPV covers about 20-30% of the total potato area in Bangladesh. The farmers maintain the IPV because of many favorable factors like better in taste, higher market price, better storage quality, low seed rate, disease resistance and relatively low input requirement. Good quality seed is one of the major limiting factors of IPV production in our country. It is also necessary to select varieties with higher yield potential. Many of the IPV growers of Bangladesh use home stored seed in potato production. There is a relative advantage of using home stored seed when different factors are considered. But the field performance of home stored seed compared to the cold stored seed is not well known. It is also possible that different varieties will have different responses in this aspect.

Keeping these considerations in view, an experiment was conducted to examine the field performance of the tubers of seven indigenous potato varieties stored under diffuse light store-house and cold storage conditions.

2. Materials and Methods

2.1 Site of the experiment

The Experiment was conducted at the demonstration farm of Rural Development Academy, Bogra during the period of 2007-2008.

2.2 Soil of the experimental site

The soil of the experimental site was clay loam in texture belonging to the level Barind Tract. The colour of the soil was red. The pH range was from 5.5 to 6.0.

2.3 Weather condition of the site

The experimental area is under the sub tropical climate, characterized by heavy rainfall during the months of April to September and scare during the rest period of the year. The total rainfall of the locality was 42 mm during the growing period from November, 2007 to February,2008.

2.4 Planting materials used

The materials of the study were seven indigenous varieties of potato (*Solanum tuberosum*). Uniform size of the tubers was selected for planting. The average diameter of the tubers was 20-30 mm.

2.5 Land preparation

The selected experimental plot was opened firstly by a tractor in one month before planting. Several ploughing and cross ploughing followed by laddering were done until the desired tilth was achieved for planting the tubers. During land preparation, weeds and stubbles of the previous crops were collected and removed from the field. Irrigation and drainage channels were prepared around the plots in three days before planting the potato tubers. Soil was treated with Darsban 20 EC at the rate of 20 ml/10L of water.

2.6 Manure and fertilizer application

The crop was fertilized with 20 t/ha of cow dung, 276 kg/ha of urea, 185 kg/ha of TSP, 322 kg/ha of MP, 75 kg/ha of Gypsum, 25 kg/ha of Zinc Sulphate and 9 kg/ha of Borax.

Well rotted cow dung was applied as a basal dressing during land preparation. Half of urea and the entire quantity of others fertilizers were applied during the final preparation of land and thoroughly mixed with the soil. Rest of amount of urea was applied in two equal splits at 25 and 40 days after planting of tubers.

2.7 Experimental treatments

The present experiment consisted of two sets of treatments viz. different potato varieties and type of seed. The treatments were as follows:

2.7.1 Potato varieties

i. Lal shill
ii. Ausha
iii. Lal pakri
iv. Festa Shil
v. Challisha
vi. Dohazari lal
vii. Shada guti

2.7.2 Storage Type

i. Diffused light stored
ii. Cold stored

2.8 Layout and design of the experiment

The experiment was laid out following Randomized Complete Block Design (RCBD) with a factorial arrangement of seven different local potato varieties and two seed

types. Three replications were used in this study. There were fourteen combinations and three blocks (replications) making a total number of 42 plots. Each block consisted of fourteen plots and an individual plot was 3.0 m x 2.4 m i.e 7.2 sq.m in size. A distance of 1.0 m and 0.5 m in the form of drain was maintained between blocks and plots respectively. The treatments were randomly distributed within the blocks.

2.8.1 Planting of tubers

Healthy and uniform tubers were planted on 14 November, 2007. After planting, the tubers were covered with soil. The spacing was maintained 60 cm x 15 cm, thus accommodating 80 tubers in each plot.

2.8.2 Inter-cultural operations

Weeding and mulching were done as and when required to keep the plot free from weeds. Earthing up was done twice in the growing period with pulverized soil. Irrigations were done at 15 days after germination and every 20 days interval later on.

Dithane M-45 at the rate of 50 g in 10 L of water was applied during the growing period at an interval of two weeks until one month before harvesting to prevent the late blight infection. To control the same diseases, Ridomil MZ 72 WP at the rate of 25 g in 10 L of water was applied once before 25 days of harvesting.

3. Data collection

The experimental plots were observed frequently to record changes of plant geometry at different stages of growth. The final harvesting was done when the maximum number of plants under different treatments showed the sign of maturity. The observations were made on the following parameters:

i. Days required for 80% emergence;
ii. Foliage coverage (%) at 60 and 80 DAP;
iii. Average height of plant at maximum growth stage;
iv. No. of stems/hill at maximum growth stage;
v. No. of days required for maturity;
vi. Yield of tubers/hill (in gram);
vii. Yield of tubers/plot (in kg);

viii. No of tubers/hill;

ix. Yield of tubers/ha (in tons); and

x. Percentage of <20mm, 20-30mm and >30mm size tubers (by weight).

3.1 Statistical analysis

The yield and yield parameters were analyzed following M-stat Program by a IBM computer following two factors RCBD wherever necessary. The mean for all the treatments were calculated and the analysis of variances for most of the characters under consideration was performed by F-variance test. The significance of the difference among the treatments was evaluated by Least Significant Difference (LSD) test for interpretation of the result.

4. Results and Discussions

The results obtained from the present study on main and combined effects of different indigenous potato varieties and different storage types are presented in this chapter. Some of the data have been presented in table(s) for ease of discussion and understanding. A summary of the Analysis Of Variance (ANOVA) in respect to all the parameters has been shown in Appendix-Ia, Ib. The results are presented under the following heads:

4.1 Days to 80% emergence

There was no significant difference in the days to 80% emergence among the varieties and storage type (Appendix-Ia,Ib).The interaction effect of indigenous potato varieties and different storage type was significant (Appendix-Ia,Ib) in respect of days to 80% emergence. It ranged from 17.33 to 22.67 days. The longest time (22.67 days) required for 80% emergence was observed from the combination of local stored seed of Lalpakri variety. Cold stored Ausha variety took the shortest time (17.33 days) for 80% emergence.

4.2 Height of plant at maximum growth stage

Plant height due to the effect of different indigenous potato varieties showed significant variation among them (Appendix-Ia,Ib). The tallest plant (78.2 cm) was obtained from Dohazari lal and the shortest plant (61.6 cm) was produced by Lalpakri (Table-1). The plant height with different storage type exhibited wide variation (Table-2). The variation was highly significant (Appendix-Ia,Ib). The plant height (75.9 cm) with cold

stored seeds was significantly higher than local stored seeds (64.5 cm). The analysis of variance (Appendix-Ia,Ib) indicated significant effect on plant height due to the interaction of variety and type of storage. The tallest plant (85.51 cm) was found from the treatment combination of cold store seed of the variety Dohazari lal, and the shortest plant (55.63 cm) was found from the diffuse light stored seeds of Challisha variety.

4.3 Number of stems per hill

The effect of different varieties in respect of number of stems per hill was highly significant (Appendix-Ia,Ib). The highest number of stems per hill (no.7.0) was produced by Dohazari lal, whereas the lowest (no.5.1) was produced by Lal Pakri (Table-1). Different storage type caused significant variation in the number of main stems per hill. The cold stored potato seeds gave the higher number of stems (no.6.5) per hill. The interaction effect of different indigenous potato varieties and storage type was significant (Appendix-Ia,Ib). Maximum number of stems per hill (no.7.23) was produced by the treatment combination of cold stored seeds of Dohazari lal variety and the minimum (no.4.77) was recorded from the diffused light stored seeds of Challisha variety. While the rest of the treatment combinations produced intermediate number of stems per hill (Table-03).

4.4 Days of maturity

Table-01 reveals significant variation in days to maturity due to the different indigenous potato varieties (Appendix-Ia,Ib). They ranged from 84 to 107 days. The maximum time (107 days) required for maturity was observed in Dohazari lal variety which was statistically identical with Festashil. The shortest time for maturity (81 days) was observed in the variety Challisha (Table-01). Significant variation in respect of days to maturity was recorded due to the effect of different storage types (Appendix-Ia,Ib). Table-02 reveals that the plants from diffused light stored seeds required 97 days to maturity and the plants from the cold stored seeds required 99 days. While combined effects (Table-03) of different indigenous potato varieties and different storage type were considered, it was observed that the maximum number of days (108) was required for maturity by the plants grown from diffuse light stored seed of Dohazari lal and Festashil varieties.

4.5 Weight of tubers per hill

There was a significant variation in the weight of tubers per hill due to the effects of different indigenous potato varieties (Appendix-Ia,Ib). Ausha produced the highest yield of tubers (399g) per hill. The lowest tuber yield (253g) per hill was produced by the variety Festashil (Table-1). Results from table-02, showed that the plants from cold stored seeds produced higher tuber yield (336 g) per hill than the plants from the diffused light stored seeds (329 g). The combined effect of different indigenous potato varieties and storage type was found to be significant in respect of weight of tubers per hill (Appendix-Ia,Ib). The maximum weight of tubers (405 g) per hill was produced by the treatment combination of cold stored seeds of Dohazari lal variety and the cold stored seeds of Festashil variety (242g).

4.6 Number of tubers per hill

The number of tubers per hill in different indigenous potato varieties exhibited significant variation among them (Appendix-Ia,Ib). The maximum number of tubers harvested per hill (no.37) was obtained from the Lalshil variety which was close to Shadaguti (no.34), Dohazari lal (no.32) and Ausha (no.31) (Table-01).From Table-02, it is evident that the number of tubers per hill produced by the plants of diffused light stored seed (no.35) was significantly higher than the number of tubers produced by the plants of cold stored seeds. The data showed that the interaction between different indigenous potato varieties and storage type had significant effect on the number of tubers per hill (Table-03). The number of tubers per hill ranged from 21.6 to 40.6. The maximum number of tubers per hill (no.40.6) was found from the diffused light seed of Lalshil variety and the minimum (no.21.6) was found from the cold stored seed of Festashil variety.

Analysis of Variance of tuber yield showed that the different indigenous potato varieties and storage typed had highly significant influence on tuber yield per plot and per hectare (Appendix-Ia,Ib).Ausha produced significantly higher yield (26.57 kg) per plot which was statistically identical with Dohazari lal and Lalpakri were converted into yield per hectare, the figures were 36.9, 35.7 and 34.1 tons per hectare respectively (Table-01). It is revealed from Table-02 that the total yield per plot was 23.12 kg when cold stored seeds were used, compared to 21.07 kg when diffused light stored seeds were used. When the total yield per plot obtained from each seed type was converted

into total yield per hectare, the figures were 29.2 and 32.7 tons per hectare for diffused light stored and cold stored seeds respectively (Table-2). The combined effect of different indigenous potato varieties and type of seed was significant (Appendix-Ia,Ib). The maximum yield (27.8 kg/plot; 38.6 ton/ha) of potato was obtained from the combined effect of cold stored seeds of Ausha variety (Table-03)

4.7 Percentage of potato diameter in different grades

The percentage of potato in different size grades (diameter) varied significantly due to varieties (Appendix-Ia,Ib). The highest percentage (70.2%) of large size tubers (>30 mm) was obtained from Ausha variety and the highest percentage (16.4%) of small size tubers (<20 mm) was produced by Festashil variety (Table-1). It was observed that the influence of different storage type was significant in respect of size of tubers (Appendix-Ia, Ib). The highest percentage (62.6%) of >30 mm tuber was obtained from the plant of cold stored seed. When the interaction effect was considered, it was observed that the cold stored seeds of the variety Ausha produced the highest percentage (73.4%) of >30 mm size tubers.

Table-1(a): Yield and Yield Parameters of IPV

Variety	Days of 40% emergence	Height of plant (cm)	No. of main stems /hill	Foliage coverage %		Days to maturity	Weight of tubers / hill (g)	No. of tubers /hill
				45 DAP	60 DAP			
Lalshi1	21.6	71.8	6.6	67	90	106	274	37
La1 Pakri	20.8	61.6	5.1	60	84	84	387	28
Challisha	20.1	64.1	5.7	73	86	93	267	30
Sadaguti	19.8	74.4	6.6	79	100	106	312	34
Ausha	17.6	70.0	5.8	79	100	86	399	31
Festashi	20.6	71.5	5.8	73	100	107	253	27
Dohazari lal	20.6	78.2	7.0	70	98	107	390	32
LSD 5%	-	2.01	0.41	5.52	3.51	0.32	45.55	6.18
LSD 1%	-	2.71	0.56	7.46	4.75	0.43	61.57	8.35
CV (%)	14.3	2.4	5.7	6.4	3.1	0.28	11.5	16.4

Table-1(b): Yield and Yield Parameters of IPV

Variety	Yield of tubers /plot (kg)	Percentage below 20 mm	Percentage (%) 20-30 mm	Percentage (%) above 30 mm	Yield (t/ha)
Lalshi1	17.43	15.07	41.66	44.97	24.2
Lal Pakri	24.59	5.94	28.41	68.96	34.1
Challisha	16.19	9.79	30.96	60.73	22.48
Sadaguti	21.72	8.51	37.42	54.07	30.1
Ausha	26.57	4.71	25.04	70.24	36.9
Festashi1	19.65	16.43	38.18	51.22	27.2
Dohazari lal	25.66	9.32	35.95	54.72	35.7
LSD 5%	2.50	3.71	7.04	10.17	3.47
LSD 1%	3.38	5.02	9.52	13.75	4.60
CV (%)	9.7	31.4	17.5		9.7

Table-2(a): Storage Type Effect on the Yield and Yield Parameters of IPV

Storage type	Days of 80% emergence	Height of plant (cm)	No. of main stems/ hill	Foliage coverage %		Days to maturity	Weight of tubers /hill (g)	No. of tubers/ hill
				45 DAP	60 DAP			
Under diffused light	20.5	64.5	5.7	68	93	97	329	35
Under cold condition	19.9	75.9	6.5	75	95	99	323	28
LSD 5 %	-	1.07	0.22	2.95	1.88	0.17	-	3.30
LSD 1 %	-	1.45	0.29	3.99	2.54	0.23	-	4.46
CV (%)	14.3	2.4	5.7	6.4	3.1	0.28	11.5	16.4

Table-2(b): Storage Type Effect on the Yield and Yield Parameters of IPV

Variety	Yield of tubers /plot (kg)	Percentage (%) below 20 mm	Percentage (%) 20-30 mm	Percent above 30 mm	Yield (t/ha)
Local stored	21.07	11.1	37.8	53.0	29.2
Cold stored	23.12	8.7	30.0	62.6	30.9
L.SD 5%	1.51	1.98	3.76	5.43	1.6
LSD 1%	2.04	2.68	5.09	7.35	2.24
CV (%)	9.7	31.4	17.5	14.8	9.7

Table-3 (a): Interaction Effect of Potato Varieties and Storage Type on the Yield and Yield Contributing Characters of IPV

Variety x storage	Days to 80% emergence	Height of plant (cm)	No. of main stems /hill	Foliage coverage %		Days to maturity	Weight of tubers /hill (g)	No. of tubers /hill
				45 DAP	60 DAP			
Lalshi1 x LS	20.0	67.65	6.43	63	88	107	297	40.56
Lalshi1 x CS	21.33	76.12	6.86	71	91	106	251	34.76
Lalpakri x LS	22.67	91.39	4.80	58	83	85	388	32.13
Lalpakri x CS	19.0	71.88	5.43	63	85	84	379	24.10
Challisha x LS	21.0	55.63	4.77	68	83	81	266	28.46
Challisha x CS	19.33	62.64	5.77	78	90	80	268	26.16
Shadaguti x LS	19.33	72.98	6.43	76	100	107	318	36.03
Shadaguti x CS	20.33	75.83	6.90	81	100	105	306	33.33
Ausha x LS	18.0	67.81	5.30	75	100	88	395	24.63
Ausha x CS	17.33	72.22	6.43	83	100	85	404	28.20
Festashil x LS	20.33	65.44	5.46	68	100	108	265	33.50
Festashil x CS	21.0	77.72	6.20	78	100	106	242	21.60
Dohazark 1al x LS	20.33	70.95	6.83	66	96	108	376	38.13
Dohazark 1al x CS	21.0	85.51	7.23	75	10	106	405	26.83
LSD 5%	4.87	2.84	0.58	7.8	4.9	0.45	64.4	8.74
LSD 1%	6.58	3.83	0.79	10.5	6.7	0.62	87.0	11.81
CV (%)	14.3	2.3	5.7	6.4	3.1	0.28	11.5	16.4

Table-3 (b): Interaction Effect of Potato Varieties and Storage Type on the Yield and Yield Contributing Characters of IPV

Variety x storage	Yield of tubers /plot (kg)	Percentage (%) < 20 mm	Percentage (%) 20-30 mm	Percentage (%) > 30 mm	Yield (t/ha)
Lalshi1 x LS	17.8	14.2	40.0	45.7	24.8
Lalshi1 x CS	16.9	15.8	43.2	44.2	23.5
Lalpakri x LS	23.3	8.1	32.2	59.5	32.4
Lalpakri x CS	25.8	3.7	24.5	78.3	35.8
Challisha x LS	15.5	8.1	36.5	58.2	21.6
Challisha x CS	16.8	7.4	33.3	60.3	23.3
Shadaguti x LS	21.8	9.2	42.3	48.4	30.3
Shadaguti x CS	21.6	7.8	32.4	59.7	30.0
Ausha x LS	25.2	5.0	27.8	67.0	35.1
Ausha x CS	27.8	4.3	22.1	73.4	38.6
Festashil x LS	19.8	20.4	40.1	51.0	27.6
Festashil x CS	19.4	12.4	36.1	51.4	26.9
Dohazark 1al x LS	23.7	13.1	45.6	41.2	32.9
Dohazark 1al x CS	27.5	5.5	26.3	68.1	38.4
LSD 5%	4.0	5.2	9.9	14.38	4.3
LSD 1%	5.4	7.1	13.4	19.44	5.9
CV (%)	9.7	31.4	17.5	14.8	9.7

Appendix –I (a): Analysis Of Variance (ANOVA) of the Data on Plant Growth and Yield Parameters as Influenced by Different Indigenous Potato Varieties and Storage Types

Variety	Days of Freedom	Days to 80% emergence	Height of plant (cm)	No. of stems/hill	Foliage coverage %		Days to maturity	Weight of tubers / hill (g)
					45 DAP	60 DAP		
Replication	2	19.14	1.71	0.08	43.45	2.38	0.02	568.38
Variety (v)	6	9.54 NS	197.11 **	2.69 **	252.57**	293.05 **	623.55**	20789.87
Seed type (T)	1	4.02 NS	1374.4 **	7.20 **	648.21**	48.21 NS	32.59 **	542.88 NS
Interaction (V &T)	6	4.07 NS	63.87 **	0.49 **	6.54 NS	9.32 NS	153.31**	3501.60 NS
Error	26	8.42	2.86	0.12	21.65	8.79	0.07	1472.84

*Indicates significant at 5% level, **Indicates significant at 1% level, NS Indicates not significant.

Appendix-I (b): Analysis Of Variance (ANOVA) of the Data on Plant Growth and Yield Parameters as Influenced by Different Indigenous Potato Varieties and Storage Types

Source of variation	Degree of freedom	Mean Sum of Square					
		No. of tubers/hill	Yield of tubers /plot (kg)	Percent < 20 mm	Percent 20-30mm	Percent > 30 mm	Yield (t/ha)
Replicaton	2	4.51	0.21	23.10	18.97	144.84	6.403
Variety (V)	6	77.15*	75.91**	114.13**	211.97**	519.32**	132.37**
Seed Type (T)	1	386.44**	43.84**	63.32**	637.72**	964.70**	130.27**
Interaction (V x T)	6	43.05**	12.18**	28.79**	71.59**	156.36**	44.16**
Error	26	27.11	5.7	9.80	35.26	73.46	6.83

* Indicates significant at 5% level, ** Indicates significant at 1% level, NS Indicates not significant.

5. Conclusion

Potato has been cultivated in Bangladesh for more than a century. At present, the area under potato cultivation is about 4 lakh hectares, out of which about 3 lakh hectares under modern varieties (MV) and rest of 1 lakh hectares under indigenous potato varieties (IPV). The total requirement of seed potatoes in Bangladesh is about 6 lakh tons. From the study, it can be concluded here that the cold stored seeds of most of the

indigenous potato varieties gave overall better performance in respect of yield and other characteristics, but in some cases it was identical to diffuse light stored seeds. Considering the cold storage facilities, transport problem and economic condition of the farmers of Bangladesh, diffused light storage of seed tubers will be acceptable to many farmers because IPV have long dormancy and relatively high dry matter content which encourages its natural preservation.

6. Recommendations

Good quality seed is one of the major limiting factors of Indigenous Potato Varieties (IPV) besides storage facilities also very limited and costly. However, the following recommendation may be given for the IPV growers in respects of IPV Seed preservation:

i. For preservation of IPV seed, natural diffused store is suitable and cost effective;

ii. The places where cold store facilities are not available;

iii. Northern part of Bangladesh especially Bogra, Jaypurhat, Rangpur, Nilphamari etc. are very effective areas for natural storage; and

iv. The natural storage cost is about Tk. 2 / kg of IPV seed where cold storage cost is Tk 5/ kg excluding transport cost.

References

Ahmed, K.U (1980). "*Indigenous potato varieties in Bangladesh*": A paper presented at the International Symposium on "Potato Production in the Humid tropics" held in Bandung, Indonesia, during 13-17 October, 1980

Bhuya,M.M. Quddus M.A. Sikka L.C. and Khan A.L.(1984). "*Performance and prospects of local potato varieties in the Districts of Bogra and Joypurhat*": 6th Workshop of Potato Research Workers, Potato Research Centre, BARI, Joydevpur, pp. 30-36

Habib, A.K.M.A. and Khan, A.L. (1984). "*A study on yield potentials of the indigenous potato varieties*":6th Workshop of Potato Research Workers, Potato Research. Centre, BARI, Joydevpur, pp. 24-29

Khan, A. L., Rashid A., Bari, M.A. and Habib,A.K.M.A. (1981). *"Rejuvenation of local varieties through cleaning of yellows"*: 4th Workshop of Potato Res. Workers, Potato Res. Centre, BARI, Joydevpur, pp. 85-88

Siddique, M.A. and Rabbani, M.G. (1986). Annual Report of the Project, *"Improvement of Indigenous potato Varieties 1985-86"*: Department of Horticulture, Bangladesh, Agriculture University, Mymensingh, 19p

Siddique, M.A. and Rabban, M.G. I. (1987). *"Annual Report of the Project, 'Improvement of Indigenous potato Varieties', 1986-87"*: Department of Horticulture, Bangladesh. Agriculture University, Mymensingh, 12p

Siddique, M.A. and Rabbani, M.G. (1988). Annual Report of the Project, *"Improvement of Indigenous potato Varieties, 1987-88":* Department of Horticulture, Bangladesh. Agriculture University, Mymensingh, 8p

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Analytical Assessment and Rural People's Perception on Environmental and Socio-economic Consequences of Shrimp Farming of Chakaria, Bangladesh

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Abstract

Brackish water shrimp farming in coastal zone of Bangladesh has been practicing over the last 30 years, but there is lack of data sources regarding the environmental and socio-economic consequences of brackish-water shrimp farming and people's perception on shrimp farming practices. To assess the environmental and socio-economic consequences of shrimp farming, an exploratory study was conducted by using two land use types viz. shrimp farm and agricultural (rice) land Chuarfari, Bheola-manikchor region of Chakaria, Cox's Bazar. Three water and soil samples were collected from each sampling site. Soil samples were collected at a distance of 50 meter and at depths of 0-10, 10-20 cm. The minimum value of pH (4.5) and EC (0.21 □s/cm) were found in the agricultural soil and the maximum as 9.75 and 5.64 □s/cm respectively in shrimp farming area. The Organic Carbon and Total Nitrogen Content of soil in the shrimp farm land significantly ($p \leq 0.05$) lower than that of the agricultural land. The pH, Electrical Conductivity, Dissolved Oxygen, Biological Oxygen Demand, and Total Soluble Solids values of the water in the shrimp farm ponds were significantly ($p \leq 0.05$) higher than that of source of water or discharged water. The study showed that the most of the respondents agreed that there is a loss of livestock, agricultural production, and wild life habitat in the locality due to shrimp farming. There are some changes in land ownership and social instability also due to shrimp farming.

Keywords: *Land use change, Aerial photographs, Satellite imageries, Chakoria Sundarban, freshwater prawn, environmental impacts*

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1. Introduction

The Chakoria Sundarban is located along with the Chittagong coast of Chakoria, Cox's Bazar. The Cox's Bazar coastal zone has a great importance since its historical abundance of natural resources. The local coastal communities of this area have been haphazardly utilizing the available natural resources of this region and consequently the natural resources base is now degrading day by day. One such example is the Chakoria Sundarban mangrove forest where some natural resources are being over explored and utilized for coastal shrimp farming and salt production. There is a lack of appropriate guidelines for natural resource conservation and utilization. Therefore, the changes in land use are causing major socio-economic and environmental damages (Musa, 2008).

Chakoria Sundarban area was a mangrove forest of the Matamuhuri delta at Chakoria in Cox's Bazar district. The initial area of the Chakoria Sundarban area was about 18,200 ha and 7,490 ha of land were declared as Reserved Forest and rest of the area was Protected Forest (BBS, 2007). There was a selection system followed to manage the forest area. But it was modified by time to time in order to manage the condition of demand. At one point restrictions were imposed on extraction of forest. But this could not stop the destruction of the forest. In fact, the forest already has been completely destroyed few years back. Most of the mangrove forest area which is close by shrimp ponds has been cleared and some of the area has a few trees standing (Sherman, et. Al., 1998).

Environmental change is a major problem of the world. Coastal environment of Bangladesh has been changed since 1980. Many researchers attempted to focus on different issues and aspects of environmental change. Bangladesh's coastal brackish water shrimp export sector has been growing over the past thirty years in response to expanded global demand for high quality sea food and attempts made by successive Bangladesh governments since 1980's to liberalize and diversify the economy (Pokrant *et al*, 2002). Rahman, (1998) says that subsistence shrimp culture is as old as 700 years in South Asian region. Opposed to this, commercialized shrimp culture is a recent phenomenon. The environmental problems associated with shrimp farming in Bangladesh, have been widely reported throughout the period of 1990s. The extensive farming systems that required large land areas have contributed the most to

encroachment of agriculture land and mangrove clearance with increased intrusion of salinity, degradation of land and destabilization of coastal eco-system.

Shrimp is one of the leading exportable products in Bangladesh. Bangladesh earns about 500 millions of foreign currency annually by exporting shrimp and contributing 3.78% to the Gross Domastic Production (GDP). Although the shrimp farming contributes to our national economy to a larger extent, the extensive practices are posing many negative impacts on the surrounding environment as well as on the socio economic condition of the indigenous people (Karim and Shah, 2001; Phillips, 1995).

2. Objectives

The present study aimed to achieve the following objectives:

i. To assess the environmental and socio economic effects of brackish-water shrimp farming in the Chakaria, Bangadesh; and

ii. To examine the indigenous people's perception regarding the environmental and socio-economic changes due to brackish-water shrimp farming in there locality.

3. Methodology

3.1 Socio-economic survey

For the socio-economic survey, an intensive survey questions were developed and 100 rural people were interviewed including house wives, students, fishermen, day labors, shrimp and agriculture farmers. The result was analyzed by using SPSS statistical software (version 16).

3.2 Analysis of soil properties

To assess the impacts of shrimp farming on soil resources, two land use types viz. shrimp farm and agricultural (rice) land of Chuarfari and Bheola Manikchar region of Chakaria Upazila of Cox's Bazar was selected as the study site. For each sampling location, three soil samples were collected at a distance of 50 meter and at depth of 0-10, 10-20 cm. pH and Electrical Conductivity (EC) were measured instrumentally on a 1:5 soil/de-ionized water suspension, using (*HANNA* HI 96107) pH meter and microprocessor conductivity meter (WTW model LF 137), respectively. The Kjeldahl method was used for the assessment of total Nitrogen (Bremner and Mulvaney, 1982). Available Phosphorus was measured by the Bray-2 method (Bray and Kurtz, 1945).

Soil organic matter content was measured by using the Walkley-Black technique (Nelson and Sommers, 1982). The particle distribution of each soil sample was determined by the hydrometer method (Gee and Bauder, 1986) and the results were expressed as percentage of sand, silt, and clay. Bulk density and particle density were measured by the method proposed Blake and Hartge, 1986.

3.3 Analysis of water quality

In order to interpret the impacts of shrimp culture on water resources, four sampling locations were selected within the study site. The sites included source of water from which the water was taken to fill the pond enclosures (SW1), pond water in which shrimp was cultivated (PW2), receiving water immediately outside the ponds in which pond water was discharged (DW3) and fresh water collected from the household pond not used for shrimp farming (FW4). At each sample location, three water samples were collected in 1 liter plastic bottles from the middle of the water column. The samples were instrumentally analyzed immediately for Dissolved Oxygen (DO), pH and Electrical Conductivity (EC) using DO meter (HANNA HI 8043), microprocessor pH meter (HANNA HI 96107), microprocessor conductivity meter (WTW model LF 137), respectively. The rest of the water samples were stored on ice and transferred to the laboratory for further analysis. Turbidity was determined by using a turbid meter (HACH model 2100). Other parameters were analyzed as per APHA-AWWA-WPCF, 1998.

Table-1: Soil Sampling Sites and their Characteristics

Sampling Points	Site Characteristics
Shrimp Farm Sampling Point 1 (SFSP1).	Low lying shrimp farm land, barely one meter above mean sea level, Salt water persist for majority portion of the year.
Shrimp Farm Sampling Point 2 (SFSP2).	Low lying shrimp farm land, barely one meter above mean sea level, Salt water persist for majority portion of the year.
Shrimp Farm Sampling Point 3 (SFSP3).	Low lying shrimp farm land, barely one meter above mean sea level, Salt water persist for majority portion of the year.
Agricultural land Sampling Point 1 (ALSP1).	Agricultural land mainly rice is cultivated throughout the year, Free from salt water.
Agricultural land Sampling Point 2 (ALSP2).	Agricultural land mainly rice is cultivated throughout the year, Free from salt.
Agricultural land Sampling Point 3 (ALSP3).	Agricultural land mainly rice is cultivated throughout the year, Free from salt water.

4. Results and Discussions

4.1 *Environmental impact*

4.1.1 Variation of soil properties

Chemical and physical account of the soil of agricultural (rice) and shrimp farm land were conducted to make a comparison of their properties as well as to outline the potential limitations for plant growth in these soil (Table-2 and Table-3). Table-2 summarizes the chemical properties of agricultural (rice) and shrimp farm land use.

pH of natural water is governed by the Carbonate-Bicarbonate-Carbon Dioxide equilibrium (Moskovchenko*et al.*, 2009). In the present study, the minimum pH value (4.5) was found at ALSP2 and the maximum (9.75) at SFSP2 (Table-2). In terms of pH SFSP1 (8.98) and SFSP3 (8.31), as well as ALSP2 (4.5) and ALSP3 (4.6) did not vary significantly ($P<0.05$). Soil of shrimp farm land showed higher value, probably because of shrimp culture ponds were built on sites where lime is applied to the bottom soil of pond to increase the alkalinity of pond water, thereby removing carbon deficiencies

which limit phyto plankton growth (Boyd and Bowman, 1997). Hence, the pH value is greater significantly in shrimp farm soil compared with the soil of agricultural land.

The EC is an important parameter due to its relation to soil salinity. High salinity constrains plant growth by dipping the osmotic pressure gradient between the plant and soil solutions, confining the capability of the plant to uptake water (Moore, 1998). EC value of the soil of shrimp farm land was significantly higher compared to levels in the soil of agricultural land (Table-2), most likely as a result of deposition and accumulation of salt from sea water that is brought in to support the operation of the shrimp farms (Szuster and Flaherty, 2000). This finding is consistent with the work of Islam *et. Al.,* (1999) and Hagler (1997), who reported that salinization, can occur through the deposition and accumulation of salt in soil due to shrimp farming. Islam *et. Al.,* (1999) reported increase of salinity level up to 500% due to shrimp farming.

The organic carbon content of the soils of shrimp farmed land is significantly ($P<0.05$) lower than that of the soil of agricultural land (Table-2). The organic carbon content in the soil of shrimp farm land was possibly due to the removal of surface soil that was later used for the construction of pond embankments when ponds were initially constructed. Further, the deficiency of organic carbon in the soil of shrimp farm land restrains the stream of available Nitrogen and Phosphorus (Pulford, 1991). Higher content of organic carbon in the soil of agricultural land could be attributed to remained vegetation. The greater organic carbon content was found in the soil of agricultural land because of its high value of CEC (Table-2).

The total Nitrogen in the soil of shrimp farm land was significantly ($P<0.05$) lower than that of the soil of agricultural land and the value of total Nitrogen in almost all sampling sites of shrimp farm land were lower than the critical level of 0.15 % (Moore, 1998), except SFSP2 (Table-2). Likewise, Phosphorus content in the soil of shrimp farm land falls below the 4 mg/kg minimum threshold (Landon, 1991), suggesting a probable deficiency in SFSP1, SFSP2 and SFSP3 sample sites (Table-2). The higher content of total Nitrogen (0.39-0.47%) and available Phosphorus (7.86-8.17 mg/kg) in the soil of agricultural land (ALSP1, ALSP2 and ALSP3), are undoubtedly due to a combination of the fertilizers and remained vegetation on rice fields.

Table-2: Soil Chemical Properties of Agricultural (rice) and Shrimp Farm Land

Sampling Point	Chemical properties					
	pH	EC (s/cm)	Organic Carbon (%)	CEC (meq/100 g soil)	Total Nitrogen (%)	Available Phosphorus (mg/kg)
SFSP1	8.98*[a]	5.64[a]	0.26[a]	5.71[a]	0.10[a]	1.37[a]
SFSP2	9.75[b]	5.10[a]	0.22[a]	5.27[a]	0.15[a]	1.42[a]
SFSP3	8.31[a]	5.50[a]	0.17[a]	5.3[a]	0.12[a]	1.30[b]
ALSP1	5.30[d]	0.32[b]	3.69[c]	18.64[b]	0.45[b]	8.13[c]
ALSP2	4.5[c]	0.21[b]	6.50[b]	20.42[b]	0.39[c]	7.86[d]
ALSP3	4.6[c]	0.23[b]	6.21[b]	19.58[b]	0.47[b]	8.17[c]

*Means followed by the same letter (s) in the same column do not vary significantly at $p \leq 0.05$, according to Duncan's Multiple Range Test (DMRT)

Table-3: Soil Physical Properties of Agricultural (rice) and Shrimp Farm Land.

Sampling Point	Physical properties					
	% of soil Particle				Bulk density(g/cm^3)	Particle density (g/cm^3)
	Soil texture	Sand (%)	Silt (%)	Clay (%)		
SFSP1	Clayloam*[a]	24.89[a]	43.74[a]	31.3[a]	2.32[a]	2.86[a]
SFSP2	Clayloam[a]	26.11[a]	44.15[a]	29.54[a]	1.98[a]	2.64[a]
SFSP3	Clayloam[a]	25.24[a]	44.61[a]	32.76[a]	2.67[a]	2.88[a]
ALSP1	Clay[b]	16.01[b]	26.18[b]	57.82[b]	1.45[b]	2.41[b]
ALSP2	Clay[b]	17.22[b]	25.54[b]	58.15[b]	1.61[b]	2.19[b]
ALSP3	Clay[b]	15.67[b]	26.88[b]	57.11[b]	1.26[b]	2.3[b]

*Means followed by the same letter (s) in the same column do not vary significantly at $p \leq 0.05$, according to Duncan's Multiple Range Test (DMRT)

4.1.2 Variation of water quality

The results of the water quality analysis are presented in Table-03. The pH value of the water collected from shrimp farm pond was significantly higher than that for source water or discharge water. The high pH value (9.11) in shrimp farm pond (PW2) could

be attributed due to the application of lime for increasing the pH level in order to improve the survival, reproduction and growth of shrimp. The higher electrical conductivity (9.4 □s/cm) and salinity level (4.4 ppt) in the shrimp farm pond (PW2) water were also attributed by sea water added to them for adjusting salinity to an optimum level for cultivating shrimp (Boyd and Bowman, 1997) (Table-3).

Turbidity of water in Shrimp farm pond (72.73 NTU) was significantly ($P<0.05$) higher than that of other water. Eroded sediments from the shrimp farm pond sides, unconsumed feeds and plankton probably accounted for the higher turbidity values of the pond water (Boyd and Bowman, 1997).

DO value (6.52 mg/l) for pond water was significantly higher than other water (Table-4). Again, BOD concentrations (26.33 mg/l) for pond water were significantly ($P<0.05$) higher than that of source water (Table-04), most likely due to the decay of unconsumed feeds, vegetation, plankton (Lee, 1997) and plankton respiration (Seim, et al., 1997).

The TSS values for pond water and receiving water were significantly higher than that of source water (Table-4). The major sources of suspended solids in pond water and pond effluents are suspended soil particles and particles of organic matter resulting from live plankton and detritus which is also true for fresh water pond (FW4) (Lee, 1997).

Table-4: Water Quality Parameters of Water Samples Collected from Different Source

Sampling Point	Water quality parameters						
	pH	EC (s/cm)	Salinity (ppt)	Turbidity (NTU)	DO (mg/l)	BOD (mg/l)	TSS (mg/l)
SW1	6.66*^{a}	8.32^{a}	4.10^{a}	39.67^{a}	4.73^{a}	14.76^{a}	3336.67^{a}
PW2	9.11^{b}	9.4^{a}	4.40^{a}	72.73^{b}	6.52^{b}	26.33^{b}	5,680.00^{b}
DW3	6.75^{a}	8.65^{a}	4.47^{a}	36.67^{a}	5.21^{c}	13.87^{a}	6,383.72^{c}
FW4	5.8^{c}	2.27^{b}	0.21^{b}	10.46^{c}	6.1^{d}	20.11^{c}	1167.87^{d}

*Means followed by the same letter (s) in the same column do not vary significantly at $p\leq0.05$, according to Duncan's Multiple Range Test (DMRT)

4.2 People's perception

4.2.1 Socio-economic impact of shrimp farming

The study showed that about 57% respondents agreed that there was a loss of livestock in comparison with the 23% of respondents, who did not give answer. 85% of respondents believe that there is a loss of agricultural production due to shrimp farming. 51% and 58% respondents agreed that, there was a change in land ownership and social instability due to shrimp farming. In case of shortage in housing material and fuel wood crisis, almost same result was obtained. About 52% of respondents realized that there income was reduced due to shrimp farming in comparison with the 37% of respondents, who was unwilling to say anything. 21% of respondents realized that shrimp culture induces child labor but the rest of 35% of respondent did not give any comments regarding this issue. Only 15% of respondents realized that shrimp culture induced migration but 46%of respondent mentioned that shrimp culture did not influence the migration (Table-5).

Table-5: Rural People's Perception about Socio-Economic Impact of Shrimp Farming in Coastal Area

Socio-economic impact parameter	People's perception (%)			
	Yes	No	Have no idea	No comments
Loss of livestock	57	5	5	23
Loss of agricultural production	85	4	6	5
Change in land ownership	51	16	6	27
Social instability	58	10	7	25
Reduction in family income	52	5	6	37
Change in educational level	59	21	5	15
Shortage of fuel wood	78	3	6	13
Shortage of housing material	79	5	2	14
Change of occupation	70	15	6	9
Migration	15	5	34	46
Child labor	21	25	19	35

4.2.2 *Environmental consequences*

The survey result reveals that about 67% of the respondents realized there was destruction of wild life habitat in the coast. Almost similar number of respondents believed that there is innumerable destruction of fin fish and loss of bio diversity due to shrimp farming. Regarding destruction of fin fish 18% of respondent did not give any answer. The study reveals that about 75% and 80% of the respondents agreed that there is coastal pollution and salinity intrusion in the coastal area due to shrimp farming. It was found that, about 56% and 62% of the respondents do not have any idea regarding loss of eco-system balance and destruction of ecological resilience in the coastal area. About 45% of respondents mentioned that the wetland of the study area is badly degraded due to shrimp farming and 19% of respondents have no idea regarding this issue. Most of the respondents (76%) agreed that sea level was rising in the coast but 54% of the respondent have no idea about global warming and its related issues (Table-6).

Table-6: Rural < People's < Perception < about < Changing < Environmental Circumstances in the Coastal Area

Environmental impact parameter	People's perception (%)			
	Yes	No	Have no idea	No comments
Destruction of wild life habitat	67	25	5	3
Loss of bio diversity	68	20	5	7
Pollution of the coastal area	75	10	3	12
Salinity intrusion of the coastal area	80	3	6	11
Destruction of fin fish	69	5	8	18
Loss of eco system services	28	3	56	13
Loss of eco-system resilience	20	4	62	14
Sea-level rise	76	5	16	3
Global warming	31	9	54	6
Depletion of wetlands	45	21	19	15

4.2.3 Extent of Shrimp Farming

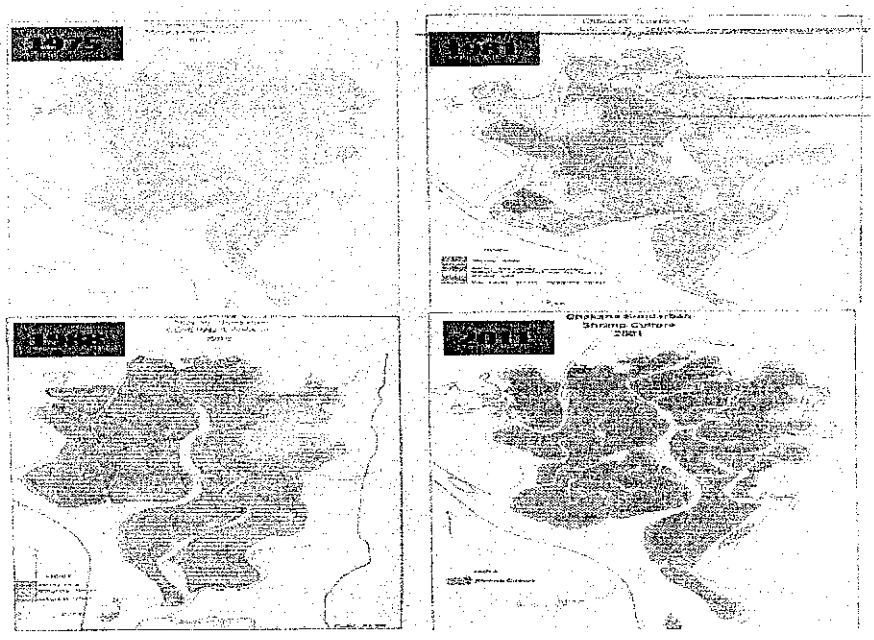

Figure-1: Sequential Presentation of Conversion of the Chokoria Sundarbans Forest to Shrimp Farming Areas (Source: Habib, 2002)

Shrimp farming is expanding very rapidly in the coastal region of Bangladesh which leads to accelerated mangrove deforestation. Number of shrimp farms and horizontal extent has been doubled between 1984 and 1990. In 1984, there were 3,171 farms over 51,834 hectares of land while in 1990 it grew 6,581 farms over 108,279 hectares of land (Figure-1). More than 50% increase in shrimp culture took place within a span of only six years because of the profitability (Siddiqi, 2001). In many areas, productive agricultural lands and mangrove forests have been converted to shrimp farms. This practice brings about drastic changes in the physical environment of the Southern part of Bangladesh. During the last decade, the area of shrimp farming has grown from 50,000 ha to 140,000 ha, resulting into total clearing of the Chakaria Sundarban (Choudhury, *et. Al.*, 1994).

5. Conclusion

The obvious effects of brackish-water shrimp farming in the Chakaria, Bangladesh are in the form of adverse changes in the environmental condition from high rate of degradation of mangrove forest which is almost extinct in the study area. Remote

sensed data also gives an indication regarding the rapid destruction of mangrove forest of Chakoria, Bangladesh, in which brackish water shrimp farming, salt pan and settlement have played an active role. The quality of the soil as well as water of shrimp farm area is significantly deteriorated. From the people's perception, it is clear that, most of the agricultural lands are losing their productivity. Though brackish water shrimp farming adding foreign currency to our economy, it is also disrupting the quality of the coastal environment.

References

Bullock and Gregory (eds.), P.J, "Soil in Urban Environment". (2001). Blackwell Scientific Publications, Oxford

Pokrant,B, Reeves P. and Rahman A.A.(2002). "*The Organization and Development of CoastalBrackish-Water Export-Oriented Shrimp Production in Bangladesh*": A Critical Review of the Literature, In Delivered at the ISA XV World Congress of Sociology in Brisbane, Session 7, Australia, (Unpublished)

Primavera, J. H. (1997). "*Socio-economic impacts of shrimp culture*": Aquaculture Research, 28, 815-827

Pulford, I.D. (1991). "*Nutrient provision and cycling in soils in urban areas*", pp 119-138 In P

Seim, W.K., C.E. Boyd and Diana, J.S. (1997). "*Environmental considerations*", pp. 163-182, In H.S. Egna and C.E. Boyd (eds.), Dynamics of Pond Aquaculture, CRC Press, New York

Shah Asad Ahmed, D.L., Mallick, Md. Liaquat Ali and Atiq Rahman.A. (2002). "*Literature Review on Bangladesh Shrimp, Individual Partner Report for the Project*": Policy Research for Sustainable Shrimp Farming in Asia (PORESSFA), a comparative analysis of Bangladesh, India, Thailand and Vietnam with particular reference to institutional and socio-economic aspects, European Commission INCO-DEV Project PORESSFA No.IC4-2001-10042, CEMARE University of Portsmouth UK and BCAS, Dhaka, Bangladesh

Szuster, B.W. and Flaherty, M. (2000). "*Inland Low Salinity Shrimp Farming in the Central Plains Region of Thailand*", pp. 1-11: In International Conference, The Chao Phraya Delta: Historical Development, Dynamics and Challenges of Thailand's Rice Bowl, Kasetsart University, Bangkok

Tsai, C.K. (1989). "*Water Quality Management*", pp. 56-63:In Proceedings of the South East Asia shrimp farm management workshop, American Soybean Association, St. Louis

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Women in Co-operatives: The Experience of Kanchanpur Comprehensive Village Development Co-operative Society

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Abstract

Men and women constitute the mankind. Their conscious and collaborative effort can help to attain cherished goal in society through collective endeavor. Women can be benefited from a co-operative society; undertaking various income generating activities by utilizing organization as a social vehicle following the maxim's `unity is strength'. A good number of women of Kanchanpur village took part in the co-operative movement under the dynamic leadership of the management committee of the society at Kanchanpur Comprehensive Village Development Co-operative Society (CVDCS). Women have come forward in organizational activities in order to ensure their participation and at the same time to be empowered as an integral part of society. Women's effort in capital formation and utilization has been contributing considerably to improve their living standard through various income generating activities under the patronage of the society. Through eradicating the existing barriers, the status of women in the co-operative society can be further increased. Expansion of education among the women co-operators can play a great role in understanding their position in the family as well as in the co-operative society with critical consciousness. Women should be aware about the activities of the society in terms of their rights and privileges whether their duties has been maintained by the co-operative leaders in distributing services among the co-operators. The increased participation of woman co-operators in this society encompasses their better future if the society runs following the 'bye-lays' under dynamic and reliable leadership in the future. The study highlights the status of women in Bangladesh sighted as an example of Kanchanpur Sarbik Gram Unnayan Samabaya Samity.

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1. Introduction

The Co-operative Movement in Bangladesh has a common history. The co-operative movement in the Indian sub-continent started at first during the British period in 1904. The British Indian Government introduced the Co-operative Act 1904 for improving the economic condition of poor farmers. In 1912 the Act was amended and created provision for providing support for non-agricultural village co-operative societies formed under the Act followed the 'Raiffesen type' of co-operatives with unlimited liabilities (Ali, 2002). Since inception the success and failure of co-operatives simultaneously embraces its history. The co-operative as an instrument for development can not be blamed for its failure.

In Bangladesh Integrated Rural Development Programme (IRDP) has played the pioneering role to make women's involvement with co-operatives. The women's programme of IRDP was started in 10 Thanas in 1975 and by the time, the first phase of the pilot project (1975-80) was over. The project was extended to 40 Thanas during the second phase (1980-85) when 1722 Rural Women's Co-operative Societies (MSS) were organized having 70011 members. The third phase (1985-90) was covered the old 40 Thanas and 60 additional Thanas where a special Women's Project was implemented based on the experiences of the earlier pilot project of IRDP. The third and the fourth phase (1990-95) of the women's programme of Bangladesh Rural Development Board (BRDB) are called `Strengthening Population Planning through Rural Women's Co-operatives (Hye, 1993). The underlined forces are liable for unwanted picture such as cooperators, co-operative department and the government's policy. If due roles are played by these factors, co-operative society could prove itself as a good instrument for development of male and female of the society. On the other hand, if non-co-operation is found in one of them, the result will be dissatisfactory. It is true that positive transformation in the life-style of common people can be possible in a long time under the co-operative society and thereby expectation of overnight change will be inappropriate. Common co-operators can be benefited in the long run by thrift deposits under a co-operative society if it is operated smoothly according to the by-laws of the society. Generally, next generations enjoy the benefit of co-operatives if it survives with reliable, dynamic leadership and appear as a viable socio-economic institution in the village area. Initiative of some people is a must for establishment of any institution and at the same time it is true in case of a co-operative society. Women

are an important segment of Comprehensive Village Development Programme (CVDP). Therefore, their role in the co-operative society is noteworthy. Due to multifarious reasons, their appearance in the organizational activities seems to be pale. Cultural, political, economic and household problems make barriers for them to be active partners of co-operative movement. Following the result of Comilla experiment, various efforts were undertaken for the upliftment of women in the society through different institutions. Women have come forward from the confinement of their home wall in order to establish their rights in the society side by side with men. Still their participation is negligible. BRDB is working for the development of women in society through various development schemes financed by different development partners and countries of the first world. Different poverty alleviation programmes of BRDB address the majority of the women, for an example 75% of female constitutes of the total members enrolled in the Rural Poor Projects (RPPs) (Kashem and Bari, 1999).

2. Objectives

The present study aimed at following objectives:

i. To provide an idea about the development picture of the society;

ii. To study the socio-economic status of the woman co-operators;

iii. To find out their perception about the leadership of the co-operative society;

iv. To examine the nature of their participation in various activities of co-operative society; and

v. To acquire knowledge about the pattern of development through the co-operative society.

3. Methodology

Both primary and secondary data were used for producing this article. A group of conscious informants was chosen to collect information from the woman co-operators through administering formal questionnaire. Moreover, the author's working experience in this programme unveils some insight of the activities of the co-operative society. The data were collected previous year back. Some essential information was collected from the office of the society and CVDP office, RDA Bogra. Due to the location advantage and effective performance since its establishment, the researcher

had great desire to observe the development profile of the society and also easy communication system attracted the researcher to choose the society.

3.1 *Some conceptual issues*

Some of the relevant issues are to be explained before going to the main body of the paper. These are the co-operative society, comprehensive village development co-operative society, women co-operator etc.

3.1.1 Co-operative Society

The term "Co-operative society" is derived from the notion of "Co-operation" which general meaning is "Working together". Co-operative means working together with another or others for a common purpose (Hornby, 1999). A co-operative is a voluntary organization, operating on democratic basis to realize some common interests of the group which are primarily economic, and sharing the benefits on the basis of patronage or participation (Hossain, 1969). The co-operation is unique type of economic enterprises which possess some extra-ordinary peculiarities that can be differentiate from other business enterprises as well as other voluntary organizations, NGO, any other association, society or club (Khan, 2000). The definition was given in a conference held in Geneva Co-operative is "an association of persons who have voluntarily joined together to achieve a common interest through the formation of a democratically controlled organization, making equitable contribution to the capital required and accepting a fare share of the risks and benefits of the undertaking in which the members actively participate" (Report of the International Labor Conference in Geneva, 1966). On the basis of above, we can say that co-operative society is a socio-economic and democratic organization which is established under the co-operative laws of the state and administered according to the by-laws of the society.

3.2 Comprehensive Village Development Co-operative Society (CVDCS)

A federated type co-operative societies established by taking people from all strata of the society under the patronage of the Comprehensive Village Development Programme (CVDP), an action research programme of the BARD, Comilla and the RDA, Bogra and has been registered under the Co-operative Department of the government.

3.3 Women Co-operator

The female co-operators who are enrolled as members of the Kanchanpur Comprehensive Village Development Co-operative Society established under CVDP of RDA, Bogra.

4. Status of women in Bangladesh

Although women constitute the half of the total population of Bangladesh, they present a dismal picture. They have lower status as compared to men in every sphere of socio-economic and political life (Sultana et.al. 2000). Empirical evidences show that they have little access to employment, income-generating opportunities, leadership and decision making. Along with these, social customs, traditions and norms and other handicaps like illiteracy, lack of institutional supports and skill development training have kept down women's participation in the mainstream of development process (Rahman, 1996). Severe gender discrimination is a fatal problem in Bangladesh society. Theoretically Bangladesh state regards men and women as equal. The Constitution of 1972 grants all the citizens equal rights. Moreover, the state has been signatory to many UN conventions designed to eliminate gender discrimination (Jahan and Islam, 1997). As yet different measures were adopted for their upliftment from time to time by the various regimes. Now a days NGOs as a partner of development have come forward for upgrading the status of women especially of distressed class standing in the marginal position of society. Changes are happening in some cases as per expectation. But, by and large, the picture is gloomy and yet to be improved rapidly considering their backwardness in all walks of social life. Poverty, illiteracy, malnutrition, limited access to different amenities, poor participation in different organizations is the real companions of Bangladeshi women. Especially rural women in Bangladesh are in dark in many ways. They have no right to move freely, they can not raise their voice both in decision making and getting benefits, they are mostly engaged in household chores which have little recognition in the society (Rahman, 1996). In recent years, the developmental sector prefers to incorporate women's participation in development. But the partriarchal values, beliefs, prejudice, religious obstruction and social norms of the country like ours, have kept women far away from such development (Haldar and Akhter, 1999). From family life to public life, the rate of participation of women in different affairs and institutions are negligible. There are

immeasurable reasons for backwardness of women in our society. These can be mentioned as parent's outlook towards their girl baby in the family, overall social outlook to the women in society and some other socio-economic aspects.

As an integral part of human society, women deserve special attention from the part of government and NGOs. Therefore, their present status can be improved. Women are the main victim of poverty disaster. In case of nutrition, the position of women is very grim, nearly 50% of women suffer from chronic energy deficit; low birth weight incidence is estimated at 45%, perhaps the highest in the world and micro nutrient deficiencies are rampant (over 70% of pregnant women are anemic) (World Bank, 2000). In Bangladesh in agricultural sector, women are paid 71% of what men are paid (MHHDC, 2000). Although the equal rights of women have been recognized in politics but in social life this has not been cordially accepted. Thus the rate of direct participation seems to be pale in different elections. Due to social discrimination woman is not considered in the politics as a candidate rather as a woman (Bhuyan, 2000). In all societies to a greater or lesser degree women and girls are subjected to physical, sexual and psychological abuses that cut across lines of income, class and culture. The violence against women is a matter of concern to all states and should be addressed. Violence has thus been identified as a priority issue on the global basis (Jahan and Islam, 1997). Violence on women is also a serious problem in our country. Over the last two decades, violence against women has become one of the most visible and articulated social issues in Bangladesh (Jahan and Islam, 1997). Dowry seems to be a main reason for violence to women in Bangladesh. The law designed to prevent dowry has not had the desired effect. This issue relates to other issues of ineffective implementation of laws designed to deter/reduce violence which need to be addressed (Jahan and Islam, 1997). Women in Bangladesh suffer from rape, dowry, and sexual harassments along with women trafficking. They have no role in ownership and control over property. Majority of families are headed by the male. In these families women have no right to take decision independently and in financial matters they depend on male person (Begum and Akanda, 2000). In conclusion it can be said that male domination and women's subordination are basic tenets of social life in Bangladesh (Jahan, 1999).

5. An account of gradual development of Kanchanpur cooperative society

Pertinently some information regarding CVDP under which patronage the society Kanchanpur was established are presented before showing the picture of Kanchanpur Comprehensive Village Development (CVD) Co-operative society.

Comprehensive Village Development Programme (CVDP) is an action research programme of BARD, Comilla and RDA, Bogra. Eighty villages are covered by the programme. RDA, Bogra is implementing the programme in four Upazillas of Rajshahi and Khulna Divisions. The objectives of CVDP are:

i. To develop broad-based village co-operative institutions involving people of all classes and professions with a aim of actively engaging them in socio-economic activities for poverty alleviation, multi-dimensional development and welfare of the rural community;

ii. To develop leadership through expansion of the scope of villagers' participation in planning, implementation and decision making;

iii. To mobilize villagers for their own capital through savings programme for production, investment and creation of their collective resources;

iv. To use the village institution as the receiving point for all kinds of services and supplies from the line departments;

v. To create employment opportunities by undertaking need based investment projects;

vi. To improve production,home management skills, education and social status of women through appropriate education and training;

vii. To undertake community based primary health care, nutrition and population education activities for improvement of human resources and reduction of population growth rate; and

viii. To introduce continuous education, motivation and training to eradicate illiteracy, ignorance, social stagnation and frustration (Obaidullah, 1996).

The Kanchanpur CVD Co-operative Socieity came into existence in 1993. At the outset the society had 10 members with Tk. 100.00 as share and Tk. 50.00 as savings. Gradually it has expanded its activities in different development fields getting various assistance from the RDA and concerned Upazilla administration. At the outset there were 10 members combining male and female while at the time of study, the number rose to 490 wherein women co-operators are 265. In each year the number of women co-operators increased and presently they occupy the highest position in terms of number which indicates their eagerness to become member of society. The picture of capital formation at the beginning were Tk. 50 as savings and Tk. 1200 as share and at the time of study the amount rose to Tk. 3,48,000.00 and Tk. 2,64,000.00 respectively. The participation of women in capital formation is noteworthy. They have deposited Tk. 2, 04,000.00 as savings and Tk. 1, 70,500.00 as share with the society showing a positive indicator of their active participation.

The managing committee of the society is composed of 9 members. It is found that women are three out of nine managing committee members. This reflects a slight improvement in women participation in the decision making body of the society in comparison with the status of the past.

It is learnt from the study that woman co-operators have undertaken various income generating activities in their family such as small trading, cow and poultry rearing, stitching of kantha, vegetable production in their homestead. These activities have contributed as additional income to their family. Women have invested money in different income generating projects with the support of credit of the society and the revolving fund of the project. They have already repaid their project loan fully and run with their own capital.

6. Results and Discussions

Information regarding socio-economic status of the respondents as well as their opinion about the society activities is presented in the following tables along with discussion of their significant aspects.

6.1 *Age of the respondents*

Data show that 25.59% respondents belong to 31-35 age group and 64.70% remain between 26-40 age group. In this stage of life, women possess the physical capacity of

doing work for a prosperous future and try to share the responsibility with their husbands in managing family affairs.

6.2 Occupation of the respondents

The data show that vast majority (90%) of the respondents is house wives by profession and rest (10%) belongs to small trader, farm worker and service holder. This has happened due to two reasons. Firstly, only housewives were available at their residence during survey period. The second is still our women are very much involved with household chores. Data depict that the role of women has been expanded in the greater field of the village beyond the family circle. Thus, it is seen an improvement in the traditional belief on women's confinement in the household. Housewives are becoming conscious of their position in the family and in the society day by day.

6.3 Land ownership of the respondents' husbands

Majority (80%) respondents' husbands own land 0.50 acres. This is because; the value of land adjacent to the district town is very high; thus the possession of land remains little. About 10% of respondents have 1.01-2.00 acres of land and about 6% have less than 1.00 acre. That means cooperators are mostly landless and medium size land owners.

6.4 Income of the respondents

The following table clarifies us about the monthly income position of the respondents' families. About 24% respondents earn Tk. 2001 – 3000 and 55.10% earn Tk. 2000 – 4000 which is insufficient amount to meet their family expenses. It is very easy to understand that they want to improve their income range towards positive direction through undertaking various income earning activities under the patronage of the co-operative society.

Table-1: Monthly Income of the Respondents' Family

Income level (Tk.)	Number of respondents	Percentage (%)
Up to 1000	02	3,92
1001 – 2000	09	17.65
2001 -3000	12	23.53
3001 – 4000	11	21.57
4001 – 5000	04	9.80
5001 – 6000	04	7.84
6001 – 7000	03	5.88
7001 and above	06	11.76
Total	51	100

6.5 Educational level of the respondents

A total of 29.41% respondents are illiterate while only one respondent is a graduate. About 22%of them read up to class X and 25% got primary education. Only 8% and 3% passed the SSC and HSC examination respectively.

6.6 Training of the Co-operators

The table shows only a negligible number of women co-operators (11.76%) have obtained training from RDA, Bogra and Upazilla Training and Development Centre of Jhenaidah Sadar. This is due to trained women co-operator's absence in their residence at the time of survey. On the other hand, incorporating all women members under the training facilities could not be possible due to resource constraints of the programme wherein it is believed that the trained woman co-operators will disseminate their training knowledge among other woman co-operators through the weekly meeting of the society.

Table-2: Status of Training of the Respondent Co-operators

Status of training	No. of respondents	Percentage (%)
Trained	06	11.76
Non-trained	45	88.24
Total	51	100

6.7 Status of undertaking income generating activities by the respondents

Only a total of 37.25% respondents have undertaken income-generating activities for meeting their financial requirements in the family. Women's effort contributes to the additional income in their family by utilizing credit in income generating activities. Thus, they enjoy some solvency in their families.

6.8 Attendance in weekly meetings

The following table shows about the pattern of attending the weekly meeting by the respondents.78.43% respondents mentioned that they attend weekly meeting regularly. The co-operators were motivated constantly by the project officials to attend the weekly meeting as it is regarded as the life blood of society. The territorial proximity of their residence plays a conducive role to attend the weekly meeting regularly. Sometimes depositing weekly subscription and putting signature on the resolution book with the assistance of the paid worker of the society without attending in the meeting place by the individual member is considered 'holding meeting' does not serve the purpose of which the meeting has been being given importance.

Table-3: Opinion of the Respondents Regarding their Attendance on Weekly Meeting

Status	No. of respondents	Percentage (%)
Attend weekly meeting Regularly	40	78.43
Doesn't attend weekly meeting regularly	11	21.43
Total	51	100

About 86% respondents view positively about holding of weekly meeting (Table-04). Women workers are employed to realize weekly savings and takes necessary preparations for holding weekly meeting. Thus, woman co-operators attend the meeting in order to discuss different matters they face in their personal, family and social life. Women are well aware of attending the weekly meeting than hitherto. Some members seem to be reluctant about co-operative activities and keep themselves aloof from the organized effort.

Table-4: Opinions of the Respondents Regarding Holding of Weekly Meeting in the Society

Status	No. of respondents	Percentage (%)
Weekly meeting is held regularly	42	85.71
Weekly meeting is not held regularly	06	12.24
Unaware	03	2.04
Total	51	100

6.9 Opinion on managing committee formation

In a rural society women are normally backward in giving leadership to the people of the village. But traditional ideas are going to be extinguished in present days and they are coming forward to lead the society within their capacity. The table below is a testimony to the fact. 27.45% woman co-operators aspire to work in the managing committee for their awareness regarding various issues of women rights. Specifically the awareness among the women to be found better than hitherto. On the other hand, the confidence on the existing managing committee by the majority women can be understood from this table. Furthermore, their unwillingness to steering the society might be dominant reasons for showing less interest to have the position in leadership.

Table-5: Intention of Co-operators to be Members of the Managing Committee

Status	No. of respondents	Percentage (%)
Wants to be a member of managing committee	14	27.45
Doesn't want to be a member of managing committee	36	70.59
Made no comment	01	1.96
Total	51	100

6.10 Credit disbursement

It is found that 80.39% respondents have borrowed loan from the society and have invested them in different income generating activities for additional income in the

family (Table-06). The objective of women in the society is to attain credit support for income earning activities which is playing vital role in increasing their family income.

Table -6: Status of Taking Credit from the Society

Status of borrowing	No. of respondents	Percentage (%)
Borrowed	41	80.39
Did not borrowed	10	19.61
Total	51	100

Data show the positive loan repayment behavior of the co-operators. About 71% respondents repaid their borrowed loan in time. Only 29.42% respondents could not repay the loan in time due to their inertia and economic insolvency. It is learnt that normally comparatively well-off people get delay in repaying loan.

Table-7: Opinion of the Respondents as to Taking Added Advantage of the Managing Committee Members (MCMs) from the Society

Opinion	No. of respondents	Percentage (%)
Take added advantage	08	15.68
Doesn't take added advantage	40	78.43
Somebody take added advantage	03	5.88
Total	51	100

The above table shows about MCMs advantage like credit, training etc. in getting facilities from the society. 78.43% respondents mentioned that MCMs get less facility in comparison with the common co-operators of the society. Therefore the organizational activities of the society are going smoothly under the reliable and dynamic leadership of the society.

6.11 Support services provided by Upazila Parishad

Table-08 highlights the opinion of the co-operators regarding the government services to the people especially to the co-operators. Still Bangladeshi officials inculcate colonial mentality in providing services to the people. Some of the respondents were in confusion to understand the term 'service'. The women who are dissatisfied with the

activities of officers made negative responses. Moreover, a few officials only have opportunities to provide supports and services to the people. Some officials such as Upazila Livestock Officer, Family Planning Officer, Agriculture Officer, and Fishery Officer working at Upazila level are aware of the programme through attending various programme i.e. orientation course, workshop, Annual Planning Conference held under the project. Therefore some positive changes have taken place in the mind of the officials that encourage them to extend their co-operation to trained workers of co-operatives and the villagers as well.

Table-8: Opinion of the Respondents Regarding Service

Opinion	No. of respondents	Percentage (%)
Provide service	23	45.09
Doesn't provide service	26	50.98
Made no comment	02	3.92
Total	51	100

7. Conclusion

i. ***Professionalism has been developed among the women*:** Women's involvements in various activities other than the household chores have increased their capacity under the patronage of the co-operative society;

ii. ***Presence of dynamism in the life-style of the women section*:** At present women are going to be free from the age old adage 'infirm women'. Their upgraded economic condition and working capacity has created dynamism in their life style;

iii. ***Existence of harmonious relationship in the family and in the society*:** Good relationship has been developed between the husbands and the wives because of women's ability to contribute in the financial requirements of the family as well as in providing valuable opinion in the family affairs. Thus, status of women has been increased which encompasses their empowerment the term which is widely discussed among the academics, researchers and policy formulators;

iv. ***Achievement of development communication skill*:** Meanwhile, women have attained the capacity to contact with the outsiders especially development workers and officers and to think over the problems they face in the family and in the

society. A sort of critical consciousness has been achieved by them which is very much needed for peoples' development in general;

v. ***Appearance of women as supporting force to their husbands in the family***: Today women are not burden to their husband. They are self-confident of their position than hitherto. Now they can realize that they have a lot of things to do for their family side by side with child bearing and rearing;

vi. ***Contribution to resource mobilization***: In the society women are playing important role in resource mobilization. Their position is better in capital formation in comparison to their male counterpart. Accumulation of capital through weekly thrift savings and annual share purchasing has upgraded the position of the society in terms of capital formation. In spite of above positive aspects women still are dominated and influenced by the male co-operators. Their position is weak in the decision making process of the co-operative society for their little representation. Expansion of education among the woman co-operators should be ensured in order to be conscious critically. If women become more aware of their rights and duties in the society they will be more empowered in the years ahead;

vii. Women involvement with this society as members is very significant although their participation in the managing committee seems to be negligible;

viii. Most of the woman members cherish positive confidence about the leadership of the society with no intention to study or assess the activities of the society minutely just keeping themselves aloof from the society's activities. Though blind trust is an important factor for development, this unconditional belief can create a space for misappropriation in the organization whenever concerned parties work as sleeping partner;

ix. Attendance in weekly meeting is very important matter in the society to discuss various matters of society and to ventilate the feeling of the general co-operators regarding societies activities before the co-operative leaders. Women as an integral part of the society should attend the meeting to be aware of the on going activities of the society. For various reasons such as family household chores,

hospitality, child nursing are the tasks which hamper them to attend the meeting regularly;

x. It is observed that well-off co-operators are showing inertia in repaying loan to the society wherein relatively weak co-operators are updated to repay their loan. Such situation will not be conducive to smooth credit operation of the society in the days to come;

xi. Harmonious relationship has been developed among the co-operators for having the chance to be united under the umbrella of the society. If the present good relationship continues the society will emerge as a strong institution in the future for more betterment of the generations of the society area yet to come; and

xii. Most of the women co-operators are unaware of the 'by-laws' of the society. Therefore, their knowledge should be increased by undertaking arrangements at weekly `meeting and intensive training programmes beyond the society.

8. Recommendations

On the basis of above findings some suggestions are given for development of women to put strong footing in the society. The main target of the society is to unite all the people of the village irrespective of caste and creed, eliminating on going parochialism in terms of power structure, social groups, village politics, group conflict, inspiring all the people of the village to achieve the taste of development in all walks of life in their own village. Women of this society made positive response in this regard. A women group should be formed as a part of federation of the society thus solidarity can be enhanced among them and efforts can be taken for their upliftment considering their position in the society. The number of women in the managing committee can be increased and conscious woman should come forward to steering the society for betterment of the huge number of backward woman co-operators as a token of their active representation in the society management. The development of the society mostly depends on the dynamic and reliable leadership of the society with the co-operation of the common co-operator of the society irrespective of their political belief, sex, being imbued with the developed culture.

References

Ali, Md. Ashraf, (2002).*"Development of Rural Co-operatives"*: Problems, Opportunities, Challenges and Remedial Measures in Co-operation, Journal of Co-operative Sector, Bangladesh 2001, p-5

Begum, H.A. and Akanda Shahriar S.(2000). In Bengali: *"Pesha 0 ArthoSamajic Ovosthavade Narir Manoshic Shusthotabhod Mental Healthiness of Women in terms of Profession and Socio-economic Condition"* : In Hamida Akter Begum edited "Khomotayon" No.3. Women for Women, Dhaka, P-17

Kashem M.A and Fazlul Bari A.K. (1999). *"A Profile of the Rural Poor Projects of BRDB"*: Palli8 Bhaban, Kawran Bazzar, Dhaka, P-5

Mahbub ul Huq Human Development Centre. (2003). *"Human Development in South Asia, 2002, Agriculture and Rural Development"*: UPL, Dhaka, P-113

Obaidullah, A.K.M. (1996).CVDP, *"An Approach to Rural Development in Quddus, A. edited Rural Development in Banglaesh,Strategies and Experiences"* pp.243-265

Rahman, Md. Habibur (1996). *"Participation of Women in Rural Development: An Experience of Comprehensive Village Development Programme"*, The Bangladesh Rural Development Studies, RDA, Bogra

Shahnaj Huda. (1999). *"Perspectives on Sexual Harassments in Bangladesh"*: Acknowledging its Existence in Hamida Akter Begum edited Empowerment Vol. 65, Women for Women, Dhaka, P-23

Bangladesh Development Series. (2001). Bangladesh, *"Breaking the Malnutrition Barrier Key to Development"*: Health, Nutrition and Population Unit, South Asia Region, The World Bank, December, 2000 in Executive Summary (13)

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Review of ICT Policy and Rural Development in Bangladesh

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Abstract

Information Communication Technology (ICT) plays a vital role in all sectors of development. The present review study was carried out to examine how the ICT policy is helping in rural development activities, its present status and problems encountered at present. In doing so, necessary data were collected mainly from secondary sources like reports and books published by various organizations. Relevant web sites were also consulted.

In the study, first of all the ICT policy was reviewed thoroughly. It covers mainly clearly defined 15 areas, of which 4 areas were found major: these are 1) Training and Human Resources Development, 2) Agriculture and Poverty Alleviation, 3) Health Care and 4) Social Welfare.

Hence, Progress and achievements are highlighted. Among the findings, human resources development was emphasized by creating training facilities at Bangladesh Computer Council, National Academy for Computer Training and Research, NGOs, Private firms, Public and Private Universities; Progress on E-Governances and E-commerce were also discussed. Finally, access to information was discussed by which farmers and villagers are getting information now a days on their agricultural activities, health, education and employment. Further more, problems of ICT are pointed out and among the problems, supply of constant electricity and price of accessories were given much importance.

1. Introduction

Bangladesh is a country of villages as most of the people live in villages. Their livelihoods mainly depend on agriculture which includes cultivation of crops, rearing of poultry birds, livestock and fishery. It contributes 20.89% to the Gross Domestic Production (GDP) of Bangladesh economy (Bangladesh Economic survey, 2010). Aside from this, a large section of rural people are involved in working with various

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garment factories established in different locations of Bangladesh. A good number of people are also working in non-farming sector. They are mostly poor and possess little amenities in their family. They suffer from various diseases and have low literacy rate.

These situations should not be continued for long time. Socio-economic conditions of these people have to be improved and their standard of living should be upgraded. Therefore, the attention should be made mainly on rural people. The role of ICT in this case is considered as vital. These people or the government had not paid much attention on ICTs during 1980s. It has been becoming important since 1990s.

It is thus felt by the government that the country has to be an ICT driven nation and envisage ensuring accessibility of ICT and delivering service to all citizen equitably for sustainable development and finally it will be attained as a country of Digital Bangladesh. In this connection, the National ICT Policy was reviewed in light with rural development. It should be mentioned here that the National ICT Policy of Bangladesh was approved by the parliament on 7th of October 7, 2002. Afterwards, it was revised in 2008. The main objective of the ICT Policy is to create all sorts of appropriate infrastructural facilities and develop human resources in Bangladesh.

With the above background the present review study was carried out to examine how ICT can help rural development activities, to study the present status and the problems encountered at present. For the study, necessary data were collected from various reports, journals and websites. On the other hand, some people at the village level were also consulted.

In the study, first of all the ICT policy was reviewed thoroughly. It covers mainly clearly defined 15 areas, of which 4 areas were found major: these are 1) Training and Human Resources Development, 2) Agriculture and Poverty Alleviation, 3) Health Care 4) Social Welfare.

1.1 ICT Policy covers the Following 15 Areas:

i. Training and Human Resources Development;
ii. Research and Development in ICT;
iii. ICT Industry;
iv. E-Commerce;

v. E-Government / E-Governance;

vi. Legal Issues;

vii. Health Care;

viii. Agriculture and Poverty Alleviation;

ix. Social Welfare;

x. Transportation;

xi. Tourism;

xii. Environment;

xiii. Judiciary;

xiv. Regional and International Cooperation; and

xv. Implementation and Monitoring.

All the above cited areas are very much related with development of the ICT sector and have got direct or indirect effect on the employment opportunities and development of the poor. However, the four areas above mentioned which are very relevant with this study have been mentioned below in detail as laid down in the revised ICT policy.

1.1.1 Training and Human Resources Development

Bangladesh should make effort to produce skilled labor force in ICT for competing effectively with the global ICT market. As the demand for skilled man power in ICT is growing worldwide, the country needs to produce a large number of ICT professionals. The specific policy statements are:

i. Widespread introduction of ICT education in public and private educational institutions is a prerequisite for producing skilled ICT manpower. Facilities shall be built to promote ICT training and computer aided training at all levels of education including primary schools and madrasahs,donor agencies, non-government organizations and other development partners of the country shall be encouraged to help for building the necessary capacity in this area;

ii. Universities, Bangladesh Institutes of Technology and Colleges, both in the public and private sectors, shall be strengthened to produce ICT graduates (four-year Computer Science and/or Engineering courses). Necessary resources will be allocated to these institutions;

iii. Take up programmes to develop quality ICT professionals and skilled personnel to ensure success in the global software and ICT enabled services market. Encouraging and providing support for formal and informal sectors to adopt internationally accepted standards in training programmes and to introduce internationally acceptable standards.

iv. To ensure capacity building of the nation in the field of Information Technology, to attain a sustainable growth in ICT sector of Bangladesh and to help competing in the expanding global ICT market, Ministry of Science and information & Communication Technology and BCC should be appropriately strengthened.

v. Socio-economic development can be accelerated if more people can have access to information. Tele-density is important in this respect and it will be increased broaden coverage, which will improve the socio-economic condition of the people through ICT related activities in line with experience of developed countries.

vi. Advanced and new technologies will be introduced to expand the existing network and will be extended gradually to the rural and underserved areas.

vii. Tele-communication facility will be made available to all segments of the society and all of the present and emerging services will be provided at an affordable cost.

viii. To ensure public access to information, Cyber Kiosks will be set up in all Post offices, Union complexes and Upzila complexes. Private sector participation will be encouraged to set up these facilities.

1.1.2. Health care

i. The main focus in the use of ICT and communication technologies in Health care will be to deliver new capabilities for hospital and health care service providers. ICT should be used to develop such capabilities specifically in the areas of electronic medical records, tele-medicine, medical and health education;

ii. Tele-medicine System Network shall be introduced throughout the country for cost effective delivery of health care services. The tele-medicine Network will be

used for rural patient management, distant medical education and training of health professionals and to develop mass awareness for disease prevention;

iii. Development of Bangladesh Health Portal should be given priority for appropriate growth of e-health and tele-medicine referral system. International tele-consultation through telemedicine for critical patients will be promoted in both private and public sector; and

iv. All public hospitals and medical research centers shall be linked by computer networks with Medical center of excellence as the central hub in order to make expert services available throughout the country. This network can be gradually extended to the local level.

1.1.3 Agriculture and poverty alleviation

Agriculture including fisheries and livestock is the main source of earnings for the majority of the people of Bangladesh; Hence use of ICT systems in these sectors are very much essential to reap its unutilized potentials and thereby improving the socio economic conditions particularly of the rural people. Proper initiatives will be taken to utilize ICT systems in agro-based industries, agricultural research and dissemination of agricultural technologies, agri-business development to the farmers and preparation and maintenance of an agricultural database.

1.1.4 Social welfare

i. Nationwide ICT systems will be implemented for rural development activities, agricultural, horticulture, fisheries and livestock extension for farmers, career guidance for youth, technology guidance for rural enterprises and micro level planning. Communities and user groups of beneficiaries would be actively encouraged to participate in all such activities; and

ii. Non-government organizations will be encouraged to establish centers at the village level for providing hardware/software or other support services. At the same time the government will use both the formal and non-formal channels to disseminate information about the application and advantages of the use of ICT to communities.

2. Review of ICTs in Rural Development Activities

Rural development activities cover a wide range of subject areas. It does not cover only agricultural activities but also covers health, education, family planning and so on. It aims at finding the ways to improve the rural lives with participation of rural people in different fields. From the identification of above areas of ICTs involvement included in ICT policy, it is very clearly understood that the most of the areas are the fields related with rural development. Technologies developed in these various fields are now pouring down and rural people have started to get in touch with them and harnessing the benefit of it gradually. Farmers are getting all the rerequired information related to higher dairy, crop production, shrimp and fish cultivation due to development of ICT. It has only become possible due to technology developed in case of information and communication sector. It is expected that with the available information and communication technologies, it will continuously give benefit to a larger part of rural people who need these urgently. Thus, their socio-economic conditions are expected to improve.

3. Present Status of ICTs

Many countries have embarked on a new era of economic development by wide spread implementation of ICT in their societies. Unfortunately Bangladesh still lags behind although it has framed out a good ICT policy. But it is moving slowly with step by step. It is expected that it will move faster with the advantage of submarine cable connection and with the support of the government. There is no doubt that ICT can be an enabling tool for wider socio-economic development of the people including rural people. It can greatly increase the ability of the rural people to get benefit from development programmes launched for them.

With the approval of ICT policy, Bangladesh has initiated activities one after another to achieve those policies. Some of those are:

3.1 Establishment of Training Facilities for Human Resources Development

3.1.1 Bangladesh Computer Council (BCC)

It was established in early in early 1990's with its head office in Dhaka and six regional offices in divisional cities. A team consisting of 13 members is responsible for operation of the council. Prime objective of the council is to develop various cadres of

efficient people needed for the country. They prepare a calendar of their training programmes, short and long term courses are conducted in each year and these are published in news paper and its website. In the mean time it has trained more than 35,000 persons. With a view of developing ICT capacity of the public sector for making the government's e-government initiatives, different ICT training for the government officials was also organized. It is now going to offer diploma and post graduates diploma courses. It also undertakes related research studies from time to time.

3.1.2 Public and Private Universities and NGOs

Bangladesh has got 21 public and 52 private Universities. Most of them offer Bachelor degrees and some Universities offer Master's degree courses as well. Products of these Universities are working in different organizations. Likewise, some NGOs have become involved in offering ICT training courses on regular basis. Many of them are doing business by opening computer firms and some are working in NGOs.

3.1.3 National Academy for Computer Training and Research (NACTAR)

It is established in Bogra. It offers various types of courses needed for the college and high school teachers as well as for the unemployed educated youth. These are circulated through its training calendar, website and in the daily newspapers.

Beside this council, some training institutes like Youth Training Centers, Public Administration and Training Center and Rural Development Academy are also engaged in conducting short ICT courses.

3.2 E-Governance

E-Government refers to the use of ICT's to improve the efficiency, effectiveness, transparency and accountability of the government. Under e-Government initiative, all ministries including their departments have hosted their websites. Now anybody can browse these websites and can get necessary information. One can put any related questions and receive replies. Many of them advertise tenders, recruitment and other related matters. Online access to results of different exams (like SSC and HSC) is now available; results of job interviews, relevant public notices also can be found. This not only promotes better administration and better business environment, but also saves time, labor and money.

3.3 E-Commerce

It is also started to practice but it has remained confined within the banks, super markets and electronics shops. It is expected that its usage will be spread over the other areas day by day.

3.4 Access to Information for improvement of rural livelihood

The rural people are often unaware of their rights, entitlements, new government projects and services of various nation building departments. For this, they can not avail their services for which they are meant for. In this case ICT can improve their accessibility to the information that they require.

It is also said that development of a society largely depends on the access to information. Despite ICT's massive potential, the current information explosion has yet to have much impact on development activities and access to practical information for rural communities, local people and particularly to farmers. Considering this, the Government of Bangladesh has approved its ordinance for right to information very recently and have made contact person for each organization who remains responsible for providing information of the same organization, if it is sought from him.

In the mean time, Department of Marketing of the Agricultural Ministry is providing online access to information on the prices of agricultural products daily (Begum, S, 2004). It covered more than 268 commodities of 30 districts. The farmers, consumers and the businessmen are becoming aware of this information. The Rural Development Academy, Bogra with the assistance of CABI Bioseience, UK through its Mobile Plant Clinic Project is also receiving information of farmers' problems on pest and diseases as well as their seeds and is providing necessary solutions on spots (Jeffery Bentley, 2003).

The Grameen Telecom Village Phone Programme is another unique effort to provide tele-communication facilities in rural areas. It provides access to these facilities to more than 50 million people living in remote rural areas. Over 34,000 villages of 61 districts of rural communities get direct benefits from this programme.

Community radio is also playing a good role in sharing information about day today life of the rural people. This is creating awareness of burning issues such as AIDS,

literacy etc. It is also helping people to become self motivated and aware of their rights. Bangladesh NGO Network for Radio Communication (BNNRC) is working in this area to popularize it.

Some other private organizations have come to help village people in this regard. D. Net, an NGO through its *Palli Tathho* (Rural Information Centers) provides various necessary information at Nilphamari (Uddin, Md. Forhad and Hasan Mahmud (2007). According to their findings, villagers sought information with their problems on health, agriculture, education, legal and human rights and on non-farm activities (Raihan, Ananya, 2005). *Amader Gram* (Our Village) and UNDP's sustainable Development Networking Programme operate tele-medicine services in rural areas. This is a scheme through which patient and doctor interact with each other through online chatting and video conferencing. According to a study conducted by Saeem (2008) pointed out that income of rural people of Rampal Upazila of Bagherhat district and Mirzapur Upazila (sub-districts) of Tangail district have increased with having access only to mobile phones. Their business activities were flourished having correct information about their products through mobiles.

Right to information at right time is very important for farmers of Bangladesh. It helps to eradicate the middlemen. Hence it is to be channelized considering as mandatory for farmers for his quick action and to avoid price manipulation. Likewise, students who are mostly youth and other category of people require information of their activities. Tele-centers are considered to be much helpful in this regard. Bangladesh Tele-center Network, an apex body of Tele-center providers is going to install around 40,000 Tele-centers throughout Bangladesh by 2011.

Radio and Television is still effective tools for dissemination of information. Weekly programmes on agriculture of some private TV channels and hourly agriculture programmes of Bangladesh Television (BTV) have been appreciated by many of the village people. Likewise, daily and weekly health programmes (including live programmes) of RTV and ATN (Private Bangladesh TV channel) are contributing a very good role where doctors and patients discuss about the diseases and get advices accordingly. Recently some mobile phone companies (like Bangla-Link) have created facilities for people to provide information on agriculture and health services . Among all, the very recently introduced 'Union Thotho Seba Kendra" launched by the present

government is a very good step to bring ICT at the door step of the people. All these Sheba Kendra are provided Computer with Internet, Printer, Scanner and other facilities. People are coming to take their services. Through the above activities, it is understood that people at the grass root level have started to get access to various information. But it is still long way to go.

3.5 Problems Encountering in ICTs

From the various reports and users of ICTs, it is known that there are a number of problems encircled with ICTs in Bangladesh. Among them, some of them are mentioned below:

i. Although steps were taken to boost up various types training programmes, low literacy rate in the rural areas is considered to be a barrier for faster development in ICT sector;

ii. Shortage of power supply is a problem. Continuous and regular supply will enhance ICT usage;

iii. Price of ICT materials/ accessories are still high which rural people can not afford to buy those;

iv. Web sites which are hoisted by different organizations are not updated on regular basis for which up to date information are not found and thus users are deprived of having correct information;

v. Number of cyber cafés and facilities within the cyber cafés are limited. These are mainly district-based;

vi. There is no clear-cut law of cyber use for which users remain in dark. However, more cyber cafés are to be established at least at the Upazila level, if not able to give at union level; and

vii. Newly established 'Thotho Seba Kendra' has come across with some problems. Their supplied ICT equipments are getting out of order one after another for improper handling. Some rules and regulations are to be imposed there. More trained personnel are to be placed at these places.

4. Recommendations

With the above discussions, it is revealed that Bangladesh has placed ICT on the top of its development agenda. In this connection, it has also started working in different sectors of development. There is some progress as well. Information flow is one of them through websites. This solves many problems as it provides information of all sectors of development which can be made available within a minute. There are other achievements. But problems are there. Of them, shortage of trained man power in ICT and inadequate supply of electricity are the main. These are to be solved.

The following recommendations can be taken into account for speedy implementation of ICT activities:

First and foremost duty was to develop required manpower. The GOs and NGOs are continuously working on this line. But their programmes are to be reviewed now and modified as per the present demand.

Secondly, Education system at all school levels has been strengthened with ICT facilities in the meantime, low-cost laptop has been developed. Further more facilities are to be developed with the development of web-sites and their regular updating by providing uninterrupted supply of electricity.

Thirdly, the development of more ICT infrastructures at the grassroots level is to be created, so that village people can have easy access and feel encouraged to use those. Thereby they can apply those according to their needs in the field of agriculture, livestock, fishery, forestry and for other means of their livelihood so that their level of living is improved gradually at a satisfactory level.

Finally, the government has decided to establish an ICT village at Kaliakore near to Dhaka and has acquired around 18 acres of land. This has to be given a final shape soon as it will work as a center of ICT activities. In doing so, support and investment has to be sought from within and outside of the country.

References

Begum, S. (2004). "*Application of ICTs in Agriculture for Poverty Reduction (1)*": Attempts and Successes of ICT Roadmap to Villages in the SAARC Countries

Jeffery Bentley (2003): Mobile Clinics & Local Knowledge in Bangladesh; CABI Bioscience, UK

Raihan, Ananya.(2005). "*ICTs and Access to Information, How to Make it Work for Promoting Human Rights*", D.Net

Saeem Ferdous, Sheikh (2008): Information Technology Facilities available in the Rural Area and its use; Rural Development Academy, Bogra, Bangladesh

Uddin, Md. Forhad and Hasan, Mahmud. (2007). "*Access to Information*": D. Net.

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Social Capital: From the Perspective of Slum-dwelling Female Garment Workers in Bangladesh

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Abstract

Everywhere in the world, the garment sector employs mainly young women. Bangladesh is not an exception. In spite of the great contribution make to the national economy, the female garment workers in Bangladesh are beset with enormous problems. Problems often relate to low payment, compulsory over time, job insecurity, threat of being laid off or withheld wages. These problems bring severe impacts on the female garment workers' livelihoods coping strategies in urban slums. In the slums of Bangladesh, basic infrastructural amenities and social services are largely insufficient. Inadequate and congested housing, over crowded population, poor health care facilities and poor sewerage and water supply are common in the Dhaka slums. This study found that supportive roles of household relationships and supplementary functions of social capital are the key pillars of coping strategies of slum dwelling female garment workers. Moreover, the study shows that relationships with NGOs were important to build up a social safety net. Besides this, relationships with friends, co-workers, neighbours and local people played vital roles. Their contributions of sharing information, money lending, sharing tragedies or difficulties and work were essential in the life of a garments worker. Finally, the research justified the supplementary role of social capital.

Key Words: social capital, livelihoods coping strategy, urban slums, female garment workers

1.Introduction

The garment sector in Bangladesh is a classic example of the globalisation of production. The garment sector is now the major source of foreign exchange in Bangladesh. Bangladeshi ready made garments were increasingly visible in the market

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of developed countries (Zohir and Mojumder, 2008). For an example, in the fiscal year 1983-84, the number of garment factories was 134 and 0.04 million garment workers were employed. It contributed 3.89% to the national export of Bangladesh. After 25 years, in the fiscal year 2007-08 the number of garment factories was 4740 and total 2.5 million workers were involved in this sector and the contribution to the national export was 75.83% (BGMEA, 2009). Everywhere in the world, the garment sector employs are predominantly young women and Bangladesh is not an exception (Naved *et al.*, 2001, p.91). The contribution of garment workers to the growth of export oriented industries in the last decade had created opportunities for factory jobs for women (Amin *et al.*, 1998) in urban areas of Bangladesh. Bangladesh was witnessing a rapid increase in the number of female garment workers living in urban slums. In 1991, Dhaka received more than 40% of the total rural migrants and the rate of female migrants was significant (Hussain, 1996). According to BBS (1994) *"Whereas in the past migration to urban areas consisted mostly of single males in the working age groups, recently women are also moving at rates comparable to that of men to urban areas; mainly due to expansion of garment sector"* (p.78). This creates enormous pressure to the existing facilities and makes situation more vulnerable in urban slums (Kabeer and Mahmud, 2004a).

In spite of the great contribution to the national economy, the female garment workers in Bangladesh were beset with enormous problems. Problems often related to low payment, compulsory over-time, job insecurity, threat of being laid off, or withheld wages (Zohir and Mojumder, 2008). These problems bring severe impacts on the female garment workers' livelihoods coping strategies in urban slums. In the slums of Bangladesh, basic infrastructural amenities and social services are largely insufficient. Inadequate housing, overcrowded population, poor health-care facilities and, poor sewerage and water supply system are common in slums in Dhaka (Hussain, 1996, p.96).

2. Objective

This paper examines the roles of social capital in the lives of female garment workers as a tool to cope with urban slum environment in Dhaka city.

3. Research Methodology

An exploratory research method was followed to identify the social capital of female garment workers in slums of Dhaka. The field work of this research was conducted during July-August 2009 in Rampura and Badda slums of Dhaka. These two slums were selected because these are situated in the heart of the city and a large number of the garment workers live there. Un-structured interviews with female garment workers were carried out. All the selected respondents had been working for at least one year in the garment industry during the data collection period. Respondents were interviewed in order to find out the nature and outcomes of coping strategies to deal with slum dwelling. A tape-recorder and note books were used for collecting data. Primary data were collected by interviewing of 32 female garments workers. Moreover, to elicit the wider dimensions of coping strategies, their family members were also interviewed, where possible. The 32 respondents were selected purposively from two different slums. Amongst them 16 garment workers from Rampura and 16 garment workers from Badda slum. The respondents were selected considering their age, education and work of experience.

4. Results and Discussions

Table-1: Respondents Selection Criteria

Exclusion and inclusion criteria of respondents selection		
Name of the slums	Rampura and Badda	Selected purposively considering female garment workers availability and situated in main city.
Number of slums	02	A large number of the garment workers of Dhaka city are lived in these slums.
Number of respondents	32	16 garment workers were selected from each slum those who had at least one year work experience.
Methods of data collection	Qualitative	In-depth interviews were done by using a check list.

Local NGOs staffs were also interviewed formally and informally during the study. The purpose of the interviews with them was not only to identify appropriate respondents but also to get further information in accordance with the study context.

For the secondary data, relevant journals, books and other form of publications were referred. Moreover, for updated information, a regular internet search was made.

Table-2: Profile of the Respondents at a Glance (n= 32)

Characteristics		Rampura Slum	Badda Slum
Age (Year)	16- 20	07	06
	21-25	05	07
	26- 30	02	02
	31-35	02	01
Level of education	No Schooling	02	01
	1-5	08	09
	6-10	05	05
	Secondary School Certificate (SSC)	01	01
Work Experience (Year)	1- 5	11	09
	6- 10	03	05
	11- 15	02	02
Marital Status	Single	12	14
	Married	04	02
Place of origin	Born and brought up in urban slums	03	02
	Migrated from rural areas	13	14
Total		16	16

4.1 Female garments workers in the context of Bangladesh

In 1951, the agricultural sector of Bangladesh occupied nearly 90% of employed men and women. By the year 1985-86, 63% of working men and only 11% of working women remained in this sector (Ahmad, 1991, cited in Kabeer and Mahmud., 2004a). The reason behind this changing pattern of the female labour force was involved with

the booming trend of the urban manufacturing sector. When the garments sector arose in late 1970s, little prospect had been seen to remove the barrier of women's paid work. Between 1974 and 1986, the percentage of working women in manufacturing rose from 4% to 55% percent. It was found that the contribution of the urban female labour force increased from 12% in 1984 to 20.5% in 1996. It was noticeable that between mid1980s and mid1990s, the annual growth of the male labour force was 9% whereas the urban female labour force rose one-third in every year. This indicates the 'feminisation' of the labour force in urban areas. Kabeer and Mahmud (2004b) describe this situation as *"tapping into garments industries reserve pool of female labour in countryside"* (p.148). She also mentioned that the female workers came from the poorer stratum of the rural areas but not from the poorest of poor. Afsar (2000) suggested that female migrant workers are mostly from the landless households. Export Processing Zone's (EPZ) garment workers were considerably better off because they were more educated and came from food secured households, whereas, wage workers outside of the EPZ were commonly poorer (Kabeer and Mahmud, 2004a).

The knitting apparel is more capital intensive and employed by mostly male workers. On the other hand, the woven apparel industry is labour intensive and mainly employed by unskilled or low skilled female workers (Ahmed, 2006). In her study, she found that 50% of low and medium and 31% unskilled and non-agricultural female workers are employed in woven apparel sector in Bangladesh. In comparison, knitting apparel sector employed highly skilled non-agricultural labours. Therefore, Kabeer (2004) found a positive correlation between female involvement in paid work and household poverty in Bangladesh.

4.2 The Socio-economic context in the slums of Dhaka

Each and every year urban population growth explosion is a common phenomenon in Bangladesh. Dhaka is one of the fastest population growth rate cities in Asia. During 1975-2000, the average annual population growth rate of Dhaka city was above 7% (UNDP, 1999). The total population of Dhaka is 10,712,206 of which 5,978,482 are male and 4,733,724 are female in 2001 (BBS, 2003). The increasing number of single females in the urban work force and the reunion of females to their male partners are the main reasons for decreasing the sex ratio in Dhaka city over the years (Siddiqui, *et al.*, 1993). Afsar (2000) found in her study that the young population of Dhaka city is

relatively high due to age selective rural-urban migration. Similarly, the BBS (1997) report shows that the age groups of 0-14 and over 60 are unproductive and dependent. They are about 40% of the total city population. Therefore, these groups cause poverty, especially among the low income groups in the city population. The UNDP reported in 1999 that the rapid growth of Dhaka is not commensurate with its industrial development. The city is characterized by poverty and social vulnerability, shortage of housing, infrastructure, social services, poor quality of physical and social environment and inefficient urban management.

The Slum Census of Urban Bangladesh, 2005 identified 4,966 slum clusters in Dhaka Metropolitan Area (DMA) with a total slum population of 3.4 million; (37.4% of the total population) more than doubling of the slum population over the 1996 level (Angeles *et al*, 2009).

Most of the population growth in Dhaka derives from rural-urban migration rather than from immigration or natural growth (BBS, 2001). According to the 'Centre for Urban Studies' (CUS) survey, the population density in Dhaka slums was about 200,000 per square kilometer in 2005 (CUS, 2005; cited in Huque, 2007). In this situation, a growing number of the population is suffering from poverty and insufficient housing. They have been forced to live in informal settlements mostly owned by the government or private landowners. Garment workers lived in slum as they could not afford a better living (Zohir and Mojumder, 2008).

Poor sanitation and water supply is one of the main features of informal settlement in Dhaka. The provisions of tap borne water supplies are insufficient. Sanitation and sewage facilities are also limited. Households without sanitation facilities have three possibilities: sharing toilets with their neighbors, paying for use of public toilets or open defecation (Hossain, 2006). During the rainy season, narrow pathways are over flooded due to lack of sewerage and drainage system. Not having excreta and solid waste management makes the situation vulnerable. Moreover, electricity and gas supplies are prominent problems of slum dwellers. The electricity supply in slum areas is very poor and due to illegal connection, there is a systematic loss of up to 30% (Siddiqui *et al.* 1993). Other features of Dhaka slums are that social services to the residents are ignored and low employment opportunities and livelihood insecurity

creates an increased number of anti-social activities; like robbery, hooliganism and drug abuse by the young population (Islam *et al.* 1997).

Legal ownership of housing in Dhaka slums is a common feature amongst the inhabitants. It is common that illegal landlords build houses on the government land and rent it to the new comer (Hossain, 2006). Usually, on average, five to six people live in a single room of a house. Typical houses consist of small rooms under a common roof. The slums are usually located on land unsuitable for residential purposes, like; city protection embankment, low-land and land beside canals and railway lines (Wood and Salway, 2000). Dependency on the informal sector and high unemployment rate is another feature of the Dhaka slums. The slum-dwellers mostly worked as rickshaw pullers, petty traders, garment workers, street vendors and day labourers although some have formal employment, like; low-paid jobs in private companies and low grade government services (Hossain, 2006).

4.3 Social capital

Coleman (1988) deserves primary credit for developing the "social capital' theoretical framework. Putnam (1995) mentioned that "by analogy with notions of physical capital and human capital tools and training that enhance individual productivity, "Social capital" refers to features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit.

Moser argued that (1998, p.4) 'Social capital' is deriving from trust and social ties. This capital originates in rural-urban networks on the basis of kin and place of origin. More recently it has been based on local networks with NGOs and CBOs. Social capital involves reciprocal social relationships and social networks between households and within communities.

4.4 Coping strategies

Many have tried to define coping strategies. A general definition of coping strategies given by Devereux (2001) is *"responses to adverse events or shocks"* (p.512). It is households that devise method to reduce risks ('ex-ante risk mitigation') and mitigate shocks ('ex-post coping strategies') (Devereux, 2001). Snel and Staring (2001) define coping strategies in a broader sense as:

"all the strategically selected acts that individuals and households in a poor socio-economic position use to restrict their expense or earn some extra income to enable them to pay for the basic necessities (food, clothing, shelter) and not fall too far below their society's level of welfare" (ibid, p.11).

According to this definition, coping strategies involves *"a conscious assessment of alternative plans of action"* (ibid: p.11). This definition is based on the assumption that the poor are asset managers. They enjoy the freedom of choice in relation to their actions within the limited options available to them. Given their limited choice of strategies sometimes, the poor are not always successful in achieving their aim. Their coping strategies often have opposite effects (Sekine, 2005). Sekine found AIDS affected households in Kenya sold their land to increase short-term income that influenced their long-term assets base. In such cases, few analysts view the idea of coping strategies is ambiguous.

Rugalema (2001, cited in Barnett and Whiteside, 2002) highlighted some reasons which challenge the idea that coping strategies have their weaknesses by pointing out, for example, that

i. Sometimes outcomes of coping strategies can cause households to break up;
ii. Coping strategies often benefit individuals more than they help households to survive; and
iii. Consideration of long term costs and benefits are not necessarily involved household actions as a 'Strategies'. They often use short-term efforts to survive.

4.4.1 Social capital based coping strategies

Female garment workers actually use all options which are more available to them to cope in the urban slums. They are used to use others coping strategies namely; labour based, human capital based, productive asset based and household relations based coping strategies

Forms of social capital based coping strategies depend on using various social networks. Most of the literature referred social capital based coping strategies as a form of community response. Moser (1998) stated *"community itself can be considered as an asset that reduces vulnerability or increases opportunities depending on its "stock" of social capital"* (p.13). Coping households can have relationships with individuals

and organizations such as neighbor, friends, CBOs, NGOs, Unions, religious groups apart from extended family. Garments workers can have supports from them when they are in need. Previous studies showed that to ensure a safety net in adverse situation, households usually get supports from the extended family and other groups is needed. Gugler (1969) argued that slum dwelling female workers tend to maintain ties with their place of origin not only for economic but also for emotional security in hardship.

In contrast, Hart (1971), Trager (1984) and Lim (1990) explore the relationship of female garment workers with their families of origin. They emphasis close ties with relatives and friends not only for economic purpose but also for their quality of loyalty, obedience, responsibility for family members and their altruistic nature. Lauby and Stark (1988) and Chant (1992) also argued that the slum dwelling female workers have much stronger social and economic links with kin and neighbors than to male. Kibria (1998) maintain that "those who come from communities where garment work is an established course of action are more likely to enjoy the assistance of sending community members in the garments work entry process" (p.18).

Zohir and Mojumder (2008) found that after coming to Dhaka, female garment workers try to settle into a slum inhabited by people from their area of origin. Moreover they maintain good relationships with local elites, co-workers and neighbours to make their establishment stronger in urban slum. Kibria (1998) also found that they always keep a close ties with their village kin and neighbours to secure their former household places in case of return.

A study in Vietnam indicates that slum living garment workers were likely to receive assistance in cash or in kind from neighbours or co-workers (Naved *et al.*, 2001). In another study, Kabeer and Mahmud (2004a) suggest that garment workers seek the help from NGOs, rights groups and co-workers to cope with job related problems. Considering above literature review it can be concluded that social capital based coping strategies are important in life of female garment workers.

After having established the theoretic foundation for looking at different assets and coping strategies, the next chapter will introduce about female garment workers in Bangladesh and the socio economic context of Dhaka.

After having established the theoretic foundation for looking at social capital and coping strategies, the next section will discuss on research findings on social capital based coping strategy of female garment workers in Bangladesh.

5. Results and Discussions

Workers used social capital mainly to ensure better residential arrangement safety and security while commuting and to overcome financial crisis. Research indicated that all the migrant workers came to the slums using their social network. Mainly kin and extended families played a crucial role in coping strategies. Two evidences showed that married workers did not get enough time to look after their children due to extra work load. They sent their children to live with relatives during the peak production period. The relatives were responsible for feeding those children and taking care of them. On the other hand, garment workers provided financial support for that certain time period to those families. The strategy was found amongst the married workers who migrated from adjacent villages. On the other hand, garment workers provided financial support for that certain time period. Another contribution that the relatives made was lending of money and help to meet daily necessities to garment workers in financial crisis.

This network also included friends, co-workers, neighbours and even inhabitants of the same locality. One of the interviewees mentioned *"before coming to the slum, I was just a burden to my family and searching for a job. Some girls of my village were working in garments and living in this slum. I contacted them for seeking a support to find job. One of them told me what to say and what do in the interview. After that I got the job in the same factory where they were working. They also helped me to find out my residence"*.

It was common among female workers to use social capital for their self-protection. During overtime, they worked until midnight. Garment workers reported the incidents of harassment in the street by local *'mastaan'* (hooligans) and hijackers on their return home. They commuted together with co-workers to overcome this problem. Co-workers of garment factories possessed strong feelings of friendship. Some cases the study found that co-workers helped to complete each other's work burden. One garment worker mentioned *"we help each other considering the situation. I also received help from one of colleague. Last month, my mother became seriously sick and*

I need to return home soon. I had some pending work. My supervisor did not allow me to go earlier. That time I requested one of my colleagues to finish my pending works. With her help I finished my work earlier and I went home".

With the help of co-workers, they try to create and broaden their web of social networks. They share information regarding jobs and better opportunities. They inspire each other to become member of NGOs which are working on labour rights. The study found that in the case of any problems or complaints regarding their jobs they usually moved together and bargained with the management. The strategy behind that was to create pressure and to represent their demand strongly to the management. This strategy also protected them from any action against an individual taken by the authority. In case of failure to manage authority, they went to the NGOs or Unions which working on garment workers' rights. Some garments workers reported that being a member of such an NGO gave them legal support in the case of job and residential related problems. Besides this, they olumbia a revolving loan system amongst co-workers to maintain themselves in financial crisis. It was found that married garment workers utilized the social net works of her husband, whereas single workers who were born and brought up in the slums used their parent's network. Single migrant workers tried to build up their own strong networks in order to cope in the slums.

5.1 Similarities and differences between the research findings with other studies

The research results focused on the importance of social capital to cope in the slums. Different individuals and organisations play vital roles for the Dhaka slum dwelling garment workers. The study found that married garment workers used their husbands' networks, whereas single workers who were born and brought up in the slums utilised their parents' networks. Single workers who migrated from rural areas tried to build up their own networks in order to cope. The literature review showed that not only have women workers learnt to earn and spend their income but also they have also acquired new social roles. This study found the same. The study shows that relationships with NGOs were important to build up a social safety net. Besides this, relationships with friends, co-workers, neighbours and local people played vital roles. Their contributions of sharing information, money lending, sharing works and so on were essential in the life of a garments worker who wants to live in a slum.

5.2 Supplementary functions of social capital

By proving external resources, social capital has a function to make up the scarcity of other assets. Research indicates that the use of productive capital was low amongst the slum dwelling garment workers. Scarcity of land and household problems was balanced out by having networks with friends, neighbours, co-workers and NGOs. Lack of financial capital was supplemented by borrowing from co-workers, friends, neighbours and relatives. Human capital, e.g. child education and meals were supplemented by religious institutions (*Madrasa*) as reported in the findings. Lack of household labour was supplemented by taking assistance from relatives. Moreover, the research justified the supplementary role of social capital.

6. Conclusion

This study found that the labour market allows easier coping only to a segment of female garment workers, i.e. those belonging to strong social support networks in the urban areas to migrate by helping them to find shelter and employment. When subsistence comes under threat, migration in search of employment, if one has social connections in the city to help find employment, becomes the only remedial option. The striking findings of the research are that, garment workers in slums are living with a lack of productive assets but their utilization strategies of other assets help them to meet up those scarcities. The study justifies the role of social capital and found that it can make up the lack of other types of assets. It is, therefore, obvious that these female garment workers lack finance to invest in their own self-employment in the urban economy. Therefore, the government and NGOs, should work to strengthen network with the garment workers.

References

Afsar, R. (2000). "*Rural-Urban Migration in Bangladesh: Causes, Consequences and Challenges*": The University Press Limited, Dhaka

Ahmed, N. (2006). "*Bangladesh apparel industry and its workers in a changing world economy*": Ph.D. thesis, Wageningen University, The Netherlands

Amin, S, Diamond, Naved, R.T, and Newby, M. (1998). "*Transition to adulthood of female garment-factory workers in Bangladesh*": Studies in Family Planning, Vol. 29, Issue 2, Page: 185-200

Angeles, G, Lance, P. O'Fallon, J.B, Islam. N, Mahbub, A.Q.M. and Nazem. N.I. (2009). "*The 2005 census and mapping of slums in Bangladesh: design, select results and application*": International Journal of Health Geographic, Vol. 8, Issue. 32

Barnett T and Whiteside, A. (2002)."*Poverty and HIV/AIDS: impact, coping and mitigation policy in Cornia*" A. G., AIDS, public policy and child well-being., Available from: http://www.unicef-icdc.org/research/ESP/aids/chapter11.pdf [Accessed on 12 July, 2009]

BBS (Bangladesh Bureau of Statistics) (1994). "*Analytical Report*", Bangladesh population Census 1991, Vol. 1, Bangladesh Bureau of Statistics, Ministry of Planning, DhakaBBS (1997). "*Urban Area Report*", Bangladesh Population Census (1991).Bangladesh Bureau of Statistics, Ministry of Planning, Dhaka

BBS (2001). "*Preliminary Report*", Population Census 2001: Bangladesh Bureau of Statistics, Ministry of Planning, Dhaka

BBS (2003). "*National Report (Provisional)*", Bangladesh Population Census 2001, Bangladesh Bureau of Statistics, Ministry of Planning, DhakaBGMEA (2009), "RMG Export Statistics", Bangladesh Garment Manufacturers and Exporters Association, [online] Website: http://bgmea.com.bd/index.php? Option comcontent & task= view&id = 56&Itemid =175 [accessed on 11 September 2009]

Chant, S. (1992). "*Conclusion: towards a framework for the analysis of gender-selective migration*": Gender and Migration in Developing countries, Chant S (ed.). Belhaven Press: London

Coleman, J. S. (1988). "*Social Capital in the Creation of Human Capital*": Americal Journal of Sociology (supplement), vol. 94, Page: S95-S120

DhakaKabeer, N. (2004). "*Globalisation, labour standards and women's rights: dilemmas of collective action in an interdependent world*": Feminist Economics, Vol. 10, No. 1, Page: 3–36

Devereux, S. (2001). "*Livelihood insecurity and social protection: re-emerging issue in rural development*": Development Policy Review, Vol. 19, Issue 4, Page: 517-519

Gugler, J. (1969). "*On the theory of rural-urban migration: the case of sub-Saharan Africa*": In Jackson JA (ed.), Migration, series: Sociological Studies 2, Cambridge University Press: Cambridge, Page: 134-155

Hart, D.V. (1971). "*Philippine rural-urban migration: a view from Caticugan, a Bisayan village*": Behaviour Science Notes, Vol. 6. Issue. 2. Page: 103-137

Hossain, S. (2006). "*Social characteristics of a megacity*",: a case of Dhaka City, Bangladesh, Conference paper, TASA Conference 2006, University of Western Australia & Murdoch University

Hussain, S.H. (1996). "*Female Migration in an Urban Setting- the Dimensions of Spatial/Physical Adaptation: The case of Dhaka*": HABITAT INTERNATIONAL, Vol. 20, No.1. Page: 93-107

Huque, I. (2007). Urban Slum Mapping in Bangladesh, Center for Environmental and Geographic Information Services (CGIS), Dhaka, Bangladesh. Website: http://www.ciesin.
columbia.edu/confluence/download/attachments/34308102/Huque+finalITCS lum+Mapping_Bangladesh.pdf? Version=1 [accessed on 02 September 2009]

Islam, N. Huda, N., Narayan, F.B, and Rana, P.B. (1997), "*Addressing the Urban Poverty Agenda in Bangladesh*": The University Press Limited

Kabeer, N. and Mahmud, S. (2004a). "*Globalization, Gender and Poverty: Bangladeshi Women Workers in Export and Local Markets*": Journal of International Development, Vol. 16, No. 1, Page: 93–109

Kabeer, N. and Mahmud, S. (2004b). "*Rags, Riches and Women Workers: Export-oriented Garment Manufacturing in Bangladesh*", in Marilyn Carr. (Ed.), Chains of Fortune: Linking Women Producers and Workers with Global markets, London: Commonwealth Secretariat

Kibria, N. (1998). "*Becoming a Garments Worker: The Mobilization of Women into the Garments Factories of Bangladesh, Occasional Paper*", United Nations Research Institute for Social Development Nations Development Programme, GenevaLauby, J. and Stark, O. (1988). "Individual Migration as a family strategy: young women in the Philippines", Population Studies, Vol. 42, Page: 473-486

Lim, L.Y.C. (1990). "*Women in the Redeployment of Manufacturing Industry to Developing Countries*": Working Papers No. 18, UNIDO

Moser, C.O.N. (1998). "*The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies*": World Development, Vol. 26, No. 1, Page: 1-19

Naved, R.T., Newby, M, and Amin, S. (2001). "*The Effects of Migration and Work on Marriage of Female Garment Workers in Bangladesh*": International Journal of Population Geography, Vol. 7, Page: 91-104

Putman, R. D. (1995). "*Bowling Alone: America's Declining Social Capital*": Journal of Democracy, Vol. 6:1, Page: 65-78

Sekine, K. (2005). "*Coping strategies of AIDS-affected households in the slums of Nairobi*":MSc. Dissertation, International Development Department, School of Public Policy, The University of Birmingham, Edgbaston, United Kingdom

Siddiqui, K., Qadir, S.R., Alamgir, S., and Haq, S. (1993). "*Social Formation in Dhaka City*": The University Press Limited, Dhaka

Snel, E., and Staring, R. (2001).*"Poverty, migration, and coping strategies: an introduction*", European Journal of Anthropology, Vol. 38,Page: 7-22

Trager, L. (1984). "*Family strategies and the migration of women: migrants to Dagupan City, Philippines*": International Migration Review, Vol. 18, Page: 1264-1277

UNDP (1999). "*World Urbanization Prospects: The 1999 Revision*": The United Nations, New York.

Wood, G., and Salway, S. (2000). "*Policy Arena Introduction: Securing Livelihoods in Dhaka Slums*": Journal of International Development, Vol. 12, Page: 669-688

Zohir, S.C., and Mojumder, P.P. (2008). "*Garment workers in Bangladesh: Economic, Social and Health Condition*": Research Monograph 18, Bangladesh Institute of Development Studies, Dhaka

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Indigenous Health Care Strategies of the Rural People: an Insight of Kishorpur village of Bangladesh

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Abstract

Indigenous health care strategies are very important and an essential part of rural health care system. It represents an important component of global knowledge on development issues. It can play a vital role to know what the local communities use in their health care management and help to improve understanding of local conditions and provide a productive context for activities designed to help the communities. This indigenous health care strategy has not been studied in broader perspective over the years. The present study aims; to find out, if the villagers have the opportunity to take the advantage of both traditional and modern health care facilities than what they prefer and to understand about the indigenous medical practices of rural Bangladesh. The approach to the study being anthropological, relatively a greater emphasis has been given on the details of information, inner consistency and authenticity of data. In this micro level study both qualitative and quantitative data has been collected in the year 2006 in 'Kishorpur'. Findings of the study showed that the health care strategies, as a part of such cultural system, are coherent to the beliefs, norms, arrangements, institutions, and patterns of interaction. Now a day, various national and international organizations are giving importance to the usefulness of indigenous health care system. But in the context of our country, it can be said that for a huge number of research on indigenous health care strategies need to be done to find out more on importance of indigenous health care system of Bangladesh.

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1. Introduction

Human beings have been using different components of this world in pursuit of its existence for exploring various devices of health care system. Indigenous health care strategies are very important and an essential part of rural health care system (Ackernecht 1971). Indigenous knowledge provides the basis for problem solving health care strategies for local communities, especially the poor (Alam *et al.*2000).

In an article Choudhury, Alam and Hasan (1996: 20-23) discussed about 42 medicinal plants and their usages. In another research work, they focused on the documentation of 143 medicinal plants in case of treatments of 53 general diseases.
It represents an important component of global knowledge on development issues (Amin 2002). Indigenous knowledge (IK) is an underutilized resource in the development process. By investigating, it was known that IK play an important role to know what the local communities use in their health care system, it helps them to improve understanding of local conditions and provide a productive context for activities designed to help the communities (Medical Anthropology Unit 1995). Understanding of IK can increase responsiveness to clients (Choudhury 2002). Adapting international practices to the local setting can help to improve the impact and sustainability of health development assistance (Dunn 1968). Sharing IK within and across communities can help enhance cross cultural understanding and promote the cultural dimension of health believes (Flavier, 1995). Most importantly, investing in the exchange of IK and its integration into the assistance programs of the World Bank and its development partners can help to reduce poverty and the problems of health sector (World Bank 1991).

The people of the rural Bangladesh have knowledge about indigenous health care system (Hasan 2000). They depend on it for various reasons, such as socio economic status, cultural pattern as well as lack of modern health care facilities. In some cases modern health care facilities are available but they are very much biased about it (Helman 1990).

The main concept of this field research is indigenous health care system. This indigenous health care strategy has not been studied in broader perspective over the years. Generation to generation, this health care knowledge had been adopted or learnt

from the predecessors (Chowdhury *et al.* 1996). This health care system had never gone through in a scientific way and no potential research work has been carried out yet (Karim 2000). Focusing point of this, a field research conducted to find out why and how villagers deal with indigenous health care and the impact of this system and sometimes why they become very much biased on it.

2. Objectives

The present study aimed to achieve the following objectives:

i. To find out, if the villagers have the opportunity to take the advantage of both traditional and modern health care facilities than what they prefer; and
ii. To understand about the indigenous medical practices of rural Bangladesh.

3. Methodology

Research area, '*Kishorpur*' village of '*Durgapur*' Thana, which is in the Eastern part of Rajshahi district were selected purposively. The people of the village are living, sharing common ideas, values and belonging to almost the same socio-economic stratum.

The approach to the study being anthropological, relatively a greater emphasis has been given on the details of information, inner consistency and authenticity of data. In this micro level study both qualitative and quantitative data has been collected in the year 2006. Empirical data were collected through direct observations and a survey by using a structured questionnaire.

The analysis of qualitative data has been made through systematic and analytical description. On the other hand, the quantitative data were analyzed by systematically using statistical method.

3.1 Limitation of the study

The scope and objectives of the present study have been kept with less ambitious for a number of reasons. Therefore, the study had several obvious limitations. Such as there was no prior similar study to guide the present study. There was a paucity of recorded data. Researcher had to rely on verbal reports, some of which could not be fully verified. Researcher had only limited data on the attitudes, habits and opinions of the deviants to indicate their way of life and value orientation. The inadequacy of such data

was obviously a considerable limitation of the study. Therefore, it becomes ambiguous to generalize the problems and prospects when evaluating the potentialities.

4. Results and Discussions

4.1 Socio-Economic background and physical setting

Kishorpur is a village of 20.20 square Kilometer area. It is 9 Kilometers away from Durgapur. This village is under Deluabari Union and under Durgapur *Thana*. It is situated on the Eastern side of Rajshahi town. Kishorpur village consists of six *paras* named; Mondol *para*, Darga *para*, Fokir *para*, Medi *para*, Bagan *para* and Uttar para. Research work was conducted the in *Mondol para* and *Darga para*, which are the largest *paras* of the village.

There was no official document or concrete history regarding the name of the two villages. Some mythical stories are in vogue. The old people of the village *Mondal para*, said that there was a famous village leader in the early 20th century named Habib Uddin Mondal. He was very pious, honest and a man of justice. He used to settle the village problem efficiently with proper justice. After his expiry the village was renamed in the memory of that famous Mondal-Mondal para. Regarding Dorga para, we have got the information that there is a Darga in the middle of the village and therefore it is called *Darga para*. It is known from the villagers that the disciples of Hazrat Shah Makdhum used to live around the darga. Later on the locality was known as '*Darga Para*'.

52.68% of the total population of the village lives in two paras which were the research areas. The number of households and population is higher in *Mondal para* than the other one; Percentage of literacy is higher than the *Darga para*.

Table-1: Number of Households and Population

Paras	No.of Households	Population
Mondal para	51	329
Darga para	38	302
Total	89	631

Table-2: Rate of Literacy of the Household Heads in the Two Villages:

Literacy frequency	Mondal *para*	Darga *para*
0	23	18
1-5	14	11
6-10	06	04
11>	00	00
Others	08	05
Total	51	38

Literacy rate of the village is not remarkable. In this village, there are primary school, madrasa and BRAC School. There is no good secondary or high schools and there is no college. In order to get education, villagers have to send their children to adjacent village and few people send their children to Rajshahi. However *Mondal para* is having higher percentage of literacy in comparison to *Darga para.* With few exceptions both the villages have same occupational status. Half of the villages are toning masses and men of small means. Others pull their life somehow. Few land owner's position is well off. Most of the villagers of the study area are share cropper, traditional healer (*Kabiraj*), day labour, fisherman, shop keeper, religious leader (*Imam).* Therefore, economic position of both the villages is like the other villages of Bangladesh. But both villages are almost homogenous so far when economic situation is concerned.

4.2 Indigenous health care system of the study area

Study found various kind of health care system in the study area such as *Allopathy, Homeopathy, Kabiraji and Ayurveda.* The following table shows the respondents' choices of treatment for health.

Table-3: Choices for Health Treatments of the Two *Paras*

Health seeking behavior	Male		Female		Total	
	No	%	No	%	No	%
Allopathic	56	17.93	33	10.92	89	28.85
Homeopathic	51	15.50	41	13.57	92	29.07
Kabiraj	148	44.09	139	46.05	287	90.14
Ayurvedic	60	18.23	67	22.18	127	40.41
Self medication	14	4.25	22	7.28	36	11.53
Total	329	100	302	100	631	200

It was observed that majority of the people preferred *Kabiraj*i treatment. At present, many types of treatment systems are available. The study found the following causes to choose the *kabiraji* treatment.

i. Most of all the inhabitants of the study area are poor and that's why *kabiraji* is the most cost effective health system;
ii. Local people have deep faith in this treatment. Because of its success stories;
iii. Most of them are illiterate and believe that bio-medical system is very complicated;
iv. They have some misconception about other health treatments. They thought that *kabiraji* is the only powerful treatment than any other treatment;
v. They believe that other health care treatments can cause serious side effects, this will end up creating another disease; and
vi. They thought that most of the diseases are natural and the disease can be cured by natural medicines.

4.3 Medication system of the village

There is no M.B.B.S. doctor in the research area. People have to depend on the midwives, bone setters, *kabiraj*, Shaman (*ojha*), homeopathy doctors and sometimes on self-medication. The villagers who want to take the allopathic treatments they have to

go to Thana health complex in *Durgapur* or to the sub centre of the health complex in *Deluabari Union*. But the Thana health complex provides the cosmopolitan health care facilities to the villagers. It is unfortunately true that the doctors who are bound to work there do not deliver their service properly. There are lack of modern medical equipments which is also responsible not providing the proper treatments to the villagers. Therefore, it is found that in case of major health problems or any broad operation villagers come to Rajshahi Medical Collage Hospital.

On the basis of availability there are mainly three types of medication on which they rely on. Those are;

4.3.1 Folk medicine

Throughout the age of people, they have turned to use herbal medicine for healing, the sixth field of alternative medicine. All cultures have folk medicine traditions that include the use of plants and plant products. Many licensed drugs used today originated from the herbal traditions of various cultures such as the medication commonly used for heart failure, digitalis which is derived from foxglove.

The folk medicine consists of local healers, such as herbalists, bone-setter, spiritual healers, diviners and traditional birth attendants. Folk medicine mainly refers to the indigenous knowledge of medical treatments, especially what they call *'kabiraji'* in Bengali.

4.3.2 Homeopathy

It is also common among them as because there is a Homeopathy doctor in the village. The villagers used to rely on both *kabiraji* and *homeopathy* in the past but gradually they are losing their faith on them.

4.3.3 Allopathy

For allopathic treatments, they mainly depend on Thana Health Complex which is in *Durgapur* and its sub-station in *Deluabari* union. Villagers have to pass through three or four kilometers to get the service.

4.4 Major health problems and the causes

They do not think that all the diseases are not always related with the natural causes, sometimes they are related with super natural causes. The major health problems

among the villagers mainly are tetanus, polio, migraine, jaundice, pneumonia, tuberculosis, miscarriages, still birth, fracture of bone, snake bite and some kinds of female diseases. Villagers believe that there are three reasons for these types of health harassment. These are as follows:

- Natural causes;
- Super natural causes; and
- Individual causes.

4.4.1 Natural causes

The villagers do not bother about the super natural causes but accept it naturally in case of jaundice, pneumonia, tuberculosis, asthama and pox. In point of fact, it is found that when the villagers are able to explain the original reason about the disease causation, they grouped such kind of diseases into natural diseases. For example, in early time villagers believe that diarrhea occurs only for supernatural reason. But due to increase of mass awareness, now the villagers believe that the diarrhea caused not for the supernatural power but because of filthy environment or polluted water.

In case of such kind of diseases, natives likely to go homeopathy doctors or in serious case they take allopathic treatments. But before taking any kind of treatment they discuss with their relatives, friends or the person who got similar experiance.

4.4.2 Super natural causes

Focusing on the super natural causes, the study found if the disease persists and does not yield to the usual treatment, suspicion grows and it is usual for the person and his relatives to think about the supernatural or divine causes. According to this field research there are some diseases which villagers believed that are caused by the supernatural power. In case of such kind of diseases villagers mostly depend on the folk medicine, man or shaman (*ojha, kabiraj, moulana).*

In the study area most of the people depend on the *Kabiraji* treatment. But when the disease takes a serious turn and the *Kabiraji* treatment failed to prevent the disease and then they switched over to another treatment system.

4.4.3 Personally responsible

There are some health hazards such as bone fracture and snakebite where the villagers think that if they are careful about their movement they are able to avoid such kind of problems. But in case of snake bite, it must be mentioned that the area is very bushy; therefore, there are many snake holes thus many villagers suffer from snake bites. In case of bone fracture, insufficient nutritious food intake is responsible. Therefore, villagers should have to be careful about these matters. For the treatment of such kind of health problems villagers preffered folk medicine man or shaman and in case of failure they preferred homeopathy and then allopathy.

4.5 Female health problem

Villagers believed on super natural power in some female health problems such as miscarriage, stillbirth, abortion, eclmpsia. Therefore, they maintain some restrictions in order to avoid such kind of health problems. Such as not to move in bare headed, not to move in public, not to swim against the current, not to walk under the banyan tree, not to eat during the eclipse. In case of diseases which are caused by super natural power villagers depend on folk medicine man.

Table-4: Numbers of Households Believe in Super Natural Power

Paras	Believes in supper natural cause	Believes not in super natural cause	Total
Mondal	28	23	51
Darga	23	15	38

Study found that the less educated people of the *Darga para* believe in super natural power where the education level is low. On the other hand the educated families of *Mondal para* do not believe in super natural power. These types of families which are conservative but economically sound do not prefer modern medical system for any kind of disease.

4.6 Health system as part of a cultural system

A cultural system is a coherent whole of beliefs, norms, arrangements, institutions and patterns of interaction. A Health System Includes, in Kleinman's (1980: 24) words, *"patterns of belief about the causes of illness, norms governing choices,evaluation of*

treatment, socially legitimated status, roles, power relationships, interaction settings, and institutions"

It should be stressed that a health system is not a static phenomenon. It is in a continuous process of change due to pressures from both outside the system and from within.

4.7 The three sectors of health care system

Another way of ordering the variety of medical ideas and practices within one culture is to distinguish various, partly overlapping, sectors in health care; Kleinman (1980) introduced the concept of the popular, folk and professional sectors (Helman, 1990: 55-65). Each sector has its own ways of explaining and treating ill-health, defining who the healer is and who is the patient and specifying how healer and patient should interact in their therapeutic encounter. Explanatory models are likely to differ markedly between the three sectors. What is extraordinary about Kleinman's model is the emphasis which he places on cognitive processes such as belief systems on health and illness. In villages these three sectors exist with some varied examples and experiences.

4.7.1 The popular sector

This is the lay, non-professional, non-specialist domain of society, where ill-health is the first recognized, defined and health care activities are initiated. It includes all the therapeutic options that people utilize without any payment and without consulting either folk healers or medical practitioners. Among these options are self-treatment or self-medication, advice or treatment given by a relative, friend, neighbor or collegue, healing and mutual care activities in a church, cult or self-help group or consultation with another lay person who has special experience in particular disorder or of treatment of a physical state. In this sector the main arena of health care is the family; here most ill-health is recognized and then treated. It is the real site of primary health care in any society. In the family, the main health care providers are women, usually mothers or grandmothers who diagnose most common illnesses and treat them with the materials at hand. It has been estimated that about 70-90% of health care takes place within this sector, in both Western and non-Western societies.

The popular sector usually includes a set of beliefs about health maintenance. These are usually a series of guidelines, specific to each cultural group. In this village female health problems, female diseases and pregnancy are belonged to popular sector.

4.7.2 The folk sector

This sector is especially large in non-Western societies, certain individuals specialize in forms of healing which are either sacred or secular or a mixture of the two. These healers are not part of the '*official*' medical system and occupy an intermediate position between the popular and professional sectors. There is a wide variation in the types of folk healer found in any society like bone setters, midwives, sorcerers, tooth extractors or herbalists to spiritual healers and shamans. Folk healers form a heterogeneous group, but sometimes they are organized into associations of healers, with rules of entry, codes of conduct and the sharing of information.

Most folk healers share the basic cultural values and view of the communities in which they live, including beliefs about the origin, significance and treatment of ill-health. Their approach is usually a holistic one, dealing with all aspects of the patient's life, including their relationship with other people, with the natural environment and with super natural forces as well as any physical or emotional symptoms.

4.7.3 The professional sector

This comprises the organized, legally sanctioned healing professionals such as modern Western scientific medicine also known as allopathic or biomedicine. It includes not only physicians of various types and specialties but also the recognized Para-medical professionals such as nurses, midwives or physiotherapists. In most countries, scientific medicine is the basis of the professional sector but as Kleinman notes, traditional medical systems may also become '*professionalized*' to some extent; examples of this are the Ayurvedic and Unani Medical Colleges in India, which receive the governmental support. It is important to realize that Western scientific medicine provides only a small proportion of health care in most countries of the world.

4.8 Why they are following this Health Care System

Medical health care throughout a person's life time occurs within a matrix of cultural belief and practice and social relations. Likewise, the current dominant health care

modality in the Bangladesh, termed bio-medicine is historically linked to a context of folk and native practice.

It's very difficult to present the belief and choice of human being in a particular chart because many factors are related with it; such as socio-economic condition, education, geographical condition and religious belief are also related with it.

Now a day, various national and international organizations giving importance to the usefulness of indigenous health care system. Some organization; such as World Bank (WB), World Health Organization (WHO), United Nations Educational, Scientific and Cultural Organization (UNESCO), Food and Agricultural Organization (FAO), International Labour Organization (ILO) are trying to concentrate on the development of indigenous health care system. But from the context of our country, it can be said that for a huge number of research on indigenous health care strategies need to be done. And all these research work should be conducted with the participation of the indigenous people.

References

Ackerknecht, Erwin,H., (1971). "*Medicine and Ethnology*": Selected Essays. Baltimore: Johns Hopkins University Press

Alam, M. K. and Khisa, S. K. (2000). "The Perception of Ethno Botany in Chittagong Hill Tract and Its Linkage with Biodiversity": In Alam, N. A. (ed.), Of Popular Wisdom: Indigenous Knowledge and Practices in Bangladesh, August (2000). BARCIK, Dhaka

Alam, M. K., Chowdhury, J. U. and Hasan, M. A. (1996). "*Some Folk Formularies from Bangladesh*": Bangladesh Journal of Life Science 81(1)

Amin, M. N. (2000). "*Potential use of Indigenous Knowledge in Sustainable Conservation of Plant Diversity in Bangladesh*" In: Alam, N. A. (ed.), Of Popular Wisdom: Indigenous Knowledge and Practices in Bangladesh', August (2000). BARCIK, Dhaka.

Choudhury, A. F. H. (2000). "*Indigenous Knowledge System: A Development Paradigm in Anthropology*" In: Alam, N. A. (ed.), Of Popular Wisdom:

Indigenous Knowledge and Practices in Bangladesh', August 2000, BARCIK, Dhaka

Chowdhury, J. U., Alam, M. K. and Hassan, M. A. (1996). "*Some Traditional Folk Formularies against Dysentery and Diarrhea in Bangladesh*": Journal of Economics Tax. Bot., Additional Series-12

Dunn, Frederick L. (1968). Traditional 'Asian Medicine and Cosmopolitan Medicine as Adaptive System (Imperialism and Medicine in Bengal – Poonam Bala)

Flavier, J. M. et al. (1995). "The regional program for the promotion of indigenous knowledge in Asia" In: Warren, D. M., L. J. Slikkerveer and D. Brokensha (ed.), 'The Cultural Dimension of Development: Indigenous knowledge Systems', London

Hasan, S. (2000). "*Indigenous Perceptions, Predictions and Survival Stratigies Concerning Cyclones in Bangladesh*" In: Alam, N. A. (ed.), Of Popular Wisdom: Indigenous Knowledge and Practices in Bangladesh', August 2000, BARCIK, Dhaka

Helman, C. G. (1990) "*Culture, Health and Illness*", London

Karim, A. H. M. Z. (2000). "The Indigenous Pattern of Subsistance Practices of the Munda and Mahato People in the Sundarba Mangrove Forest Areas of Bangladesh": An Anthropological Overview, Alam, N. A. (ed.), Of Popular Wisdom: Indigenous Knowledge and Practices in Bangladesh', August 2000, BARCIK, Dhaka

Medical Anthropology Unit (ed.). (1995). "*Applied Health Research Manual: Anthropology of Health and Health Care*": University of Amsterda

Warren, D. M. (1991). "*Using Indigenous Knowledge in Agricultural Development*": World Bank Discussion: The World Bank, Washington, DC

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Cost-Benefit Analysis of RDA-developed Community-based Biogas Plant: A Study in RDA Campus

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Abstract

Any decomposable materials like animal and human excreta, agricultural and industrial waste, water hyacinth etc. when fermented under an anaerobic condition produce a combustible gas called biogas. There are three basic designs of biogas plants such as (i) Floating cover digester, (ii) Fixed cover digester, and (iii) Plastic cover digester. RDA has installed five fixed cover digester having capacity of 130 m^3 each. The main inputs of these bio-gas plants are cow dung (92%), poultry drops (6%) and kitchen waste (2%) and total monthly operation cost was Tk. 30,000.00. Mixing proportion of raw materials and water is 1:1 and groups of microbes involved in Bio-gas fermentation were fermentative bacteria, hydrogen producing acetogenic bacteria and methane producing bacteria. Installation cost of this type of bio-gas plant was Tk. 5, 00,000.00 lakh including a gas generator having capacity of 4.6 kVA. Total numbers of Bio-gas connections were twenty three in RDA campus. The monthly production of organic fertilizer was.10, 800 kg and total monthly income from selling organic fertilizer was Tk. 86,400.00 and monthly income was Tk. 15,000.00 from selling bio-gas. Total gross monthly income was Tk. 1, 01,400.00 from Bio-gas supply as well as organic fertilizer production and net monthly profit was Tk. 71,400.00. Benefit cost ratio of bio-gas plant was 3.38:1.00.

1.Introduction

Organic matters such as animal and human excreta, agricultural and industrial waste, water hyacinth etc. when fermented under an anaerobic condition produce a combustible gas called biogas. It is a renewable source of energy, can be used as fuel for cooking, lighting,

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running vehicles and generators, etc. There are three basic types of designs of biogas plants used in Bangladesh: (i) Floating cover digester, (ii) Fixed cover digester, and (iii) Plastic cover digester.

(i) Floating cover digester: It works on the principle of constant pressure and changing volume. The digester and cylindrical wall, commonly made of brick, covered with a open bottom floating steel cylinder. As the cylinder has a content weight, it moves up when gas production is higher than consumption and comes down under reverse conditions.

(ii) Fixed cover digester: It works according to the principle of constant volume and changing pressure. When the rate of gas production is higher than that of gas consumption pressure inside the digester rises and expels some contents into the outlet compartment. If the consumption is higher than production, pressure inside the digester falls and the expelled materials in the outlet compartment run back to the digester.

(iii) Plastic Cover digester: A long cylindrical polythene/PVC bag, half-buried longitudinally in the ground, is fed with fresh cow-dung slurry at one end and discharged at the other. With the formation of gas, the bag swells like a balloon and the gas is led out to the point of use through a pipe by putting pressure on the balloon form outside.

Rural Development Academy (RDA), Bogra has successfully established a fixed cover digester model of community based bio-gas plant. There were five numbers of bio-gas plants in RDA campus having capacity of 130 m^3 in each. Out of five bio-gas plants, two were in operation. One plant was located at residential campus and another was installed at RDA demonstration farm and was inter-connected by pipe line with each other.

2.Objectives

The main objective of the study was to analyze the cost-benefit of bio-gas and bio-slurry of bio-gas plant installed in RDA campus. The specific objectives as follows:

i. To quantify inputs required for bio-gas plant;
ii. To observe mechanism of bio-gas fermentation in the plant ;
iii. to quantify organic fertilizer by using slurry; and
iv. to assess the production of bio-gas.

3.Methodology

All the relevant data were collected by direct supervision and monitoring the sites. Data were also gathered from secondary sources like books and articles published by RDA.

4. Results and Discussions

4.1 Inputs

The main inputs of bio-gas plant were cow dung (92%), poultry drops (6%) and kitchen waste (2%) are used in bio-gas plant (figure-01). Cow dung was the main input of bio-gas plant. The rate of cow dung was Tk. 0.7 per kg. The daily cost for purchasing cow dung was Tk. 770.00. Besides, 75 kg(s) of poultry drops was used daily at a rate of Tk. 0.40 per kg. The daily cost for poultry drops was Tk. 30.00. About 25 kg(s) of decomposed materials collected from cafeteria and residential households were used. Input costs of bio-gas plant are shown in table-1

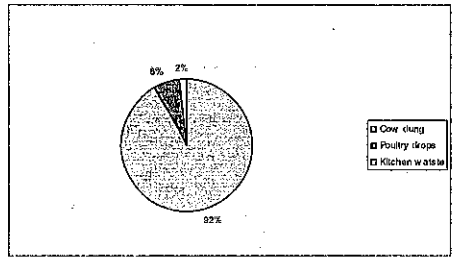


Figure-1: Daily Inputs Used in RDA Bio-

Table-1: Input Cost of Bio-gas Plant

Raw materials	Amount /day (Kg)	Rate/Kg (Tk.)	Total Cost/day (Tk.)
Cow Dung	1100	0.70	770.00
Poultry Drops	75	0.4	30.00
Kitchen Wastage	25	-	00.00
Daily input cost			800.00
Monthly input cost			24,000.00
Monthly operator's salary			6000.00
Total Monthly cost			30,000.00

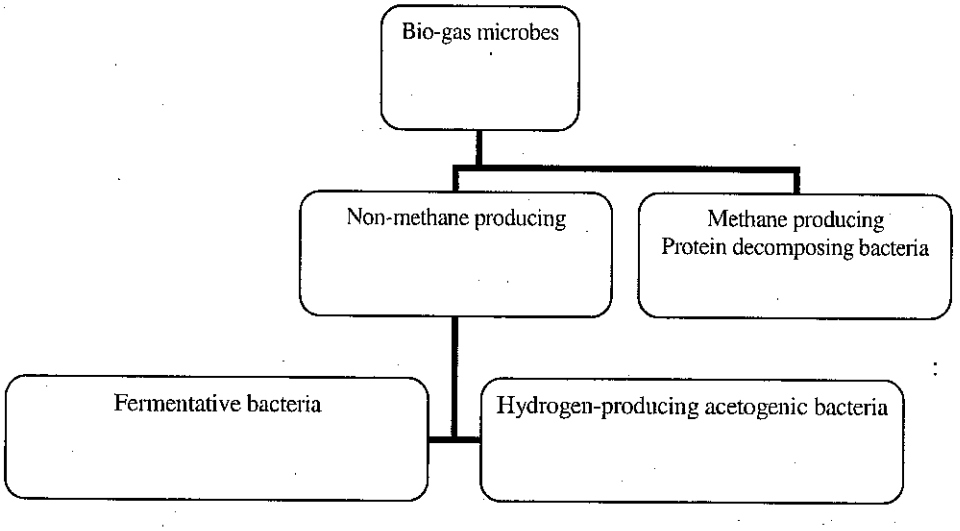
4.2 Mechanism of biogas fermentation:

4.2.1 Mixing Proportion

Mixing proportion of raw materials and water was 1:1.

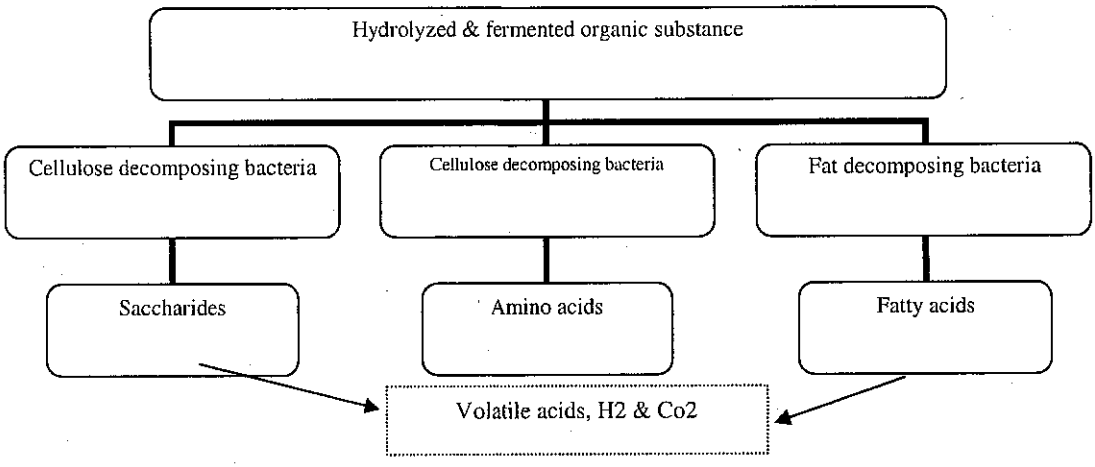
4.2.2 Groups of Biogas microbes

Bio-gas microbes are two forms such as none methane producing and methane producing. Non- methane producing bacteria is again two types: Fermentative bacteria and Hydrogen-producing acetogenic bacteria. The flow chart of bio-gas microbes are presented below:

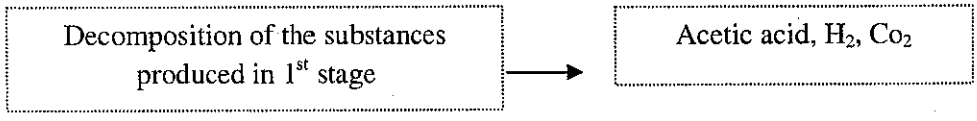


4.2.3 Groups of microbes involved in the following 3 stages of Bio-gas fermentation:

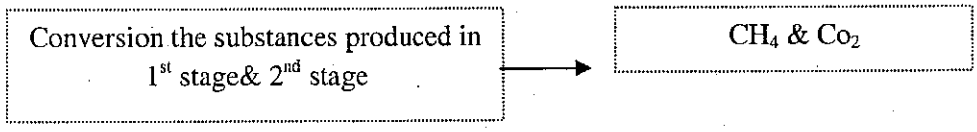
1st stage: Fermentative bacteria



2nd stage: Hydrogen producing acetogenic bacteria



3rd stage: Methane producing bacteria



4.3 Installation Cost

Installation cost of a bio-gas plant was Tk. 5.00, 000.00 including a gas generator having capacity of 4.6 kVA. Component-wise costs of bio-gas plant installation are shown by the following bar chart.

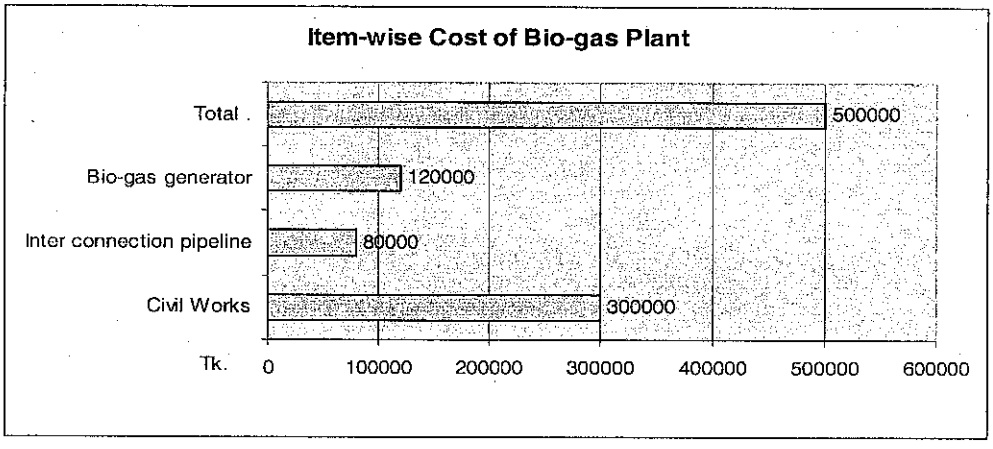


Figure-03: Item-wise Cost of Bio-gas

4.4 Outputs

Total numbers of bio-gas connections were twenty three in RDA campus. Out of those, there were 22 in residential households and 1 in RDA guest house. The monthly gas charge was Tk. 600.00 for each household

Tk.1800.00 for guest house. Out of twenty three bio-gas connections, total monthly income was Tk. 15,000.00 by RDA.

4.5 Organic fertilizer froduction by utilization of slurry:

Slurry obtained as a result of anaerobic decomposition from biogas plant was considered as organic fertilizer. This organic fertilizer is environmental-friendly, has no toxic or harmful effect and it can help to rejuvenate the soil by supplying considerable amounts of macro and micro nutrients and adds organic matter, helps in improving the physical and biological properties of soil. Organic fertilizer from slurry source contains 20-30% more nutrients than the commonly used aerobically decomposed organic manure. Demand for organically produced crops is increasing day by day in Bangladesh and elsewhere in the world. Both cow dung or poultry slurry was fitted into the modern soil fertility management, popularly known as Integrated Plant Nutrition System (IPNS), which combines the use of organic and chemical fertilizers. Thus the use of slurry from the bio gas plants can reduce at least 30% chemical fertilizers, which may increase acidity/alkalinity in soil and deteriorate their physical conditions. The monthly income was Tk. 86,400.00 through selling organic fertilizer at a price of Tk.8.00.

4.6 Benefit-Cost Analysis

Table-2: Benefit-Cost Analysis

Benefits		Cost	
Indicators	**Monthly income (Tk)**	**Indicators**	**Monthly expenditure (Tk)**
Bio-gas supply	86,400.00	Input cost	24,000.00
Organic fertilizer	15,000.00	Operator Salary	6,000.00
Total	1,01,400.00	Total	30, 000.00

Monthly income by selling of organic fertilizer and bio-gas was Tk. 1, 01,400.00 and monthly expense was Tk. 30,000.00.The monthly net profit was Tk. 71,400.00 by operating a bio-gas plant. Finally, total installation cost Tk. 5, 00,000.00 has been recovered within 07 (seven) months and the benefit cost ratio of bio-gas plant comes to 3.38:1.00.

5. Recommendations

Biogas gas is stable, reliable, easy and useful source of household energy. The following recommendations can be considered for further studies:

i. Biogas can be used for cooking just like commercially available natural gas;
ii. Mantle can be lightened with biogas;
iii. Electricity can be produced with the help of generator and thus electric fan, radio, television etc can be run;
iv. Irrigation can be facilitated by using bio-gas operated pumps;
v. Biogas plant makes the homestead/farmhouse environment neat and clean;
vi. One biogas plant of 130 m^3 gas producing capacity can save about 175 tons of biomass which on burning can release considerable amounts of green house gases;
vii. The use of biogas reduces the smoke exposure and significantly improves the condition inside the kitchen; and
viii. Investment cost recovery is possible within 7-10 months.

6. Conclusion

Bio-gas is one of the best modern technologies for producing gas and organic fertilizer. It can contribute to overcome load shedding in our national grid as alternate source of power. Also it can clean environment where waste materials are available especially in city areas and improved sanitation system to avoid various harmful diseases.

References

Islam M. S. (2006). "*A Solution to Growing Fuel Crisis in Rural Household*": Paper Presented at the National Seminar on Renewable Energy 2006, Biogas Programs in Bangladesh Renewable Energy Research Centre, University of Dhaka, Bangladesh.

http:// www.reein.org, Bio-gas Design, Construction of Bio-gas Plants, Different Steps of Bio-Gas- Plant.

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Impact of Micro-Credit Programme on Grameen Bank Credit Recipients: A Study in Sherpur Upazila.

Md. Mazharul Anowar[1]

Abstract

Bangladesh is a developing country in the South Asian Sub-continent. About 26% of its population lives below poverty line. National Strategies and Action for Poverty Reduction (NASPR) of the government targeted to reduce the rate of poverty to fifty percent by the year 2015. Micro-Credit credit has been considered as an effective and sustainable tool to achieve this goal. The present study examined socio-economic impact of micro-credit on the credit recipients of Grameen Bank in Sherpur Upazila. The respondents for this study were the credit recipients of selected five branches of Grameen Bank in Sherpur Upazila of Bogra District. One hundred and eighty credit recipients were selected randomly by using random number table from 10,000 credit recipients of the selected five branches. Major findings of the present study show that most of the credit recipients properly utilized their credit for various purposes like, small business, housing, agricultural and children education purposes for socio-economic changes and development. It was found that, most of the credit recipients' that is (58.7%) income increased after receiving credit from Grameen Bank and their income was with an average of Tk. 7500.

1. Introduction

Bangladesh is a least developed country in the world; where women have extremely minimum level of socio-economic status. This is due to their lack of very little participation in the nation building activities, particularly in the area of economic Aactivities. It is to note that the overall male-female ratio is 106:101. SoTherefore, nearly fifty percent of our population is women and their active involvement in the development process can lead the nation forward.

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More than 60 million people of Bangladesh live below the poverty line; among them 74% are women (Khan, 2001). Most of the rural women are deprived in fulfilling their basic needs. They donot get enough basic livelihood requirements such as food, clothes, shelter, health care and social security. They become the victims of acid throwing, dowry, high mortality, malnutrition, higher illiteracy etc. For these reason Eeven some parents consider them as the burden of the family. Now it is a dire need to let them raise their voice regarding human rights, decision making process, health and social awareness, education, moreover economic solvency. One way of doing this is to create an environment where each woman can establish those rights for herself. One of the best options of an enabling environment for women's economic empowerment is access to credit, so that they can start to earn income. When income flow begins, then the right to food, shelter and everything else becomes a reality (Yunus, 1987).

Micro-credit is one of the important strategies for women's socio-economic development in Bangladesh. Grameen Bank (started on an experimental basis in 1976 and received government approval in 1983 as a regular bank but not schedule) has come forward to empower women as well as to change the lives of countless women suffering from extreme poverty. Micro-credit is a small amount of loan (US$ 100-US$ 500) provided by the formal institutions e.g., banks, cooperatives and informal institutions e.g. NGOs (Choudhury, 2002). NGOs are playing a very significant role in the development of Bangladesh especially for rural women. NOGs are supporting them with micro-credit that is usually their comprehensive and social programmes (Begum, 2005).

A large number of studies have so far been conducted on socio-economic impact of micro-credit on women's empowerment in Rural Bangladesh, Bangladesh; most of them were confined tovolume of loan utilization and repayment. The present study intends to review some of the post and contemporary studies particularly concerned with disbursement, utilization, control, repayment of credit, income generating activities, and impact on women's empowerment.

2. Objectives of the Study

The objectives of the study are as follows:

i.) to examine the socio-economic status of micro-credit recipients;

ii.) to to examine the accessibility of micro-credit and its utilization;

iii.) to review the opinions of micro-credit recipients on different problems of micro-credit; and

iv.) to assess the impact of micro-credit on income, self-employment opportunities, socio-economic changes and improving the living standard of micro-credit recipients;.

3. Methodology of the Study

The present study was conducted in the selected five branches of Grameen Bank namely Garidaha, Mirzapur, Sughat, Kusumbi and Bishalpur in Sherpur Upazila. In all, 13 villages covered under the selected branches from covered 13 villages under five Union. Parishads. The Universe for the Present Study was 10,000 credit recipients under the same area. selected five branches of Grameen Bank in Sherpur Upazila. Inall, A total of 180 credit recipients were selected randomly from 10,000 Credit recipients. Primary data was collected in the study areas by using a structured questionnaire. Secondary information was also collected from published journals, articles and selected five branches of Grameen Bank. Focus Group Discussion Method was also followed to collect relevant information from the selected respondents.

Different Statistical tools like Frequency Table Analysis, Hypothesis Testing with Cross Table Analysis, Gini Coefficient Calculation for measuring income inequality were used for the present study. Statistical Analysis was done by using the latest Statistical Package SPSS.

4. Findings of the Study

4.1 Socio-economic Status of the Credit Recipients Characteristics

Socio-economic status characteristics of the respondents were assessed to understand the social status in terms of age, level of education, marital status, and household assets including land, livestock and others before and after receiving the credit.

4.1.1 Age of the Respondents

Age of the credit recipients ranged from 20 to 60 years. Most of them credit recipients i.e., 60 (33.3%) respondents were from the age group 30 to 40 years and the second highest (30%) were belong to the age group 40 to 50 years (Table-1).

Table-1: Respondents According to Age Distribution

Age of the Respondent (Years)	No. of the Recipients	%
20-30	50	27.8
30-40	60	33.3
40-50	54	30.0
50-60	15	8.3
60 +	1	0.6

(i) (Source: Field Work)

4.1.2 Level of Education and Marital Status of the Respondents

Most of the credit recipients (97.2%) can write their name. On the other hand, table-2 suggests that most of the credit recipients i.e., 176 (97.2%) respondents were married and the remaining were divorced and widowed.

Table-2: Marital Status of the Credit Recipients

Marital Status	No. of the Recipients	%
Married	176	97.8
Divorced	2	1.1
Widowed	2	1.1
Total	180	100.0

(Source: Field Work)

4.1.3 Household Assets of the Respondents

All the credit recipients were landless and assetless before receiving credit from Grameen Bank. It was found that 28.3%, 42.2% and 29.4% respondents occupied 0-

0.15, 0.50-0.70 and 0. 70-1.00 acres of land respectively. Regarding the household assets including Livestock 108 (60%) respondents mentioned that they could not possess any domestic animal, but 72 (40%) respondents were able to establish small dairy and poultry firm after taking credit from Grameen Bank.

4.1.4 Value of Household Assets after Receiving Credit

Before receiving credit from Grameen Bank, it was difficult for the respondents to purchase any household assets as they used to live from hand to mouth, But after receiving credit from Grameen Bank it was found that majority of the respondents were able to increase their value of household assets that was were on an average of Tk. 4,00,000, the remaining 8.9% increased their value of household assets upto that were on an averages of Tk. 25000, Tk. 85, 000 and Tk. 200000 respectively **(Table-3).**

Table-3: Value of Households Assets of the Recipients after Receiving Credit

Value of Households Assets (Tk.)	**No. of the** Recipients	*%*
0-50000	3	1.7
70000-100000	3	1.7
100000-300000	10	5.6
300000-500000	164	91.1
Total	180	100.0

(Source: Field Work)

4.2 Accessibility of Credit and its Utilizations

4.2.1 Criterion Criteria of receiving micro-credit from Grameen Bank

Grameen bank provides micro-credit supports to the beneficiaries on the basis of some criteriaon. Most of the respondents' i.e., 97.2% mentioned following criteriaon for getting credit support from GB **(Table-4):**

i. Must be landless and assetless rural poor households;
ii. Must start any small business;
iii. Must be married women/men and
iv. Minimum value of household assets was is to be Tk. 25,000.

Table-4: Information Regarding Sources of Micro-credit

(n) Opinion of the Recipients	No. of the Recipients	%
Yes	175	97.2
No.	5	2.8
Total	180	100.0

(Source: Field Work)

4.2.2 Various Purposes of Receiving Credit

Grameen Bank is a non-government financial organization. The main function of the Grameen Bank is to provide credit supports for landless and assetless rural poor households in the rural areas of Bangladesh. It was found that 150 (83.3%) respondents had received credit for various purposes like small business , small stationery shop, vegetables shops in the local hats/bazars, small tea-stall for their sons/husbands and mobile business for themselves. The remaining respondents had received credit for construction of houses like, tin-shed, brick built and others; and also for children' education purposes like education loan, private expenditures, tuition fees and others

Table-5: Purposes of Receiving Credit by the recipients

Various Purposes	**No. of the** Recipients	%
Business	150	83.3
Housing	20	11.1
Children Education	10	5.6
Total	180	100

(Source: Field Work)

4.2.3 Utilization of Credit

All the respondents were too very poor and they were also landless and assetless. After receiving credit from GB they utilized their credit properly. Data suggest that only 53 (29.4%) respondents were engaged by themselves with income generating activities (IGAs) in their areas and other places, most of the respondents (70.6%) choosed other options rather than IGA's (Table-6).

i) Established Ornamental Nursery;
ii) Made Rice boiler machine;
iii) Prepared small ponds for fish cultivation;
iv) Established Dairy/poultry firm;
v) Established big stationary shop in peri-urban places and
vi) Bought three/four wheeler engine C.N.G/Taxi/Minibus for using as rental basis

Table-6: Utilization of the Credit in on Creating IGAs

Response on increasing IGAs	No. of the Recipients	%
Yes	53	29.4
No.	127	70.6
Total	180	100.0

(Source: Field Work)

4.3 Respondents' Opinion Regarding Different Problems of in Micro-credit Programme

4.3.1 Problems faced by the Credit Recipients at the time of in Repayment of Credit

It was found that 128 (71.1%) respondents had not faced any major problem in repayment of credit. at the time of credit repayment. The remaining respondents faced various problems at the time of in this regard credit repayment such as misutilization of credit due to having, lack of proper training on utilization of the credit. Major problems were to repay installment in the dull season as they had to stay at home without work. Another problem was higher interest rate of GB credit that was beyond out of their capability.

4.3.2 Respondents' Satisfaction Regarding Credit Repayment Rate of Credit.

Out of the total respondents, 68 (37.8%) respondents expressed their satisfaction on the repayment rate of credit. But most of the recipients (62.2%) were not satisfied in this regard. They mentioned several reasons of their dissatisfaction regarding GB repayment rate like high interest rate, credit repayment rate on weekly basis and others. Finally they suggested that, credit repayment should be on monthly installment in lieu of weekly installment.

4.4 Impact of Micro-credit on Grameen Bank Credit Recipients

4.4.1 Respondents' Economic Conditions Status before Receiving Credit

All the Credit recipients of Grameen Bank were landless, assetless rural poor and their economic status conditions were so measurable. They used to live from hand to mouth. Table-7 Statistical analysis shows that 92.2 percent credit recipients's economic status conditions were so measurable; even they took their meals one time a day. On the other hand, the remaining respondents' had good housing condition and own cultivable land. (Table-7).

Table-7: Economic Condition Status of the Recipients before receiving credit

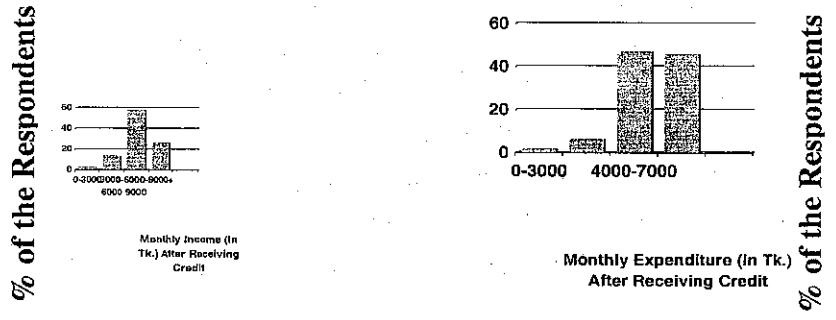
Economic Condition Status	No. of the Recipients	%
Good housing condition	7	3.9
Own cultivable land	7	3.9
Not so good	166	92.2
Total	180	100.0

(Source: Field Work)

4.4.2 Respondents' Monthly Income and Expenditure after Receiving Credit

It was found that, most of the credit recipients' (58.7%) income increased after receiving credit from Grameen Bank and their income was with an average of Tk. 7500. The income level of 26.1% and the remaining respondents' were also at satisfactory level with an average of Tk. 1500 and Tk. 4500 respectively (Fig-1).

On the other hand, mMost of the credit recipients (87.1%) mentioned that their monthly expenditure was less than their monthly income, and the remaining respondents had monthly expenditure with an average of TK. 1250 andTk. 3250 (Fig-2).



4.4.3 Monthly Savings after Receiving Credit

Like income and expenditure, savings is another important component for the credit recipients. All the selected respondents were supposed to save some amount of money weekly, which was compulsory according to Grameen Bank's rule. Data suggested that among all the selected respondents only 6.7% were able to save money ranged to Tk.500- 1000 and the rest 93.3% respondents saved money ranged to Tk.0-.500

Table-8: Monthly Savings of the Credit Recipients after Receiving Credit

Information on respondents' monthly savings	No. of the Recipients	%
0-500	168	93.3
500-1000	12	6.7
Total	180	100.0

(Source: Field Work)

4.4.4 Socio-economic Changes among Respondents after Receiving Credit

Most of the credit recipients (66.7%) mentioned that their socio-economic status had been changed through proper utilization and control of the credit. (Table-9) and the rest respondents' conditions was the same like the past.

Major following socio-economic positive changesd observed among the beneficiaries after receiving credit, which is as follows:

i) Constructed houses for their accommodation;

ii) Enhanced their financial solvency as their monthly income increased, so extent of poverty is less in the beneficiaries' family.

iii) Improved their life style. Before receiving credit from Grameen bank they lived from hand to mouth. Now they are enjoying entertainment facilities like e.g., they have bought T.V, Radio, Connected Satellites, Using mobile. They are taking three meals a day. They are saving some amount of money weekly which is also paid as the installment for fixed deposit.

iv) Increased number of visit to several hospitals, clinics. So therefore, it is clear that beneficiaries are more aware about their health conditions compared to the past.

v) Using good sanitation facilities. Increased abilities to install tube-well at home for safe water. Peviously they used to drink water from different sources like, rivers, ponds, etc., as a results they suffer different kinds of diseases. At present, they are more conscious to maintain their health.

Table-9: Response on Socio-economic changes after Receiving Credit

Response on socio-economic changes	No. of the Recipients	%
Yes	120	66.7
No.	60	33.3
Total	180	100.0

(Source: Field Work)

4.4.5 Repeatation of the credit after Creating Self-employment Opportunities

This section highlighted those recipients who were able to improve their socio-economic status after receiving credit from GB. They received repeated credit from GB after creating self-employment opportunities, because they proved that they had utilized their credit properly in changing their livelihood status. Among all the respondents, 55.6% got the opportunity to receive credit again through utilization of previous credit (Table-10). Some of the reasons for receiving repeated credit by the recipients from GB are as follows:

i) Bought lands for housing, cultivation and fish culture,

ii) Started small business,

iii) Increased opportunities for IGAs in their areas,

iv) Bought Riksha/Van for their households,

v) Bought three/four wheeler engines, C.N.G., Auto Tempo, Auto Rikshaw, etc. for their sons.

vi) Bought fish net for catching fish for their households.

vii) Bought miching lking cows to establish a small dairy firm at their home.

Table-10: Repetition of credit after creating self-employment through utilization of credit

Response on Repetation of credit	No. of the Recipients	%
Yes	100	55.6
No.	80	44.4
Total	180	100.0

(Source: Field Work)

4.4.6 Relationship between Respondents' Monthly Income and Socio-economic Changes after Receiving Credit from GB.

Considering Null hypothesis against alternative hypothesis in terms of relationship between respondents' monthly income and socio-economic changes after receiving credit was tested by using chi-squre test at 5 percent level of significance. The chi-squre tests suggest that to reject the null hypothesis. So, there exist some positive relationship between respondents' monthly income and socio-economic changes after receiving credit from Grameen Bank.

4.4.7 Measurement of the income inequality

The section deals with Gini coefficient in comparisons of the income Inequality inequality between respondents' monthly income before and after receiving credit from Grameen Bank. It was found that the value of Gini Coefficient regarding respondents'

monthly income before and after receiving credit varied from 0 to 1. In this case, the value of gini-coefficient regarding respondents' monthly income after Receiving credit is **50.89%** and that was 36.25% for the respondents' monthly income before receiving credit. It suggests that the value of Gini-coefficient regarding respondents' monthly income after receiving credit is higher than that of those respondents' monthly income before receiving credit from Grameen Bank

5. Conclusion and Recommendations

5.1 Conclusion

Based on the Major findings the following conclusions might can be drawn.

i) Credit is the most powerful instrument for upliftment of the economic status of the rural poor. Education is one of the important indicators for the credit recipients to utilize and controls the credit properly. The study revealed that the number of literate credit recipients was increased after receiving credit from Grameen Bank.

ii) The study shows that all the selected respondents were landless and assetless. But after receiving credit, 42.2 percent credit recipients were able to increase their land assets including home and cultivable land. Apart from this, it shows that the number of credit recipients was increased in using livestocks like cows, goat, hens and ducks for domestic purposes.

iii) In case of the value of household assets 55.6 percent credit recipients had an average of Tk. 50,000 before receiving credit, but after receiving credit 91.1 per_cent credit recipients were able to increase the value of household assets which was on an average of Tk. 4, 00,000.

iv) Most of the credit of Grameen Bank was utilized in various purposes which played a significant role in creating income generating activities. In all, 99.4 per_cent credit recipients utilized their credit in non-agricultural purposes like, small business, housing and children education.

v) It was also found that 72.2 percent credit recipients had properly utilized their credit in housing purposes.

vi) In case of monthly income of the beneficiaries previously 86.7 percent credit recipients had no monthly income but after receiving credit, 57.8 percent credit recipients had increased their monthly income of an average of

Tk.7000 and the remaining recipients income was on an average of Tk 1500 and Tk 3000. So it is evident that, credit recipient's monthly income increased after receiving credit from GB.

vii) Among all the selected respondents, 71.1 percent credit recipients mentioned that they had not faced any problem at the time of in repayment of credit.

viii) On the other hand, 62.2 percent credit recipients had expressed their dissatisfactions at the current repayment rate of Grameen Bank due to having high interest rate.

5.2 Recommendations

On the basis of findings and conclusions of the study, the following recommendations are mademay be drawn:

i) Most of the credits recipients had utilized their credit in a proper way and were able to establish themselves as succeed ss recipients. So Therefore, to move forward, they for forwardly moving in future they should get need more financial and technical help supports from Grameen Bank.

ii) The study also revealed that a very few percent of recipients had been to spreaded over income generating activities in their areas. So, it is necessary to arrange some training courses among credit recipients through Grameen Bank authorities for spreading over more income generating activities.

iii) The study indicated that the interest rate of Grameen Bank credit programme seems to be higher in comparison e to other institutional sources such as like, commercial Banks and other institutions. Most of the credit recipients have given their negative expression about the interest rate of Grameen Bank; actually they are not satisfied with the present interest rate. Considering the objectives of Grameen Bank credit programmes and the target group it may be recommended that, the Grameen bank authority should give a second thought for reducing the interest rate in future and also should need to change the credit repayment time i.e., monthly installment in lieu of weekly installment.

References

Abedin, Dr. M.Z. (1996). A Hand Book of Research for the Fellows of M. Phil and Ph.D Programmes, Dhaka; Book Syndicate.

Attacking Poverty with Micro-credit (2003), Pksf; Dhaka.

Baskota, S. (2004) Research methodology, Kathmandu; New Hira Books Enterprises.

Baskota, S. (2006). Statistical Methods for Rural Development, Kathmandu; New Hira Books Enterprises.

BBS (2001). Bangladesh Population census 2001. Dhaka: Bangladesh Bereau of Statistics, Ministry of Planning.

BBS (2006). Population Census Wing. http://en.wikipedia.org/wiki/ sherpur_upazila.

Cochran, W.G. (2006). Sampling Techniques, Latested. Newyork: John Wiley and Sons.

Elandt –Johnson, R.C. and N.L. Johnson (1980). Survival Methods and Data Analysis. Newyork: john wiley and Sons.

Islam S.M. Fakhrul and M. Jahangir Kabir (2005). Impact of Micro-credit on poverty alleviation of rural pooor in Bangladesh: The Case of Rural bitaheen Project of Bangladesh Rural Development Board. Bangladesh Rural Development Studies. Vol.11 No.1 pp.2-18

Raj, D. (2005). Sampling Design, new ed. Kolikatta: Statistical Publishing Society.

Yunus, M. (2008) Grameen Bank at a Glance. Mirpur Two, Dhaka-1216, Bangladesh: Grameen Bank Head office

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নদী ভাঙ্গন এলাকার দারিদ্র্যের প্রকৃতি বিশ্লেষণ ঃ চন্দনবাইশা এলাকার উপর একটি সমীক্ষা

মোহন চন্দ্র সরকার [১]
মোঃ হাবিবুর রহমান [২]

Abstract

Poverty refers to a vulnerable socio-economic condition of the people especially in terms of calorie intake and daily wage earnings. The poor are those families whose basic needs fall short and other essential needs. According to the thesis of "Entitlement and Deprivation" of Amartya Sen`poverty' means the shortage of inheritness and capability. Present study area Chandanbaisha is situated in Sariakandi upazila under the district of Bogra. The pauperization of this area is caused primarily by the natural hazards. The study has been undertaken to measure the degree of poverty level.Under the research a family is choosen as a unit of poverty measurement. This is done by measuring the consumption (Calorie intake) process using three formulae .Those are: 1) Head Count Index; 2) Poverty Gap Index; and 3) Poverty Gap Index of Amartya Sen. Indicators show that the study area is highly poverty-strickened than that of other areas of the country. The Social Protection and Safety Nets are also poor in the area.

সার-সংক্ষেপ

দারিদ্র্য বলতে একটি নির্দিষ্ট সময় ব্যাপী বহুমাত্রিক সক্ষমতার অভাব বোঝায়। যে অবস্থায় কোন পরিবার মৌলিক চাহিদা পূরণসহ অন্যান্য অত্যাবশ্যকীয় চাহিদা পূরণে ব্যর্থ হয়, সেই অবস্থাকে দারিদ্র্য বলা হয়। অমর্ত্য সেনের (১৯৭৯) স্বত্বাধিকার এবং সক্ষমতা গবেষণা অনুযায়ী দারিদ্র্যকে ন্যূনতম জীবন-যাপন মান অর্জনে স্বত্বাধিকারের অভাব বা অক্ষমতার অবস্থাকে বুঝায়। ন্যূনতম জীবনমান বলতে ব্যক্তি নিরপেক্ষভাবে এমন জীবন-যাপন ব্যবস্থা বুঝায় যেখানে দেশের মানুষের অবস্থান কাম্য নয়। দারিদ্র্য একই সময়ে বহু বিষয়ের সাথে সম্পর্কিত বিধায় কোন এলাকার দারিদ্র্য পরিমাপ করা অত্যন্ত কঠিন। কিন্তু যে কোন এলাকার আর্থ-সামাজিক অবস্থার চিত্র পেতে হলে এবং ঐ এলাকার পরিকল্পিত উন্নয়ন করতে হলে সে এলাকার দারিদ্র্য পরিমাপ করা একান্ত প্রয়োজন। বর্তমান গবেষণাধীন এলাকা বগুড়া জেলার চন্দনবাইশা ইউনিয়ন দেশের অন্যতম দরিদ্রতম অঞ্চল। এলাকার দারিদ্র্যায়নের পেছনে ঐ এলাকার পশ্চাদপদ আর্থ-সামাজিক কারণের সাথে প্রাকৃতিক কারণও দায়ী।

[১] সহকারী প্রকল্প পরিচালক, সিভিডিপি, আরডিএ, বগুড়া।
[২] উপ-পরিচালক, আরডিএ, বগুড়া।

দরিদ্রতর অবস্থা থেকে বেড়িয়ে আসতে গেলে এ এলাকার দারিদ্র্যের কার্য-কারণ সম্পর্কও জানা দরকার। আলোচ্য প্রবন্ধে চন্দনবাইশা এলাকার দারিদ্র্য পরিমাপ করতে গিয়ে পরিবারকে একক হিসাবে বিবেচনা করা হয়েছে। এখানে পরিবারগুলো নদী সিকস্থি এবং স্থায়ী পরিবার-এ দুই ধরণের পরিবারকে বিবেচনায় নেয়া হয়েছে। বর্তমান প্রবন্ধে ক্যালরি গ্রহণের ওপর ভিত্তি করে তিনটি পদ্ধতিতে দারিদ্র্য পরিমাপ করা হয়েছে। যথা-১) মাথা গণনা সূচক (Head Count Index); ২) দারিদ্র্য সীমা থেকে দূরত্ব সূচক (Poverty Gap Index); এবং ৩) অমর্ত্য সেনের দারিদ্র্য সীমা থেকে দূরত্ব সূচক (Poverty Gap Index of Amartya Sen)। এ সকল সূচক বিবেচনায় নিয়ে গবেষণার ফলাফলে দেখা যায় যে, চন্দনবাইশা দেশের অন্যান্য এলাকার চেয়ে অপেক্ষাকৃত বেশি দারিদ্র্য পীড়িত। এখানে সামাজিক নিরাপত্তা বেষ্টনী যথেষ্ট ভঙ্গুর।

ভূমিকা

পৃথিবী জুড়ে বর্তমানে প্রায় ৬০০ কোটি মানুষ বসবাস করছে। এ বৃহৎ জনসংখ্যার প্রায় অর্ধেকের (২৮০ কোটি) মাথাপিছু দৈনিক আয় দুই ডলারের নিচে। দৈনিক এক ডলারের কম আয় নিয়ে জীবনযাপন করছে সারা দুনিয়ার এক পঞ্চমাংশ মানুষ (প্রায় ১২০ কোটি)। এ হিসাবে শুধুমাত্র দক্ষিণ এশিয়াতেই এক ডলারের কম আয় নিয়ে সমগ্র পৃথিবীর ৪৪ শতাংশ মানুষ বসবাস করছে। দক্ষিণ এশিয়া, দক্ষিণ-পূর্ব এশিয়ার দ্বীপসমূহ এবং আফ্রিকার সাহারা অঞ্চলে বসবাসরত জনসংখ্যার যথাক্রমে ৪০, ১৫ এবং ৪৬ শতাংশ মানুষ এক ডলারের নিচে আয় করে। দক্ষিণ এশিয়ার অনেক দেশ দারিদ্র্য অবস্থার উন্নতি সাধন করলেও বাংলাদেশ আজও দারিদ্র্যের দুষ্ট চক্রে আবর্তিত হচ্ছে। মানব দারিদ্র্য সূচক ২০০৫ এ দেখানো হয়েছে যে, বাংলাদেশে এখনও ৩৬ শতাংশ মানুষ এক ডলারের নিচের আয় দ্বারা জীবিকা নির্বাহ করে। তদনুসারে বাংলাদেশের অবস্থান ৮৬ তম। বাংলাদেশ পরিসংখ্যান ব্যুরো প্রতি চার বছরে একবার খানা জরিপ (Household Survey) পরিচালনা করে বাংলাদেশের দারিদ্র্য পরিস্থিতি নির্ণয় করে থাকে। দারিদ্র্য অবস্থা বাৎসরিক ভিত্তিতে পরিবীক্ষণের জন্য ১৯৯৪ সাল থেকে দারিদ্র্য পরিবীক্ষণ জরিপ (Poverty Monitoring Survey) চালু করা হয়। সর্বশেষ দারিদ্র্য পরিবীক্ষণ জরিপ মার্চ, ২০০৪ সালে পরিচালিত হয়েছে। এ জরিপে খাদ্য শক্তি গ্রহণ এবং প্রত্যক্ষ ক্যালরি গ্রহণ দু'টি পদ্ধতিই ব্যবহার করা হয়েছে। খাদ্য শক্তি গ্রহণ এবং প্রত্যক্ষ ক্যালরি গ্রহণ পদ্ধতিতে দারিদ্র্য পরিস্থিতি উপস্থাপনে দেখা যায় যে, মাথা গণনার হার (Head Count Ratio) অনুসারে জাতীয় পর্যায়ে দারিদ্র্য প্রবণতা ১৯৯৯ সালে ছিল ৪৪.৭ শতাংশ যা ২০০৪ সালে হ্রাস পেয়ে দাঁড়িয়েছে ৪২.১ শতাংশে। এ সময়ে শহরাঞ্চলে ৪৩.৩ শতাংশ থেকে হ্রাস পেয়ে ৩৭.৯ শতাংশে এবং পল্লী অঞ্চলে ৪৪.৯ শতাংশ থেকে হ্রাস পেয়ে ৪৩.৩ শতাংশে দাঁড়িয়েছে। প্রত্যক্ষ ক্যালরী গ্রহণ পদ্ধতিতে দারিদ্র্য হার অপেক্ষাকৃত দ্রুত হ্রাসের প্রবণতা লক্ষ্য করা যায়। প্রত্যক্ষ ক্যালরি গ্রহণ পদ্ধতিতে ১৯৯৯ সালে দারিদ্র্য হার ছিল ৪৬.২ শতাংশ যা ২০০৪ সালে হ্রাস পেয়ে ৪৪.৯ শতাংশে দাঁড়ায়। এ সময় শহর অঞ্চলে ৪৯.৯ শতাংশ থেকে হ্রাস পেয়ে ৪৩.৬ শতাংশে এবং পল্লী অঞ্চলে ৪৫.৬ শতাংশ থেকে হ্রাস পেয়ে ৪০.১ শতাংশে দাঁড়ায়।

উল্লেখ্য, এ পদ্ধতিতে পল্লী অঞ্চলের তুলনায় শহরাঞ্চলের দারিদ্র্য হ্রাসের প্রবণতা বেশী। আবার প্রত্যক্ষ ক্যালরি গ্রহণ (Direct Calorie Intake) পদ্ধতিতে বাংলাদেশের চরম দারিদ্র্য (Hard-core Poverty) প্রবণতা বিশ্লেষণে দেখা যায় যে ১৯৯৯ সালে জাতীয়, শহর এবং পল্লী অঞ্চলে দারিদ্র্যের হার ছিল যথাক্রমে ২৪.৯%, ২৭.০% এবং

২৪.৫% যা ২০০৪ সালে হ্রাস পেয়ে যথাক্রমে ১৮.৭%, ২০.৮% এবং ১৮.২% এ উপণীত হয়। দারিদ্র্য ব্যবধান সূচকেও ১৯৯৯ সালের তুলনায় ২০০৪ সালে দারিদ্র্য ব্যবধান হ্রাস পেয়েছে। বাংলাদেশের উপর দিয়ে পৃথিবীর অন্যতম বড় তিনটি নদী (পদ্মা,যমুনা ও মেঘনা) প্রবাহিত হয়েছে। নদী তিনটির বার্ধক্য অবস্থা (Last Stage)হেতু এদেশে নদী ভাঙ্গনের প্রকোপ বেশী। এদেশের ৫০টি জেলার ৯৪ টি উপজেলার ২৮৩ টি স্থান প্রতিবছর নদী ভাঙ্গনের কবলে পড়ে। এর মধ্যে ৩৫টি উপজেলা ভয়ঙ্কর রূপে নদী ভাঙ্গনের শিকার। নদী ভাঙ্গন উপজেলা গুলোর মধ্যে কাজীপুর (সিরাজগঞ্জ) এবং সারিয়াকান্দি (বগুড়া) শীর্ষে অবস্থান করছে। সারিয়াকান্দি উপজেলার মধ্যে চন্দনবাইশা ইউনিয়ন (দুই-তৃতীয়াংশ নদী গর্ভে বিলীন হয়েছে) নদী ভাঙ্গনের দিক থেকে অতি গুরুত্বপূর্ণ। নদী ভাঙ্গন এ এলাকার একটি নৈমিত্তিক ঘটনা। অত্র এলাকার মানুষের জীবনযাত্রার সাথে নদী ভাঙ্গনের একটি সম্পর্ক রয়েছে। চন্দনবাইশা এলাকার মানুষের জীবনযাত্রার সার্থে নদী ভাঙ্গনের যে প্রতিক্রিয়া হয়েছে তা পর্যবেক্ষণ ও পরিমাপই এ প্রবন্ধের আলোচ্য বিষয়। বর্তমান প্রবন্ধটির তথ্যাদি মূলতঃ প্রাথমিক ও মাধ্যমিক উৎস নির্ভর। গবেষণা এলাকার ৪০০টি নদী সিকস্থি° পরিবার এবং ১২০টি স্থায়ী পরিবারের সাক্ষাৎকার গ্রহণ করা হয়েছে। এতে মাথাপিছু ক্যালরী গ্রহণ তথ্য এবং ১৭টি নির্বাচিত চলকের সাহায্যে আর্থ-সামাজিক অবস্থা বিশ্লেষণ করা হয়েছে। এছাড়া আনুসঙ্গিক তথ্যাদিও গবেষণায় স্থান পেয়েছে। বর্তমান গবেষণায় উপাত্ত বিশ্লেষণের জন্য Microsoft Excel Software বেছে নেয়া হয়েছে। তথ্য গুলোকে সংরক্ষণের জন্য Microsoft Access ব্যবহৃত হয়েছে এবং নির্বাচিত চলক সমূহের মধ্যে সহ-সম্পর্ক বিশ্লেষণের জন্য SPSS-১১.৫ নামক সফটওয়ার ব্যবহার করা হয়েছে।

মাথা গণনা সূচক অনুসারে দারিদ্র্য পরিমাপ (Poverty Measurement Based on Head Count Index)

দারিদ্র্য পরিমাপের ক্ষেত্রে বহুল ব্যবহৃত পরিমাপ হচ্ছে 'মাথা গণনা সূচক (Head Count Index)'। এ সূচক অনুসারে নিম্নোক্ত ভাবে দারিদ্র্যের পরিমাপ করা যায়।

যদি, n সংখ্যক ব্যক্তিসমষ্টির মধ্যে q সংখ্যক দরিদ্র্য শ্রেণীভুক্ত মানুষ থাকে, তবে Head Count Index অনুসারে দরিদ্র্যের অনুপাত হবে,

$$H = q/n \quad \text{..... সমীকরণ- ১}$$

উল্লেখ্য যে, এখানে H হলো দরিদ্রের মাথা গণনা সূচক, q হলো গবেষণা এলাকার দরিদ্র্য শ্রেণীভুক্ত পরিবার (ক্যালরি গ্রহণের সাপেক্ষে) এবং n হলো মোট পরিবারের সংখ্যা। এখানে আরো উল্লেখ্য যে, বর্তমান গবেষণা এলাকার প্রশ্নপত্র জরিপ কালে মোট ৫২০ টি পরিবারকে (n) গ্রহণ করা হয়েছে, এর মধ্যে ক্যালরি গ্রহণের ভিত্তিতে (দারিদ্র্য রেখা-১ ব্যবহার করে) মোট ৩২৭ টি পরিবার (q) কে দরিদ্র্য শ্রেণী হিসেবে সনাক্ত করা হয়েছে। তাই বর্তমান সূচক অনুসারে গবেষণাধীন এলাকার দারিদ্র্যের সূচক হবে,

$H = ৩২৭/৫২০$

$= ০.৬২৮৮$ এবং দারিদ্র্যের হার হবে,

$= ০.৬২৮৮ \times ১০০$

$= ৬২.৮$।

দারিদ্র্য সীমা থেকে দূরত্ব সূচক অনুসারে দারিদ্র্য পরিমাপ (Poverty Measurement Based on Poverty Gap Index)

যদিও দারিদ্র্যের একটি সংক্ষিপ্ত পরিমাপ হিসাবে মাথা গণনা সূচক বেশ তাৎপর্যপূর্ণ তথাপি এর মাধ্যমে দারিদ্র্যের গভীরতা বা প্রচন্ডতা সম্পর্কে কোন তথ্য জানা যায় না। অর্থাৎ 'দরিদ্র শ্রেণী কতটা দরিদ্র' এ সম্পর্কিত কোন ধারণা Head Count Index দিতে পারে না। তাই দারিদ্র্যের গভীরতা সম্পর্কিত তথ্য জানার জন্য একটি 'শ্রেণীভুক্ত দারিদ্র্য পরিমাপ' পদ্ধতি ব্যবহার করা হয়, যা 'দারিদ্র্য সীমা থেকে দুরত্ব (Poverty Gap)' পরিমাপ হিসেবে সুপরিচিত।

কোন ব্যক্তি বা পরিবারের ক্ষেত্রে এ পরিমাপ হচ্ছে,

$g_i = z-y_i$ ..... সমীকরণ-২

এখানে g_i হচ্ছে তার দারিদ্র্য সীমা থেকে দুরত্ব এবং দারিদ্র্য সীমার খাদ্য গ্রহণ (কিলোক্যালরি), y_i হচ্ছে কোন নির্দিষ্ট পরিবারের মোট ক্যালরি গ্রহণ। এই ভাবে উপরের (সমীকরণ-২) সূত্র অনুসারে কোন গবেষণা এলাকার প্রতিটি পরিবারের দারিদ্র্য সীমা নির্ণয় করা হয়েছে।

কোন নির্দিষ্ট অঞ্চলে এ ধরনের সকল ব্যক্তি বা পরিবারের যদি q সংখ্যক পরিবার (দরিদ্র্য পরিবারঃ খাদ্য গ্রহণ অনুসারে) থাকে তাহলে উক্ত অঞ্চলের দারিদ্র্য সীমার দূরত্বের (Poverty Gap) সমষ্টি হবে,

$$g = \sum_{i=1}^{q} (z-y_i) \quad \text{..... সমীকরণ- ৩}$$

এখানে, q হলো গবেষণা এলাকার মোট দরিদ্র্য শ্রেণীভূক্ত পরিবারের সংখ্যা, কাজেই র =১, ২, ৩, ৪, ৫, ৬, ৭, ...৩২৭টি (গবেষণা প্রশ্নমালা অনুসারে)।

কাজেই মোট দারিদ্র্য সীমা থেকে দূরত্বের সমষ্টি হবে,

$$g = \sum_{i=1,2,3.....}^{৩২৭} (z-y_i)$$

$g = ৬৪৩২০$ ।

সিকস্তি (Shikasti): সিকস্তি শব্দটি দ্বারা জলপ্লাবণের মাধ্যমে মূল ভূখন্ড হতে কোন ভূমি খন্ডের বিচ্ছিন্ন হওয়া ও ধ্বংস প্রাপ্ত হওয়া বুঝায়।

অমর্ত্য সেনের দারিদ্র্য সীমা থেকে মোট দূরত্ব সূচকের উপর ভিত্তি করে দারিদ্র্য পরিমাপ (Poverty Measurement Based on Total Poverty Gap Ratio of Amarta Sen)

এক্ষেত্রে Poverty Gap Ratio নির্ধারিত হয় $g^{i/z}$ Ges g/z দ্বারা। সামগ্রিক Poverty Gap নির্ধারণের ক্ষেত্রে সাধারণতঃ এ সংখ্যাকে দরিদ্র শ্রেণীভুক্ত মোট সদস্য সংখ্যা দ্বারা ভাগ করে গড় Poverty Gap গ্রহণ করা হয় (g/p)। অমর্ত্য সেনের (১৯৭৬) মতে, মোট Poverty Gap নির্ণয় করা যায় নিম্নের সূত্রের দ্বারা,

$$G = (1/qz) \sum_{i=1}^{q} (z-y_i) \quad \text{..... সমীকরণ- ৪}$$

$G = (১/৩২৭\times২১২২^{*}) \times ৬৪৩২০^{\#}$ [সমীকরণ নং ৩ হতে $\sum_{i=১}^{q} (z- y_i)$ এর মান বসিয়ে]

$G = ০.০৯$

* ক্যালরি গ্রহণ সাপেক্ষে দারিদ্র্য রেখা।

\# ক্যালরি গ্রহণ সাপেক্ষে দারিদ্র্য সীমা থেকে মোট দূরত্ব।

গবেষণা এলাকার দারিদ্র্য সূচক পরিমাপ (Poverty Index Measurement of Study Area)

প্রাপ্ত তথ্য বিশ্লেষণে দেখা যায় যে, দারিদ্র্য রেখা-১ অনুসারে নদী সিকস্থি জনগণের মধ্যে ব্যাপক দারিদ্র্য প্রবণতা লক্ষ্য করা যায়। দেখা যায় যে, নদী সিকস্থি ৪০০টি পরিবারের মধ্যে মাথা গণনা সূচক অনুসারে দরিদ্র জনগণের পরিমাণ ৬৫ শতাংশ। দারিদ্র্য সীমা থেকে দূরত্ব সূচক বিশ্লেষণ করলে এ অঞ্চলে দারিদ্র্যের প্রগাঢ়তা ভালোভাবে অনুধাবন করা যায়। সমীক্ষায় দেখা যায় যে, ৪০০ টি পরিবারের মোট দূরত্ব সূচক হলো ৫৫৮১৮ কিলোক্যালরি। অর্থাৎ জনপ্রতি দারিদ্র্য সীমা থেকে দূরত্ব হলো ১৩৯.৪৫ কিলোক্যালরি। এ দিক বিবেচনা করে দেখা যায় নদী সিকস্থি অধিকাংশ পরিবারই চরম দারিদ্র্যের কাছাকাছি অবস্থান করে। এছাড়া অমর্ত্য সেনের মোট দারিদ্র্য সীমা থেকে দূরত্ব অনুসারেও দেখা যায় যে, নদী সিকস্থি অধিকাংশ মানুষই দারিদ্র্য সীমার কাছাকাছি অবস্থান করে। উল্লেখ্য যে, অমর্ত্য সেনের এই সূচকের মান ০.১০ বা তার কাছাকাছি হলে বুঝা যায় যে, সে সমস্ত পরিবার বা ব্যক্তি ব্যাপকভাবে দরিদ্র্য। দারিদ্র্য রেখা-১ অনুসারে স্থায়ী পরিবারগুলোর মধ্যে দারিদ্র্য প্রবণতা তুলনামূলক কম দেখা যায়। এখানে মাথা গণনা সূচক অনুসারে দারিদ্র্যের পরিমাণ ৫৬ শতাংশ যা নদী সিকস্থি পরিবারের চেয়ে ৯ শতাংশ কম। এছাড়া মোট দারিদ্র্য সীমা

থেকে দূরত্ব সূচক অনুসারে জনপ্রতি দূরত্ব হলো ৭০.৮৫ কিলোক্যালরি যা নদী সিকস্থি পরিবারের চেয়ে ৬৮.৬ কিলোক্যালরি কম। অমর্ত্য সেনের সূচক অনুসারে স্থায়ী পরিবারের মান ০.০৪ কম। কাজেই বলা যায় যে, দারিদ্র্য রেখা-১ অনুসারে স্থায়ী জনগণের চেয়ে নদী সিকস্থি জনগণের মধ্যে দারিদ্র্য প্রবণতা তুলনামূলক বেশী (সারণী-১)।

সারণী-১: দারিদ্র্য সূচক পরিমাপ (দারিদ্র্য রেখা-১ অনুসারে)

পরিবারের ধরণ	মাথা গণনা সূচক $H= q/n [\%]$	দারিদ্র্য সীমা থেকে মোট দূরত্ব সূচক $g = \sum_{i=1}^{q} (z-y_i)$	অমর্ত্য সেনের দারিদ্র্য সীমা থেকে মোট দূরত্ব সূচক $G= (1/qz) \sum (z-y_i)$
নদী সিকস্থি ৪০০ টি	৬৫	৫৫৮১৮	০.১০
স্থায়ী ১২০ টি	৫৬	৮৫০২	০.০৬

উৎসঃ প্রত্যক্ষ জরিপ ২০০৪।

প্রাপ্ত তথ্য হতে দেখা যায় যে, দারিদ্র্য রেখা-২ অনুসারে নদী সিকস্থি জনগণের মধ্যে ব্যাপক দারিদ্র্য প্রবণতা লক্ষ্য করা যায়। নদী সিকস্থি ৪০০ টি পরিবারের মধ্যে মাথা গণনা সূচক অনুসারে দরিদ্র জনগণের পরিমাণ ২৭ শতাংশ। দারিদ্র্য সীমা থেকে দূরত্ব সূচক বিশ্লেষণ করলে এ অঞ্চলে দারিদ্র্যের তীব্রতা অনুধাবন করা যায়। সমীক্ষায় দেখা যায় যে, ৪০০ টি পরিবারের মোট দূরত্ব সূচক হলো ৬২৫৫ কিলোক্যালরি। অর্থাৎ জনপ্রতি দারিদ্র্য সীমা থেকে দূরত্ব হলো ১৫.৬৪ কিলোক্যালরি। এ দিক বিবেচনা করে দেখা যায় নদী সিকস্থি অনেক পরিবারই চরম দারিদ্র্য সীমার নীচে অবস্থান করছে। এছাড়া অমর্ত্য সেনের মোট দারিদ্র্য সীমা থেকে দূরত্ব অনুসারেও দেখা যায় যে, নদী সিকস্থি অনেক মানুষই দারিদ্র্য সীমার কাছাকাছি অবস্থান করে। উল্লেখ্য যে, অমর্ত্য সেনের এই সূচকের মান ০.০৩ যা থেকে বোঝা যায় যে, নদী সিকস্থি পরিবারগুলো ব্যাপকভাবে দরিদ্র। দারিদ্র্য রেখা-২ অনুসারে স্থায়ী পরিবারগুলোর মধ্যে দারিদ্র্য প্রবণতা তুলনামূলক কম দেখা যায়। এখানে মাথা গণনা সূচক অনুসারে দারিদ্র্যের পরিমাণ ১৪ শতাংশ যা নদী সিকস্থি পরিবারের চেয়ে ১৩ শতাংশ কম। মোট দারিদ্র্য সীমা থেকে দূরত্ব সূচক অনুসারে জনপ্রতি দূরত্ব হলো ৪.৩০ কিলোক্যালরি যা নদী সিকস্থি পরিবারের চেয়ে ১১.৩৪ কিলোক্যালরি কম। অমর্ত্য সেনের সূচক অনুসারে স্থায়ী পরিবারের মান ০.০৩ । কাজেই বলা যায় যে, দারিদ্র্য রেখা-২ অনুসারে নদী সিকস্থি জনগণের মধ্যে স্থায়ী জনগণের চেয়ে দারিদ্র্য প্রবণতা তুলনামূলক বেশী (সারণী-২)।

সারণী-২: দারিদ্র্য সূচক পরিমাপ (দারিদ্র্য রেখা-২ অনুসারে)

পরিবারের ধরণ	মাথা গনণা সূচক $H= q/n [\%]$	দারিদ্র্য সীমা থেকে মোট দূরত্ব সূচক $g = \sum_{i=1}^{q} (z-y_i)$	অমর্ত্য সেনের দারিদ্র্য সীমা থেকে মোট দূরত্ব সূচক $G= (1/qz) \sum (z-y_i)$
নদী সিকস্থি ৪০০ টি	২৭	৬২৫৫	০.০৩
স্থায়ী ১২০ টি	১৪	৫১৭	০.০৩

উৎসঃ প্রত্যক্ষ জরিপ ২০০৪।

নদী সিকস্থি পরিবারের দারিদ্র্য সীমার নিচে অবস্থান ভিত্তিক দারিদ্র্য দূরত্ব পরিমাপ

নীচের তথ্য বিশ্লেষণে (সারণী-৩) দেখা যায় যে, সর্বোচ্চ ২১.২৯ শতাংশ মানুষ দারিদ্র্য রেখার নীচে (২১২২ কিলোক্যালরি খাদ্য গ্রহণ সাপেক্ষে) ৩০১-৩৫০ শ্রেণীর অন্তর্গত। গবেষণা এলাকার ২০.৯১ শতাংশ মানুষ দারিদ্র্য রেখার নিচে ০-৫০ শ্রেণীর অন্তর্গত।

সারণী-৩ ঃ দারিদ্র্য রেখা-১ এর আলোকে চন্দনবাইশা ইউনিয়নের দারিদ্র্য ব্যবধানের শ্রেণী ও শতকরা পরিমাণ

ক্যালরি দূরত্ব	নদী সিকস্থি পরিবার (%)	স্থায়ী পরিবার (%)
০-৫০	২০.৯১	৩৬.২৩
৫১-১০০	১৬.৩৫	৩৪.৭৮
১০১-১৫০	৭.৯৮	৪.৩৫
১৫১-২০০	১.৫২	-
২০১-২৫০	৯.১৩	-
২৫১-৩০০	১.৯০	-
৩০১-৩৫০	২১.২৯	১৩.০৪
৩৫১-৪০০	১৩.৩২	১০.১৫
৪০১-৪৫০	৩.৪২	১.৪৫
৪৫১+	৪.১৮	-

উৎসঃ প্রত্যক্ষ জরিপ, ২০০৪।

দারিদ্র্য সীমা (২১২২ কিলোক্যালরি সাপেক্ষে) থেকে ১০০ কিলোক্যালরির কম খাদ্য গ্রহণ করে জীবিকা নির্বাহ করছে নদী সিকস্থি পরিবারের ৩৭.২৬ শতাংশ, পক্ষান্তরে ঐ স্তরে অবস্থান করছে স্থায়ী পরিবারের ৭১.০১ শতাংশ। এক্ষেত্রে স্থায়ী পরিবারের পরিমাণ ৩৩.৭৫ শতাংশ বেশী রয়েছে। অপরপক্ষে, ৪০১ কিলোক্যালরির বেশী দূরত্বে অবস্থানকারী নদী সিকস্থি পরিবারের পরিমাণ ৭.৬০ শতাংশ এবং স্থায়ী পরিবারের পরিমাণ ১.৪৫ শতাংশ। অর্থাৎ নদী সিকস্থি পরিবারের পরিমাণ স্থায়ী পরিবার অপেক্ষা ৬.১৫ শতাংশ বেশী। এক্ষেত্রে নদী সিকস্থি মানুষের খাদ্য ঘাটতি স্থায়ী জনগণের তুলনায় বেশী পরিলক্ষিত হয়। দারিদ্র্য সীমা থেকে ১০১-১৫০ কিলোক্যালরি দূরত্বে নদী সিকস্থি পরিবারের ৭.৯৮ শতাংশ এবং স্থায়ী পরিবারের রয়েছে ৪.৩৫ শতাংশ। এক্ষেত্রে নদী সিকস্থি পরিবারের পরিমাণ ৩.৬৩ শতাংশ বেশী। দারিদ্র্য সীমা থেকে ১৫১-৩০০ কিলোক্যালরি দূরত্বে রয়েছে নদী সিকস্থি পরিবারের ১২.৫৫ শতাংশ। অপরপক্ষে, ঐ স্তরে স্থায়ী পরিবারের পরিমাণ শূন্য। সুতরাং দারিদ্র্য সীমার নিচে অবস্থানরত নদী সিকস্থি এবং স্থায়ী পরিবারের মধ্যে খাদ্য ঘাটতি সমান নয়। তুলনামূলক বিশ্লেষণে দেখা যায় যে, স্থায়ী জনগণের তুলনায় নদী সিকস্থি জনগণের খাদ্য ঘাটতি অপেক্ষাকৃত বেশী।

দারিদ্র্য রেখা-২ এর আলোকে চন্দনবাইশা এলাকার দারিদ্র্য ব্যবধানের তুলনামূলক চিত্র (নদী সিকস্থি ও স্থায়ী)

দারিদ্র্য রেখা প্রত্যক্ষভাবে নির্ধারণ করা হয় ন্যূনতম প্রয়োজনীয় পুষ্টি গ্রহণ করা হচ্ছে কি না তার ভিত্তিতে। এ পদ্ধতি বর্তমানে উন্নয়নশীল দেশসমূহে ব্যাপকভাবে ব্যবহৃত হচ্ছে। অপরপক্ষে, স্থায়ী পরিবারের ৮৮.৩৫ শতাংশ পরিবার চরম

দারিদ্র্য সীমা থেকে ৫০ কিলোক্যালরির কম দূরত্বে অবস্থান করছে। এ হার নদী সিকস্থি পরিবারের চেয়ে ১৫.৩৮ শতাংশ বেশী, স্থায়ী পরিবারের ১৭.৬৫ শতাংশ চরম দারিদ্র্য সীমা থেকে ৫১-১০০ কিলোক্যালরি দূরত্বে রয়েছে। এ হার নদী সিকস্থি পরিবারের তুলনায় শতকরা ০.৭০ ভাগ কম। স্থায়ী পরিবারের মধ্যে চরম দারিদ্র্য সীমা থেকে ১০১ কিলোক্যালরির অধিক দুরত্বে কোন পরিবার নাই।

সারণী-৪ঃ দারিদ্র্য রেখা-২ এর আলোকে চন্দনবাইশা এলাকায় দারিদ্র্য ব্যবধানের শ্রেণী ও শতকরা পরিমাণ

ক্যালরি দূরত্ব	নদী সিকস্থি পরিবার (%)	স্থায়ী পরিবার (%)
০-৫০	৬৬.৯৭	৮২.৩৫
৫১-১০০	১৮.৩৫	১৭.৬৫
১০১-১৫০	৪.৫৯	-
১৫১-২০০	১.৮৩	-
২০১-২৫০	২.৭৫	-
২৫১-৩০০	-	-
৩০১-৩৫০	৩.৬৭	-
৩৫১-৪০০	০.৯২	-
৪০১-৪৫০	-	-
৪৫১+	০.৯২	-

উৎসঃ প্রত্যক্ষ জরিপ, ২০০৪।

গবেষণা এলাকায় চরম দারিদ্র্য সীমার নিচে বসবাস করছে ২৩ শতাংশ পরিবার। তবে তারা সকলে দারিদ্র্য রেখা থেকে সমান দূরত্বে অবস্থান করছে না (সারণী-৪)। তাছাড়াও নদী সিকস্থি ও স্থায়ী পরিবারের মধ্যে এই ক্যালরি গ্রহণের ব্যাপক পার্থক্য পরিলক্ষিত হয়। নদী সিকস্থি পরিবারের ২৭ শতাংশ এবং স্থায়ী পরিবারের ১৪ শতাংশ চরম দারিদ্র্য সীমার নীচে বসবাস করছে। নদী সিকস্থি পরিবারের ৬৬.৯৭ শতাংশ চরম দারিদ্র্য সীমার নীচে ০-৫০ কিলোক্যালরি দুরত্বে অবস্থান করছে। ১৮.৩৫ শতাংশ পরিবার চরম দারিদ্র্য সীমার নীচে ৫১-১০০ কিলোক্যালরি দূরত্বে অবস্থান করছে। ৪.৫৯ শতাংশ পরিবার দারিদ্র্য সীমার নীচে ১০১-১৫০ শ্রেণীভুক্ত এবং ৩.৬৭ শতাংশ পরিবার দারিদ্র্য সীমা থেকে ৩০১-৩৫০ কিলোক্যালরি দুরত্বে রয়েছে। ২.৭৫ শতাংশ পরিবার ২০১-২৫০ কিলোক্যালরি দূরত্বে শ্রেণীভুক্ত, ১.৮৩ শতাংশ পরিবার ১৫১-২০০ শ্রেণীভুক্ত, ০.৯২ শতাংশ পরিবার ৩৫১-৪০০ শ্রেণীভুক্ত দূরত্বে অবস্থান করছে। অপরপক্ষে, স্থায়ী পরিবারের ৮২.৩৫ শতাংশ পরিবার চরম দারিদ্র্য সীমা থেকে ৫০ কিলোক্যালরির কম দূরত্বে অবস্থান করছে। এ হার নদী সিকস্থি পরিবারের চেয়ে ১৫.৩৮ শতাংশ বেশী। স্থায়ী পরিবারের ১৭.৬৫ শতাংশ চরম দারিদ্র্য সীমা থেকে ৫১-১০০ কিলোক্যালরি দূরত্বে রয়েছে। এ হার নদী সিকস্থি পরিবারের তুলনায় শতকরা ০.৭০ ভাগ কম। স্থায়ী পরিবারের মধ্যে চরম দারিদ্র্য সীমা থেকে ১০১ কিলোক্যালরির অধিক দূরত্বে কোন পরিবার নাই। সুতরাং দারিদ্র্য রেখা-২ অনুসারে খাদ্য গ্রহণের দূরত্ব নদী সিকস্থি পরিবারের চেয়ে স্থায়ী পরিবারে কম। কাজেই বলা যায় যে, নদী সিকস্থি পরিবার বা জনগণের মধ্যে চরম দারিদ্র্য প্রবণতা স্থায়ী পরিবারের চেয়ে তুলনামূলক বেশী। এক্ষেত্রে জাতিসংঘের খাদ্য ও কৃষি সংস্থা (FAO) এবং বিশ্ব স্বাস্থ্য সংস্থা (WHO) কর্তৃক নির্ধারিত ন্যূনতম ক্যালরি চাহিদার যে মানদণ্ড তা ব্যবহার করা হয়। ন্যূনতম ১৮০৫ কিলোক্যালরি যুক্ত খাদ্য যারা ভোগ করতে পারে না তাদেরকে চরম দরিদ্র হিসাবে চিহ্নিত করা হয়।

গবেষণা এলাকার দারিদ্র্য প্রবণতা (দারিদ্র্য রেখা-১ এবং দারিদ্র্য রেখা-২ অনুসারে)

একটি দেশ বা অঞ্চলের মধ্যে দারিদ্র্য প্রবণতা সমান নয়। বাংলাদেশে বিভাগওয়ারী দারিদ্র্য প্রবণতা পর্যালোচনা করলে দেখা যায় যে, সিলেট বিভাগে দারিদ্র্য প্রবণতা সবচেয়ে কম এবং রাজশাহী বিভাগে দারিদ্র্য প্রবণতা সবচেয়ে বেশী। এর মধ্যে শহর অপেক্ষা পল্লী অঞ্চলে দারিদ্র্য প্রবণতা বেশী।

গবেষণা এলাকায় একই ইউনিয়নভুক্ত এমন কি একই গ্রামে বসবাসরত পরিবারের মধ্যে দারিদ্র্য প্রবণতা ভিন্নতর। এছাড়া সাধারণ দারিদ্র্য (দারিদ্র্য রেখা-১ অনুযায়ী) এবং চরম দারিদ্র্য (দারিদ্র্য রেখা-২ অনুসারে) অবস্থার মধ্যেও ব্যাপক পার্থক্য পরিলক্ষিত হয়।

সারণী- ৫: গবেষণা এলাকার দারিদ্র্য প্রবণতা

দারিদ্র্য রেখার ধরণ	নদী সিকস্থি পরিবার (%)	স্থায়ী পরিবার (%)
দারিদ্র্য রেখা-১	৬৫	৫৬
দারিদ্র্য রেখা-২	২৭	১৪

উৎসঃ প্রত্যক্ষ জরিপ-২০০৪।

দারিদ্র্য রেখার নীচে (দারিদ্র্য রেখা-১ অনুসারে) বসবাসকারী পরিবারের মধ্যে নদী সিকস্থি পরিবার ৬৫ শতাংশ এবং স্থায়ী পরিবার ৫৬ শতাংশ। স্থায়ী পরিবার অপেক্ষা নদী সিকস্থি পরিবারে দারিদ্র্য প্রবণতা ৯ শতাংশ বেশী। শুধুমাত্র চরম দারিদ্র্য রেখার নীচে (দারিদ্র্য রেখা-২ অনুসারে) অবস্থানকারী নদী সিকস্থি পরিবার সংখ্যা ২৭ শতাংশ এবং স্থায়ী পরিবারের সংখ্যা ১৪ শতাংশ (সারণী-৫)। একই দারিদ্র্য রেখার নিচে অবস্থানকারী স্থায়ী পরিবার অপেক্ষা নদী সিকস্থি পরিবারে দারিদ্র্য প্রবণতা ১৩ শতাংশ বেশী। সাধারণ দারিদ্র্য এবং চরম দারিদ্র্য উভয় ক্ষেত্রেই নদী সিকস্থি পরিবারের মধ্যে দারিদ্র্য প্রবণতা বেশী।

উপসংহার

সাধারণভাবে নদী সিকস্থি এলাকার জনগোষ্ঠীর মাঝে দারিদ্র্যের প্রকোপ বেশী। গবেষণা কালে দেখা গেছে যে, সামষ্টিক প্রবৃদ্ধির মাঝেও কারো আয় বেড়েছে, আবার কারো কমেছে। এর অন্তরালে নদী সিকস্থি ও স্থায়ী পরিবারের সম্পর্ক রয়ে গেছে। অর্থাৎ কেউ দারিদ্র্য রেখার উপরে উঠছে আবার কেউ আগের চেয়ে বেশী দারিদ্র্যে পতিত হয়েছে। যে মানুষটি একই আয় স্তরে নিচ থেকে উঠে এসেছে অথবা এখানেই স্থির রয়েছে-এ দু'জনের দারিদ্র্যের উপলব্ধি এবং যাতনা এক রকম নয়। বর্তমান প্রবন্ধে দারিদ্র্যের পরিমাপ বিশ্লেষণ করে দেখা যায় যে, চন্দনবাইশা এলাকা দেশের অন্যান্য এলাকার চেয়ে তুলনামূলক বেশি দরিদ্র। এছাড়া একই এলাকার দুই পরিবেশ তথা নদী সিকস্থি এবং স্থায়ী পরিবারের দারিদ্র্যের পরিমাপ করে দেখা যায় যে, নদী সিকস্থি পরিবার গুলোর মধ্যে দারিদ্র্য প্রবণতা বেশী। বর্তমান প্রবন্ধে দারিদ্র্য রেখা-১ এবং দারিদ্র্য রেখা-২ ব্যবহার করা হয়েছে। এই রেখাদ্বয় অনুসারে দেখা যায় যে, দারিদ্র্য রেখা-২ অনুসারে নদী সিকস্থি পরিবার গুলোর মধ্যে দারিদ্র্য প্রবণতা স্থায়ী পরিবারের চেয়ে তুলনামূলক বেশী। এখানে উল্লেখ্য যে, দারিদ্র্য রেখা-২ বলতে চরম দারিদ্র্যকে বুঝানো হয়েছে। অর্থাৎ নদী সিকস্থি পরিবারগুলোর মধ্যে চরম দারিদ্র্য প্রবণতা সবচেয়ে বেশি। তাদের মাঝে খাদ্য ও সামাজিক নিরাপত্তাহীনতা বিদ্যমান। তাই নদী সিকস্থি এলাকার জন্য অগ্রাধিকার ভিত্তিতে নিরাপত্তা বেষ্টনী গড়ে তোলা জরুরী। এ লক্ষ্যে নদী পয়স্থি জমি বন্টন, খাদ্য সহায়তা, কৃষি উপকরণ সরবরাহ ইত্যাদি পদক্ষেপ গ্রহণ করা যেতে পারে।

গ্রন্থপঞ্জি

Adnan, S. (1991). Floods, People and the Environment, Dhaka: Research and Advisory Services.

Ahluwalia, M. (1976). Inequality, Poverty and Development, Journal of Development Economics.

Ahsan, Kamrul. (2003). River Bank Erosion and Consequences to the Poor, Echo From Grass Root, Comilla: Bangladesh Academy for Rural Development.

Ali, Zulfiqar & Sharifa Begum. (2006). Trends in Poverty and Social Indicators: An Update (PRCPB Working Paper No.16). Programme for Research on Chronic Poverty in Bangladesh (PRCPB), Chronic Poverty Research Centre (CPRC), Institute for Development Policy and Management (IDPM), Dhaka: Bangladesh Institute of Development Studies (BIDS).

Asiatic Society of Bangladesh (2006). Banglapedia: National Encyclopedia of Bangladesh, Dhaka: Zenesis Printing & Packaging.

BBS (Bangladesh Bureau of Statistics). (2000). Statistical Yearbook of Bangladesh 2000. Planning Commission, Ministry of Planning, Dhaka: Government of Bangladesh.

Elahi, K. (1987). Impacts of Riverbank Erosion and Flood in Bangladesh: An Introduction, *River Bank Erosion, Flood and Population Displacement in Bangladesh,* Dhaka: Jahangir Nagar University.

Elahi, K.M. (1989). Population Displacement due to Riverbank Erosion in the Jamuna in Bangladesh, in: J.I. Clarke, et. al. (eds), *Population and Disaster,* Oxford: Basil Blackwell.

Haque, C.E. (1988). Human Adjustment to River Bank Erosion Hazard in the Jamuna Floodplain, Bangladesh, Human Ecology, 16(4):421-437.

Hossain, M. (1986). A Note on the Trend in Landlessness in Bangladesh, the Bangladesh Development Studies 14(2).

Hossain, M.Z. and C. Greenberg. (1985). Population Displacement Due to Riverbank Erosion and Urban Squatters: A Case of Serajgonj. *Workshop on the Impact of River Bank Erosion and Flood Hazards in Bangladesh.* Dhaka: Jahangir Nagar University.

Sen, A.K. (1981). Povery and Famines, Oxford: Clarendon Press.

হোসেন, মো. আলতাফ ও অন্যান্য । (২০০০) । বাংলাদেশের ভূমি আইন, জলি বুক সেন্টার, বাংলাবাজার, ঢাকা ।

ইউনুস, মো. । (২০০৩) । খাদ্য বিজ্ঞান, বাংলা একাডেমী, বি.এম. প্রিন্টার্স, ঢাকা ।

ইলাহী, কে. মউদুদ । (১৯৯২) । বংলাদেশ ভৌগোলিক সমীক্ষা, নজরুল ইসলাম, এবং সিরাজুল ইসলাম চৌধুরী(সম্পাদিত), *বাংলাদেশে নদী ভাঙ্গন সমস্যা এবং জনসংখ্যাচ্যুতি,* ঢাকা: ঢাকা বিশ্ববিদ্যালয় ।

রহমান, মো: আনিসুর । (১৯৯৭) । দারিদ্র্য গণনা, দারিদ্র্য বিমোচন এবং সামাজিক ন্যায় বিচারসহ প্রবৃদ্ধি, রুশিদান ইসলাম রহমান (সম্পাদিত), *দারিদ্র্য ও উন্নয়ন-প্রেক্ষাপট বাংলাদেশ,* ঢাকা: বাংলাদেশ উন্নয়ন গবেষণা প্রতিষ্ঠান ।

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আঙ্গুর উৎপাদন প্রযুক্তি ও লাগসই জাত নির্বাচন গবেষণা প্রকল্প

ড. রণজিৎ চন্দ্র অধিকারী[১]

সার-সংক্ষেপ

*বিশ্বে যত ধরনের ফল উৎপাদন হচ্ছে তার মধ্যে আঙ্গুর অন্যতম। বলতে গেলে বিশ্বের উৎপাদিত সমস্ত ফলের যোগফলের এক চতুর্থাংশ আঙ্গুর। টাকার অংকে আঙ্গুর থেকে উৎপাদিত আয় অন্যান্য সকল ফলের তুলনায় বেশী এবং ভোগের দিক থেকেও সর্বোচ্চ। প্রায় ৭৮% আঙ্গুর মদ তৈরীতে, ১৪% কিচমিচ তৈরীতে এবং ৮% তাজাফল হিসেবে ব্যবহৃত হয়। ইরোপিয়ান আঙ্গুর Vitis vinifera (Vitaceae) মদ, কিচমিচ ও তাজাফল হিসেবে ব্যবহারের জন্য উৎপাদিত হয়। বাংলাদেশে আঙ্গুরের চাষ নেই কিংবা ভাল জাত নেই ঠিকই তবে আঙ্গুর চাষের অপার সম্ভাবনা রয়েছে এ কথা বিবেচনা করে ১৯৯৯ সালে পল্লী উন্নয়ন একাডেমী আঙ্গুর চাষের উপর গবেষণা কার্যক্রম শুরু করে। এ কার্যক্রমের আওতায় দেশের বিভিন্ন প্রান্ত থেকে দেশী-বিদেশী জাত সংগ্রহ করে তা ২নং নার্সারীতে ২০০০-২০০৩ সাল পর্যন্ত ট্রায়াল দেয়া হয় এবং আশাব্যঞ্জক জাতগুলো ২০০৪ সালে ১নং নার্সারীতে স্থানান্তরিত করা হয়। বাগান স্থানান্তরের কারণে ২০০৭ সালে ৩টি, ২০০৮ সালে ৫টি এবং ২০০৯ সালে ৬টি জাতসহ বাগানের মোট ৫৫ গাছের মধ্যে ৪৫টি গাছে ফুল-ফল ধরে এবং তা অদ্যাবধি চাষ হচ্ছে। আঙ্গুর গাছের পাতা, কান্ড, ফুল, ফল ইত্যাদির রকমফের বিবেচনা করে ১০ টি জাত বাছাই করা হয়। বিগত বছর গুলোতে ৬টি জাতে (আরডিএ-১, আরডিএ-৫, আরডিএ-৭, আরডিএ-৮, আরডিএ-৯ এবং আরডিএ-১০) ফুল-ফল ধরতে সক্ষম হয়েছে। জাত হিসেবে আরডিএ-৮, আরডিএ-৯ থেকে ২০০৯ সালে যথাক্রমে ৪.৪০ এবং ৩.৬০ কেজি আঙ্গুর উৎপন্ন হয়েছে। পক্ষান্তরে আরডিএ-১, আরডিএ-১০ জাত থেকে গাছ প্রতি যথাক্রমে ৫১০ এবং ২৫০ গ্রাম আঙ্গুর পাওয়া গেছে। **আরডিএ-১**, আরডিএ-৫, আরডিএ-৭, **আরডিএ-৮**, আরডিএ-৯ এবং আরডিএ-১০ জাতে চিনির পরিমাণ যথাক্রমে **১৯-২০%**, ১২-১৪%, ১৭-১৮%, **১৮-১৯%**, ১২-১৩% ও ১৮-১৯%, এবং বাজার থেকে সংগৃহীত জাতে চিনির পরিমান ২১-২৩%। গাছ প্রতি উৎপাদনের পরিমান ও মিষ্টতার পরিমাপ বিবেচনায় **আরডিএ-১** এবং **আরডিএ-৮** আঙ্গুরকে জাত হিসেবে গ্রহণ করা যেতে পারে।*

ভূমিকা

বাংলাদেশে ফলের আবাদ প্রাচীনকাল থেকেই। দিনে দিনে এর চাহিদা বেড়েই চলছে। কিন্তু চাহিদার তুলনায় রকমারী ফলের উৎপাদন বাড়তি জনসংখ্যার কারণে দিনে দিনে কমে যাচ্ছে । ফলে একদিকে যেমন আবাদ- যোগ্য জমির পরিমাণ কমে আসছে তেমনি অন্যদিকে ফলের উৎপাদনের কমতির জন্য জনগণ অপুষ্টি ও ভিটামিনের অভাবে রোগে-শোকে ভুগছে। অথচ এদেশের প্রাকৃতিক পরিবেশ নানাবিধ ফল উৎপাদনের সম্পূর্ণ অনুকূলে। এ জন্য প্রয়োজন সকলের প্রচেষ্টা, সরকারী বেসরকারী উদ্যোগ এবং সঠিক পরিকল্পনার। দেশের প্রতিটি বাড়ীর আঙ্গিনায়, শিক্ষা প্রতিষ্ঠানে, রাস্তার পার্শ্বে, পুকুর পাড়, খাস ও পতিত জমিতে যদি ব্যাপকহারে ফলফলাদির বৃক্ষ রোপন করা যায় তাহলে

[১] পরিচালক (গবেষণা ও মূল্যায়ন), আরডিএ, বগুড়া। ranajit_rda@yahoo.com

প্রতিটি বাড়ী হবে ফুলফল পুষ্টিতে ভরা ও সৃষ্টি হবে ছোট বড় ফল বাগানের এবং সমাজে আসবে উন্নয়নের ছোঁয়া। ফলশ্রুতিতে দেশের যুব সমাজ চাকুরীর পরিবর্তে আঙ্গুর চাষের মাধ্যমে আত্মকর্মসংস্থানের পথ খুঁজে পাবে।

বাংলাদেশের অনুকূল জলবায়ু বিভিন্ন ধরণের ফল উৎপাদনের জন্য বিশেষ সহায়ক। অম্ল মধুর ফলগুলোর মধ্যে আম, কাঁঠাল, কলা, আনারসের চাহিদা বিশ্বে ব্যাপক ও জননন্দিত। বাংলাদেশে ফল উৎপাদনের সবচেয়ে বড় সমস্যা তার মৌসুমী চরিত্র। একই গাছে সারা বছর অথবা বছরে ২/৩ বার ফল ধরে এমন ফল গাছের সংখ্যা কম। সারা বছর ফল ধরে এমন জাতের মধ্যে কলা ও পেঁপে প্রধান। একই গাছে বছরে ২/৩ বার ফল ধরে এমন ফলের মধ্যে আঙ্গুর অন্যতম। যেহেতু পঞ্চম পঞ্চ বার্ষিক পরিকল্পনায় (চ্যাপটার ১৩, সেকশন ১৩.৪.৭) বাংলাদেশী আবহাওয়ায় সারা বছর ফল ধরে এমন ফলের উৎপাদন প্রযুক্তি উদ্ভাবন এবং তাদের বাণিজ্যিক চাষের উপর গুরুত্ব প্রদান করা হয়েছে সেহেতু বাংলাদেশে আঙ্গুর চাষের সম্ভাবনার কথা চিন্তা করা হয়।

আঙ্গুরের ইংরেজী নাম Grape, বৈজ্ঞানিক নাম *Vitis vinifera* এবং ইহা *Vitaceae* পরিবারের অন্তর্ভুক্ত। বাংলাদেশে আঙ্গুর চাষ তেমন একটা হয় না এবং এটি একটি দুর্লভ ফল। এই ফলটি আবহমান কাল ধরে বিভিন্ন দেশ হতে বাংলাদেশে আমদানী করা হয়ে থাকে। এ ছাড়াও এই সুস্বাদু ফলটি উচ্চ মূল্যের কারণে সাধারণ মানুষের ধরা ছোঁয়ার বাইরে থাকে। অথচ আঙ্গুর উৎপাদনের সম্ভাবনা নিয়ে এদেশে কখনও কখনও ক্ষুদ্রাকারে গবেষণা বা পরীক্ষা নিরীক্ষা করা হলেও তার ধারাবাহিকতা পরবর্তীতে লক্ষ্য করা যায়নি। তবে দেশের আনাচে-কানাচে দু'চারজন সখের বশে যে আঙ্গুর গাছ রোপণ করে নাই তা নয়। কিন্তু রোপণের পরবর্তী কার্যক্রমগুলো সুষ্ঠুভাবে অনুসরণ না করায় আঙ্গুর উৎপাদন সম্ভব হয় নাই। আর হলেও তা প্রখর অম্লতার দরুন মুখে দেয়া সম্ভব হয়না (নূরুজ্জামান, ১৯৯৪)। কারণ আঙ্গুর উৎপাদনে প্রযুক্তিগত অজ্ঞতার কারণেই আলোচ্য ফলটি এদেশে প্রসারতা লাভ করে নাই। তাছাড়া এদেশের অনেকেরই ধারণা যে, এদেশে বিরাজমান আবহাওয়া ও জলবায়ুর মধ্যে আঙ্গুর উৎপাদন সম্ভব নয়। এই ধারণা নিতান্তই ভুল। কারণ এই ফলটির উপর কোনরুপ গবেষণা বা পরীক্ষা না করেই দু'চারজনের সাধারণ মতামতের উপর ভিত্তি করেই এই ফলটির প্রসারতায় প্রতিবন্ধকতার সৃষ্টি হয়েছে। আর এ কারণেই আঙ্গুরের উপর গবেষণার ক্ষেত্রে কেউ বিনিয়োগে আগ্রহী নয়।

বাংলাদেশের পার্শ্ববর্তী দেশ ভারত, থাইল্যান্ড, ফিলিপাইন, তাইওয়ান ও মালয়েশিয়ার জলবায়ু আমাদের দেশের জলবায়ুর চেয়ে খুব একটা ভিন্নতর নয়। তাছাড়া মাটির প্রকৃতি ও গুণগত বৈশিষ্ট্য প্রায় একই রকম। এতদসত্বেও যদি ঐ সমস্ত দেশ আঙ্গুর উৎপাদন করে নিজস্ব চাহিদা পূরণ করে প্রচুর পরিমাণে বিদেশে রপ্তানি করতে পারে সেক্ষেত্রে বাংলাদেশেও আশাবাদ ব্যক্ত করার যথেষ্ট কারণ রয়েছে যে, আমাদের দেশের জলবায়ু এবং তাপমাত্রা আঙ্গুর চাষের উপযোগী। আঙ্গুর চাষের জন্য গড় তাপমাত্রা দরকার ২৯°সেলসিয়াস এবং সহনশীল তাপমাত্রা প্রয়োজন ৫-৪০°সেলসিয়াস। এটি উত্তমভাবে বাংলাদেশে বিরাজ করছে। আঙ্গুর পাকার সময় বৃষ্টি না হলে উত্তম। যেহেতু আঙ্গুর ফল জুন মাসে পাকে তাই বৃষ্টি কোন সমস্যা নয়। তবে আগাম বৃষ্টি হলে গাছের গোড়ায় পানি না জমে এবং শীলা বৃষ্টি ক্ষতি করতে না পারে সেদিকে খেয়াল রাখতে হবে। এ সমস্ত বিজ্ঞানভিত্তিক অভিজ্ঞতার আলোকে বাংলাদেশী আবহাওয়ায় সারা বছর ফল ধরে (আঙ্গুর বছরে দু'বার ফল ধরে) এমন ফলের উৎপাদন প্রযুক্তি উদ্ভাবন এবং তাদের

বাণিজ্যিক চাষের উপর গুরুত্ব আরোপ করা জরুরী। এ কথা মনে রেখে পল্লী উন্নয়ন একাডেমী, বগুড়া আঙ্গুর চাষের উপর একটি গবেষণা প্রকল্প ১৯৯৯-২০০০ সালে হাতে নিয়েছে।

গবেষণার উদ্দেশ্য

১। মিষ্টি ও উচ্চফলনশীল আঙ্গুরের জাতসমূহ দেশ-বিদেশ থেকে সংগ্রহ করা;

২। বাংলাদেশের মাটি ও আবহাওয়ায় তার উপযোগীতা যাচাই ও বাছাই করা; এবং

৩। বাছাইকৃত মিষ্টি জাতসমূহের এলাকা ভিত্তিক লাগসই প্রযুক্তি উদ্ভাবন করা।

আঙ্গুরের জাত সংগ্রহ

প্রাথমিকভাবে বাংলাদেশের বিভিন্ন প্রান্ত থেকে বিশেষকরে খুলনা, বাগেরহাট, যশোর, বগুড়া, গাইবান্ধা, নাটোর, রাজশাহী, চাঁপাই নবাবগঞ্জ, দিনাজপুর, ঠাকুরগাঁও এবং ঢাকার কাশেমপুর এবং বিশিষ্ট নার্সারী (মানিকমিঞা অ্যাভিনিউ'র কৃষিবিদ নার্সারী) থেকে কিছু ছড়ানো ছিটানো জাত ১৯৯৯-২০০৩ সাল পর্যন্ত সংগ্রহ ও ট্রায়াল দেওয়া হয়। জাতগুলো যথাক্রমে (এলাকার নাম অনুযায়ী)- পদ্মবিলা, মোল্লাহাটী, কেশবপুরী, ডেমাজানী, গাইবান্ধা, কানাইখালী, রাজশাহী, নবাবগঞ্জী, দিনাজপুরী, ঠাকুরগাঁও এবং জাককাউ ও ব্লাকরুবী। ঐশ্বর্য ও ক্যালমেরিয়া নেপাল ও অষ্টেলিয়ান ২টি জাত। এছাড়া বাজারে প্রাপ্ত অষ্ট্রেলিয়ান জাতের সবুজ আঙ্গুর সংগ্রহ করে তার বীজ থেকে উৎপন্ন ৬ মাস বয়সের ১টি চারা গত ২৫ডিসেম্বর ২০০২ সালে লাগান হয়েছে। দেশী অধিকাংশ জাত গত জুন-অক্টোবর ২০০০, কানাইখালী জাত মার্চ ২০০১, মাঝিড়া, ক্যালমেরিয়া, ঐশ্বর্য জুন-আগষ্ট ২০০২ সালে লাগানো হয়েছে। এছাড়া নাম না জানা বীজ বিহীন সাদা লম্বাটে দুটি জাত (বীজ শূন্য কি বীজযুক্ত ফলে পরিচয়) নাটোর- লালপুর এবং বাংলাবন্দ-পঞ্চগড় থেকে সংগ্রহ করে গত ডিসেম্বর, ২০০৩ সালে লাগান হয়েছে। এ ছাড়া যশোহর-বেনাপোল থেকে সংগৃহীত ৭টি জাতের ২৩টি চারা ২৪-২৭ মে, ২০০৪ সালে লাগানো হয়েছে।

গবেষণা পদ্ধতি

গবেষণা এলাকাঃ আরডিএ ডেমনেষ্ট্রেশন ফার্ম, বগুড়া।
ডিজাইনঃ ৩ মিটার দ্ধ ৩ মিটার সারিতে বর্গাকার নক্শায় রোপণ করা হয়েছে।
রেপ্লিকেশনঃ প্রতিটি জাতের গাছের সংখ্যাই রেপ্লিকেশন নাম্বার।
ট্রেনিং পদ্ধতিঃ টেলিফোন সিষ্টেম ব্যবহার করা হয়েছে।
প্রুনিং ঃ ফেব্রুয়ারী মাসের প্রথম সপ্তাহে প্রুনিং করা হয়েছে।

আন্তঃ পরিচর্যা

সারের মাত্রা প্রতি গর্তে ঃ কাঠের গুড়া ৫ কেজি, গোবর সার ৫ কেজি, খৈল ৫০০ গ্রাম, বোনমিল ২০০ গ্রাম, ইউরিয়া ১০০ গ্রাম, টিএসপি ৫০০ গ্রাম, এসওপি ৫০০ গ্রাম।
সার প্রয়োগঃ এসওপি অর্ধেক সহ সমস্ত সার ডিসেম্বরের ২৩ তারিখ এবং বাকী অর্ধেক এসওপি মে মাসের ০৭ তারিখ প্রয়োগ করা হয়েছে।

কীট নাশক প্রয়োগঃ লাল মাকড়, পাতা মোড়ান পোকা, শিংওয়ালা শোঁয়োপোকা ও ফ্লী বিটল দমনের জন্য রীপকর্ড বা একতারা ১০ লিটার পানিতে ৫.০ মি.লি.তরল ১০ দিন অন্তর অন্তর ছিটিয়ে এদের দমন করা হয়েছে।

রোগ নাশক প্রয়োগঃ অ্যানথ্রাকনোজ, পাউডারি মিলডিউ, ডাউনিমিলডিউ ইত্যাদি রোগ দমনের জন্য মেনকোজেব, কুপ্রাভিট, ডাইথেনএম-৪৫ ঔষধ ১০ লিটার পানিতে ২০.০ গ্রাম মিশিয়ে ১০ দিন অন্তর অন্তর ছিটিয়ে এ সমস্ত রোগ দমনের চেষ্টা করা হয়েছে।

সেচ প্রয়োগঃ নভেম্বর, ডিসেম্বর মাসগুলোতে প্রতিমাসে ০১ বার; জানুয়ারী, ফেব্রুয়ারী মাসে প্রতি ১৫ দিনে একবার; মার্চ, এপ্রিল, মে এবং জুন মাসে প্রতি ১০ দিন অন্তর অন্তর একবার প্রয়োগ করা হয়েছে।

গবেষণা ফলাফল

বিশ্বে যত ধরনের ফল উৎপাদন হচ্ছে আঙ্গুর তার মধ্যে অন্যতম। বলতে গেলে বিশ্বের উৎপাদিত সমস্ত ফলের যোগফলের এক চতুর্থাংশ আঙ্গুর। টাকার অংকে আঙ্গুর থেকে উৎপাদিত আয় অন্যান্য সকল ফলের তুলনায় বেশী এবং ভোগের দিক থেকেও সর্বোচ্চ। প্রায় ৭৮% আঙ্গুর মদ তৈরীতে, ১৪% কিচমিচ তৈরীতে এবং ৮% তাজাফল হিসেবে ব্যবহৃত হয় (রবিনসন, ১৯৮৬)। ইরোপিয়ান আঙ্গুর *Vitis vinifera (Vitaceae)* মদ, কিচমিচ ও তাজাফল হিসেবে ব্যবহারের জন্য উৎপাদন করা হয়। বাংলাদেশে আঙ্গুরের চাষ নেই কিংবা ভাল জাত নেই ঠিকই তবে আঙ্গুর চাষের অপার সম্ভাবনা রয়েছে এ কথা বিবেচনা করে ১৯৯৯ সনে পল্লী উন্নয়ন একাডেমী গবেষণা কার্যক্রম শুরু করে। দেশের বিভিন্ন প্রান্ত থেকে দেশী-বিদেশী জাত সংগ্রহ করে ২নং নার্সারীতে ২০০০-২০০৩ সালে পর্যন্ত ট্রায়াল দেয়া হয় এবং আশাব্যঞ্জক জাতগুলো ২০০৪ সালে ১নং নার্সারীতে স্থানান্তরিত করা হয়। যে সমস্ত দেশী আঙ্গুর চারা ২০০০, ২০০১ এবং ২০০২ সালে লাগান হয়েছিল তার অধিকাংশ গুলোতে ফেব্রুয়ারী মাসের (২০০৩ সালের) চতুর্থ সপ্তাহে কুঁড়ি (bud) বের হতে শুরু করে এবং মার্চের ১ম-৩য় সপ্তাহের মধ্যে ফুল ও ফল ধরে। ফলের ভিতর সবুজ জাতগুলো জুন-এর তৃতীয় সপ্তাহ থেকে জুলাই-এর দ্বিতীয় সপ্তাহের মধ্যে পাকা শেষ হয়। ব্লাকরুবী ও অন্যান্য রঙ্গিন জাতগুলো জুলাই এর প্রথম সপ্তাহ থেকে পাকা শুরু হয় এবং আগষ্ট অবধি চলে। কানাইখালী জাতটি বাঁচানো যায়নি। মাঝিড়া, ক্যালমেরিয়া ও ঐশ্বর্য তিনটি জাত এবং বীজ থেকে উৎপন্ন জাত সমূহে ২০০৩ সাল পর্যন্ত ফল ধরেনি। দেশ-বিদেশ থেকে সংগৃহীত চারার মধ্যে ২০০৭ সালে ৩টি, ২০০৮ সালে ৫টি এবং ২০০৯ সালে ৬টি সহ বাগানের মোট ৫৫ গাছের মধ্যে ৪৫টি গাছে ফুল-ফল ধরে। গাছে কুঁড়ি আসতে শুরু করে ফেব্রুয়ারীর শেষ সপ্তাহ থেকে এবং ফুল ফুঁটেছে মার্চের প্রথম থেকে দ্বিতীয় সপ্তাহের মধ্যে এবং পেকেছে ও কাটা হয়েছে জুন মাসের দ্বিতীয় সপ্তাহের মধ্যে। আঙ্গুর কাটার পর মুখে এবং বৃক্স মিটারের সাহায্যে মিষ্টতার পরিমাপ যাচাই করা হয়। তুলনামূলক যাচাই এর জন্য বাজার থেকে সংগৃহীত আঙ্গুরেরও মিষ্টতা যাচাই করা হয়। আঙ্গুরের বিভিন্ন জাত, জাতের ফলন ও মিষ্টতা পরীক্ষা সংক্রান্ত তথ্যাদি সালওয়ারী সারণী ১, ২, ৩ ও ৪ এ দেখানো হয়েছে।

বাংলাদেশের বিভিন্ন স্থান থেকে আঙ্গুরের বিভিন্ন জাত (যা সংগৃহীত বিভিন্ন এলাকার নাম দিয়ে বুঝানো হয়েছে) সংগ্রহ করা হলেও মূলতঃ ২টি জাত সর্বত্র ছড়িয়ে ছিটিয়ে ছিল, গবেষণায় এটি বেড়িয়ে এসেছে। এ দু'টি জাত যথাক্রমে- জাক্কাউ ও ব্লাকরুবী। মিষ্টতা যাচাই এর ক্ষেত্রে বাজারের আঙ্গুরসহ গবেষণা ক্ষেতের ৬টি আঙ্গুরের জাত পরীক্ষা করা

হয়। সে জাতগুলো যথাক্রমে আরডিএ-১, আরডিএ-৫, আরডিএ-৭, আরডিএ-৮, আরডিএ-৯ এবং আরডিএ-১০ এই নামে আপাততঃ পরিচয় দেয়া হয়েছে। আরডিএ-১ জাতটি বীজ শূন্য, হলুদাভ, স্বাদে মিষ্টি, খেতে কচকচে, আকারে মাঝারী এবং কিছুটা লম্বাটে। থোকায় আঙ্গুরের সংখ্যা ১৯৬-২১০টি এবং প্রতিটি আঙ্গুরের ওজন ২-৪ গ্রাম এবং ফলন ৫১০ গ্রাম। আরডিএ-৫ জাতটি বীজ শূন্য, কালো রং-এর, স্বাদে হাল্কা টক, খেতে কচকচে এবং আকারে ছোট ও গোল। গাছে রোগ ধরে কম, ফলন পাতলা, রুটষ্টক (Root stock) হিসেবে ব্যবহারের জন্য উত্তম। আরডিএ-৭ জাতটি বীজ যুক্ত, সবুজ, স্বাদে মিষ্টি, খেতে অতটা কচকচে নয় এবং আকারে ছোট, গোল, মদ তৈরীতে উপাদেয়। আরডিএ-৮ জাতটি আমাদের স্বদেশী। গবেষণা থেকে দেখা গেছে এ জাতের থোকায় কমপক্ষে ৫০-১০০টি আঙ্গুর ধরে এবং গড় ওজন ২০০-৩০০ গ্রাম। প্রতিটি ফলের গড় ওজন ৩-৪ গ্রামের মধ্যে। ফল সাধারণতঃ দু' টি বীজযুক্ত এবং রসালো। স্বাদে বেশ মিষ্টি। পাকা আঙ্গুর খাবার সময় মুখের ভিতর উপরের আবরণটি পৃথক হয়ে পড়ে। ইতোমধ্যে দেশী জাতের গাছ থেকে ৩.৫০-৪.৫০ কেজি করে আঙ্গুর উত্তোলন করা সম্ভব হয়েছে (সারণী-১ ও ৪)। আঙ্গুরের বড় শত্রু শালিখ ও বুলবুলি পাখী। আঙ্গুর না পাকতেই ১০% আঙ্গুর পাখী খেয়ে ফেলেছে। এছাড়া ১০% ঝরে পড়েছে এবং বৃষ্টির কারণে পঁচেছে। একাডেমীতে উৎপাদিত আঙ্গুর আরডিএ-১, আরডিএ-৫, আরডিএ-৭, আরডিএ-৮, আরডিএ-৯ এবং আরডিএ-১০ জাতে চিনির পরিমাণ যথাক্রমে ১৯-২০%, ১২-১৪%, ১৭-১৮%, ১৮-১৯%, ১২-১৩% ও ১৮-১৯% এবং বাজার থেকে ক্রয়কৃত জাতে চিনির পরিমাণ ২১-২৩% (সারণী ৪)। ব্লাকরুবী পঁচনরোধক জাত এবং কমপক্ষে তিন সপ্তাহ সংরক্ষণ করা সম্ভব। আঙ্গুরে ফুল আসার সময় আকাশ মেঘমুক্ত হলে আঙ্গুরের ফলন বেড়ে যায়। শীতকালে আঙ্গুরের লতা-পাতা ঝরে যায় এবং গাছ সুপ্তাবস্থায় শীতকাল অতিবাহিত করে। আবার বসন্তের আগমনে (ফেব্রুয়ারী মাসে) নতুন নতুন লতা-পাতা গজানোর সাথে সাথে মুকুল আসতে থাকে এবং পরবর্তীতে তা ফলে রূপান্তরিত হয়। আঙ্গুর চাষের জন্য সবচেয়ে উপযোগী স্থান হলো যেখানে পরিমিত বৃষ্টি অথচ মাটিতে পানি দাড়ায় না অপরদিকে আবহাওয়া শুষ্ক ও উষ্ণ থাকে। আঙ্গুর পাকার সময় বৃষ্টি হলে উহার গুণাগুণসহ আকৃতি নষ্ট হয়ে যায় এবং আঙ্গুর ফেটে যায়। অতএব, আঙ্গুর বৃষ্টির পূর্বে পাকে এমন প্রযুক্তি উদ্ভাবন জরুরী।

উৎপাদন ও বাজারজাত করণ

পর্যবেক্ষণে দেখা গেছে আরডিএ-৮ এর প্রতিটি গাছ থেকে গড়ে বছরে ৪.০০ কেজি আঙ্গুর আহরণ সম্ভব। বর্তমান রোপণ পদ্ধতি অনুসারে ৩ মিটার × ৩ মিটার বর্গাকারে এক হেক্টর (১০,০০০ বর্গ মিটার) জমিতে ১০০০টি গাছ লাগান সম্ভব এবং বাৎসরিক গড় ফলন ৪০০০ কেজি বা ৪.০ টন/হেঃ। জুন-জুলাই মাসে আঙ্গুর খুব একটা বাজারে পাওয়া যায় না তাই অসময়ের ফল হিসেবে ১০০/- টাকা প্রতি কেজি মূল্যে মোট আয় ৪,০০,০০০/- টাকা অর্থাৎ প্রতি শতকে আয় ১৬০০/- টাকা। বসত-বাড়ীতে ১০ শতকের একটি জমি থেকে ১৬,০০০/- টাকা আয় করা কোন কঠিন কাজ নয়। তাছাড়া এই ফসলটি বৎসরে দু'বার ফল দেবে যা অন্য কোন ফলজ গাছ হতে আশা করা যায় না। উৎপাদন এবং মিষ্টতার বিবেচনায় আরডিএ-১ এবং আরডিএ-৮ জাত হিসেবে বিবেচনা করা যেতে পারে।

পর্যবেক্ষণ

আঙ্গুর গরম রৌদ্রময় আবহাওয়া পছন্দ করে। বিশেষ করে আঙ্গুর পাকার সময় তাপমাত্রা বেশী ও রৌদ্রময় থাকার কারণে আঙ্গুর মিষ্টি হয়েছে। এছাড়া ১০০ পিপিএম জিব্বরেলিক এসিড (হরমোন) স্প্রে ও সালফেট অব পটাশ সার

দেওয়ার কারণেও আঙ্গুর মিষ্টি হয় (চট্টোপাধ্যায় ও অন্যান্য, ১৯৮৪)। শীতকালে আঙ্গুর গাছের পাতা ঝরে পড়েছে এবং বসন্তে নতুন পাতা গজিয়ে ফুল ও ফল ধরেছে। আঙ্গুর সাধারণতঃ আদ্র আবহাওয়া পছন্দ করে না এবং ঘন কুয়াশা ও তুষারপাত সহ্য করতে পারে না। গাছে ফুলফোঁটার সময় উজ্জ্বল আলো এবং স্বল্প তাপমাত্রা অধিক উৎপাদনের সহায়ক। পাকার সময় অধিক তাপমাত্রা ও শুষ্ক আবহাওয়া আঙ্গুর মিষ্টি হওয়ার জন্য অনুকুল। ইহাও লক্ষ্য করা গেছে মার্চ মাসে বৃষ্টির জন্য আঙ্গুরের ফুল ঝরে পড়েছে এবং পাকার সময় বৃষ্টির জন্য আঙ্গুর ফল পান্‌সে হয়েছে। সুতরাং বৃষ্টির পূর্বে আঙ্গুর সংগ্রহ জরুরী। কখনও কখনও প্রুনিং কিংবা হরমোন প্রয়োগের মাধ্যমে আঙ্গুরের উৎপাদন আগাম করা যেতে পারে তবে সে ক্ষেত্রে আঙ্গুরের ফলন কম হওয়ার সম্ভাবনা। বিকল্প হিসেবে বৃষ্টির হাত থেকে ফসল রক্ষার জন্য গাছের উপর পলিথিন টানানো যেতে পারে।

আঙ্গুর চাষে যে সমস্ত সমস্যা পরিলক্ষিত হয়েছে তার মধ্যে অন্যতম হলো গাছের রোগ যথা- অ্যানথ্রাকনোজ, পাউডারি মিলডিউ, ডাউনিমিলডিউ ইত্যাদি। রোগের প্রাদুর্ভাব সাধারণতঃ গ্রীষ্ম ও বর্ষাকালে বেশী দেখা গেছে। **অ্যানথ্রাকনোজ** ঃ গাছের শাখা, পাতা, ফুল ও ফলে পাখীর চোখের মত গোল দাগ পড়েছিল এবং পাতার গোল আক্রান্ত অংশ শুকিয়ে ছিদ্র হয়ে ঝরে পড়েছে। ফুল আক্রান্ত হলে ফল ধরে না। আবার ফল আক্রান্ত হলে ফেটে যায়। নতুন শাখা আসার সময় (মার্চ, এপ্রিল মাসে) বাতাসে যখন আর্দ্রতা বেশী থাকে এবং বর্ষাকালে এই ছত্রাকের আক্রমণ বেশী দেখা গেছে। **পাউডারি মিলডিউঃ** গাছের শাখা ও পাতায় এর আক্রমণ বেশী পরিলক্ষিত হয়েছে। কাল বৈশাখী ও মেঘলা আবহাওয়ার পরে এ রোগের আক্রমণ লক্ষ্য করা গেছে। তবে ডাউনিমিলডিউ রোগের চেয়ে এর তীব্রতা কম মনে হয়েছে। **ডাউনিমিলডিউঃ** এটিও ছত্রাক জনিত রোগ এবং আঙ্গুরের ভীষণ ক্ষতি করে। কচি পাতায় এর আক্রমণ বেশী লক্ষ্য করা গেছে। আক্রান্ত পাতার নীচে মরিচা রংএর গুড়ো দেখা যায় যা ঘষলে উঠে আসে। মৌসুমী আবহাওয়ায় যখন আদ্রতার আধিক্য ঘটে তখন রোগটি বেড়ে যায়।

সুপারিশ

বাংলাদেশের জলবায়ু এবং মাটির প্রকৃতি ভারত, থাইল্যান্ড, ফিলিপাইন, তাইওয়ান ও মালয়েশিয়ার চেয়ে খুব একটা ভিন্নতর নয়। সুতরাং ঐ সমস্ত দেশ যদি আঙ্গুর উৎপাদন করে নিজস্ব চাহিদা পূরণ করতে পারে সেক্ষেত্রে বাংলাদেশেরও আশাবাদ ব্যক্ত করার যথেষ্ট কারণ রয়েছে যে, আমাদের দেশের জলবায়ু এবং তাপমাত্রা আঙ্গুর চাষের উপযোগী। আঙ্গুর চাষের জন্য গড় তাপমাত্রা দরকার ২৯°সেলসিয়াস এবং সহনশীল তাপমাত্রা প্রয়োজন ৫-৪০°সেলসিয়াস। এটি বাংলাদেশে উত্তমভাবে বিরাজ করছে। আঙ্গুর পাকার সময় বৃষ্টি না হলে উত্তম। যেহেতু আঙ্গুর ফল জুন মাসে পাকে তাই বৃষ্টি কোন সমস্যা নয়। তবে আগাম বৃষ্টি হলে গাছের গোড়ায় পানি না জমে এবং শীলা বৃষ্টি ক্ষতি করতে না পারে সেদিকে খেয়াল রাখলেই যথেষ্ট।

আঙ্গুরের জাত হিসেবে আরডিএ-৮, আরডিএ-৯ থেকে যথাক্রমে ৪.৪০ এবং ৩.৬০ কেজি আঙ্গুর উৎপন্ন হয়েছে। পক্ষান্তরে আরডিএ-১, আরডিএ-১০ জাত থেকে গাছ প্রতি যথাক্রমে ৫১০ এবং ২৫০ গ্রাম আঙ্গুর পাওয়া গেছে। আরডিএ-১, আরডিএ-৫, আরডিএ-৭, আরডিএ-৮, আরডিএ-৯ এবং আরডিএ-১০ জাতে চিনির পরিমাণ যথাক্রমে ১৯-২০%, ১২-১৪%, ১৭-১৮%, ১৮-১৯%, ১২-১৩% ও ১৮-১৯%। গাছ প্রতি উৎপাদনের পরিমাণ ও মিষ্টতার পরিমাপ বিবেচনায় আরডিএ-১ এবং আরডিএ-৮ আঙ্গুরকে জাত হিসেবে স্বীকৃতি দেয়া যায়।

বাংলাদেশে আঙ্গুরের চাষ তেমন একটা হয় না বলেই এটি একটি দুর্লভ ফল। এই ফলটি আবহমান কাল ধরে বিদেশ থেকে বাংলাদেশে আমদানী করা হয়ে থাকে। এই সুস্বাদু ফলটি উচ্চ মূল্যের কারণে সাধারণ মানুষের ধরা ছোঁয়ার বাইরে থাকে। যদি বাংলাদেশী আবহাওয়ায় উচ্চ ফলনশীল মিষ্টি জাত হিসেবে আরডিএ-১ এবং আরডিএ-৮ কে আবাদ করা যায় তবে অনেক বৈদেশীক মুদ্রার আমদানী মূল্য সাশ্রয় হবে এবং সাধারণ মানুষ আত্মকর্মসংস্থানের পথ খুঁজে পাবে।

আঙ্গুর উৎপাদন প্রযুক্তি

১। আঙ্গুরগাছ রৌদ্রময়, আলোবাতাস খেলে ভাল, বৃষ্টিরপানি দাড়ায় না এমন স্থানে রোপণ করতে হবে।

২। প্রতি বৎসর জানুয়ারী মাসের শেষ সপ্তাহে আঙ্গুর গাছ প্রুনিং করে দিতে হবে।

৩। প্রতি বৎসর ডিসেম্বর মাসের প্রথম সপ্তাহে গাছের গোড়ার মাটি আলগা করে পরিমাণমত জৈব ও রাসায়নিক সার প্রয়োগ করতে হবে।

৪। মাটির পিএইচ ৬.৫ এর নীচে হলে অম্লতা কমানোর জন্যে প্রতিবছর প্রতি গাছে কমপক্ষে আধা কেজি চূণ প্রয়োগ করতে হবে।

৫। রোপনের পর গাছ মাচায় না উঠা পর্যন্ত বাড়তে দিতে হবে এবং কোন পার্শ্ব শাখা রাখা যাবে না।

৬। প্রধান মাথাটি মাচায় উঠার পর পরই উহার মাথা ভেঙ্গে দিতে হবে যাতে আলোচ্য শাখার দু'দিক হতে দু'টি করে চারটি কুশি বের হতে পারে। অতঃপর চারটি কুশি ৫০ সেঃ মিঃ লম্বা হবার পর পুনরায় মাথা ভেঙ্গে দিতে হবে যাতে চারটি কুশি থেকে ১৬টি কুশি পাওয়া যায়।

৭। আঙ্গুর গাছ দীর্ঘ স্থায়ী (৪০-৮০ বৎসর) বিবেচনায় রেখে লোহা বা সিমেন্টের খুঁটীর সাহায্যে তার দিয়ে মাচা তৈরী করাই উত্তম।

৮। আঙ্গুর চাষে বেলে দোঁ-আঁশ ও দোঁ-আঁশ মাটি উত্তম।

৯। এদেশে আঙ্গুর গাছ রোপনের উপযুক্ত সময় মার্চ ও এপ্রিল মাস।

১০। আঙ্গুরের দু'টি জাতের মধ্যে জাক্কাউ জাত বৎসরে দু'বার ফলন দেয় এবং ব্লাকরুবী জাত বৎসরে এক বার ফলন দেয়। শেষের জাতটি গাঢ় লালচে লাল।

১১। আঙ্গুর ১০০-১২০ দিনে পাকে। পাকার সময় ভরা রৌদ্র এবং তাপমাত্রা বেশী থাকলে আঙ্গুর দ্রুত মিষ্টি হয়।

১২। ফুল হতে ৮০-৯০ দিনের মধ্যে সবুজ অবস্থায় আঙ্গুর স্পঞ্জের ন্যায় নরম হয়ে যায়। এটা কোন অবস্থাতেই পাকার সময় নয় বরং অম্লতার শেষ সীমানা।

১৩। সাধারণতঃ ৮০ দিন হ'তে ১২০ দিনের মধ্যে আঙ্গুরে চিনির পরিমাণ বাড়তে থাকে এবং আঙ্গুরের উপরের বর্ণ বাদামী রং ধারণ করবে এবং মিষ্টি হবে।

১৪। আঙ্গুর গাছে থাকা অবস্থায় হাত দ্বারা স্পর্শ করা উচিত নয় কারণ আঙ্গুরের উপরের পাউডার নষ্ট হয়ে গেলে আঙ্গুরের বাজার দর কমে যায়।

১৫। ফুল দেখা যাবার পর যে কোন ধরণের কীটনাশক ব্যবহার নিষেধ কারণ ফুল কালো হয়ে ঝড়ে যাবে।

১৬। জানুয়ারী ও ফেব্রুয়ারী মাসে ১৫ দিনে একবার এবং গরম বাড়ার সাথে সাথে ১০ দিন অন্তর অন্তর অথবা সপ্তাহে একবার গাছের গোড়ায় সেচ দিতে হবে যতদিনে গাছে ফুল দেখা না যায়। বৃষ্টির শুরুতে সেচের প্রয়োজন নেই।

১৭। ফল পাকার প্রায় এক মাস আগে গাছ প্রতি ১০০ গ্রাম পটাশিয়াম সালফেট সার গাছের গোড়ায় অথবা ৫০ গ্রাম পানির সাথে মিশিয়ে গাছে স্প্রে করলে তা আঙ্গুরের মিষ্টতা বাড়াতে সহায়তা করবে।

১৮। ফুল হতে আঙ্গুর যখন বড় হতে থাকবে তখন ফলগুচ্ছ হতে ক্রমান্বয়ে রোগাক্রান্ত, ছোট, বিকৃত আঙ্গুর দানা বাছাই করে দিতে হবে যাতে আঙ্গুরের আকৃতি সঠিক থাকে।

১৯। আঙ্গুর যখন মুগডালের মত আকার হবে তখন ১০০ পিপিএম জিববরেলিক এসিড (হরমোন) দিয়ে ট্রিট করলে আঙ্গুর বড় ও মিষ্টি হবে।

২০। আঙ্গুর পাকার সময় বৃষ্টির পানি যাতে আঙ্গুরের গায়ে না লাগে সেজন্য মাচার উপর অথবা আঙ্গুরের থোকার উপর পলিথিন কাগজ দ্বারা মুড়িয়ে দিতে হবে যাতে শীলা বৃষ্টি বা অন্য কোন কারণে আঙ্গুরের ক্ষতি না হয়।

সারণী-১ঃ আঙ্গুরের বিভিন্ন জাত এবং ২০০৩ সালে জাতের ফলন ও মিষ্টতা পরীক্ষা

জাত (এলাকার নামানুসারে)	রোপণের তারিখ	ফলন(কেজি/গাছ)	বৃক্ষ ভেল্যু (মিষ্টতার মাত্রা %)
১। ডেমাজানী	১৭.০৬.২০০০	৩.৪০০	১৪-১৫
২। জাক্কাউ	১৭.০৬.২০০০	৩.৬০০	১৫-১৬
৩। কেশবপুরী	১৭.০৬.২০০০	৫.০৫০	১৮-১৯
৪। ব্লাকরুবী	১৭.০৬.২০০০	৩.১০০	১৫-১৭
৫। মোল্লাহাটী	১৭.০৬.২০০০	৩.৪০০	১৫-১৬
৬। পদ্মবিলা	০৬.০৭.২০০০	৩.৬০০	১৪-১৭
৭। নবাবগঞ্জী	২১.০৭.২০০০	৪.৯০০	১৫-১৬
৮। দিনাজপুরী	৫.১০.২০০০	৩.৭০০	১৫-১৭
৯। মাঝিড়া	১৯.০৬.২০০২	-	-
১০। ঐশ্বর্য	০৪.০৮.২০০২	-	-
১১। ক্যালমেরিয়া	২৩.০৫.২০০২	-	-
১২। লালপুর	২৫.১২.২০০২	-	-
১৩। বাংলাবান্দ	০২.০৬.২০০৩	-	-
১৪। আরডিএ বীজের জাত	২৫.১২.২০০২	-	-

বিঃদ্রঃ বাংলাদেশের বিভিন্ন স্থান থেকে আঙ্গুরের বিভিন্ন জাত সংগ্রহ করা হয়েছে যা সংগৃহীত বিভিন্ন এলাকার নাম দিয়ে বুঝানো হয়েছে। বিভিন্ন জাত সংগ্রহ করা হলেও মূলতঃ ২টি জাত (জাক্কাউ ও ব্লাকরুবী) সর্বত্র ছড়িয়ে ছিটিয়ে ছিল যা গবেষণায় বেড়িয়ে এসেছে।

সারণী -২ঃ আঙ্গুরের বিভিন্ন জাত এবং ২০০৭ সালে তিনটি জাতের ফলন ও মিষ্টতা পরীক্ষা

জাত	রোপণের তারিখ	ফলন (গ্রাম/গাছ)	বৃক্ষ ভেল্যু (মিষ্টতার মাত্রা %)
আরডিএ-১	২৪-২৭ মে, ২০০৪	২৫০	১৯-২০
আরডিএ-২	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৩	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৪	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৫	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৬	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৭	২৪-২৭ মে, ২০০৪	-	-
আরডিএ-৮	২৪-২৭ মে, ২০০৪	২২৩০	১৬-১৮
আরডিএ-৯	২৪-২৭ মে, ২০০৪	২৫৫০	১২-১৩
আরডিএ-১০ (আরডিএ বীজের জাত)	২৪-২৭ মে, ২০০৪	-	-
বাজার থেকে সংগৃহীত জাত (অষ্ট্রেলিয়ান জাত)	-	-	২১-২৩

সারণী-৩ঃ আঙ্গুরের বিভিন্ন জাত এবং ২০০৮ সালে পাঁচটি জাতের ফলন ও মিষ্টতা পরীক্ষা

জাত	কুঁড়ি গজানোর সময়	ফলন (গ্রাম/গাছ)	বৃক্ষ ভেল্যু (মিষ্টতার মাত্রা %)
আরডিএ-১	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	৪০০	২০-২১
আরডিএ-২	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ২য় সপ্তাহ	-	-
আরডিএ-৩	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	-	-
আরডিএ-৪	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ৩য় সপ্তাহ	-	-
আরডিএ-৫	মার্চের ১ম-২য় সপ্তাহ	১৮০	১২-১৪
আরডিএ-৬	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	-	-
আরডিএ-৭	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	২৪০	১৪-১৮
আরডিএ-৮	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	২২৭০	১৮-১৯
আরডিএ-৯	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ২য় সপ্তাহ	৩৫০০	১২-১৪
আরডিএ-১০ (আরডিএ বীজের জাত)	ফেব্রুয়ারী ৪র্থ সপ্তাহ থেকে মার্চের ১ম সপ্তাহ	-	-
বাজার থেকে সংগৃহীত জাত (অষ্ট্রেলিয়ান জাত)	-	-	২১-২৩

সারণী-৪ঃ আঙ্গুরের বিভিন্ন জাত এবং ২০০৯ সালে ছয়টি জাতের ফলন ও মিষ্টতা পরীক্ষা

জাত	ফুল ফোঁটার সময়	পাকার সময়	ফলন (গ্রাম/গাছ)	বৃক্ষ ভেল্যু (মিষ্টতার মাত্রা %)
আরডিএ-১	মার্চের ২য় সপ্তাহ	জুনের ২য় সপ্তাহ	৫১০	১৯-২০
আরডিএ-২	-	-	-	-
আরডিএ-৩	-	-	-	-
আরডিএ-৪	-	-	-	-
আরডিএ-৫	মার্চের ২য় সপ্তাহ	জুনের ২য় সপ্তাহ	৫০	১২-১৪
আরডিএ-৬	-	-	-	-
আরডিএ-৭	মার্চের ২য় সপ্তাহ	জুনের ২য় সপ্তাহ	২০০	১৭-১৮
আরডিএ-৮	মার্চের ২য় সপ্তাহ	জুনের ২য় সপ্তাহ	৪৪০০	১৮-১৯
আরডিএ-৯	মার্চের ৩য় সপ্তাহ	জুনের ২য় সপ্তাহ	৩৬০০	১২-১৩
আরডিএ-১০ (আরডিএ বীজের জাত)	মার্চের ২য় সপ্তাহ	জুনের ২য় সপ্তাহ	২৫০	১৮-১৯
বাজার থেকে সংগৃহীত জাত (ইন্ডিয়ান জাত)	-		-	২০-২১

গ্রন্থপঞ্জী

চট্টোপাধ্যায়, তরুণ কুমার; মজুমদার, বিভাষ চন্দ্র; এবং নন্দী, অলোক। (১৯৮৪০)। বিজ্ঞান ভিত্তিক ফলের চাষ। সেন্ট্রাল বুক পাবলিশার্স, ৮/১ চিন্তামণি দাস লেন, কলিকাতা ৭০০০০৯। পৃষ্ঠা ১৬৮।

নূরুজ্জামান, এম। (১৯৯৪)। আঙ্গুর উৎপাদন প্রযুক্তি। ১০৭/৪, মোবারক শাহ রোড, নারায়ণগঞ্জ।

পঞ্চম পঞ্চবার্ষিক পরিকল্পনা (১৯৯৭-২০০২)। (১৯৯৮)। পরিকল্পনা কমিশন, পরিকল্পনা মন্ত্রণালয়, গণপ্রজাতন্ত্রী বাংলাদেশ সরকার, ঢাকা। (চ্যাপটার ১৩, সেকশন ১৩.৪.৭, পৃষ্ঠা নং ২২০।)

রবিনসন, জেনিকস্। (১৯৮৬)। ভাইনস্, গ্রেপস এন্ড ওয়াইন্। আলফ্রেড এ নফ। নিউ ইয়র্ক।

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