

Exploring the Opportunities and Constraints of Rural Livelihood: A Case Study of Small Farmers Engaged in Rice Cultivation in India

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ABSTRACT

Agriculture is a primary source of livelihood for more than 75% of the Assam's population in Northeast India, however 98.9% of farmers belong to the category less than 1 to 2 hectares of land per family in Dibrugarh district of Assam.

This research aims at improving livelihood of these farmers through exploring the opportunities and constraints of their resources.

The study conducted 250 personal interviews with heads of households of small farmers cultivating rice (the staple food crop) who were chosen by the method of purposive sampling among three villages of Dibrugarh district. The data were collected by personal schedule along with observation, and descriptive statistics were used for data analysis.

The results revealed that the main constraints were: irrigation and drainage problems, small size of the agricultural land, lack access to the inputs of production, low productivity, high loss of production, lack of access to finance, lack of practical skills training for modern agriculture and marketing, lack of social organisations. However the key opportunities were: depending on rainfed agriculture, high fertility of the soil, diversification of family income, high demand of the rice in the market, low illiteracy rate, forming a cooperative association and the homogeneity of population, which represents their strong cultural bond.

The study concluded some recommendations: offering training and consulting services by the Agricultural Extension agency, establishing a good infrastructure and facilitating soft loans for agriculture and small business.

Keywords: Case Study, Northeast India, Rice Crop, Rural livelihood, Small Farmers

INTRODUCTION

Agriculture is primary source of livelihood in India; it specifically supports more than 75 per cent of the Assam's population within the Northeast India, and provides employment to quite 53 per cent of its total workforce, consistent with Assam Economic Survey, 2015-16. The agricultural sector of Assam is dominated by rice crop; it accounts quite 90 per cent of the entire food crops area (Sharma B.K., Sharma H.K., 2015).

Considering the importance of agriculture within the economy of Assam and rice as staple crop, top most priority has to give to farmers, especially the majority of these farmers are marginal and small holders of the farmland; whereas 92.84 per cent of farmers belong to the category (less than 1 to 2 Hectares/ 7.5-15 Bighas) of land per family (Agricultural Census of Assam, 2011). Furthermore, this percentage has increased to 98.9 per cent of farmers in Dibrugarh district of Assam (Assam Human Development Report, 2014). Despite the very fact that agriculture is their primary source of livelihood, small farmers have little access to production resources particularly technology and techniques which make them a really vulnerable group to climate change including flood, pest and insect attack, and drought, and what makes matter worse, once they rely on rainfed agriculture. On other hand, farming for them is grinding physical work, largely supported by their family, with each new generation being pushed into increasingly smaller plots of land.

It is supposed that when the small farmers are empowered to access to the crucial production resources, the rice productivity of these small farmers can also be increased, hence that increases their contributions to diverse their households' livelihoods and obviously to reduce their hunger and poverty within the society.

In this Article we aim at defining the rural livelihood resources of small farmers cultivating rice that can help to explore the key opportunities to be equipped for developing better quality of small farmers' livelihood, also as their capabilities to cope with any constraints which may derail successful options for improving their livelihood resources.

The definition of Rural Livelihood: The concept of rural livelihood consists of two terms; firstly, rural which has no standard international definition, however we can find a definition of what rural is as simple as what is specified by Census of India 'all area aside from urban, the essential unit for rural areas is that the revenue village' (Census of India, 2011) or a definition as conducted by The Food and Agricultural

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Organisation of the United Nations (FAO, 2018), which is more complicated with counting on the idea of three common dimensions: scattered settlement, land cover and use and remoteness from urban areas. Besides, the study of rural areas is comprehensive, including social, economic and environment aspects of people's life in those places (rural people). The social dimension is concerned with households as users of social services such as health and education. The economic dimension covers agricultural production, markets, and farm and non-farm income. Finally, the environmental dimension addresses the utilisation of the natural resources of land and water.

Secondly, livelihood is defined as 'the means of gaining a living' (Cambers, 1995) or described as 'a combination of the resources used and the activities undertaken in order to live' (Scoones, 2009).

Therefore rural livelihood as a perspective, it has been the core of rural development thinking and practice to alleviate poverty.

Livelihood Resources: Livelihood resources comprise the variability of livelihood capitals. *Human capital*: 'may be a combination of education, skills, ability to labor and good health; *natural capital* consists of soil, water, air, genetic resources; *physical capital*: is an asset that helps to turn staple into finished products and/or services; *Social capital* plays a serious role in productivity of an individual, organisation and community' (Ellis 2000); and *financial capital* 'the capital base (cash, credit, savings, and other economic assets, including basic infrastructure and production equipment and technology) which are essential for the pursuit of any livelihood strategy' (Scoones 1998).

Diversification of Rural livelihood: Diversification is related to efforts made by an individual or a household to come up with possible ways of survival to increase income and to withstand shocks (e.g. disaster and disease outbreaks) (Khatun; Roy 2012), (Datta, 2005).

According to The World Bank report for agricultural and development 'most rural households are engaged in farm activities, however non- farm activities frequently play a significant role in livelihood of small farmers' households, furthermore millions of rural people worldwide have enabled to leapfrog from poverty through better incomes and employment in rural non-farm enterprises and hence contributed to better livelihood' (The World Bank Report, 2008).

Strengthening of Rural Livelihood for Small Farmers: In this context the world development report has taken note of the fact that income diversification is a key to rural development, poverty reduction, and food security and the same applied to India as well (Pingali, et al., 2019). Especially the fragmentation of farm land

limits farm families to secure income from farming alone, and the other challenge is to revitalise the rainfed agriculture of these small farm holdings. In this concern, the recent policy of government of India has announced for the strategy on "doubling farmers' income" by year 2022 (Gupta, 2017), which includes sources of income growth through improvement in crop and livestock productivities; resources use efficiency or savings in the cost of production; increase in the cropping intensity; diversification towards high value crops; improvement in real prices received by farmers; and shift from farm to non-farm occupations (National Informatics Center, 2020).

Findings of some studies indicates that farmers involved in non-farm livelihood activities are more efficient in fulfilling their families' basic needs, are more able to endure shocks and have more sustainable livelihood than those who rely on farming only for their living (Eshetu, et al., 2017).

Regarding previous studies in the context of objective of the current research, (exploring constraints and opportunities of rural livelihood of small farmers engaged in rice cultivation), we have found that the principle constraints faced by small farmers and rural households in maintaining livelihood have been discussed by Malangmei L. (2015), et al., Khatun, Roy (2012), Saha B., Bahal R. (2010) and Joshi, et al. (2006) included: Lack of improved technology and skills, lack of business start-up budget, absence of wide market for the non-farm output, lack of credit facilities, lack of awareness and training facilities, lack of rural infrastructure, lack of opportunities in non-farm sector, the non-availability of good quality seeds, absence of appropriate market. On the other hand, the new opportunities in order to improve their livelihoods, have been suggested by Choudhary A.K, Suri V.K. (2018), Desai R.M., Joshi S. (2014) and Yoganad B., Gebremedhim T. (2006) that comprised adopting of System of Rice Intensification (SRI) using short-duration, rice-hybrids under participator-mode-technology-transfer programme, which can enhance rice productivity, thus gaining higher net income by 29.4 % and profitability to transform rural livelihoods, and applying the participatory watershed management which could be a viable strategy to rural development for achieving sustainable rural livelihoods. Moreover, rural producer associations are considered a potential community-driven solution to the problems of smallholder agriculture such as providing: training, information, risk mitigation, accessibility to inputs, market linkage and increasing non-farm income.

MATERIAL AND METHODS

We used various tools for information assimilation from three different villages; **Primary Data:** The major

data, that are, come through primary sources with the help of personal schedule. Individual interviews with physical observations are conducted with 250 heads of households who are dependent upon cultivating rice for their living, while these farmers are holders of a small size of agricultural land (1 hectare or less to 2 hectares, or as per the local unit 7.5 Bighas or less to 15 Bighas) within the villages of *Kamar Gaon, Hat Kata Konwar Gaon, and Dighala Gaon* in *Dibrugarh District of Assam* in Northeast *India* during September 2019–August 2020.

Description of Socio-economic Status of Sample of the Study:

1. Household Composition:

Table 1 represents the household composition of the respondents: The highest number 94 (37.6%) of respondents live with their wives, children, single parent and siblings, and the second highest number 91 (36.4%) of them live with their wives, children, grandchildren.

2. Type of Family:

Table 1. Household Composition

Sl. No.	Household Composition	Villages		Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
				Nos.	%.	Nos.	%	Nos.	%	Nos.	%
1.	Husband and Wife	2	4.1	1	1.2	6	5.1	9	3.6		
2.	Husband, Wife and Children	1	2.0	23	27.7	32	27.1	56	22.4		
3.	Husband, Wife, Children, Single Parent and siblings	18	36.7	35	38.5	38	41.7	91	36.4		
4.	Husband, Wife, Children and Grandchildren	28	57.1	24	25.5	42	44.7	94	37.6		
Total		49	100	83	100	118	100	250	100		

Source: Field Study

Table 2. Type of Family

Sl. No.	Type	Village	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total		
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	
1.	Nuclear Family	3	6.1	24	28.9	38	32.2	56	26		
2.	Joint Family	46	93.9	59	71.1	80	67.8	185	74		
Total		49	100	83	100	118	100	250	100		

Source: Field Study

Table3. Household Size

Sl. No.	Household Size	Village		Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
				Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	1- 4	8	14.3	41	49.4	60	50.8	109	43.6		
2.	5- 9	28	57.1	40	48.2	56	47.5	124	49.6		
3.	10- 14	13	26.5	2	2.4	2	1.7	17	6.8		
Total		49	100	83	100	118	100	250	100		

Source: Field Study

Table 2 shows that majority 185 (74%) of the respondents live in joint families which meet the demand of required numbers of agricultural labourers.

3. Household Size:

Table 3 illustrates that in the 124 (49.6%) respondents' families, the size of the family was in the middle category 5-9, which holds the highest number of families among all size.

4. Family Caste:

Families are divided into two castes: "Other Backward Class" (OBC) and Scheduled Castes (SCs). OBC is a governmental classification of castes that are educationally or socially deprived, while SCs are that the government of India is enjoined to ensure their social and educational development.

Table 4 shows the cast status of the respondents. The majority of them, is that, 227 (90.8%) found as OBC, while only 23 (9.2%) found as SC.

4. Family Caste

Caste	Villages	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1. OBC		49	100	66	79.5	112	94.9	227	90.8
2. SC		0	0.0	17	20.5	6	5.1	23	9.2
Total		49	100	83	100	118	100	250	100

Source: Field Study

5. Sex of Head of Household:

Table 5 shows that the male headed households represent 195 (78%) of the total families, while the female headed households represent 55 (22 %) of total families.

6. Age of Head of Household:

Table 6 reflects that the highest number 102 (40.8%) of respondents belongs to the age group above 60 years, and the second highest number 68 (27.2%) of respondents belongs to the age group of 41- 50 years.

7. Number of Children:

Table 7 shows that majority 202 (80.8%) of the respondents have one-two (1- 2) children.

8. Sex of Children:

Table 8 shows that 329 (73.3%) of respondents' children are male the rest 26.7 percent are female.

9. Distribution of Children's Age:

Table 9 shows the highest number 147 (32.7%) of respondents' children belongs to the age group of above 30 years. The second highest number of respondents' children, is that, 137 (30.5%) belongs to the age group of 21- 30 years.

10. Number of Dependents among the Family:

Dependency ratio relates the numbers of children (0-14 years old) and older persons (65 years or over) to the working-age population (15- 64 years old) (Kleiman, 1967).

Table 10 shows that families have no dependent members represent 73 (29.2%) of 250 families, however the highest number 119 (47.6%) of total 250 families have 1-2 dependents and the second highest number 36 (14.4%) of the families economically look after of 3-4 dependents.

Table: 5. Sex of Head of Household

Sl. No.	village Sex	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	Male	34	69.4	67	80.7	94	79.7	195	78
2.	Female	15	30.6	16	19.3	24	20.3	55	22
	Total	49	100	83	100	118	100	250	100

Source: Field Study

Table 6. Age Distribution of Head of Household per Years

Sl. No.	Villages Age Group	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	30 – 40	3	6.1	9	10.8	2	1.7	14	5.6
2.	41 – 50	10	20.4	24	28.9	34	28.8	68	27.2
3.	51 – 60	17	34.7	19	22.9	30	25.4	66	26.4
4.	Above 60	19	38.8	31	37.3	52	44.1	102	40.8
	Total	49	100	83	100	118	100	250	100

Source: Field Study

Table: 7. Numbers of Children

Sl. No.	Villages Children Nos.	Dighala Gaon		Hat Kat Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	0	3	6.1	4	4.8	8	6.8	5	60
2.	1- 2	37	75.5	69	83.2	96	81.3	202	80.8
3.	3- 4	8	16.3	8	9.6	12	10.2	28	11.2
4.	5- 6	1	2.1	2	2.4	2	1.7	5	2.0
	Total	49	100	83	100	118	100	250	100

Source: Field Study

Table 8. Sex of Children

Sl. No.	Village Sex	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	Male	65	71.4	112	75.7	152	72.4	329	73.3
2.	Female	26	28.6	36	24.3	58	27.6	120	26.7
	Total	91	100.0	148	100.0	210	100.0	449	100.0

Source: Field Study

Table 9. Distribution of Children's Age per Years

Sl. No.	Villages Age Group per Years	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
		Nos.	%	Nos.	%	Nos.	%	Nos.	%
1.	Below1	0	0.0	1	0.7	0	0.0	1	0.2
2.	1 – 10	5	5.5	17	11.5	32	15.2	54	12.1
3.	11 – 20	17	18.7	37	25.0	56	26.7	110	24.5
4.	21 – 30	37	40.6	48	32.4	52	24.8	137	30.5
5.	Above 30	32	35.2	45	30.4	70	33.3	147	32.7
	Total	91	100	148	100	210	100	449	100

Source: Field Study

Table10. Numbers of Dependents among Families

The Number of Dependents per Family	Villages							
	Dighala Gaon		Hat Kata Konwar Gaon		Kamar Gaon		Total	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%
0	11	22.5	28	33.7	34	28.8	73	29.2
1-2	22	44.9	41	49.4	56	47.4	119	47.6
3-4	13	26.5	11	13.3	12	10.2	36	14.4
5- 6	3	6.1	3	3.6	16	13.6	22	8.8
Total	49	100	83	100	118	100	250	100

Source: Field Study

Secondary data: They were gathered through the governmental surveys such as National Sample Survey and Assam State Rural Livelihood Mission (ASRLM), which have been closely associated with the work and life of the rural small farmers.

Description of Villages of the Study: The three villages of Dibrugarh district in state of Assam are, as follows: 1) *Kamar Gaon* village is situated 4km away from Dibrugarh town, has a total geographical area of 242.24 hectares, which is a home for 3,437 of the population, they are consisted of 747 households; 2) *Hat Kata Konwar* village is situated 6km away from Dibrugarh town, has population of 1197 within total of 230 families residing; and *Dighala Gaon* village is situated 7km away from Dibrugarh town, has a total population of 548 within total of 101 households as per the Census of India 2011.

RESULTS AND DISCUSSION

Small Farmers' Rural Livelihood Resources

1. Human Capital

1.1 Educational Level:

Chart 1.1 illustrates that 54 per cent of the heads of households belong to the category of upper primary; they dropped out in successive higher levels of education, while education has a positive effect on choosing better livelihood, and household income (Tran, T.; Tran Q., et. al., 2020). Chart 1.1 also shows that 22 per cent of them belong to the category of college and above, 15 per cent of them belong to lower primary, 7 per cent of them obtained to higher secondary, and only 2 per cent of them are illiterate.

1.2 Occupational Breakup:

Farmer's occupations are divided into *Farm Labour*, *Off Farm Labour* and *Non Farm Labour*. It is worthwhile to highlight the difference between off farm and non-farm labor. Off farm labor includes those farmers who work on other farms (hired labourers), and non-farm labor is the activities, which generate non agricultural income such as governmental services or own business setting.

Chart 1.2 shows that 57 per cent of the household heads depend on farm labour as only source for their livelihood, 42 per cent of them are engaged in non-farm labour in addition to farming, and only 1 per cent is off farm labourers.

1.3 Skills and Experience of Agricultural Work:

All respondents to our schedule mainly consider their traditional skills of agricultural practices, which acquired by their parents, to be the only guideline for rice production process that starts with preparing land, preparing seeds, crop health management, crop nutrition management, harvesting and skills of storage and ends by post harvesting skills. We observed that these farmers have not adopted any modern agricultural practices. They have not been able to acquire neither technological information nor technical training of the

new skills, which supposed to offer by agricultural department of block office, agricultural extension service or the initiative of the local NGOs. Thus, small farmers of this study are lagging behind in the overall development of their livelihoods due to the absence of different skills such as: using rice transplanting seedling instead of traditional wet direct seeding that is preferable in order to get higher yields, and less weeding and pests (Japan International Cooperation Agency, 2015) ,as well as, applying water management whereas in the studied villages, rice is grown under rainfed agriculture condition; accordingly rice is planted only once a year and no other crops can replace rice. Therefore, water harvesting system is a key strategy for supplemental irrigation.

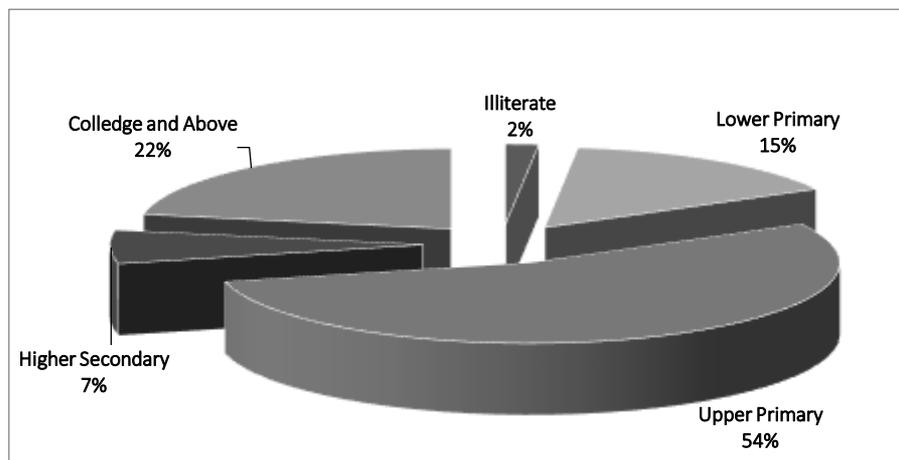


Chart: 1.1 Educational Levels of Household Heads

Source: Field Study Data

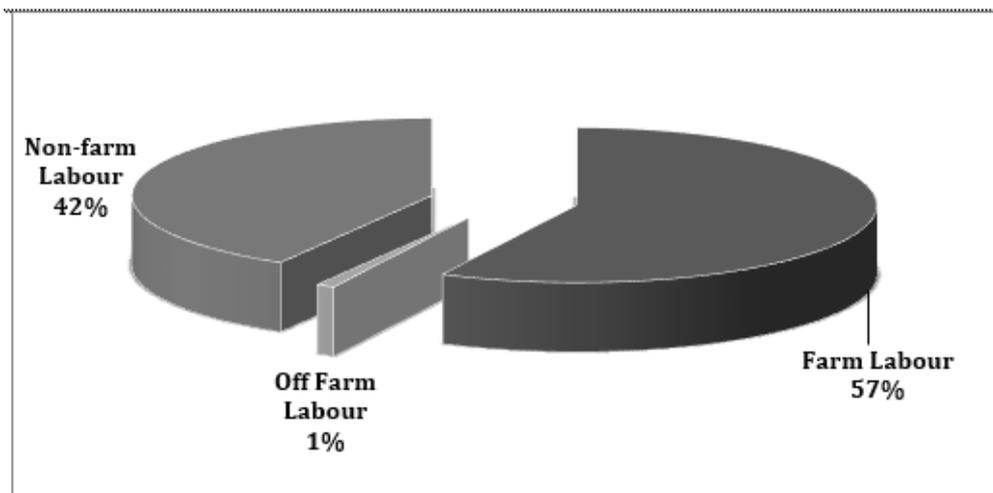


Chart: 1.2 Occupational Breakups of Household Heads

Source: Field Study Data

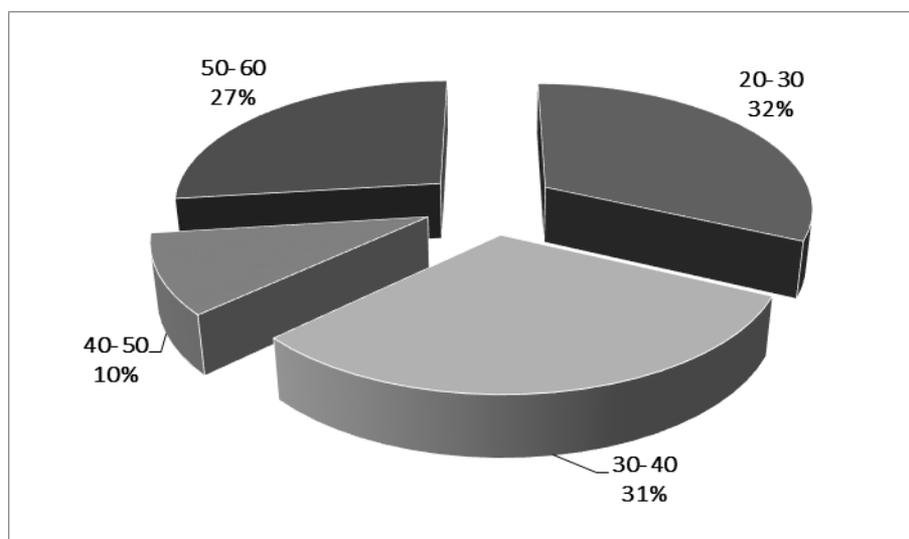


Chart: 1.3. Length of Agricultural Work Experience Of Household Heads (Per Year)

Source: Field Study Data

In term of agricultural work experience, **chart 1.3** clarifies that the household heads entirely gained considerable agricultural work experience; their experience ranged between 20 and 60 years, as they have been working in rice cultivation since childhood. Of the household heads 32 per cent belong to the category of 20- 30 years, 31 per cent of them belong to the category of 31- 40 years, 21 per cent of them belong to the category of 41- 50 years and 32 per cent of them belong to the category of 51- 60 years of agricultural work experience.

2. Social Capital

The studied villages have the presence of Self Help Groups (SHGs) as cooperative associations. Among the small farmers' households, there are 62.7 per cent of them have a membership in SHGs. These groups were constituted by Center for Community Development (CCD) and are primarily Homogenous Women Groups. The SHGs have been involved in activities such as *credit activities, develop market linkage, rice harvesting, setting small business, access to the rice production resources.*

Additionally, the villages also have some Community Based Organisations (CBOs), Village Development Committee (VDC) and Village Based Committees (VBC) like *Dibyajyoti Sangha, United Indigenous Council and Panchayat Institute.* These institutions are actively working in area of social welfare (sports and arts), blood donation, financial aid, sanitation hygiene aid and security service, however the most credible presence is of the SHGs, whereas only 6.8 percent among the respondents' families have a membership in community based organisations. Besides, the homogeneity of the population as the

majority (90.8%) of them belongs to OBC caste and Hinduism as well as same local language (Assamese) and cultural tradition and norms, especially in the way of organising their agricultural work in addition to the whole community of villages of the study principally participate in one economic activity (Rice Cultivation) that is, represents their strong cultural bond and consists their socio-cultural unite.

2.1 Gender Differences of Participation in Rice Farm Activities:

Chart 2.1 shows the contribution of men and women in farm activities of rice cultivating; the *decision making* of rice cultivation in terms of selecting the varieties, the perfect time for planting as well harvesting and marketing: 69 per cent of the men are the decision makers in their families, while 31 per cent women of the families participate in making decision, *land preparing* is totally (100%) performed by the men, *seed preparing* is performed by 58 per cent men and 42 per cent women of the families, *sowing seeds* is performed by 90 per cent men of the family while only 10 per cent women participate, the activities of *fertilising* and *weeding* are both performed by 80 per cent men and 20 per cent women of the families, *pests control* is totally (100%) perform by men of the families, *harvesting* is performed by 90 per cent of women and only 10 per cent of men including families members and agricultural labourers, the post harvesting activities including *selecting best seeds* for next cropping, *drying, winnowing, threshing* are performed by 44%, 44%, 10% and 60% of men respectively, while the same post harvesting activities are performed by 56%, 56%, 90% and 40% of women respectively, however the other post harvesting

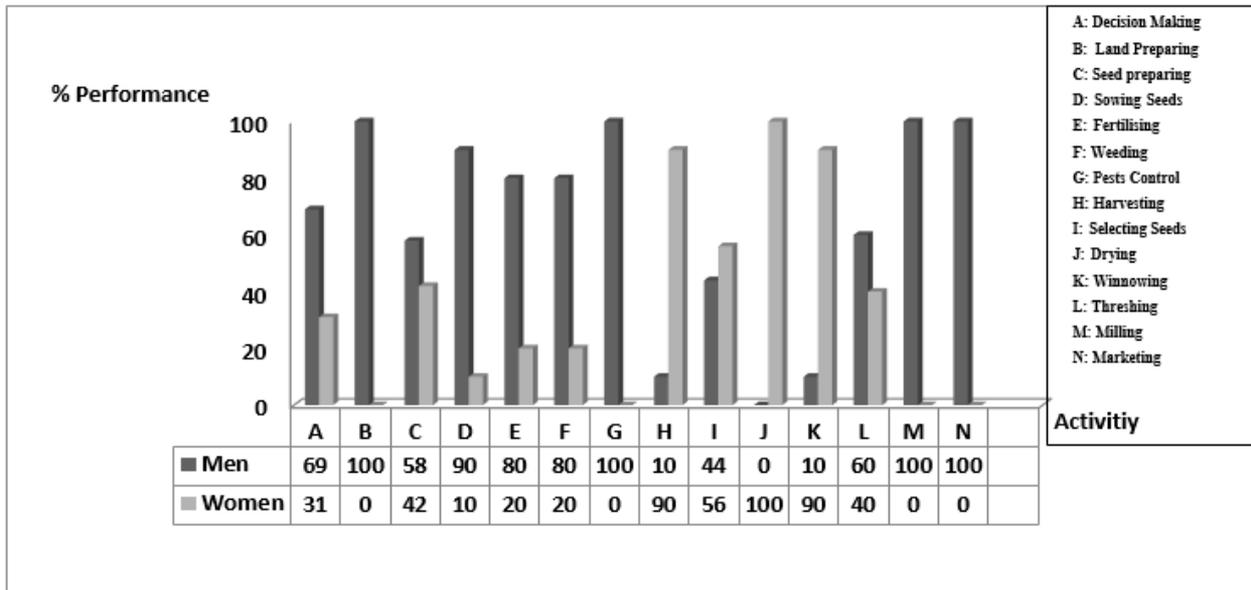


Chart: 2.1. Distribution of Participation of Gender in Rice Production Activities

Source: Field Study Data

activities such as *milling* and *marketing* are totally (100%) performed by men.

Basically, studying gender in the topic of rice cropping is essential for the planner of training programmes to consider the differences between sexes in specific culture (particularly in traditional rural community) such as norms in significant ways for gaining successful results from these programmes.

3. Natural Capital

Farmers depend on two main natural resources: *Agricultural Land* and *Water Resources*. The topography of the studies villages can be classified broadly into two land types: *Upland* and *Wet Land*. Both kinds of land totally plant relying on rainfall for irrigation water (Rainfed Agriculture).

The upland rainfed under rice crop is about 205 Bighas which accounts 14.7 per cent of total agricultural land, while the low/ wet land area is about 1,188.5 Bighas which accounts 85.3 per cent of total agricultural land. The average productivity of upland rice is less than that in low land rice, as it is estimated at 470 Kg/ Bigha and 600 Kg/ Bigha, respectively.

The studied region receives very heavy rainfall and rice is grown under rainfed condition, therefore rice is planted only once a year from May- July to September-December, and there is no other crops can replace rice.

4. Physical Capital

Rice production goes through a long process of activities that starts with land preparing to getting the

finished rice, edible product through threshing, drying, winnowing, storing and finally milling. The key observations during this study in terms of physical capital are as follows:

- 4.1 Land preparing: All farmers have to prepare their lands by using a tractor, which was designed to meet all the agricultural demands (like Ploughing, Leveling, and Weed Control) from two to four times in whole season. It costs 250 Rupees/ Bigha on average to hire a tractor;
- 4.2 Planting: Farmers successively select the best seeds of the crop for next cropping, whereas they cannot afford the improved seeds. As for the seeding, farmers perform it manually with helping of their families' members e.g. wives, children, and daughters in law;
- 4.3 Irrigation: Rice is grown under rainfall condition (non-irrigated/ rainfed agriculture), thus planting rice relies on rainfall as a source of irrigation;
- 4.4 Crop Nutrition: Only 10 per cent of the farmers can access to the fertiliser;
- 4.5 Crop Protection: 60 per cent farmers can afford pesticides for their crop protection against rice plant diseases and pests, which are available in the Agricultural Trading Shops in town. In spite of the high cost of the pesticides, which is (80- 250 Rupees/ 200 g), they mentioned it is not a big challenge because the crop is rarely infected. While 40 per cent of the farmers refrained from using the

pesticides, as they stated that the infection had been causing insignificant damage in the crop;

- 4.6 Harvesting: Rice harvesting is performed manually by using a sickle, which is a tool with a short handle and a curved blade, used for cutting grass and rice crops. Farmers rely on their families' members (wives, children, and daughters in law) for rice harvesting; in addition to the agricultural labor. Usually the agricultural labour consists of 5 men or 10 women for 150 Rupees/ day for every woman and 200-250 Rupees/ day for every man;
- 4.7 Threshing: Threshing is to separate the rice grain from the rest of cut crop. Traditional threshing tools such as threshing racks/ simple treadle threshers and animals for trampling are still used, however majority farmers (80%) perform threshing by a thresher machine; whereas (20%) of the farmers perform threshing manually with helping of their families' members e.g. wives, children, and daughters in law as well agricultural labourers (1-3 women for 150 Rupees/ day), while farmers who hire a thresher machine, it cost 7 Kg/ 10 Rupees or 10 Kg / 14 Rupees;
- 4.8 Drying: Drying is the most critical operation that reduces grain moisture content to a safe level for storage. Rice drying methods include traditional method "Sun Drying" and mechanical system. Sun drying is used by all farmers in the study villages because of its low cost and simple management;
- 4.9 Storage: Every family has its own storage at garden's home. It can be described as wooden raised floor granary store. This facility is designed in order to provide safe storage conditions for the

grains thus prevent grain loss caused by adverse weather, moisture, rodents (rats, mice, squirrels etc.), birds, insects and micro-organisms like fungi;

- 4.10 Winnowing: This method is used for separating grains from harmful materials and impurities. Winnowing is performed manually by using the traditional winnowing basket (sieve made of bamboo). It is usually practiced by wives and daughters in law or labourers for 7 Kg/ 10 Rupees;
- 4.11 Milling: Milling is a crucial step in post production of rice, as in this step rice milling machine removes the husk (the dry outer covering of rice seeds) and the bran (brown outer layer of rice kernel) layers and produces the edible, white rice. It costs 7 Kg/ 15 Rupees to hire a miller; and
- 4.12 Technical Consulting and Training Services: The accessibility to such service is limited, as shown in **chart 4.12** only 15 per cent of the farmers receive training through field visits which are offered by the governmental agronomists (experts who work at The Agricultural Department of Block Office, and act as the go-between for farmers and crop researchers). This agricultural extension service provided these farmers by the knowledge of making compost, which uses to fertilise their house garden for planting vegetables, and the skill of perfect usage of fertilisers and pesticides for rice growing, while 26 per cent of the farmers relied on the crop advisory at the agricultural trading shop, which is the place they buy their fertilisers and pesticides. However the majority 59 per cent of the farmers gained their farming experience from their parents.

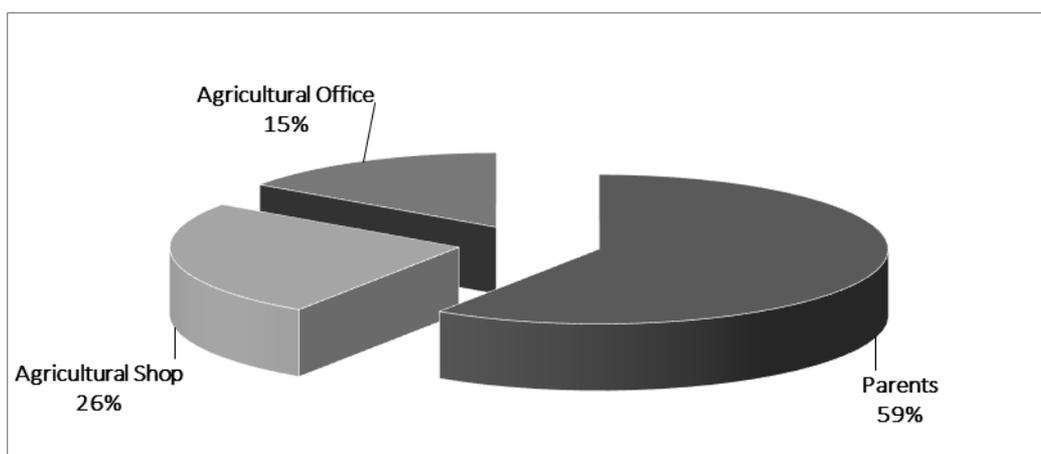


Chart: 4.12. Resource of Agronomic Information

Source: Field Study Data

5. Financial (Economic) Capital

5.1 Monthly Family Income:

Chart 5.1 clarifies that only 2 per cent of the respondents’ families belong to the high income category of above 50,000 Rupees, while 42 per cent of the respondents stated that their families’ income per month belongs to upper middle income group of (30,000- 50,000 Rupees), and 39 per cent of them belong to the middle income group of (10,000- 30,000 Rupees), in addition of 17 per cent of the families belong to the low income category of below 10,000 Rupees.

5.2 Accessibility to Financial Institutes:

The study reveals that 92 (36.8%) of the total respondents only have accessibility to financial Institutes: 59 (64%) of them deal with national banks and 33 (36%) of them deal with private financial companies.

Further, there are four domains of loans according to these respondents, as shown in **chart 5.2**: 36 (39%) of the farmers who are borrowing loans for agricultural purpose, and 35 (38%) of the farmers who are borrowing loans for housing purpose, 13 (14%) of the farmers who are borrowing loans for personal purpose, and 8 (9%) of the farmers who are borrowing loans for setting business.

5.3 Household Durable Appliances:

Households’ possession of durable appliances is as varied as shown in **table 5.3**. Group (A) consists of the consumer goods: 233 (93%) of farmers’ families have a *bicycle*, 160 (64%) of them have a *motorcycle* or a *scooter*, 140 (56%) families have a *refrigerator*, 77 (31%) families have a *personal car*, and 34 (14%) families have a *washing machine*; Group (B) represents *Television* as an entertainment good for 233 (94%) families, while last group (C) comprises farm machinery

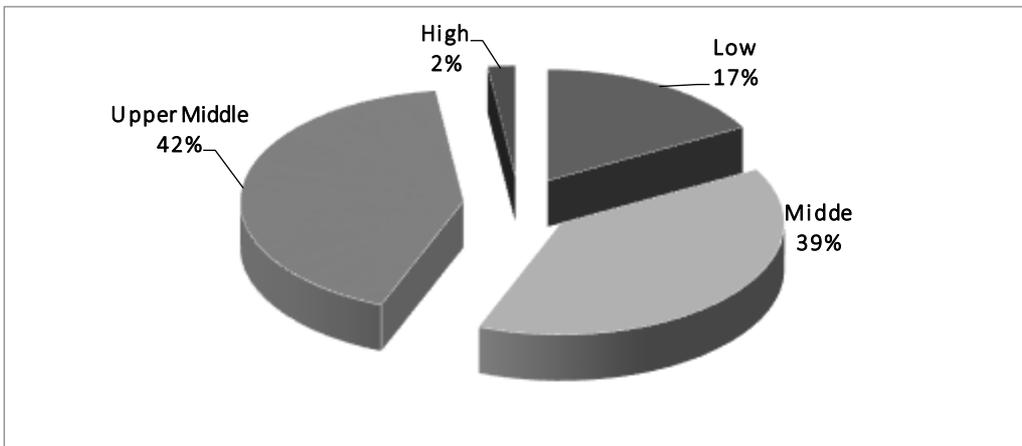


Chart: 5.1. Monthly Family Income per Rupees

Source: Field Study Data

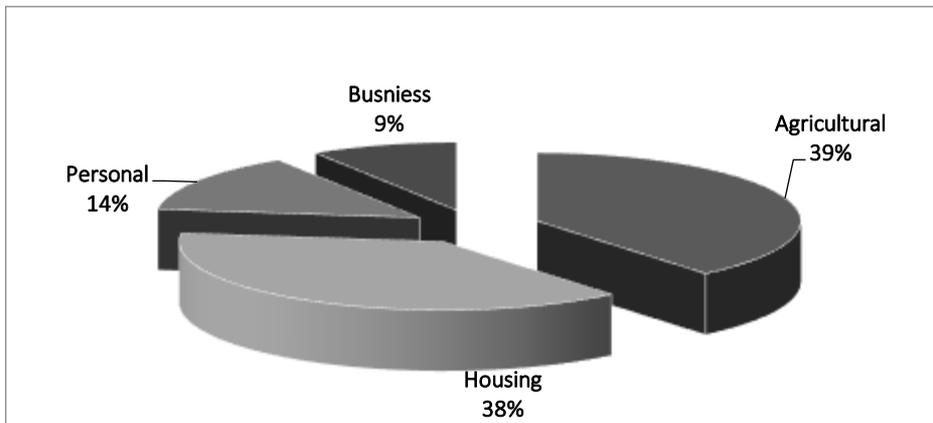


Chart: 5.2. Types of Borrowed Loans

Source: Field Study Data

Table 5.3 Household’s Durable Appliances

Sl. No.	A. Consumer Goods	Nos. 250=100%	%	B. Entertainment Good	Nos. 250=100%	%	C. Farm Machinery	Nos. 250=100%	%
1.	Bicycle	233	93%	Television	235	94%	Tractor	37	15%
2.	Motorcycle/Scooter	160	64%				Miller	27	11%
3.	Refrigerator	140	56%				Thresher	15	6%
4.	Car	77	31%						
5.	Washing Machine	34	14%						

Source: Field Study

as follows: Families who have a tractor account 37 (15%), and of 15 (6%) families have a thresher, and 27 (11%) farmers have a miller.

5.4 Farm Animals:

Most households in the rural areas raise farm animals to produce labour and commodities such as meat, eggs and milk. **Table 5.4** shows that 137 (55%) of the total families’ farmers own 199 cows, 158 (63%) of them own 232 pigs, 125 (50%) of them own 109 goats, 213 (85%) of them own 1,159 chicken, and 216 (86%) of them own 946 ducks.

5.5 Agricultural Land Size:

Most important economical factor for farmers’ livelihood is their Agricultural Land. Actually the total land of rice cultivation in the studied villages is 1,393.5 Bighas (approximately 186 Hectares), 1,059.5 (76%) of total cultivated land is owned, while 334 (24%) of them is rented land.

Chart 5.5 illustrates that farmers cultivating of (1- 4) Bighas (approximately 0.5 Hectare or less) account 43 per cent of the total farmers, farmers cultivating of (4- 8) Bighas (approximately 0.5 to 1 Hectare) account 42 per cent of them, farmers cultivating of (8- 12) Bighas (approximately 1- 1.5 Hectares) account 10 per cent of them, and farmers cultivating of (12- 16) Bigha (approximately 1.5- 2 Hectares) only account 5 per cent.

Table: 5.4 Distribution of Farm Animals

Farm Animals	Nos. of Animals	Nos. of Families	
		Nos. (250= 100%)	%
Cows	199	137	55 %
Pigs	232	158	63 %
Goats	109	125	50 %
Chicken	1,159	213	85 %
Ducks	946	216	86 %

Source: Field Study

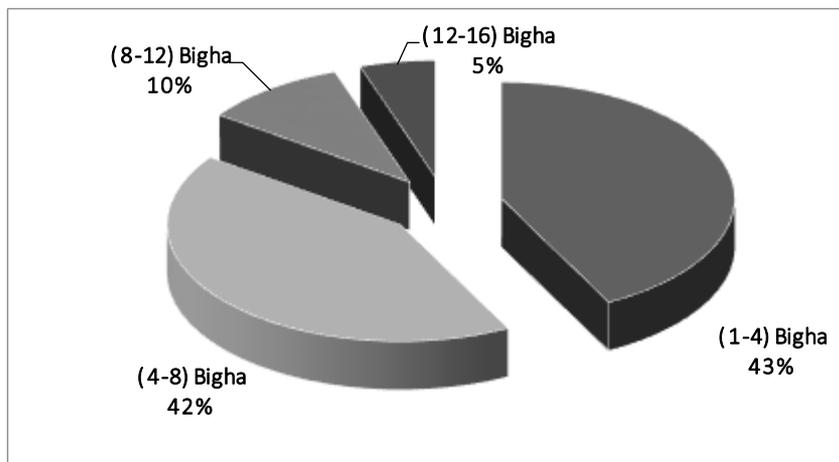


Chart: 5.5 Distribution of Farmers’ Holding of Cultivated Land

Source: Field Study Data

It worthy to mention that 97 per cent of the total farmers own their cultivated land, 12 per cent of these owners enlarge their cultivated land by hiring from other farmers. The rest of 3 per cent of the total farmers are landless, therefore they hire land for cultivating rice. Obviously, hiring cultivated land is considered as a mutual benefit, whereas the leaseholders take charge of cultivating the land (Off- Farm labor) then they leave to the owners (who actually face lack of agricultural laborers) a half of the total rice production as a rental cost.

5.6 Rice Production:

The study helped in obtaining information about the classification of rice crop's varieties according to the production as well size of cultivated land. It is represented in the **table 5.6** as follows: total rice production accounts 282,343 Kg. cultivated on total land of 1,393.5 Bighas. As for the productivity, variety of *Swagmoni* has the highest value 600 Kg/ 1 Bigha, the second highest value 550 Kg/ 1 Bigha belongs to the varieties of *Soymara*, *Lahi* and *Ranjit*, while the lowest value of the productivity 400 Kg/ 1 Bigha belongs to the varieties of *Borah*, *Joha*, *Hali* and *Bao*.

Further the **table 5.6** reveals that *Borah* is the highest value 71,808 Kg (25.4%) of the production, which cultivated on land of 217.5 Bighas (15.6%), while the second highest value 57,458 Kg (20.4%) of the production belongs to the variety of *Soymora*, which cultivated on 368.5 Bighas (26.4%), as well the third highest value 42,627 Kg (15.1%) of the production, which cultivated on 270.5 Bighas (19.4%). We can conclude that *Borah* is less than *Soymora* and *Lahi* in the average of productivity and cultivated land size, however it has the highest value of production and that means *Borah* is more resistant to pests and disease.

Table: 5.6 Rice Production

Sl. No.	Variety	Average of Productivity (quantity/ 1 Bigha)	Size Of Cultivated Land/ Bigha		Production/ Kg	
			Nos.	%	Nos.	%
1.	Borah	400	217.5	15.6%	71,808	25.4%
2.	Soymora	550	368.5	26.4%	57,458	20.4%
3.	Lahi	550	270.5	19.4%	42,627	15.1%
4.	Joha	400	130	9.3%	32,450	11.5%
5.	Mansoury	450	119	8.5%	20,120	7.1%
6.	Bore	500	87	6.2%	18,040	6.4%
7.	Hali	400	77.5	5.6%	13,890	4.9%
8.	Bao	400	54	3.9%	11,160	4%
9.	Swagmoni	600	56	4.1%	11,870	4.2%
10.	Ranjit	550	13.5	1%	2,920	1.0%
Total			1,393.5	100.0	282,343	100.0

Source: Field Study

5.7 Rice Marketing:

Given information of marketing by questioned farmers clarified that rice marketing cannot ensure income for their families, whereas basically they produce rice for their food security. Only 38 (15%) of the farmers has sufficient production for both their families' need and marketing. The quantity of rice for marketing accounts 15,529 Kg (5.5%) of the total production, the totally selling price accounts 621,160 Rupees (average price 40 Rupees/ 1Kg).

Rice varieties for marketing are *Borah*, *Lahi*, *Joha* and *Soymora*. Local traders are the only channel between farmers and market in the studied villages and they are responsible for transporting the marketing quantity of rice from the storage place at the farmers' houses to the market.

5.8 Rice by-product:

There are three main by-products: *Straw*, *Husk* and *Bran*. The farmers use straw as green manure in the field or use it for feed their animals. As for husk and brain, they sell 40-50% of both for 40 Rupees/ 12Kg and the rest uses for feeding their animals.

5.9 Crops in House Garden:

Farmers use their house garden for their families' food security. They plant varied types of fruit and vegetable crops, as well *Bamboo* trees which are used for building and renewing their houses or for selling on price of 80-100 Rupees/ Piece. It should be mentioned that growing vegetables relays on irrigation water through tube well and pumps. The farmers planting vegetables accounts 166 (66.4%) of the total farmers, of 159 (63.6%) farmers plant *Bamboo* trees, and 113 (45.2%) of them plant fruits.

CONCLUSIONS

As can be explicit from the respondents that there are a variety of constraints which can derail successful options for improving livelihood resources, as follows:

1. **Low Productivity:** It attributes to many reasons such as *poor access to good quality seeds, fertiliser, pesticide, agricultural extension services, financial institutes, agricultural machinery and agricultural labourers*.
2. **Relatively High Loss in Rice Production:** It causes by that the villages generally experiences heavy rainfall and severe flood. Especially, in the rainfed upland rice, rice crop deteriorates due to soil moisture stress as the result of unpredictable and inadequate rainfall, whereas rain water flows down quickly and farmers are not able to conserve the soil moisture. In addition of the problems of flash flood, there is water submergence in low lands due to poor drainage and high rainfall. Thus the crop gets setback either from flash floods, high rainfall or drought condition.
3. **Small Farm Size:** It is a major obstacle to rice marketing for two main reasons; first the size of small farm hinders farmers to produce for the market, the limited quantity of production is only sufficient for their families' food security, second economics of scale-larger farms pay less for their production inputs (resources) thus this low cost will offer the production in less selling price, which is preferable to local traders (who seek definitely to higher profit), therefore small holders farmers have fewer opportunities for marketing.

On the other hand, the study explored the key opportunities to be equipped for developing better quality of small farmers' livelihood resources, as follows:

1. In terms of *rice production resources*, it can be noted that the farmers performed some procedures (Cultural Control) for rice pests' proactive and preventive measures such as *synchronised cropping, planting early maturing variety, planting difference varieties of rice*, and they basically rely on rice straw as a green manure and animals materials as organic manure instead of the costly chemical fertilise;
2. As for *harvesting*, it should be done at the right time and the right way for maximising grain yield and minimising grain losses and quality deterioration; however, farmers face a critical problem of the lack of agricultural labour at the time of harvesting. In order to reduce frequency and severity of this problem, some farmers formed a

self help groups as a cooperative association for rice harvesting;

3. On the subject of livelihood diversification, we found that farmers' income varied between on farm, off farm and non-farm activities. That actually can be secure and sustain their livelihood;
4. Regarding marketing, rice crop is staple food, which consumes widely (High demanding commodity for mostly supplying quantity of the production), and the villages of study are situated closely 4-7 Km to Dibrugarh town, where the main market is located; in addition to fairly good rural road network;
5. Low illiteracy rate of parents and high rate of the educated children;
6. Depending on rain fall for water irrigation; and
7. The homogeneity of population, which represents their strong cultural bond.

Finally, it may be concluded some recommendations, which are as follows:

1. **Watershed Technology:** It uses in rainfed areas for an effective conservation of soil and water resources (Oweis; Wani, et al., 2009) thus for sustainable production. In other words, it gains some benefits of water storage for agriculture, control flood, eliminating soil erosion;
2. **Crop Rotation:** It uses with vegetables especially legumes which break disease build-up and weed problem of grass-type crops like rice, moreover, it helps in boosting soil organic matter (soil fertility) and recycling nutrients mostly nitrogen which is basic element of boosting quality and yield of the rice crop (JICA, 2015);
3. **Setting Irrigation and Drainage Infrastructure:** The uneven distribution of rainfall throughout the year has called for a developed irrigation infrastructure, whereas, excessive rainfall during the months of May to September causes heavy flood, water logging and damage of crop. On the other hand, too little rainfall in the winter season stands as a hindrance to cultivate rice over the year;
4. **Boosting Agricultural Extension Services:** For example; motivating and teaching the farmers for adopting seedlings instead of raw seeds and making Compost can double the production;
5. **Facilitating banking loans with low interest rate (Soft loans):** It can help the farmers to buy production resources and set small scale business;
6. Governmental farming subsidy could provide small farmers by the production resources needs such as good quality seeds and agricultural machinery; and
7. Developing producer associations could be a solution to overcome the problems of small size farm and lack of agricultural labour.

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الملخص العربي

بحث الفرص والقيود لسبل العيش الريفي: دراسة حالة لصغار مزارعين الأرز في الهند

مروة عبد العزيز محمد أحمد وبرنجال سرما

وكشفت النتائج عن أن أهم معوقات التي يواجهها المبحوثين شملت: انخفاض الإنتاجية، وارتفاع نسبة الفاقد من المحصول، وصعوبة الحصول على مدخلات الإنتاج؛ بينما كانت الفرص الأساسية لتنمية موارد سبل العيش لديهم: تنوع مصادر الدخل، اتباع إجراءات الثقافة الوقائية في الزراعة، وتشكيل مجموعات العمل الذاتية ذات الطابع التعاوني.

وقد خلصت الدراسة بعدة توصيات، وهي: توفير خدمات التدريب والاستشارات المقدمة من جهاز الإرشاد الزراعي، دعم وتمكين المزارعين من تسويق محصولهم، وتيسير قروض بنكية للزراعة والمشروعات الصغيرة. الكلمات المفتاحية: إقليم شمال شرق الهند، دراسة حالة، سبل العيش الريفي، صغار المزارعين، محصول الأرز.

يعتمد أكثر من ٧٥% من سكان ولاية آسام في شمال شرق الهند على الزراعة كمصدر رئيسي لسبل العيش خاصة محصول الأرز الذي يحتل القطاع الزراعي، في حين أن ينتمي ٩٨,٩% من المزارعين إلى فئة حيازة تتراوح من ١ إلى ٢ هكتار أرض زراعية لكل أسرة في مركز ديبروجار بولاية آسام.

ويهدف هذا البحث إلى تحسين سبل عيش هؤلاء الأغلبية من المزارعين من خلال دراسة الفرص والمعوقات التي تواجه تنمية مواردهم، وقد تمت هذه الدراسة من خلال إجراء المقابلة الشخصية والملاحظة مع ٢٥٠ رب أسرة الذي يعمل في زراعة الأرز وينتمي لفئة صغار المزارعين. وقد تم اختيار عينة عمدية ضمن ثلاث قري بمركز ديبروجار، وتم تحليل البيانات وصفا باستخدام النسب المئوية والتكرارات.