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ROLE OF CLIMATE RESILIENT AGRICULTURAL TECHNOLOGIES ON SOCIO-ECONOMIC STATUS OF FARMING COMMUNITY OF SALCHAPRA-I VILLAGE, CACHAR DISTRICT, ASSAM

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ABSTRACT

All total 84 households of NICRA village situated at *Salchapra-I* in Cachar district were selected at random (80% of the total households) with an objective to determine the change of socio-economic status of farming community, after the implementation of National Initiative on Climate Resilient Agriculture (NICRA) technologies. The primary data on socio-economic parameters were collected through benchmark survey in 2010 - 11. Based on the data collected, various possible and adaptable interventions to the prevailing climatic conditions were executed utilizing the available resources of the village and their effectiveness on farming practices were studied during 2011-12 and 2012-13. The study revealed that the farming community is highly adoptive to climate resilient agricultural technologies that being implemented. The benefit-cost analysis showed improvement for the major crops and livestock enterprises. It was improved for *Sali* rice (2.38), *Autumn* rice (*boro* and *ahu*) (2.15), potato (1.93), pulses (1.99) and poultry (4.05). The study also revealed the change in farming practices like adoption of new and flood tolerant varieties, high valued crops, improved poultry breeds, recommended packages of practices, *etc.*, with the intervention of the technologies showed significant influence on farming practices of the farming community which led to betterment of the socio-economic status of the villagers.

KEYWORDS: Socio-Economic Status, Cachar, Rainfed

INTRODUCTION

Agriculture, the back bone of Indian Economy, is one of the significant sources of India's gross domestic product (GDP) as it contributes 14.6%, providing food, raw materials, income and employment to its 52% of population pushes us to take the matter with supreme interest. The maximum advancement in change of science and technology at present is creating a very comfortable and contented life and livelihood, the change in climate of the planet earth is instinctively occurring. Since agriculture is totally dependent on climatic factors and there are no alternate of the later issue, climate change has become a concerning one and drawing attention of public and private sector developing agents and compelling to think over and implement policies on climate resilient agriculture. With the implementation of such projects comprising of technologies which are climate resilient, the total production through agriculture and thus total income of the farming community is strategic to increase. Since the role of improved technology in agricultural intensification and growth continues to be evidenced by a number of studies (Haggblade, 2004), these projects follow the technologies which cope up with the prevailing climatic calamities of the respective area. The Barak valley zone of Assam is situated in the southern part and consists of three districts *viz*., Cachar, Karimganj and Hailakandi. The area has an altitude of 16-17 m above MSL and this falls under 24°8' and 25°8' N latitude and 92°15' and 93°15' East Longitude. The valley is characterized by excessive humidity and average rainfall of the zone is 3180 mm with average rainy days of 146 per annum (Bhattacharjee and Dutta, 2010). Flood is a recurrent natural calamity of Barak valley under district Cachar, Assam. Generally flood occurs from the month of April – May. So farmers quite often loss their autumn rice during harvesting time, which are the major crop of the farmers of flood prone area. To decrease the losses incurred by farmers due to flood, a NICRA (National Initiative on Climate Resilient Agriculture) project is implemented in one of the village – *Salchapra-I*. An investigation was carried out to determine the impact of the implementation of climate resilient agricultural technologies on socio-economic status of farming community of this village during the year 2011- 12 and 2012 - 13.

Methodology

A benchmark survey was done in 84 households of the village *Salchapra-I*, which is 80% of the total households present in the village. The households were selected by random sampling by cluster method. The information was collected on the basis of personal interview to each of the surveyed farmers based on pre-tested questionnaire. Primary data on socio-

economic parameters such as age, gender, education, tenancy status, cropping pattern, subsidiary income sources, occupational details, land holding particulars, costs and income on crops and allied activities were collected from respondents. The sample households were then stratified into four groups, on the basis of their size of operational holding. The stratification was depicted in fig 1.

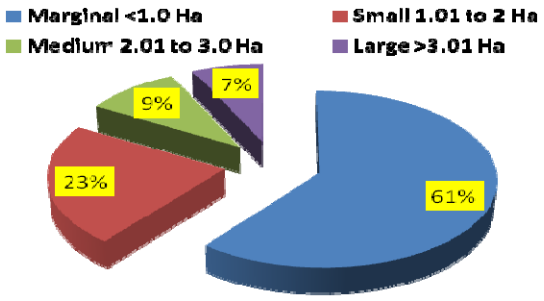

Fig. 1. Respondents in NICRA village

The bench mark data were collected before the implementation of the project in 2010-11 and the intervened information during the year 2011-12 and 2012-13 in order to study the impact of the project. The benefit-cost analysis was done for the major crops and livestock such as rice, potato, pulses (Rajmash) and poultry to study the change due to climate resilient agriculture,

Result and discussion

The data have been analysed and presented as under:

1. Population demography
2. Educational level of the respondents
3. Operational holding
4. Cropping pattern
5. Economic analysis of different intervention
6. Livestock enterprise
7. Conclusion

Population demography:

It can be revealed from the table 1 that out of 84 households surveyed, 60.72% were marginal farmers followed by 23.57% small farmers, 9.42% medium and 7.37% large farmers. The maximum number of farmers being included in marginal group and small group, stressed on the need of an efficient agricultural technology and subsidiary income source other than cultivation, free from adverse climatic consequence.

The study on the gender, work force and family size revealed 59% of the total population in the village are adult workers and left 41% are children, hence it can be depicted that majority of the population can be utilized as work force for livelihood practices. The sex ratio was found to be 886 female per thousand male. The higher family size was observed in small (8.1) followed by medium (7.5) farm group and lower in marginal (5.8) and large (6.7) farm (Fig. 2 & Table 2). It may be due to division of family and land among the marginal and large farms unlike the small and medium farms which are mainly joint families with undivided land holdings.

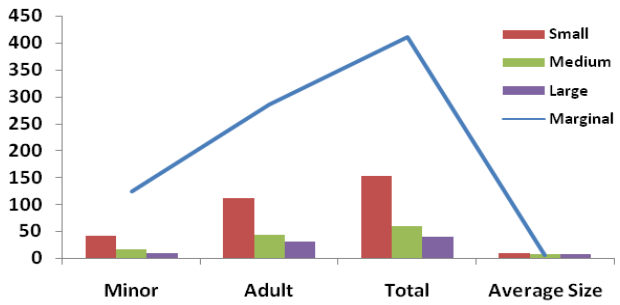

Fig.2. Population Demography of Respondents

Educational level of the respondents:

The literacy status revealed that out of total population in the sample farms 73.34 per cent were literate and 26.65 per cent are illiterate (Table 3). The percentage of total literate persons varies from 73.20 to 76.67 per cent and illiterate persons varied from 23.33 to 27.26 per cent among the farm groups. The highest percentage of literates was found in medium farm 76.67 per cent whereas the lowest were found in marginal farm 72.77 per cent.

Operational holding:

Total operational holding of the surveyed farmers under rainfed was 101.86 ha (Table 4). The total operational holding for marginal, small, medium and large farmers was 29.08, 26.92, 19.17 and 26.69 ha respectively, out of which 10.87 ha were leased in and 12.87 ha were leased out among the farmers. The average sizes of the operational holdings in hectare of marginal, small, medium and large farmers were 0.57, 1.42, 2.39 and 4.45 respectively (fig. 3). There are no irrigation facilities in the village.

Fig. 3: Average Operational holding (ha)

Cropping pattern:

A sector wise distribution of occupation of the farmers is depicted in table 5. It was pertinent that agriculture is the primary occupation, 84.21 per cent small and 68.62 per cent marginal and followed by medium and large with 62.50 and 50.00 per cent respectively. Among the farming groups agriculture was also the secondary occupation, out of which 50 per cent large farmers followed by 37.5 per cent medium farmers and the least was recorded in small farmers with 10.52 per cent.

The cropping patterns of the farm were presented in table 6. The total area put by the respondents to *Sali* and autumn rice, potato and pulses were 51.51, 32.68, 18.12 and 12.94 ha respectively with total coverage 115.25 ha. The marginal group cultivated total 36.54 ha followed by large group 31.25 ha as former comprised of maximum number of farmers. Intervention with limited resources of proven varieties such as Jalashree (*Sali* rice- 4.20 ha), Disang (autumn rice - 4.03 ha), Kufri Jyoti (Potato - 3.70 ha) and Rajmash (Local - 2.00 ha) were undertaken to some of the leading farmers. As a whole a total of 15.43 ha of area covered for intervention (Table 7).

Livestock Enterprise:

Livestock, particularly dairy and birds such as duck and poultry are the part and parcel in the farming system of Assam. Most of the farm families keep these animals for their own consumption. The animals have got little care as they are leaved open for their food. For this reason, by producing better output the farmers would think about for generating additional income from these enterprises. There are tremendous opportunities to increase the purchasing power with minimum effort in the study area. A livestock enterprise, therefore, was undertaken with a view to income and employment generation. For this purpose, an improved poultry breed Vanaraja was introduced to farm families. At the age of 6 month, average body weight was recorded 3.3 kg per male bird and average 400 egg/ layer for first 2 years were recorded (Table 9).

Economic analysis of different intervention:

Flood is the most affecting and recurring natural calamity of the village, which causes loss to the main crop *i.e.*, rice, and hence degrading the economic condition of the farmers. To overcome the concurrent flood situation during *kharif* season, climate resilient technology like submergence tolerant rice variety 'Jalashree' has been introduced in the village. The variety gave an impressive yield of 41 q/ha compared to the yield of local variety which was only 26 q/ha (Table 8). Since BCR as an indicator gives the economic value of sustainability and profitability of an enterprise. The method was supported by the study where BCR was calculated to find out the feasibility of enterprises such as livestock on the sustainability and profitability of marginal and small farmers. The BCR of local *Sali* rice variety was 1.90 increased to 2.38 after intervention with submergence tolerant rice variety 'Jalashree'. However, in autumn season, 'Disang' was demonstrated with recommended package of practices recorded and yield 37 q/ha which was 32.43 per cent higher than local rice variety *ahu* rice variety of 25 q/ha. It observed that the BCR of 'Disang' 2.15 which was more than the local *ahu* rice recorded as 1.83. This finding was supported by the reports of Hussain *et al.* (2008) and Dash, *et al.* (1995) on BCR of different rice varieties as well as cost and return and level of input used in production per hectare basis during *summer* rice. During *rabi* season, another high valued crop was introduced *i.e.*, potato variety 'Kufri Jyoti' in order to increase the total income of the farmers. The yield of 'Kufri Jyoti' was recorded 87 q/ha against the yield from local variety 49 q/ha and hence an increase of 77.55 per cent was obtained with the introduction of HYV variety. The BCR from the local variety was recorded 1.88 whereas for 'Kufri Jyoti' was 1.93 (Table 8). Peer *et. al.*, (2013) reported good return from commercial potato cultivation with an estimated BCR is 1.73. This increased trend of potato production by growing HYV cultivar following recommended package of practices boosted the yield as well as economy of the farmers. The 'Rajmash' is one of the popular pulse crop of the village. The demonstration on recommended package of practices of Rajmash with local variety increased the yield to 15 q/ha from 12 q/ha. The BCR of Rajmash crop after the intervention increased to 1.99 from the farmers practice 1.85, and hence lead to the improvement of the economy of the intervened farm families (Table 8). This finding has been supported by the study of Sekhar *et. al.*, (2014) that in Rajmash cultivation growers were benefited economically with BCR 2.02. There was substantial percentage increase in net returns. It was the highest in *Sali* rice by 91.93 per cent followed by potato to 82.61 per cent.

The lowest was obtained in Rajmash (35.76%). It might be due to incorporation of cultural practices (improved variety not provided).

In order to upgrade the living standard of farmers, a subsidiary source of income is very worth mentioning. Such income not only helps farmers to cope up from any loss of crops due to flood and/or other reasons, but also adds volume to the total income. Besides that, it plays the vital role in income generation to the farmers and therefore, has an effect on their living as the livestock has latent potential and boon for employment generation and poverty alleviation in poor resource regions (Picca, 2008 and Leonard, 2006). For that purpose, intervention on improved poultry breed 'Vanaraja' was being undertaken. The breed gave an impressive performance in terms of growth and egg production. The 'Vanaraja', was found to be well adapted to the local climatic conditions. The growth performance of the breed was very encouraging compared to the local breeds. At the age of 6 months, the body weight of male was recorded average 3.3 kg, which is almost 2.5 times more than the local breed. The female started laying eggs at the age of around 160 days and recorded 400 eggs/layers for first 2 years, which is 200 percent higher than the local breeds (Table 9). The breed gradually contributed a significant outcome of the farmers, which encouraged them to produce chicks locally by incubating the eggs of introduced breed with local hens. Analysis of BCR for the breed 'Vanaraja' was calculated as 4.05 against the local breed as 3.79 (Table 9) and so the economic benefit from the enterprise also motivated the farmers towards livestock rearing.

Conclusion

The results of the study village showed that 73.34 per cent population as educated they may be able to inculcate the performance of modern technology for adoption to better agriculture leading to boost the economic growth and development especially in Salchapra-1 village and state in general. As the production of staple food as well as in pulse are at present deficit in Assam, the farmers may adopt for increasing production and productivity of major crops. In this regards following steps are forwarded--

1. Introduction of rice varieties like Jalashree (Submergence tolerance) and Disang (short duration) will help subsistent and marginal farmers.
2. Production of potato will be double if they culture the proper production technology.
3. High yielding varieties (HYV) like HUR 302, HUR 203, PDR 14, Arun etc., for Rajmash will accelerate the total pulse production.

4. Irrigation facility may increase about 30% of *rabi* crop production, so irrigation infrastructure should be properly installed and provided to the cultivators.
5. Awareness towards recent and scientific methods in production should be provided

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Table 1: Breakup of respondents in NICRA village

Farm	Size	Numbers
Marginal	<1.0 Hectare	51
Small	1.01 to 2 Hectare	19
Medium	2.01 to 3.0 Hectare	8
Large	>3.01 Hectare	6
Total		84

Table 2: Population demography of respondents in NICRA village (Nos.)

Farm	Male		Female		Total				Average Size
	Minor	Adult	Minor	Adult	Minor	Adult	Total	%	
Marginal	60	153	65	133	125	286	411	60.72	5.8
Small	20	63	22	48	42	111	153	23.57	8.1
Medium	9	24	8	19	17	43	60	9.13	7.5
Large	5	18	4	13	9	31	40	6.58	6.7
Total	94	258	99	213	193(41%)*	471(59%)*	664	100.00	
Male= 352 Nos. Female= 312 nos. Ratio= Male: Female :: 1000:886									

* Parentheses indicate percentage to the total population

Table 3: Educational level of respondent farms (Nos.)

Educational Level	Marginal	Small	Medium	Large	Total
a. Illiterate	112 (27.26)*	41 (26.80)	14 (23.33)	10 (25.00)	177(26.65)
b. Literate	299 (72.77)	112 (73.20)	46 (76.67)	30(75.00)	487(73.34)
i. Middle	146 (35.52)	40 (26.14)	17 (28.33)	18 (45.00)	221(33.28)
ii. HSLC	107 (26.03)	37 (24.18)	15 (25.00)	4 (10.00)	163(24.55)
iii. HSSLC	35 (8.51)	26 (16.99)	11 (18.33)	5 (12.50)	77(11.60)
iv. Graduate & Above	11 (2.67)	9 (5.88)	3 (5.00)	3 (7.50)	26(3.91)
Total	411 (100)	153 (100)	60 (100)	40 (100)	664(100)

*Parentheses indicate the percentage to total

Table 4: Operational holding of the respondents in ha

Farm	Owned land	Leased in land	Leased out land	Total Operational holding	Average Operational holding
Marginal	25.15	3.93	-	29.08	0.57
Small	23.20	5.33	1.61	26.92	1.42
Medium	20.40	1.61	2.84	19.17	2.39
Large	35.10	-	8.42	26.69	4.45
Total	103.86	10.87	12.87	101.86	-

Table 5: Occupational details of the farmers in NICRA village (in no.)

Farm	Main Occupation				Secondary Occupation		
	Agri	Livestock	Service	Others	Agri	Livestock	Others
Marginal	35(68.62)*	-	9(17.64)	7(13.72)	15(29.41)	4	5
Small	16(84.21)	-	3(15.79)	-	2(10.52)	1	4
Medium	5(62.50)	-	2(25.00)	1(12.50)	3(37.50)	-	2
Large	3(50.00)	-	1(16.67)	2(33.33)	3(50.00)	1	1

*Parentheses indicate the percentage to total

Table 6: Enterprises under cultivation to be intervened (ha)

Farm group	Local Rice (Sali)	Autumn Rice (Local)	Potato (Unknown)	Rajmah Local)	Total area covered
Marginal	19.07	11.72	3.00	2.75	36.54
Small	11.62	7.39	5.60	3.17	27.78
Medium	8.16	4.75	4.60	2.17	19.68
Large	12.66	8.82	4.92	4.85	31.25
Total	51.51	32.68	18.12	12.94	115.25

Table 7: Total area under different intervention for 2 years in the village (ha)

Farm group	Jalashree (*Sali* Rice)	Disang (*Autumn* Rice)	Potato (Kufri jyoti)	Rajmah (Local)	Total area covered
Marginal	1.50	2.33	1.00	0.50	5.33
Small	1.20	1.50	1.00	0.50	4.20
Medium	1.00	-	1.20	0.50	2.70
Large	1.00	1.20	0.50	0.50	3.20
Total	4.20	4.03	3.70	2.00	15.43

Table 8: Economic analysis of different crop interventions (Av. of 2 years)

Farmers Practice.(FP)						After Intervention						PC increa-se over FP
Crop /Var.	Yield (q/ha)	Gross Return	Total Cost	Net Return	BC	Crop /Var.	Yield (q/ha)	Gross Return	Total Cost	Net Return	BC	
Rice /local	26.0	32500	17000	15500	1.91	Jalashree	41.0	51250	21500	29750	2.38	91.93
Autumn rice/ahu local	25.0	31250	17000	14250	1.83	Disang	37.0	46250	21500	24750	2.15	73.68
Potato/ unknown	49.0	49000	26000	23000	1.88	Kufri Jyoti	87.0	87000	45000	43000	1.93	82.61
Rajmah/ local	12.0	36000	19500	16500	1.85	Local	15.0	45000	22600	22400	1.99	35.76

Table 9: Economic analysis of livestock intervention

Particulars	Local bird	Improved breed (Vanaraja)	Per cent increase over local
Av.body wt./ Male (kg)*	1.25	3.30	164.00
Egg Laid/Layer (No.)**	190	400	110.52
Gross Return (Rs.)	1327.50	2330.00	75.52
Total Cost (Rs.)	350.00	575.00	64.29
Net Return (Rs.)	977.50	1755.00	79.45
BC	3.79	4.05	-

*6 months old ** first two years