AJES
ASIAN JOURNAL OF ENVIRONMENTAL SCIENCE
VOLUME 10 | ISSUE 1 | JUNE, 2015 | 90-94 e ISSN-0976-8947 Visit us : *www.researchjournal.co.in*
DOI: 10.15740/HAS/AJES/10.1/90-94
A CASE STUDY

Adoption of climate resilient agricultural technologies and its impact on aliba village under Mokokchung district of Nagaland

PIJUSH KANTI BISWAS, RENBOMO NGULLIE, SAMUEL SANGTAM, RONGSENSUSANG, RUYOSU NAKRO, BENDANGJUNGLA, RUOPFÜSELHOU KEHIE AND SHILUNOKDANG JAMIR

Article Chronicle :
***Received* :**
21.02.2015;
***Accepted* :**
20.05.2015

ABSTRACT : Aliba village under Mokokchung district of Nagaland mostly comes under water scarce village. Last five years before undertaking climate resilient technologies faces sever climatic vulnerability such a erruptic rainfalls, severe drought, thunderstorm etc. During 2011-2014 through Village Climate Risk Management Committee(VCRMC) under the supervision of Krishi Vigyan Kendra, Mokokchung some of the climate resilient technologies undertaken in farmers field. Cilmate resilient technologies interms of Natural Resource Management (NRM), Crop production, Livestock and Fisheries and Institutional Interventions mainly undertaken. The result of the study shows that all the climate resilient technologies greatly solved farmers farming problems and boost up the economy of the farmer as well.

HOW TO CITE THIS ARTICLE : Biswas, Pijush Kanti, Ngullie, Renbomo, Sangtam, Samuel, Rongsensusang, Nakro, Ruyosu, Bendangjungla, Kehie, Ruopfüselhou and Jamir, Shilunokdang (2015). Adoption of climate resilient agricultural technologies and its impact on aliba village under Mokokchung district of Nagaland. *Asian J. Environ. Sci.*, **10**(1): 90-94.

Key Words :
VCRMC, NRM, Climate resilient technology, NICRA

Author for correspondence :
PIJUSH KANTI BISWAS
Krishi Vigyan Kendra, MOKOKCHUNG (NAGALAND) INDIA
Email: drpijushpckvk @gmail.com
See end of the article for **Coopted authors'**

Agriculture is subjected to number of stress and potential yield are seldom achieved with stress. The present challenges like global climate change, water and soil pollution, less water availability, urbanization etc. ads are to the situation. A biotic stress includes drought, heat, flood and salinity, mineral deficiency toxicity and chilling or freezing stress. All crops grown under natural environment are subjected to one or the other stress. In order to sustain our agricultural production with present day climate challenges we need to adopt total packages of climate resilient agricultural technologies. The nature and magnitude of the climatic stress may vary place to place and technologies should be introduced based on the nature and magnitude.

Climate changes possess serious challenges to human and places unprecedented pressures on the sustainability of agriculture industries. Climate models indicates that running over the next several decades well take place in respect of any action taken today. Therefore, the development of climate resilient agricultural technology well is the most important step to adaptation to the changes we face today and in the future.

EXPERIMENTAL METHODOLOGY

NICRA village profile :

The present study is conducted at Aliba village under mokokchung district of

Nagaland. The geographical location of the village falls between 26° N-38' N to 94° 43' 8E and the elevation of the villages 1060 msl. This Aliba village falls under mid-tropical hill one agro climatic zone. The average rainfall of the village is 2000 to 2500 mm. the soil mostly in this village are non-lateritic red soils, alluvial soils and inceptisol soil. The major crops grown in this village are paddy, maize, cucumber, beans, orange; litchi banana vegetables pea etc. total cultivated area comes around 47350 ha. The major climate challenges encounters are flood and prolong dry spell like situation (drought).

EXPERIMENTAL FINDINGS AND DISCUSSION

The following climate resilient agricultural intervention was adopted to upset the climatic extravaganzas in farmer's field during the period 2011-2014.

Adoption and impact of climate resilient technology under natural resource management :

Construction of embankments :

About 65 farming household cultivate paddy in the lowland area of Tzuvi valley where the river Tzuvi flows. In the earlier years large area of crop lands were damaged due to high river current during rainy season rendering great loss to the farmers. However, under NICRA project, embankments using sausage wires at strategic locations were constructed. Since then eroding of land due to river current was drastically reduced by 75 per cent and the farmers are now achieving good harvest. During the year 2012 an area of 65 ha was brought under paddy cultivation in Tzuvi valley alone.

Ring well :

Due to long dry spell (5-6 months) during winter months cultivation of winter crops and off season cucumber is effected which results in very low yield. Almost all the irrigation channel dries up and farmers have to fetch water from far places for irrigating their fields. This problem discourages farmers from taking up large scale cultivation of winter vegetable crops. Therefore, with a view to encourage farmers from taking up winter crop cultivation, ring wells were dug during 2011-12. With assured irrigation after the intervention many farmers started cultivating winter crops especially off season cucumber which is in high demand. Average yield of 150 and 21.8 q/ha of cucumber and winter vegetables, respectively was achieved.

Water shortage was also reported even during summer in WRC fields which resulted in late transplanting of paddy. However, the farmers can now complete the transplanting of their crop well in time by pumping out water from the ringwells. The ring wells cover about 12 hectares benefitting 78 farmers.

Rain water harvesting tank and farm ponds :

Even though there is sufficient rainfall during the summer, farmers experienced midterm drought but they are not aware about conserving water for use during dry period. This creates problem of irrigating the fields especially when there is long spell of dry period and most of the crops fails to produce good harvest due to moisture stress. Inspite of this, farmers never bothered to dig ponds for conserving rainwater due to the apprehension that they will loss land for cultivation. After convincing them, water harvesting tanks and farm ponds with lining was constructed at strategic locations where irrigation problem frequently prevailed. With the availability of the tanks the farmers are now using the stored water for irrigating their crop fields. By promoting farm ponds for timely irrigation, an additional area of 13 hac. was brought under cultivation. An increase in yield of 15 per cent on vegetables alone was recorded with an additional income of Rs. 27,500/- as compared to earlier years.

Adoption and impact of climate resilient technology under crop production :

SRI: Water saving paddy cultivation :

Water is an important factor in rice production system especially in lowlands. Water shortage due to weather variability causes constraint to produce more rice to meet increasing demand. In spite of providing assured irrigation,

Table 1 : Growth and yield parameters

System	Plant height (cm)	Number of tillers	Panicle length (cm)	Number of grains/ panicle	Weight of 1000 grains (g)	Duration (days)	Yield (q/ha)
SRI	85	23	26	115	42	145	41
Conventional	77	13	23.5	102	30	155	29.3

% increased over conventional method : 28.54 %

use of pest-resistant high-yielding varieties, and high inputs of fertilizers and pesticides, rice yields are plateauing. Hence, to invest on improving water productivity and produce more rice, SRI was promoted through the project. A yield as high as 41 q/ha was obtained from SRI as compared to conventional method (29.3 q/ha) with an additional income of Rs. 37,250/-.

Promotion of short duration paddy varieties :

In the project village WRC paddy varieties used were mostly long duration varieties (155-170 days). Furthermore, most of the transplanting is done during the month of July-August and harvest the crop by December only which creates problem for cultivation of winter vegetable crops in WRC fields. In order to gain time for winter crop cultivation, short duration paddy varieties were introduced to 17 farmers. Among the different varieties, Disang and Dikow performed excellently well with a duration of 115 days and 100 days, respectively. The crops sown during July could be harvested by mid October. By promoting short duration varieties the farmers could now cultivate winter crops and fetched additional income to the tune of Rs. 28,500/- and Rs. 24,800 during 2011-12 and 2012-13, respectively.

Early planting of Rabi crops :

Long dry spell (4-5 months) during winter months coupled with no irrigation facilities leads to very low crop yield, especially winter vegetable crops. Under this situation, farmers are reluctant to cultivate crop with apprehension of crop loss. Cultivation of crops like cabbage, cauliflower and other cole crops and also high value crops like broccoli, which is becoming popular among the farmers is restricted due to irrigation problem. Therefore, to address this problem, advancement of planting time for *Rabi* crops was encouraged in 13 farmers fields, immediately after harvesting of paddy when there is still moisture in the soil. Overall yield from various crops was 21.7 q/ha with an increase in yield of 16.12 per cent.

Offseason cucumber cultivation :

Aliba village is the pioneer in off season cucumber cultivation for the last 10 years but of late the district experienced very long dry spells which leads to drying up of irrigation channels. The production drastically reduced due to constraints in irrigation facilities. Though market demand for cucumber rise, the production could not meet the demand. Due to this constraint, large area under this crop reduced as many farmers gave up cucumber cultivation.

With assured irrigation through the project interventions like rainwater harvesting structures, ring well and farm ponds, the area under this crop increased from 1.5 ha to 4 ha. The produce started to reach the market by April and very good income was achieved from the sale of cucumber. The production of cucumber is further expected to achieve 125 q/ha with a net income of Rs. 4,75,000/-. On an average, a farmer earned a net income of Rs. 25,000/- to 35,000/- from off season cucumber in a particular season.

Low cost poly house for nursery raising :

Green houses are climate controlled. It has several advantages like yield increase, reduction in labour low water and fertilizer requirement, off season crop cultivation etc. But above all, cultivation of crops in problematic climatic conditions can be possible. Considering the present climatic condition, green house was promoted with an aim to raise nursery of crops to make it available for the farmers as well as to cultivate off season crops. The green houses are managed by

Table 2 : Economics of one unit backyard poultry (15 numbers of birds)

Sr. No.	Particular	Quantity/ number	Amount (Rs.)
1.	Expenditure : Cost of 1 month old kuroiler chick @ Rs. 65/- per chick	15 numbers	975*
2.	Cost of concentrated feed	75 kg	1500
3.	Local feeds	--	500
4	Medicine (vitamins etc.)	--	550
Total cost			**3525**
	Gross income		
5.	Average annual eggs produced	1750 numbers @ Rs. 5/- per egg	8750
6.	Net income		5225

* B:C ratio -1:2.4

SHGs where vegetable crops are being grown and during the *Rabi* season they could earn a good income by selling various winter crops amounting to Rs. 11,150/unit (Net return).

Adoption and impact of climate resilient technology under livestock and fisheries :

Backyard poultry farming :

Poultry is one of the fastest growing segments of the agricultural sector. Family poultry (or the 'traditional scavenging' system), which is based almost entirely on native birds, has been by-passed by the poultry revolution, with virtually all the growth occurring in the large-scale 'confined and intensive' sub-sector. By contrast, traditional poultry-keeping appears to be a stagnant low-productivity sub-sector. The meat of family Kuroiler chicks under backyard farming produced scavenging chickens is much more highly valued (by rural and urban dwellers, rich and poor) than that of industrially produced birds. As part of the project programme, 15 units (15 birds/unit) of kuroiler chicks were distributed in the village and the farmers were encouraged to rear under semi intensive care system along with the local birds (Table 2).

Preventive vaccination :

Vaccination mainly done against FMD, swine fever and Ranikhet. Most of the disease outbreaks occur during winter followed by rainy and summer season. In order to prevent economic losses due to various diseases in livestock and poultry, a camp was held in the NICRA village where 210 animals were given vaccination. However, inspite of the preventive measures there were some reports of dead especially in pigs though the number was not alarming.

Adoption and impact of climate resilient technology under institutional interventions :

Custom hiring centre :

A custom hiring centre (CHC) was set up to ensure timely availability of farm machineries. The custom hiring centre is run by a committee wherein the machineries/ equipments were made available to the farmers to complete sowing and intercultural operations in time. With the existence of the custom hiring centre, the farmers could easily make use of the various machineries according to their requirements during field operations. Power tiller, water pump machine, cono weeder, wheel hoe and sprayer contributed significantly to the revenue generation of CHC. Farmers could save 75 per cent of labour cost by using of Power tiller. Apart from this, the farmers could save 30-40 per cent of the cost of cultivation by using other implements like cono weeder and wheel hoe. Most significant impact of CHC is also observed with the water pump machine. During 2012 though rainfall was there, the fields were not flooded enough for transplanting. Therefore, the farmers pump out water from the ring wells constructed under NICRA and irrigated their fields and achieved timely transplanting of crop. The water pump also benefitted the framers as supplemental irrigation in winter vegetable crops and off season cucumber. The amount realized as rent from machines and implements are deposited in the account of VCRMC (Table 3).

All the above mentioned interventions and their outcomes supporting directly and indirectly with earlier documentation done by Venkateswarlu *et al*. (2012b).

Acknowledgement :

The authors are thankful to the Central Research Institute for Dryland Agriculture (CRIDA), Indian Council

Table 3 : Evaluation of custom hiring of farm implements and machinery

Implement	Number of units	Usage/unit (hr)	Area covered (ha)	Number of farmers using implement	Labour saved (hr/ha)	Cost saving (Rs./ha)	Revenue generated from CHCs (Rs.)
Power tiller	1	177	145	95	28	5600	14700
Pump machine (4.5 hp)	2	29	142	131	23	4700	3000
Weighing balance (150 kg capacity)	2	16	–	113	–	–	570
Wheel hoe	5	120	5.2	71	12	2400	1980
Cono weeder	5	141	13	79	15	3000	2280
Knapsack sprayer	2	107	34.5	101	–	–	2340
Chaff cutter	5	67	–	61	15	2650	2000

of Agricultural Research, Hyderabad (A.P.) India and ICAR Zonal Project Directorate Zone-III for providing financial assistance and necessary guidelines to implement the project.

Coopted Authors' :

RENBOMO NGULLIE, SAMUEL SANGTAM, RONGSENSUSANG, RUYOSU NAKRO, BENDANGJUNGLA, RUOPFÜSELHOU KEHIE AND SHILUNOKDANG JAMIR, Krishi Vigyan Kendra, MOKOKCHUNG (NAGALAND) INDIA

REFERENCES

Arunachalam, A. (2011). National Intiative of Climate Resilient Agriculture. *Indian Farm*., **61**(4):32-34

Patel, L.C., Nath, D., Islam, N., Biswas, S., Shil, S. and De, D. (2015). Dissemination of outcome of climate resilient agricultural technologies in a tribal village of Tripura. *Internat. J. Farm Sci*., **4**(4) : 272-278.

Singh, R., Yadav, V.P.S., Varishti, J.S. and Adhiguru, P. (2012). Best management practices in livestock rearing for reducing green house gasses. *Indian Farming*, **62**(6) : 26-30.

Venkateswarlu, B., Kokate, K.D., Gopinath, K.A., Rao, S.C., Anuradha, B. and Dixit, S. (2012a). Coping with climate variability: technology demonstration on farmers field in vulnerable districts. Central Research Institute for Dryland Agriculture, ICAR, Hyderabad (A.P.),India.

Venkateswarlu, B., Shalender, K., Dixit, S., Rao, S.C., Kokate, K.D. and Singh, A.K. (2012b). Demonstration of climate resilient technologies in farmers fields –Action plan for 100 vulnerable districts. Central Research Institute for Dryland Agriculture, ICAR, Hyderabad (A.P.), India.