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APPLICATION OF CLIMATE RESILIENT TECHNOLOGIES IN NICRA VILLAGE OF RAFALA

M. M. Tajpara[1], B. N. Kalsariya[2] and V. P. Dadhania[3]

1 Scientist, Krishi Vigyan Kendra, JAU, Targhadia Dist. Rajkot – 360003
2 Associate Professor, Polytechnic in Agriculture, JAU, Sidsar, Junagadh-362001
3 SRF, Krishi Vigyan Kendra, JAU, Targhadia Dist. Rajkot – 360003
Email: tajpara1978@rediffmail.com

ABSTRACT

ICAR has launched major network project NICRA in vulnerable districts across India. Project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through four module technological demonstration. Present study was conducted to application of climate resilient technologies in NICRA village of Rafala. The Rafala village of Rajkot district was purposively selected for the study with sample size 250 farmers under NICRA project. The research finding indicated that after NICRA project implementation, 128 hectares area under dipping of pond and check dam and about 238 ha area were incorporated cotton stalk and wheat straw through use of rotavator and mobile chopper. In case of recycling of organic waste, 152 farmers had prepared 435 tons rich compost from cotton stalk chopped by shredder. Total 56.80 Per cent and 52.00 Per cent farmers had used rain gun sprinkler irrigation and summer deep ploughing technologies after implementation of NICRA project, respectively. Whereas, groundnut (GJG-22), chickpea (GJG-5) and cumin (GC-4) crop yield were increased up to 8.9 per cent, 14.28 per cent and 17.80 percent, respectively over local varieties and milk production of buffalo per lactation had increased by 14.00 per cent. Total 259 farmers and 130 farm women were participated in training programmes. In overall, majority of farmer (82.20 per cent) had high level of adoption in crop production, followed by livestock management (78.20 per cent), natural resource management (63.80 per cent) and institutional intervention (55.60 per cent) to climate resilient technologies, respectively.

Keywords : *adoption, farmers, climate resilient technologies*

INTRODUCTION

Climate is the primary important factor for agricultural production. Climate change and global worming impacts effect on all sectors of human life. Rainfed agriculture will be primarily impacted due to rainfall variability and reduction in number of rainy days (Venkateshwarlu and Shanker, 2013). Impacts will be global, but much of the damage will be in developing countries, where, 11 percent of arable land could be affected by climate change, including a reduction of about 16 percent of agriculture GDP (Pathak *et al*. 2012). National Initiative on Climate Resilient Agriculture (NICRA) is one of the pilot projects launched by Indian Council of Agricultural Research (ICAR), New Delhi during 2010-11, that correlate the climate variability and its impact on agricultural process and too aims at development in agricultural strategies based on variability of temperature, humidity, dry land and other adverse condition. NICRA is the brain child of Central Research Institute for Dry land Agriculture (CRIDA), Hyderabad. It is a network project of Indian Council of Agricultural Research implemented in 121 vulnerable districts across the country. The project was implemented by Krishi Vigyan Kendra (KVK) in different agro climate zones. Based on this; Rajkot, Amreli, Kutch, Valsad and Banas Katha district is selected for piloting the NICRA project in Gujarat. But Rajkot district is well known for its low, uneven and erratic rainfall. So, present study was conducted in new adopted NICRA village (Rafala) of Rajkot district.

Farmer of selected village & nearby village under adverse climate situation such as early season drought (delayed onset), normal onset followed by 15-20 days dry spell, mid-season drought (long dry spell) & early withdrawal of monsoon were faced during past years. Cotton and groundnut crop is major crop during kharif and both crops are affected by drought/dry spell which generally occur during mid-July to August. During kharif 2016, nearly 799 hectares of cultivated land in villages was badly affected by drought. Extent of yield loss was about 50-80 percent in cotton and 80-100 percent in groundnut (Anon., 2016). In this view, the study was conducted in the following objective.

OBJECTIVE

To know the impact of climate resilient technology in NICRA village Rafala of Rajkot district of Gujarat.

METHODOLOGY

The study was conducted at Rafala village comes under North Saurashtra Agroclimatic Zone VI. It is situated in the eastern part of the Rajkot district and 14 km away from Krishi Vigyan Kendra, Targhadia (Rajkot). The Rafala village of Rajkot district was purposively selected for the study with sample size 250 farmers; due only one village was coming under NICRA project. The main crops were growing viz. cotton, groundnut, gram, cumin and wheat in this village. Project is working on four modules to address the climate vulnerability through suitable intervention in project village of Rafala.

(1) Natural Resources Management

This module consists of intervention related to in situ moisture conservation, water harvesting and recycling for supplemental irrigation, improved drainage in flood prone area, conservation tillage, artificial ground water recharge and water saving irrigation methods.

(2) Crop Production

This module consists of introducing of drought/ temperature tolerance varieties, advancement of planting, sowing date of rabi crops in area with terminal heat stress, high yield and diseases resistance varieties, location specific intercropping system, integrated nutrient management (INM) and integrated pest management (IPM).

(3) Livestock Management

Breed improvement of big and small ruminants, fodder production through improve planting materials during drought/flood, improved fodder/feed storage methods, preventive vaccination/deworming, improved shelter for reducing heat stress, fodder enrichment and balance feed are important factors for livestock management.

(4) Institutional Intervention

This module consists of institutional intervention either by strengthening existing one or initiating new one relating to seed bank, fodder bank, commodity group, custom hiring center, collective marketing, introduction of weather index-based insurance and climate literacy through village level weather station.

RESULTS AND DISCUSSION

Whole climate resilient location specific technologies are demonstrated in NICRA village Rafala of Rajkot district of Gujarat since 2016. Out of 25 climate resilient technological intervention, 25 practices are accepted by farming community (Table 1).

Table-1 : Adoption of climate resilient technologies in NICRA village of Rafala (n=250)

Sr. No.	Practices	No. farmers adopted *CRT	Percentage of adoption of CRT by farmers
(1) Natural Resources Management			
1	Summer deep ploughing	184	73.60
2	Enrich soil health through incorporate crop residues into soil.	158	63.20
3	Rain gun, sprinkler irrigation	142	56.80
4	Recycling of organic waste	152	60.80
5	Soil sample collection and testing	168	67.20
6	Soil test-based fertilizer	151	60.40
7	Tree plantation	167	66.80
8	Use of vermicompost	154	61.60
(2) Crop Production			
9	Seed treatment	196	78.40
10	Drought/ short duration varieties	226	90.40
11	Diseases resistant varieties	211	84.40
12	INM in crop	218	87.20

Sr. No.	Practices	No. farmers adopted *CRT	Percentage of adoption of CRT by farmers
13	IPM in crop	221	88.40
14	Intercropping	191	76.40
15	Crop diversification	176	70.40
(3) Livestock Management			
16	Breed Improvement	205	82.00
17	Mineral mixture	211	84.40
18	Vaccination	219	87.60
19	Deworming	216	86.40
20	Bypass protein & bypass fat	204	81.60
21	Improve fodder production around the year	220	88.00
22	Urea treatment	94	37.60
(4) Institutional Intervention			
23	Seed bank	117	46.80
24	Fodder bank	121	48.40
25	Custom hiring centre	179	71.60

*CRT= Climate Resilient Technology

The data in Table-2 revealed that after dipping of pond and check dam average ground water table has raised up to 3 meter as compare to previous year. Before adopted, only 18 hectares of area was covered and after NICRA project implementation, 128 hectares area were covered. To enrich the nutrient status of soil through recycling of farm residues 158 farmers in about 238 ha area were incorporated cotton stalk and wheat straw through use of rotavator and mobile chopper. In case of recycling of organic waste, 152 farmers had prepared 435 tons rich compost from cotton stalk chopped by shredder and applied in the farm to increase organic material in soil which improve the soil fertility and sustainability. Similar finding has been reported by Sasanka *et al*. (2016).

Before NICRA adopted, only 10 farmers (4.00 Per cent) were used rain gun sprinkler irrigation technology and 10 farmers (4.00 Per cent) were used summer deep ploughing, whereas 142 farmers (56.80 Per cent) and 130 farmers (52.00 Per cent) had used these technologies after implementation of NICRA project, respectively.

Table 2 : Application of NRM technologies before and after NICRA village adoption (n=250)

Sr. No.	NRM technologies	Before NICRA		After NICRA	
		No. of Farmer	Area (ha)	No. of Farmer	Area (ha)
1	Dipping of community pond & check dam	16	18	130	128
2	Summer deep ploughing	10	20	184	320
3	Enrichment of soil by crop residue	20	30	158	238
4	Recycling of organic waste	04	13 tone	152	435 tone
5	Rain Gun sprinkler irrigation	10	17	142	219

In drought or uneven and erratic rainfall situation of Rajkot district, data in Table-3 showed that after adopted village, groundnut (GJG-22) was demonstrated and yield was increased up to 8.9 per cent and heavy drought tolerant character. Demonstration of High yielding varieties of chickpea (GJG-5) and wilt resistance varieties of cumin (GC-4) result were indicated increased yield 14.28 per cent and 17.80 percent, respectively over local varieties. The probable reason might be that the location specific intercropping system were demonstrated in farmer field. Pronounced achievement was reported from farmers that groundnut & pigeon pea, maize & groundnut intercropping system were adopted. Not only these, but also adopted INM demonstration cotton and groundnut. IPM in Bt. cotton resulted, most of sucking pest were controlled. This finding is line with result reported by Sasanka et al. (2016).

Table 3 : Crop/Livestock yield before and after nicra village adoption (n=250)

Sr. No.	Crop/ Livestock	Before NICRA Yield (q/ha)/	After NICRA Yield (q/ha)	% increase yield
1	Groundnut (GJG-22)	16.85	18.35	8.90
2	Chickpea (GJG-5)	11.90	13.60	14.28
3	Cotton	29.42	31.50	7.07
4	Cumin (GC-4)	6.32	7.45	17.80
5	Buffalo Milk	1489 lit/Lactation	1699 lit/ lactation	14.00
6	Capacity building programme	-	259 farmers	-
		-	130 farm women	-

The Table-3 indicated that the milk production of their buffalo per lactation had increased by 14.00 per cent due to adaption of this intervention. Due to improved breed of cow and buffaloes were introduced for improving local breeds like as Gir, Jafrabadi and Bunny. Demonstration of green fodder round the year was conducted on farmer field. Further mineral mixture, deworming and vaccination were conducted during animal treatment camp. Also due to urea treatment protein content of fodder was increased. This finding was in line with finding of Jasna *et al*. (2014).

From Table-1 revealed that small and marginal farmers are mainly using village level NICRA custom hiring center of farm implements during cultivation of crops and nominal amount deposited in the NICRA account for post project management and repair implements. Provision of farm machinery and argil implements assured timely planting and higher yield. Seed bank and fodder bank in NICRA villages are helping farmers to mitigate their seed and fodder demand.

Under capacity building programmes 259 farmers and 130 farm women were participated in training programmes like NRM, Crop production, LPM, and Agri. Engineering etc. (Table-3)

Table-4: Summary of modules wise adoption of climate resilient technologies in NICRA village of Rafala. (n=250)

Sr. No.	Modules of climate resilient technologies	No. of farmers adopted *CRT	Percentage of adoption of CRT by farmers
1	Natural Resources Management	159	63.80
2	Crop Production	205	82.20
3	Livestock Management	195	78.20
4	Institutional Intervention	139	55.60

*CRT= Climate Resilient Technology

In Table-4, the data revealed that majority of farmer (82.20 per cent) had high level of adoption in crop production, followed by livestock management (78.20 per cent), natural resource management (63.80 per cent) and institutional intervention (55.60 per cent) to climate resilient technologies, respectively.

CONCLUSION

It can be concluded that after NICRA project implementation, 128 hectares area under dipping of pond and check dam and about 238 ha area were incorporated cotton stalk and wheat straw through use of rotavator and mobile chopper. In case of recycling of organic waste, 152 farmers had prepared 435 tons rich compost from cotton stalk chopped by shredder. Total 56.80 Per cent and 52.00 Per cent farmers had used rain gun sprinkler irrigation and summer deep ploughing technologies after implementation of NICRA project, respectively. Whereas, groundnut (GJG-22), chickpea (GJG-5) and cumin (GC-4) crop yield were increased up to 8.9 per cent, 14.28 per cent and 17.80 percent, respectively over local varieties and milk production of buffalo per lactation had increased by 14.00 per cent. Total 259 farmers and 130 farm women were participated in training programmes.

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