PROMOTION OF REDGRAM BASED INTERCROPPING SYSTEM FOR ENHANCING FARMERS INCOME

Input and Technology details :

1) Technology assessment of Redgram based intercropping system i.e. Maize + Redgram, Greengram + Redgram and Foxtail Millet + Redgram
2) Front Line Demonstrations organised
   i) Maize+Redgram intercropping system (94 ha., 235 farmers)
   ii) Greengram + Redgram intercropping system (16 ha., 40 farmers)
   iii) Foxtail Millet + Redgram intercropping system (12 ha., 30 farmers)
3) Capacity building programmes (nos. 81., covering 2010 farmers)
4) Extension Programmes (110 nos., covering 3100 farmers)

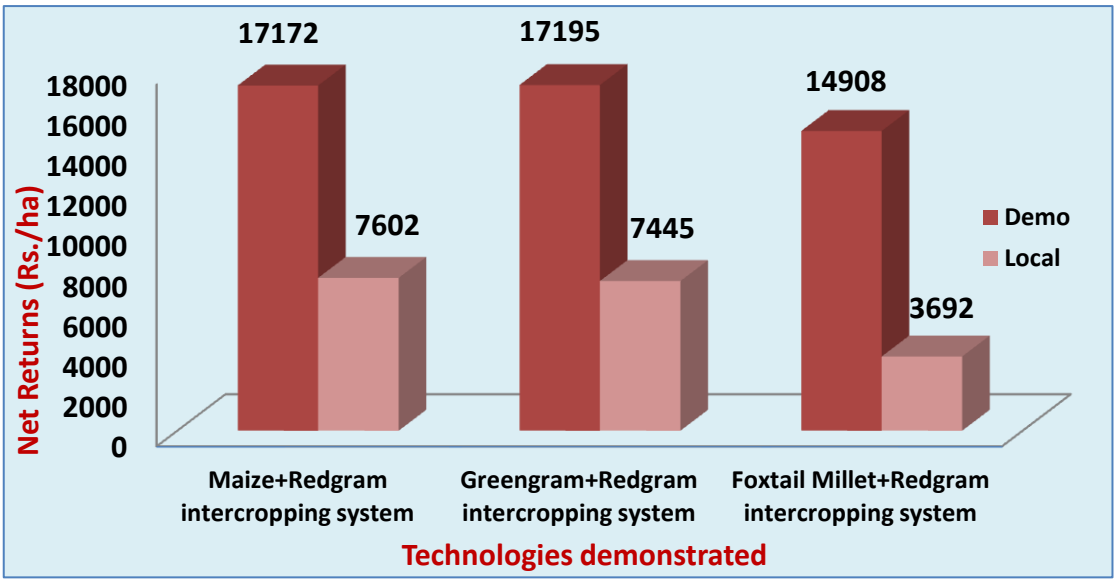
MAIZE+REDGRAM INTERCROPPING SYSTEM

FOXTAIL MILLET+REDGRAM INTERCROPPING SYSTEM

GREENGRAM+REDGRAM INTERCROPPING SYSTEM

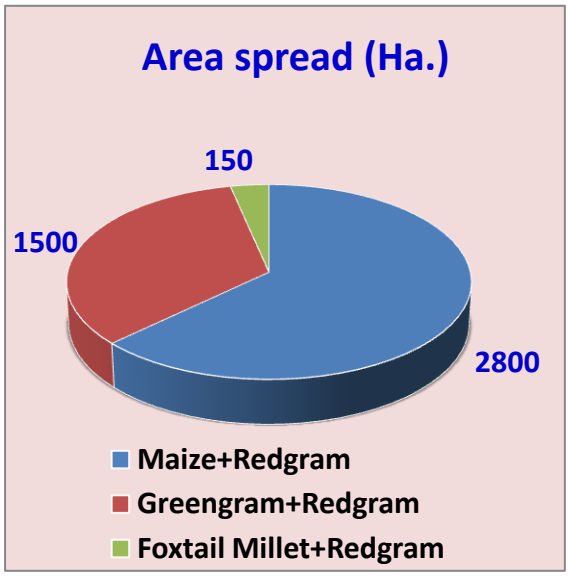
Output details :

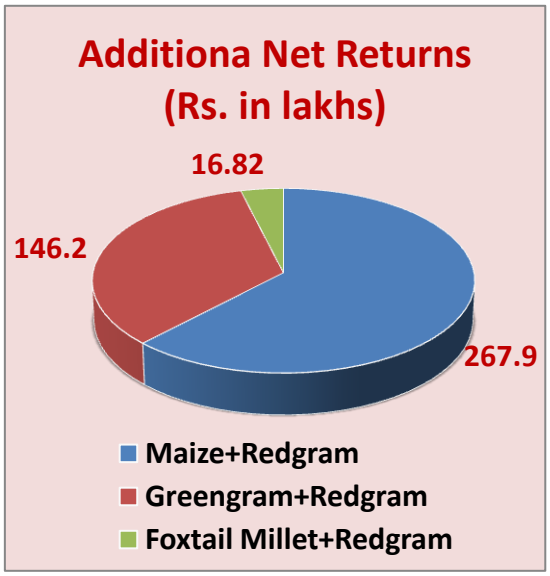
Technology promoted through FLD	Area under FLD (Ha.)	No. of farmers	Crop Equivalent Yield (Qtl./ha.)		Increase in yield (%)	Net Returns (Rs./ha.)	
			Demo	Local		Demo	Local
Maize + Redgram (Variety: TS-3R) 5:1 intercropping system **(Dry land condition)**	94	235	35.01	22.51	57.59	17172	7602
Greengram + Redgram 5:1 intercropping system **(Dry land condition)**	16	40	10.02	6.79	46.32	17195	7445
Foxtail Millet + Redgram 5:1 intercropping system **(Dry land condition)**	12	30	15.80	7.94	99.97	14908	3692



Outcome : Farmers got additional net returns of Rs.9570/- per hectare from Maize + Redgram intercropping system. From Greengram + Redgram intercropping system, 46.32 % increased yield was realised compared to sole cultivation of Greengram with additional returns of Rs.9750/- per hectare. Foxtail Millet + Redgram intercropping system fetched additional returns of Rs.11,216/- per hectare, an increase of 99.97 % compared to sole cultivation of Foxtail Millet.

Impact : The technologies are spread in NICRA villages of KVK as well as adjacent villages. Spread of technology and additional net returns obtained during last five years are given below.





District economy was enriched by additional net returns of about Rs.430 lakhs from the Redgram based intercropping systems during last five years.

DETAILED IMPACT ANALYSIS OF MAIZE+REDGRAM INTERCROPPING SYSTEM

INTRODUCTION :

Maize is an important cereal crop cultivated predominantly under rainfed situation in Kharif season in Gadag district. It occupies 15-20 per cent of the total cultivable area. The average productivity of crop decreased from 25 Qtls./ha during last decade to 14 Qtls/ha. during current decade. The major reason for decreased productivity is due to moisture stress caused due to long dry spells during June to August months after sowing. During the last couple of decade, the district has been experiencing climate variability with respect to shift in the rainfall pattern as well as its distribution. This situation has severely affected the productivity of Maize and income of farmers.

KVK INTERVENTIONS :

KVK adopted Mahalingapur village in Gadag taluk under NICRA project. The village is representative village of the district with respet to productivity constraints in Maize. Since Maize is the important crop of the village, KVK made interventions of intercropping of Redgram in Maize in the ratio of 5:1, Short duration TS-3R variety of Redgram was introduced as intercrop. Maize crop suffers from moisture stress during vegetative stage (45-50 DAS) resulting in less yield. On the contrary, Redgram also suffers from moisture stress during early vegetative stage. But later the crop gets sufficient moisture during grand growth period and flowering stage as the crop duration of the Redgram is long (155 days) compared to Maize. Redgram crop escapes moisture stress as sufficient rains coincides with grand growth, flowering and pod formation period.

KVK organised Front Line Demonstration on Maize+Redgram intercropping system in Mahalingapur and surrounding villages of Beladhadi, Kabalayatakatti and Nabhapur. The details of programmes implemented year-wise is presented in Table:-1

Table:1 FLD programme on Maize+Redgram intercropping system

Sl. No	Year	Area (Ha.)	No. of farmers
1	2015-16	8	20
2	2016-17	30	75
3	2017-18	16	40
4	2018-19	20	50
	TOTAL	**74**	**185**

During four year period, KVK introduced Maize+Redgram intercropping system in 74 ha. covering 185 farmers

DETAILS OF TECHNOLOGIES DEMONSTRATED :

Maize +Redgram intercropping system was demonstrated with following technologies:

- Introduction of Redgram as an intercrop in Maize as Redgram can sustain early and mid-season drought during Kharif season.
- Demonstration of medium duration TS-3R variety in Redgram @7.5kg/ha.
- Seed priming with Calcium Chloride @ 2% to enhance germination percentage, to improve the crop vigour and to induce drought tolerance to the crop.
- Seed treatment with Bio-fertilizers (PSB & Rhizobium) which facilitates drought tolerance in crops through the supply of nutrients.
- Opening of conservation furrows at every 25-30 feet interval at 20-25 DAS for insitu moisture conservation during crop growth period for enhancing moisture availability to the crop.
- Foliar spray of Pulse Magic @ 1% (mixture of micronutrient formulated by UAS, Raichur for pulse crops) during flowering stage for enhancing pod setting percentage and pod development through supplementation of micronutrients.
- Biological control of pest in Redgram for effective control of pod borer through pheromone traps and yellow sticky traps.

RAINFALL PATTERN :

Rainfall data of Mahalingapur cluster of villages is presented in Table-2. The data presented reveals that out of four years the average rainfall of 3 years i.e. 2015-16, 2016-17, 2017-18 and 2018-19 is very less compared to normal rainfall.

Table-2 : Rainfall data in Mahalingapur cluster of villages

Months	Normal	2015-16	2016-17	2017-18	2018-19
		Actual	Actual	Actual	Actual
June	85.20	67.76	110.70	5.90	52.40
July	70.60	8.63	61.00	14.60	9.30
August	75.40	68.50	57.00	47.60	29.10
September	137.40	91.80	141.30	129.40	27.70
	368.60	**236.69**	**370.00**	**197.50**	**118.50**
% of deviation		**-35.78**	**+0.37**	**-46.41**	**-67.85**

ECONOMIC PERFORMANCE OF DEMONSTRATION:

KVK demonstrated Maize+Redgram intercropping system along with resilient technologies in 74 ha. covering 185 farmers in Mahalingapur cluster villages during 4 years period. The data presented in Table-3 reveals that average crop equivalent yield of 36 Qtls./ha was achieved in the demonstration plots. The data clearly reveals that there has been doubling of income in demonstration plots compared to sole cultivation of Maize during all the four years. When we look into average net returns, it was triple as against local check. It is interesting to note that these yield level are achieved even during deficient rainfall years (Table:-2)

Table: 3-Economic performance of Maize+Redgram intercropping system

Year	Area (ha.)	No. of farmers	Yield (Qtl./ha.)			Crop Equivalent yield (Qtls./ha.)	Net Returns (Rs./ha.)	
			Demo		Local Maize as sole crop		Demo	Local
			Maize	Redgram				
2015-16	85.20	20	18.40	4.95	21.95	36.96	11374	712
2016-17	70.60	25	14.66	5.60	17.90	33.83	13653	4678
2017-18	75.40	40	20.00	5.75	24.50	42.50	13375	2368
2018-19	137.40	50	21.50	2.98	24.77	30.33	12607	8528
TOTAL	**368.60**	**185**	**18.59**	**4.82**	**22.28**	**36.00**	**12752**	**4071**

ADDITIONAL NET RETURNS FROM DEMONSTRATION FIELD :

The data presented in Table-4 reveals that 185 farmers participating in demonstration programme in 74 hectares got Rs.12.50 lakhs as additional returns during 4 year period from 2015-16 to 2018-19. This is one of the good indicator of impact of

Maize+Redgram intercropping system. This has created lot of impact in terms of spread of technologies to other farmers.

Table: 4-Additional returns from Maize+Redgram intercropping system

Year	Yield		Additional Yield (Qtls./ha.)	Price (Rs./ qtl)	Additional Returns (Rs. /ha)	Total area of demo (ha.)	Total additional returns from demo (Rs.)
	Demo Yield CEY (Qtls/ha.)	Local check (Qtls./ha.)					
2015-16	39.96	21.95	15.01	1200	18012	8	144096
2016-17	33.83	17.90	15.93	1300	20709	30	621270
2017-18	42.50	24.50	18.00	1150	2070	16	331200
2018-19	30.33	24.77	5.56	1400	7784	20	155680
TOTAL						**74**	**1252246**

SPREAD OF TECHNOLOGY TO OTHER FARMERS :

As a result of KVK interventions through Front Line Demonstrations, trainings and extension programmes , there has been a spread of the technology in 2100 ha. of area including area under demonstrations during last four years involving 2570 farmers. During 2018-19 itself 1500 ha. of area was brought under Maize+Redgram intercropping system. The spread has been noticed mainly in Mahalingapur cluster of village. This indicates that farmers have been convinced about the profitability of intercropping system. During last four years, 2570 farmers have got net returns of Rs.270 lakhs, thus contributing lot to the district economy.

Table: 5-Year wise approximate spread of area and total net returns in Maize+Redgram intercropping system

Year	Area (ha.)	No. of farmers	Net Returns (Rs./ha.)	Total net returns (Rs.)
2015-16	8	20	11374	90992
2016-17	100	150	13653	1365300
2017-18	500	700	13375	6687500
2018-19	1500	1700	12607	18910500
TOTAL	**2108**	**2570**	**51009**	**27054292**

CONCLUSION :

Maize+Redgram intercropping system with resilient technologies demonstrated by KVK has created a huge impact in Mahalingapur cluster of villages in terms of good net returns and income of farmers. Farmers have been convinced about the profitability of technologies as

good net returns were achieved during drought years of 2015-16, 20117-18 and 2018-19. There has been a spread of technologies in 2500 ha. involving 2570 farmers in Mahalingapur cluster of village in last four years and these farmers got Rs.270 lakhs as net returns. Thus the demonstrations have huge impact in improving the income of farmers in rain shadow district of Gadag.