FARMERS' FIELD SCHOOLS (FFS): A SUSTAINABLE APPROACH IN THE TANK COMMANDS OF NORTH EASTERN KARNATAKA (INDIA)

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ABSTRACT

In the history of Indian agriculture, farmers followed many indigenous technologies in the integrated management of crop production. These were not only economically, socially and environmentally feasible but also sustainable. Many indigenous technologies are disappearing these days due to the modernization of agriculture. In order to retain these technologies among farming communities, the government of Karnataka conducted Farmers Field Schools (FFS) through the Community Based Tank Management Consultancy Project (CBTMCP) from the University of Agricultural Sciences (UAS), Dharwad in three districts of north eastern Karnataka (India) in selected tank commands rejuvenated by *Jala Samvardhane Yojana Sangha* (JSYS, a World Bank sponsored project).

The study was conducted with the objective of identifying and analyzing the cost and returns of FFS demonstrated crops and studying the impact of FFS on the socio-economic condition of farmers and its sustainability of practice. The multistage random sampling technique was used to select 45 farmers from three selected tank commands and due care was taken so that the majority were interviewed. Primary data was collected by the personal interview method. Tabular analysis and the Partial Budgeting technique was employed to analyze the data.

The analysis gave many interesting and valuable results. In FFS plots, returns increased over control plots for many valid and scientific reasons. The FFS successfully communicated information on modern crop production technology and sustainable management of resources to the farming community. The impact study of FFS revealed that most of the sample farmers adopted various methods of cultivation by utilizing most of the inputs uneconomically in their farming. FFS showed how rational use of inputs and recommended cultivation practices in the same farmers' fields could enhance farmers' incomes. To educate farmers regarding modern production technologies, efforts were made through FFS by adopting IPM and INM techniques. These technologies not only enhanced resource productivity but also conserved natural resources which increased the sustainability of the system. Based on this lesson, extension agencies should make necessary arrangements to provide technical guidance for agricultural enterprise as a whole to increase productivity in the tank commands. Thus

FFS has emerged as a new conduit for communicating information to the farming community.

INTRODUCTION

'Tank' refers to a reservoir impounding run-off water behind earthen bunds and embankments constructed across the slope of a valley to harvest and store water in the rainy season and used for irrigation and other purposes. Tanks are a historical innovation to deal with monsoon irregularities and reduce the risk of uncertainties in water availability in dry zones. There are about 127,000 tanks in southern India in Andhra Pradesh, Tamil Nadu and Karnataka. Tanks can be effectively used for the development of backward areas and have been used for domestic purposes from time immemorial. They also serve as an important source of ground water recharge.

Tank irrigation is an age old established practice in most of the semi-arid tropical parts of India and particularly in south (peninsular) India. Tank irrigation is less capital intensive and has wider acceptance compared to major irrigation projects. The tank irrigation system has a special significance for marginal and small farmers who depend on tank irrigation. This study was conducted to throw light on the impact of Farmers Field Schools (FFS) which were introduced in the study area by the Community Based Tank Management Consultancy Project (CBTMCP) of UAS, Dharwad to learn about its use and impact on the farming community to achieve balanced, integrated, overall agricultural development of the tank command farmers of north eastern Karnataka.

During the past few decades, considerable attention has been focused on the plight of the rural poor in developing countries. One aspect of this emphasis has been to direct agricultural research specifically to the needs and aspirations of farmers with limited resources. Indian farming is dominated by small and marginal farmers accounting for about 75% of total

holdings but commanding only about 26% of the total cultivated area. The land acquired by this category of farmers is meagre and provides very low levels of income and limited employment to the farm family. Even today, the socio-economic conditions of small and marginal farmers are miserable. Generally, technologies offered to small farmers have come from a top-down approach, meaning that research would be largely initiated and conducted on experimental stations and then offered to farmers to accept or reject. As a result, farmers rejected many of the proposed changes because the suggested improvements were impracticable, too risky, inappropriate or the farmers lacked adequate inputs and suitable markets. In short, the technologies were not suitable because the researchers did not know or consider the condition of small and marginal farmers who mostly operate in diverse and risk-prone production. Research, extension and other programs need to come together to address these deficiencies, if small farmers in developing countries are to be helped.

As a milestone to achieve the above ne**ed**, the University of Agricultural Sciences, Dharwad was entrusted with the responsibility of improving agricultural productivity and promoting practices that improve the efficient use of resources in tank command areas. In order to fulfill the responsibility effectively, FFS were conducted. This approach is a non-formal, learner-centered educational process and an innovative, participation-oriented program to build the technical knowledge of tank command farmers and empower them to find solutions to their own problems in farming and to increase farmers' self-confidence and decision-making abilities through group discussions and meetings with a final focus on achieving profitability for farming in tank command areas (CBTMCP Report, 2003). FFS plots were compared to check plots in terms of cost and returns to assess the impact of FFS on farmers' yields and net returns. The details are presented in Table 1.

North eastern Karnataka comprises two major districts, Bidar and Bellary, falling under the north-eastern transitional zone and northern dry zone of Karnataka. Due to similar agro-climatic conditions almost all types of field crops are grown successfully in these districts. The climatic conditions are suitable for growing all types of field crops and, if irrigation is available, sugarcane, paddy and horticultural crops. Rearing of cross-breed cows, poultry and fish farming are other potential agro-based activities contributing to the income of farm families. Integration of these activities in farming helps to raise the overall productivity and income of farmers in these districts.

METHODOLOGY

Primary data were collected through the personal interview method using pre-tested, well-structured schedules designed for the purpose. The data so collected pertained to the agricultural year 2003-04. Tabular analysis and partial budgeting techniques were employed for the computation of means and percentages to present the data regarding the costs and returns and to study the impact of FFS on the income of sample farmers in the study area.

The multistage sampling technique was adopted for the selection of the study area and sample respondents. In the first stage, two districts - *Bidar* and *Bellary* - from north eastern part of Karnataka where FFS were conducted in the selected tank commands werechosen. These tanks are managed by *Jala Samvardhane Yojana Sangha* based on all variabilities of agro-climatic conditions. At the second stage, based on number of FFS conducted, one tank - *Shedol* in *Bidar* district - and two tanks - *Hoskere* and *Kenchattanalli* in *Bellary* district - were selected. At the third stage, fifteen FFS beneficiaries and non-beneficiaries' sample respondents were selected from each tank command, ensuring that the majority of the demonstrating farmers were included in the study. 45 farmers were selected from the study area.

RESULTS AND DISCUSSION

To assess the impact of FFS on economic conditions of the sample farmers, the cost and returns were computed for the demonstrated plot in FFS and the results compared with control plots for the production of selected crops following farmers' practices with similar situations. The costs incurred and returns realized in the production of selected crops under FFS in *Bidar* and *Bellary* districts are presented in Tables 2, 3 and 4. The gist of costs and returns of demonstrated crops of FFS plots and control plots in tank commands of *Bidar* and *Bellary* district are presented in Table 5. While calculating the cost and returns structures of FFS plots (FFS's beneficiaries' plots) compared with control plots (FFS non-beneficiaries), the fixed cost was taken as the same for both plots as they were compared under similar situations.

Bidar District

The results of FFS conducted for red gram crops in *Shedol* tank command are presented in Table 2. It is interesting to note that the total cost (Rs.11, 920.64/ha) incurred was less by Rs. 1,515.35 per hectare than that of the control plot (Rs.13, 435.99/ha). This was mainly due to reduced costs for non-application of plant protection chemicals. The technological interventions in the FFS plot resulted in a substantial increase in yield of 14 quintals, while it was only 9.85 quintals in the control plot. This resulted in net additional returns of Rs.5, 686.97 per hectare showing compatibility of high yielding variety BSMR-736 to the region over other varieties like *Maruthi* commonly grown by the farmers in the study area.

The per hectare increase in gross returns in the FFS plot amounted to Rs.5, 686.97. The use of home prepared *Neem* Seed Kernel Extract (NSKE) plus garlic extract, application of vermicomposting and recommended doses of fertilizers (Table 2), together contributed to additional net returns of Rs.7, 202.32 per hectare in the FFS plot over the control plot, taking account of the reduced cost of cultivation. The returns per rupee of expenditure were Rs.2.03 and Rs.1.38 respectively for the FFS plot and control plot.

Bellary District

The impact of FFS on groundnut crops in *Hoskere* tank command (Table 3) showed that the per hectare total variable cost was more in the case of the FFS plot (Rs.14,480.39) as compared to the control plot (Rs. 12,323.59). The additional cost incurred on FFS plot over control plots was Rs.2, 966.79. The major contributing factors were the increased cost of FYM, *Rhizobium* and recommended doses of fertilizer with Z_nSO_4 and gypsum. This resulted in a per hectare total cost of Rs.17, 058.96 and Rs.14, 092.17 in the FFS and control plots respectively. The gross return realized per hectare was Rs. 31,994.59 in the FFS plot and Rs. 16,512.63 in the control plot, whereas the net returns in the FFS and control plots were Rs. 14,885.63 and Rs. 1,610.46 respectively. The return per rupee of expenditure was 1.87 and 1.10 in that order. The increase in cost on FFS plots over control plots was Rs. 2,966.79, and an increase in gross return over control plots was Rs.15, 481.96. The net additional return of Rs.12, 515.17 was realized in FFS plots over control plot counterparts. This was mainly due to use of bio-fertilizers, application of recommended doses of fertilizer and use of NSKE and garlic extract for effective control of disease, all together enhancing the returns per rupee of expenditure in FFS plots over control plots. Similar results are quoted by Chowdhary *et al.,* (1980).

The FFS conducted on cauliflower crops in *Kenchattanahalli* tank command in *Bellary* district clearly indicated that the total variable cost and total cost were more in FFS plots with Rs.18, 211.72 and Rs.24, 693.15 respectively. The gross return was Rs.50, 016.00 with returns per rupee of expenditure of 2.02. In the case of control plots, the expenditure incurred for variable inputs and total cost were respectively Rs.16,339.67 and Rs.22,821.10 .The additional cost incurred, gross and net returns realized in case of FFS plots for cauliflower over control plots were Rs.1,915.45, Rs.7,822.25 and Rs.5,907. The factors attributed for additional returns on FFS plots over control plot s were application of fertilizers based on soil requirement, vermicomposting (@ 3q/ha) /NSKE plus garlic extract to have effective control of pests in cauliflowers (Table 4). Meanwhile no major cost was incurred on plant protection chemicals. The demonstration of integrated pest management technology in cauliflowers was proved to be much more profitable than the normal practice followed by farmers in the study area.

CONCLUSION

Based on the findings of the above study, it is clear that in all the crops demonstrated, increases in yield and net returns realized in FFS plots were substantially higher than control plots and achieved by reducing the cost of cultivation and also by increased yield, thus indicating adoption of recommended packages of practices along with integrated pest and disease management, integrated nutrient management can lead to the better profitability of crop enterprises by increasing productivity. The FFS approach can become a sustainable approach for the farming community while disseminating new, stable and sustainable technologies in the near future.

REFERENCES

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Chowdhary, K.R., Prasad, Y.E. and Reddy, G. K., 1980, Analysis of yield gaps and constraints for groundnut crop in Ananthpur Region. Food farming and Agriculture, 19 (3): 59-84.

Table 1: Details of Farmers Field School conducted in the study area

Sl. No.	District	Village	Intervention	crop
1	Bidar	Shedol	IPM/INM	Redgram
2	Bellary	Hoskere	INM	Groundnut
		Kenchattanahalli	IPM	Cauliflower

Table 2: Cost and returns structure in red gram production under FFS and control plots in *Shedol* tank command of *Bidar* district

(Per hectare)

Sl No.	Particulars	Unit	FFS plot		Control plot	
			Phy.qty	Value	Phy.qty	Value
I	**Variable Cost (VC)**					

1	Human labour	M.D	63.38	2724.48	62.90	2705.08
	a) Family labour		46.26	1989.49	40.89	1758.30
	b) Hired labour		17.12	736.16	22.01	946.78
2	Machine labour			235.10		
3	Bullock labour	B.P	15.02	1502.00	14.54	1454.45
4	Seed	Kg	13.60	448.80	11.80	387.90
5	FYM	t	6.00	1800.00	8.60	2582.1
6	Fertilizer					
	a. Nitrogenous	Kg	40.0	200	15.00	75.00
	b. Phosphatic	Kg	30	291	36.48	353.85
	c. Potassic	Kg	40	184		
	d. $ZnSO_4$					
	e. Gypsum					
7	Bio-fertilizers					
	a. Vermicompost	q	3	750.0		
	b. Pheramone trap	No.				
8	PPC	lt.			7.65	2132.93
9	Weedicides					
10	1. NSKE + garlic extract	lt .	15	150.0		
	2. Bio- control agent					
11	Miscellaneous charges	Rs.		230.12		218.37
12	Interest on working capital	Rs.		723.81		842.53
	Total Variable Cost (TVC)	**Rs.**		**9239.31**		**10754.66**
II	**Fixed Cost (FC)**					
	1. Land revenue	Rs.		6.41		6.41
	2. Depreciation charges	Rs.		256.82		256.82
	3. Rental value	Rs.		2185.47		2185.47
	4. Interest on FC	Rs.		232.62		232.62
	Total Fixed Cost(TFC)	**Rs.**		2681.33		2681.33
III	**Total Cost (TC)**			**11920.64**		**13435.99**
	Main product	Q	14.00	22820.00	9.85	16801.73
	By-product	t	2.86	1430	3.14	1761.3
	Gross returns			24250.0		18563.03
IV	**Net Returns**	**Rs.**		**13214.36**		**5127.04**
	B:C ratio			2.03		1.38
V	Increase in cost in FFS plots over control plots		-1515.35			
VI	Increase in returns over control plots		5686.97			
VII	Net additional returns		7202.32			

Table 3: Cost and returns structure in groundnut production under FFS and control plots in *Hoskere* tank command of *Bellary* district

(Per hectare)

Sl. No.	Particulars	Unit	FFS plot		Control plot	
			Phy. qty	Value	Phy. qty	Value
I	**Variable Cost (VC)**					
1	Human labour	M.D	56.54	2431.22	64.79	2785.97
	a) Family labour		39.57	1701.51	38.87	1671.58
	b) Hired labour		16.97	729.71	25.92	1114.39
2	Machine labour			375.40		375.40
3	Bullock labour	B.P	16.77	1677.00	13.65	1365.15
4	Seed	Kg	112.15	3588.8	75.40	2449.79
5	FYM	t	7.0	2100	881	2641.95
6	Fertilizer					
	a. Nitrogenous	Kg	150	750	17.0	85.0
	b. Phosphatic	Kg	50	230	43.10	418.07
	c. Potassic	Kg	40	407	19.0	87.40
	d. $ZnSO_4$	Kg	20.00	300		
	e. Gypsum	q	5.00	400.00		
7	Bio-fertilizers					
	a. Rhizobium	Kg	1.23	185.00		
8	PPC	lt/gm	296.0	111.15	3.25	905.04
9	Weedicides					
10	a. NSKE + garlic extract	lt.	10.00	50.00		
	b. Bio- control agent					
11	Miscellaneous charges	Rs.		242.82		242.82
12	Interest on working capital	Rs.		1134.40		965.44
	Total Variable Cost (TVC)	Rs		**14480.39**		**12323.59**
II	**Fixed Cost (FC)**					
	1. Land revenue	Rs		17.34		17.34
	2. Depreciation charges	Rs		247.38		247.38
	3. Rental value	Rs		2090.38		2090.14
	4. Interest on FC	Rs		223.71		223.71
	Total Fixed Cost (TFC)	Rs		2578.57		2578.57
III	**Total Cost (TC)**	**Rs**		**17058.96**		**14092.17**
	Main product	Q	20.56	28629.59	9.74	13562.88
	Bi-product	t	6.63	3315.0	4.86	2949.75
	Gross returns	Rs.		31944.59		16512.63
IV	**Net Returns**	**Rs.**		**14885.63**		**1610.46**
	B:C ratio			1.87		1.10
V	Increase in cost in FFS plot over control plot		2966.79			
VI	Increase in returns in FFS over control plot		15481.96			
VII	Net additional returns		12515.17			

Table 4: Cost and returns structure in cauliflower production under FFS and control plots in *Kenchattannahalli* tank command of *Bellary* district

(Per hectare)

Sl. No.	Particulars	Unit	FFS plot		Control plot	
			Phy.qty	Value	Phy.qty	Value
I	**Variable Cost (VC)**					
1	Human labour	M.D	110.50	4751.5	104.50	4493.5
	a) Family labour		68.95	2964.5	64.79	2785.97
	b) Hired labour		41.55	1786.65	39.71	1707.53
2	Machine labour			375.00		430.25
3	Bullock labour	B.P	22.54	2254.00	18.54	1854.0
4	Seed	Kg	0.60	1482.00	0.60	1480.0
5	FYM	t	12.00	3600.00		
6	Fertilizer					
	a. Nitrogenous	Kg	150	750	100	500
	b. Phosphatic	Kg	100	460	25	242.50
	c. Potassic	Kg	100	970	50	230.0
	d. $ZnSO_4$	Kg				
	e. Gypsum					
7	Bio-fertilizers					
	a. Vermicompost	q	3.00	750.00		
	b. PSB	Kg	2.50	20.00		
8	PPC	lt/kg	4.9	122.50	8	4579.36
9	Weedicides					
10	1. NSKE + garlic extract	lt.	10.00	100.00		
	2. Bio- control agent					
11	Miscellaneous charges	Rs.		1150.00		1250.00
12	Interest on working capital	Rs.		142672		1280.06
	Total variable cost	Rs.		18211.72		16339.67
II	**Fixed cost (FC)**					
	1. Land revenue	Rs.		12.56		12.56
	2. Depreciation charges	Rs.		346.68		346.68
	3. Rental value	Rs.		5559.28		5559.88
	4. Interest on FC	Rs.		562.31		562.31
	Total Fixed Cost (TFC)	Rs.		6481.43		6481.43
III	**Total Cost (TC)**	**Rs.**		**24693.15**		**22821.10**
	Main product	Q	250.08	50016.0	201.39	40278.00
	Bi-product					
	Gross returns	Rs.		50016.0		40278.00
IV	**Net Returns**	**Rs.**		**25322.55**		**17456.9**
	B:C ratio			2.02		1.76
V	Increase in cost in FFS plots over control plots		1915.45			
VI	Increase in returns over control plots		7822.25			
VII	Net additional returns		5907			

Table 5: Costs and returns in FFS and control plots in tank commands of *Bidar and Bellary* district

(Rs. /ha)

Particulars	Bidar		Bellary			
	Shidol		Hoskere		Kenchattanahalli	
	Redgram		Groundnut		Cauliflower	
	FFS plot	Control plot	FFS plot	Control plot	FFS plot	Control plot
Total variable cost	9239.31	10754.66	14480.39	12323.59	18211.72	16339.67
Total fixed cost	2681.33	2681.33	2578.57	2578.57	6481.43	6481.43
Total cost (1+2)	11920.64	13435.99	17058.96	14092.17	24693.15	22821.10
Gross returns	24250.00	18563.03	31994.59	16512.63	50016.00	40278.00
Net returns (4 - 3)	13214.36	5127.04	14885.63	1610.46	25322.55	17456.90
B:C Ratio(Returns per rupee of expenditure (Rs.)	2.03	1.38	1.87	1.10	2.02	1.76
Increase in cost in FFS plot over control plot	-1515.35		2966.79		1915.45	
Increase in returns in FFS plot over control plot	5686.97		15481.96		7822.25	
Net additional returns	7202.32		12515.17		5907.00	

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