

Original Research Article

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## Economic Impact of Integrated Crop Management Farmers' Field Schools in Paddy Cultivation

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### ABSTRACT

The present study was conducted in Andhra Pradesh with the objective to assess the economic impact of Farmers' Field Schools (FFSs). The total sample size was 240 comprising 120 FFS farmers and 120 non-FFS farmers selected through random sampling method from three districts of Andhra Pradesh. The double difference method was used by analysing change in performance before and after the programme for FFS farmers to the change in performance over the same period for non-FFS farmers unaffected by the programme. The farmers were interviewed by using a structured interview schedule. The study revealed that there was the increase in the yield of paddy among FFS participants was 22.42 per cent whereas it was 11.36 per cent in case of non-FFS farmers. The average per hectare gross income obtained by FFS farmers during post FFS period was Rs.29131 which was Rs.7000 higher than the income (Rs.21847.00) gained by non-FFS farmers. The increase in per hectare net income after participation in FFS among FFS farmers was Rs.14158.81, whereas it was only Rs.2220.74 among non-FFS farmers for the same period. The Gross benefit Ratio for FFS farmers during post-FFS period was 1.15 while it was 0.98 in case of non FFS farmers. The FFS farmers experienced 67.95 per cent of change while the non FFS farmers experienced 50.65 per cent change in increased gross income compared to pre-FFS period. The increase in case of non-FFS farmers was only 50.65 per cent. With respect to net income the FFS farmers had an increase of 302 per cent compared 67.16 per cent in case of non FFS farmers. With respect to chemical pesticides 18.19 per cent cost was saved by FFS farmers while non-FFS farmers incurred an additional cost of 13.83 per cent. The study has further shown additional cost incurred by FFS farmers due to use of IPM inputs and neem products. However non-FFS farmers incurred more additional cost in use of chemical fertilizers than that of FFS farmers.

#### Keywords

Farmers Field School, Impact, Income, Yield, Variable cost, ICM practices

#### Article Info

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### Introduction

One of the biggest problems of the developments in agriculture over the years has been the tendency to generalize and make

recommendations for farmers across large and highly heterogeneous areas. This has been true invariably for all manner of input recommendations including fertilizers, pesticides and crop varieties. The local

specificity of inputs recommendation requires that farmers become experts while managing their farms. Maintenance of crop health by farmer is essential for successful farming for both yield and quality of produce. This requires long-term strategies for the minimization of pest and disease occurrence preferably by enhancing natural control mechanisms and growing a healthy crop.

In recent years, Farmers Field Schools (FFSs) have been promoted as an effective extension methodology to enhance the competency of farmers specially in introducing the complex technologies such as Integrated Crop Management (ICM) practices with a view of healthy, economical and sustainable crop management. Any training programme should be considered an investment with an identifiable stream of benefits that occur over time. A publicly funded training programme that follows the Farmer Field School (FFS) approach should be subjected to rigorous analysis and scrutiny because of the widespread perception that this concept is too expensive (Ooi *et al.*, 2005).

Thus, treating an FFS program in the context of cost-benefit analysis can help to answer the question of whether FFS is a justifiable investment or not. By keeping above facts in view the present study was undertaken to investigate the economic impact of FFS with respective Integrated Crop Management practices in paddy.

## **Materials and Methods**

Research was undertaken in Andhra Pradesh State where FFS was introduced in 1994. Out of 23 districts, three districts were selected purposively from three regions based on the largest area under paddy viz., West Godavari from Coastal Andhra region, Warangal from Telangana region and Kurnool from Rayalaseema region. Simple random

sampling procedure was followed in selection of farmers. A sample of 80 farmers including 40 FFS and 40 non-FFS farmers was selected from each region and the total sample size was 240 farmers. An *ex-post facto* research design was used.

The data on economic impacts were collected from FFS and non-FFS farmers during two periods namely pre-FFS and post-FFS periods. Thus, the double difference method was used which compared the change in performance before and after the programme for FFS farmers to the change in performance over the same period for non-FFS farmers unaffected by the programme. The farmers were interviewed by using a structured interview. The data for before FFS were collected through recall method. The economic impacts of FFS were studied with respect to the following: increase in income (gross income and net income) in rupees; yield difference (quintals per hectare); input cost saved/ added (human and bullock labour, seed, and fertilizers and plant protection chemicals) in rupees and change in labour in per cent as well as in frequency. Cost concepts given by CACP (Commission for Agricultural Cost and Price) were used to find the economic impact. Data were subjected to suitable statistical analysis like frequency and percentage analysis.

## **Results and Discussion**

It is evident from Table 1 that on an average the increase in yield of paddy through ICM practices was 11.31 q/ha (22.42 per cent change) among FFS participants, whereas, it was 5.76 q/ha (11.36 per cent change) in case of non-FFS farmers. In other words, there was 22.42 per cent of yield increase among FFS farmers during post FFS period when compared to pre-FFS period. The non-FFS farmers also reported an increase in yield. However, the percentage of increase was only

11.36 per cent. Thus, the impact of FFS in increase in yield was 11.06 per cent.

The investigation confirms the findings of other studies (Ramaswamy *et al.*, 1992 and Nanta, 1996) which observed that FFS farmers had 8 to 13 per cent higher rice yields than their non-FFS counterparts. The pesticide applications decreased with more IPM knowledge and FFS training, while rice yields increased by as much as 25 per cent.

### **Economic impacts of FFS due to adoption of ICM practices in paddy cultivation**

It is evident from the Table 2 that the increased per hectare average total variable cost among FFS farmers was Rs.12,914.90 which was about 74 per cent cost (Rs.17,568.64) among non-FFS farmers.

Reduction in cost of cultivation is the ultimate benefit that farmers usually derive from FFS participation. Such reduction in cost could be considered as one of the key indicators to determine the effectiveness of FFSs.

The study revealed that average per hectare gross income obtained by FFS farmers was Rs.29,131 which was Rs.7,000 higher than the income (Rs.21,847.00) gained by non-FFS farmers. The increase in gross income among FFS farmers was due to adoption of ICM practices. Overall increase in per hectare net income after participation in FFS among FFS

farmers was Rs.14,158.81, whereas it was only Rs.2,220.74 among non-FFS farmers.

The gross benefit ratio for FFS farmers during post-FFS period was 1.15, while it was 0.98 for non-FFS farmers with a difference of 0.17. The augmented gross benefit compared to pre-FFS was 0.25 in case of FFS farmers compared to 0.06 in case of non-FFS farmers.

It indicates that in case of FFS farmers, an investment of one rupee in paddy cultivation gives a return of one rupee 15 *paise* (for every one rupee investment, profit is 15 *paise*) whereas in non-FFS farmers it was almost nil (for every one rupee investment, there was no profit at all). Hence, FFS made an impact and was found to be more profitable for farmers.

The impact of FFS on farmers' income has also been documented by a few previous studies. According to the Best *et al.*, (1998) FFS participants in the Bangladesh Integrated Rice and Fish (INTERFISH) project used no pesticides and were able to harvest 17 to 33 per cent more rice, which increased their gross marginal income by 33 to 54 per cent.

By adopting ICM practices, FFS farmers have experienced favourable outcome in terms of increased yield reduced cost of cultivation, increased gross income and net income than non-FFS farmers in cultivation of paddy in the study area of Andhra Pradesh.

**Table.1** Yield increase through adoption of ICM practices in paddy

Category Farmers	Pre-FFS period	Post-FFS period	Difference	% change from Pre-FFS period (Qt/ha)
	(Qt/ha)	(Qt/ha)	(Qt/ha)	
FFS (N=120)	50.44	61.75	11.31	22.42
Non-FFS (N=120)	50.74	56.50	5.76	11.36

**Table.2** Economic impact of FFS due to ICM practices in paddy as compared with non-FFS farmers (N= 240)

Inputs/ Outputs	FFS Farmers		Difference (Rs)	non-FFS farmers		Difference (Rs)
	Pre-FFS period	Post-FFS period		Pre-FFS period	Post-FFS period	
	Value (Rs)	Value (Rs)		Value (Rs)	Value (Rs)	
<b>Human labour</b>	12306.52	17495.09	5188.57	12098.77	18215.36	6116.60
<b>Bullock labour</b>	910.83	668.75	-242.08	877.42	711.67	-165.75
<b>Machine labour</b>	5203.33	8492.23	3288.89	5101.08	8124.01	3022.93
<b>Seed</b>	826.04	1455.83	629.79	849.38	1580.63	731.25
<b>Manure</b>	2815.10	3513.23	698.13	2764.90	1859.06	-905.83
<b>Fertilizer</b>	6965.70	10042.52	3076.81	6802.50	14240.59	7438.10
<b>Chemical pesticides</b>	4956.04	4054.44	-901.60	4720.42	5373.23	652.81
<b>IPM inputs</b>	111.15	295.92	184.77	102.50	152.08	49.58
<b>Neem products</b>	98.65	430.00	331.35	99.58	117.71	18.13
<b>Irrigation</b>	112.50	150.00	37.50	112.50	150.00	37.50
<b>Interest on WC</b>	976.81	1599.57	622.77	1023.96	1597.29	573.33
<b>Total variable cost</b>	35282.68	48197.58	12914.90	34552.99	52121.63	17568.64
<b>Fixed Cost</b>	12269.50	14327.12	2057.62	12269.50	14327.12	2057.62
<b>Total Cost</b>	47552.18	62524.70	14972.52	46822.49	66448.75	19626.26
<b>Gross Income</b>	42874.00	72005.33	29131.33	43131.83	64978.83	21847.00
<b>Net Income</b>	-4678.18	9480.64	14158.81	-3690.66	-1469.92	2220.74
<b>GB Ratio</b>	0.90	1.15	0.25	0.92	0.98	0.06
<b>NB Ratio</b>	-0.10	0.15	0.25	-0.08	-0.02	0.06

**\* Negative sign is due to inclusion of fixed cost and variable cost in estimation of net income, but in reality fixed cost will be paid only once and will not be taken into account for all seasons**

**Table.3** Income Increased through ICM practices in paddy by FFS farmers in comparison with non-FFS farmers

Category Farmers	Gross Income (% increase over pre-FFS period )	Net Income (% increase over pre-FFS period)
FFS (N=120)	67.95	302.66
non-FFS (N=120)	50.65	60.17

**Table.4** Cost saved through ICM practices in paddy by FFS farmers in comparison with non-FFS farmers

Category Farmers	Bullock labour (% change over pre-FFS period)	Chemical pesticide (% change over pre-FFS period)
FFS (N=120)	-26.58	-18.19
Non-FFS (N=120)	-18.89	+13.83

**Table.5** Cost added through ICM practices in paddy by FFS farmers in comparison with non-FFS farmers

Category Farmers	% change over pre-FFS period						
	Human labour	Machine labour	Seed	Manure	Fertilizer	IPM inputs	Neem products
FFS (N=120)	42.16	63.21	76.24	24.80	44.17	166.24	335.90
Non-FFS (N=120)	50.56	59.26	86.09	-32.76	109.34	48.37	18.20

### Income increased through ICM practices in paddy cultivation

Income increased through ICM practices in paddy by FFS farmers in comparison with non-FFS farmers has been presented in Table 3. The data show that the FFS farmers experienced 67.95 per cent increased gross income over the pre-FFS period, the increase in case of non-FFS farmers was only 50.65 per cent. With respect to net-income, the FFS farmers had an increase of 302 per cent, compared to 60.17 per cent in case of non-FFS farmers over pre FFS period. Data revealed that FFS farmers have experienced increased gross income as well as net income than non-FFS farmers in cultivation of paddy through adoption of ICM practices. Thus, involvement of the FFS farmer in FFS helped them to have significant gain in income when compared to non-FFS farmers.

### Cost saved through ICM practices in paddy cultivation

The data in Table 4 show that 26.58 per cent of cost saved by FFS farmers relating to bullock labour while 18.89 per cent of cost was saved by non-FFS farmers. In case of chemical pesticides 18.19 per cent of cost was saved by FFS farmers whereas, non-FFS farmers had incurred an additional 13.83 per cent cost. This indicates that non-FFS farmers spent nearly an additional cost of 39.13 per cent on chemical pesticides, compared to the expenditure of FFS farmers.

Due to the application of less plant protection chemicals, there was reduction in cost by 18.19 per cent in case of FFS farmers but it was increased in case of non-FFS farmers by 13.83 per cent as they did not follow IPM practices. Thus, this study confirms the

finding of other studies on Farmer Field Schools which have reported reduction of pesticide application and cost savings. According to Pincus (1991), FFS graduates in Indonesia reduced insecticide application from an average of 2.8 sprays per season to less than one. Further, IPM methods promoted in FFSs, typically ranged from simple practices such as not applying pesticides in the first 30 days after planting (no early spray) to more complex ones that necessitate in depth agro-ecological and crop management knowledge such as being able to differentiate beneficial from harmful insects and creating a conducive environment for pest predators (Ricker *et al.*, 2008). Thus, the FFS farmers applied chemicals not in an indiscriminate manner like non-FFS farmers.

#### **Costs added through ICM practices in paddy cultivation**

Cost added with ICM practices in paddy by FFS farmers in comparison with non-FFS farmers has been presented in Table 5. The data show that considerable changes have happened in expenditure on various critical inputs by both the groups during post-FFS period. With respect of FFS farmers, it is observed that 335.90 per cent of cost was added in neem based products (NSKE, Neem oil etc.,) as against of 18.20 per cent of cost in case of non-FFS farmers. Regarding IPM related inputs (bird perches, pheromone traps) 166.24 per cent of cost was added by FFS farmers in comparison with the 48.37 % cost added by non-FFS farmers.

Data further indicate that there is relatively less difference observed related to cost added in case of inputs such as seed, machine labour and human labour. But with regard to application of fertilizers, 109.34 per cent additional cost was incurred by non-FFS farmers compared to 44.17 per cent additional cost increased by FFS farmers. The cost on

manures was reduced in case of non-FFS farmers whereas, it was increased by 24.8 per cent under FFS farmers situation.

In conclusion the FFS has generated substantial discussion among the scientific community regarding sustainable economic impact. The present study tried to answer following questions as a result of adoption of ICM practices: Whether there is increase in yield? Whether there is increase in gross and net income?. In relevant to economic impact of FFS, the benefit-cost ratio of the study revealed that for every one rupee investment, there is a profit of 15 *paise* in FFS farmers as compared to non-FFS farmers where there is no profit. This is a positive phenomenon which can increase the acceptance and further spread of FFS concept among farming community.

The significant reduction of production costs and increase in net income by FFS farmers through adoption of ICM practices are the positive effects of FFS. The primary purpose of FFS program was to provide farmers with adequate knowledge and skills to improve their decision making process so that with this new knowledge and new skills, they could make better decisions (balanced use of fertilizers and pesticides) on how to improve the productivity of their paddy fields. Due to higher wage rates there was no savings appeared in case of human labour. In other hand the excessive use of machine labour reduced not only expenses but also time spent over bullock labour drastically.

The above result confirms that FFS is a justifiable investment and also suggest that the demand for FFS may continue to be higher in those areas where pesticide overuse is widespread and pesticide reduction can lead to high benefits. This would be concurrent with areas where farmers practice intensive methods of farming and where so far

economic considerations in the application of pesticides have been ignored.

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