Impact of Farmers' Field School on Farmer's Knowledge of Integrated Crop Management Practices in Paddy

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ABSTRACT

The present study was conducted in Andhra Pradesh to assess the impact of Farmers' Field Schools on knowledge and adoption of Integrated Crop Management (ICM) practices in paddy. A total of three districts were selected purposively from the three regions of Andhra Pradesh based on the area under paddy. The total sample size was 240 comprising 120 FFS farmers and 120 non FFS farmers. The knowledge level of the farmers was measured through a knowledge test developed for the purpose. The data were collected though interview schedule. The study revealed that knowledge level of farmers of FFS was higher than the knowledge of non FFS farmers with regard to all the ICM practices such as integrated nutrient management, seed management, water management and integrated pest management. The results of the t-test showed that the difference between the knowledge level of the FFS and non FFS farmers was statistically significant. It was concluded that FFS methodology is an effective extension tool to enhance farmer's knowledge related to complex crop management practices in paddy.

Key word: *Knowledge; ICM practices; FFS farmers; Non FFS farmers;*

The progress and prosperity of a nation to a very great extent depends on how far its agriculture sector is advanced and modernized. Adoption of improved and innovative agricultural technologies by the majority of agriculturists is a pre-requisite to agricultural development in the developing countries like India where the economy is mainly based on agricultural sector. One of the main challenges that extension and research is currently confronting is effective transfer of agricultural technology. Due to rapid technological and scientific growth, the problem gets even more complicated and intricate. Beside these, lack of knowledge of innovative technologies is another key fundamental problem for agricultural development.

The Farmer Field School (FFS) is one of the most effective extension approaches ever developed (*Dinpanah et al. 2010*). It is a group-based learning process where farmers carry out experiential learning activities that help them to understand the ecology of their crop fields. These activities involve simple experiments, regular field observations and group analysis. The knowledge gained from these activities enables participants to make their own locally specific decisions about crop management practices (*Kenmore, 2002*). Modification of any crop production practice ultimately affects yield through complex interactions with the crop and environment. This approach represents a radical departure from earlier agricultural extension programmes, in which farmers were expected to adopt generalized recommendations that had been formulated by specialists from outside the community. Keeping the above facts in view the present study was formulated to measure component wise knowledge of Integrated Crop Management (ICM) practices in paddy with respective of farmers those who have been trained under FFS as compared with farmers those who have not been trained under FFS.

METHODOLOGY

The study followed an *expost-facto* research design. A total of three districts were selected purposively from three regions of Andhra Pradesh based on the area under paddy. The selected districts were: West Godawari from Coastal Andhra region, Warangal from Telangana region and Kurnool from Rayalaseema region. A total of six *mandals*, two

mandals from each district, and two villages from each *mandal* (one FFS village and one non FFS village) were selected based on random sampling. From each FFS and non FFS village, 20 farmers were selected through random sampling method. Thus the total sample of the study consisted of 240 farmers which had 120 FFS farmers and 120 non-FFS farmers. Data were subjected to descriptive statistics such as percentage analysis and independent t-test. Data were analyzed using the statistical package SPSS- 16. To measure the knowledge of farmers about different ICM practices in paddy a knowledge test was developed based on following standard steps:

i. Item collection: Forty multiple choice items were selected in the areas of Integrated Crop Management (ICM) practices with the help of relevant experts;

ii. Selection of items: Selection was carried out by applying standard criteria such as item should be thought provoking and it should discriminate the well informed respondents from the poorly informed ones;

iii. Item analysis: Forty items were administrated to thirty randomly selected non sample respondents for their response. Item analysis yielded Index of item difficulty and Index of item discrimination;

iv. Final selection of the items for the test: Items having an item difficulty index ranging from 0.40 to 0.60 and discrimination index range above 0.40 were considered for inclusion in the final knowledge test. Thus, the final knowledge test consisted of 26 item statements related to different components of ICM.

RESULTS AND DISCUSSION

Knowledge of ICM practices: The knowledge level of ICM practices was studied with respect to components like integrated nutrient management, seed management, water management and integrated pest management. The recommended practices related to integrated nutrient management consisted of soil testing, use of organic manures, optimum dose of chemical fertilizers application and corrective measures for micro-nutrients deficiency. Similarly, the recommended practices related to seed management consisted of seed rate, seed treatment and spacing. The recommended practices related to water management consisted of critical stages of water requirement, benefit of land leveling, timely weeding, alternate wetting and drying and maintenance of water depth.

Practices with respect to integrated pest management were further classified into four major sub components such as cultural control measures, mechanical control measures, biological control measures and chemical control measures. The recommended practices related to cultural control measures consisted of summer ploughing, selection of tolerant varieties and conservation of beneficial insects. Similarly, the practices related to mechanical control measures consisted of physical destruction of pests, insect trap benefits and clipping off seedling tips. The biological control measures consisted of botanical pesticides and bio-pesticides and chemical control measures consisted of the following: benefit of seedling root dip technique, knowing of registered plant protection products, observing appropriateness of chemical, awareness of banned chemicals and advantage of Economic Threshold Level (ETL) respectively.

Knowledge of crop production practices of FFS and non FFS farmers **:**

Integrated Nutrient Management : The results of knowledge level of farmers with respect to INM practices are presented in Table 1. The study reveals that in the case of FFS farmers, knowledge level was the highest for organic manures (80.83%) followed by optimum dose of chemical fertilizers application (70.83%), purpose of soil testing (61.67%), corrective measures for micro-nutrients deficiency (54.17%) and method of collection of soil sample (43.33%). In the case of non FFS farmers, the highest level of knowledge was found with regard to organic manures (75.83%) followed by optimum dose of chemical fertilizers application (43.33%), corrective measures of micro-nutrients (31.67%), purpose of soil testing (25.83%) and method of collection of soil sampling (17.50%).

A comparative analysis of knowledge level showed that the purpose of soil testing was known to 61.67 per cent of FFS farmers while only 25.83 per cent of non-FFS farmers knew about it. The correct method of soil sampling was known to 43.33 per cent of FFS farmers while only 17.50 per cent non-FFS farmers were aware of it. Both FFS (80.83%) and non-FFS (75.83%) farmers had high level of knowledge about organic manures. However, a large percentage of FFS farmers (70.83%) had knowledge of chemical fertilizers application when

Table 1: Knowledge regarding integrated nutrient management, seed management and water management practices in paddy (N=240)

Practices	% Knowledge		Differ-ence %
	FFS farmers (n=120)	Non FFS farmers (n=120)	
Integrated Nutrient Management			
Purpose of soil testing	61.67	25.83	35.84
Method of collection of soil sampling	43.33	17.50	25.83
Organic manures	80.83	75.83	5.00
Optimum dose of chemical fertilizers application	70.83	43.33	27.50
Corrective measures for micro-nutrients deficiency	54.17	31.67	22.50
Seed Management			
Seed rate	95.83	89.00	6.83
Seed treatment	63.33	34.17	29.16
Plant spacing	73.33	57.50	15.83
C) Water Management			
Critical stages of water requirement	93.33	86.67	6.66
Benefit of land leveling	98.33	93.33	5.00
Timely weeding	95.83	90.83	5.00
Alternate wetting and drying	91.67	87.50	4.17
Maintenance of water depth	93.33	87.50	5.83

compared to non-FFS farmers (43.33%). Similar situation existed in the case of knowledge of corrective measures for micro nutrients deficiency for FFS (54.17%) and non-FFS farmers (31.67%).

The data in Table 1 further show that the difference in knowledge level between FFS and non FFS farmers was the highest for purpose of soil testing (35.84 %), followed by chemical fertilizers (27.50%), method of collection of soil sample (25.83%), corrective measures of micro nutrient deficiency (22.50%) and organic manures (5.00 %).

The study revealed that participation in FFS has helped them in enhancing the overall knowledge of INM practices. The increase in knowledge level was high for soil testing (purpose & method) followed by optimum application of chemical fertilizers and corrective measures of micronutrient deficiency.

Seed Management: Table 1 reveals that the knowledge level of FFS farmers was the highest for recommended seed rate (95.83%) followed by plant spacing (73.33%) and seed treatment (63.33%). In the case of non FFS farmers, a similar situation existed though the percentage of knowledge level was relatively lower. A comparative analysis of knowledge level shows that both FFS (95.83%) and non FFS (89.00%) farmers had a higher level of knowledge about recommended seed rate. However, the knowledge of seed treatment was known to 63.33 per cent of FFS farmers while only 34.17 per cent of non-FFS farmers knew about it. Moreover a large percentage of FFS farmers (73.33%) had knowledge about plant spacing when compared to non FFS farmers (57.50%). The data in Table 1 further show that the difference in knowledge level between FFS and non FFS farmers was the highest for seed treatment (29.16%), followed by plant spacing (15.83%) and seed rate (06.83%).

The study showed that participation of farmers in FFS has helped them in enhancing the overall knowledge of seed management practices. The increase in knowledge level was higher in case of seed treatment followed by plant spacing and recommended seed rate.

Water Management : The investigation revealed (Table 1) that in case of FFS farmers with regard to water management practices the knowledge level was the highest for benefit of land levelling (98.33%) followed by timely weeding (95.83%), critical stages of water requirement and maintenance of water depth (93.33 %) and alternate wetting and drying (91.67 %). In case of non FFS farmers a similar situation existed. A comparative analysis of knowledge level shows that both FFS (98.33 %) and non-FFS (93.33 %) farmers had a higher level of knowledge about land leveling. The knowledge level was also high with regard to timely weeding (FFS 95.83 %, non FFS 90.83%), critical stages of water requirement (FFS 93.33%, non-FFS 86.67%) alternate wetting and drying (FFS 91.67 %, non FFS 87.50 %) and maintenance of water depth (FFS 93.33 %, non FFS 87.50 %). The data in Table 1 further show that the difference in knowledge level between FFS and non FFS farmers was very less in all areas of water management such as critical stages of water requirement (6.66%), maintenance of water depth (5.83%) benefit of land leveling and timely weeding (5.00%) and alternate wetting and drying (4.17%).

The study showed that participation in FFS has helped them in enhancing the overall knowledge of water

management practices. The increase in knowledge level was higher in case of critical stages of water requirement followed by maintenance of water depth.

Independent t-test was carried out to assess the significance of mean difference between FFS and non FFS farmers in relation to knowledge about ICM practices. Table 2 reveal that the calculated 't' values of all the components of ICM practices such as integrated nutrient management (6.04), seed management (5.74) and water management (4.07) were greater than the theoretical value of 1.97 with 238 degree of freedom. Thus it is clear that there was a significant mean difference between FFS and non FFS farmers' knowledge about crop production practices related to integrated nutrient management, seed management and water management.

Table 2. Significance of mean difference between FFS and non FFS farmers' knowledge about crop production practices (N=240)

Components	Farmers	Mean*	S.D	't' value
Integrated Nutrient Management	FFS	2.62	1.988	6.04**
Non FFS	1.29	1.343		
Seed Management	FFS	2.38	.676	5.74**
Non FFS	1.83	.803		
Water management	FFS	4.52	.879	4.07**
Non FFS	4.02	1.016		

Degree of freedom = 238;
*= Calculated based on actual knowledge score

The overall picture related to knowledge of crop production practices showed that the participation of farmers in FFS has helped them in significant level of gaining in the knowledge related to Integrated Nutrient Management (INM), seed management and water management.

Knowledge of IPM practices:

Cultural control measures: The results of knowledge level of farmers with respect to IPM practices are presented in Table 3. The study reveals that with respect to cultural control measures, knowledge level of FFS farmers was the highest in case of summer ploughing (100.00%) followed by selection of tolerant varieties (70.83%) and conservation of beneficial insects (55.83%). A similar knowledge level situation existed in case of non-FFS farmers though they had relatively lower level of percentage of knowledge.

Table 3: Component wise knowledge about integrated pest management (IPM) in paddy (N=240)

Practices	% knowledge		
	FFS farmers (n=120)	Non FFS farmers (n=120)	Difference %
Cultural control measures			
Summer ploughing	100.00	100.00	0.00
Selection of tolerant varieties	70.83	39.17	31.66
Conservation of beneficial insects	55.83	18.33	37.50
Mechanical control measures			
Physical destruction of pests	95.00	88.33	6.67
Insect trap benefits	60.00	26.67	33.33
Clipping off seedling tips	49.17	18.33	30.84
Biological control measures			
Botanical pesticides	95.83	79.17	16.66
Bio-pesticides	60.00	10.83	49.17
Chemical control measures			
Benefit of seedling root dip technique	54.17	23.33	30.84
Knowing of registered plant protection products	40.00	15.00	25.00
Appropriateness of chemical pesticides	46.67	18.33	28.34
Awareness of banned chemical pesticides	35.00	13.33	21.67
Advantage of Economic Threshold Level (ETL)	64.17	9.17	55.00

A comparative analysis of knowledge level shows that all (100.00%) farmers of the FFS as well as non-FFS villages had knowledge about summer ploughing. However, a large percentage of FFS farmers (70.83%) had knowledge of proper selection of tolerant varieties when compared to non-FFS farmers (39.17%). The conservation of beneficial insects was known to 55.83 per cent of FFS farmers while only 18.33 per cent non-FFS farmers were aware of it.

Table 3 further shows that the difference in knowledge level between FFS and non FFS farmers was the highest in case of conservation of beneficial insects (37.50%) followed by selection of tolerant varieties (31.66%) and no difference was found with respect to summer ploughing.

The study showed that participation in FFS has helped them in enhancing the overall knowledge of cultural control measures. The increase in knowledge

level was high in case of conservation of beneficial insects followed by selection of tolerant varieties.

Mechanical control measures: The investigation showed (Table 3) that in case of FFS farmers with regard to mechanical control measures the knowledge level was the highest in case of physical destruction of pest (95.00%) followed by benefits of insect traps (60.00%) and clipping off seedling tips (49.17%). A similar situation existed with the knowledge level in case of non FFS farmers though they had relatively lower level of percentage of knowledge. A comparative analysis of knowledge level shows that both FFS (95.00%) and non-FFS (88.33%) farmers had higher level of knowledge about physical destruction of pests. However, a large percentage of FFS farmers (60.00 %) had knowledge of insect trap benefits when compared to non-FFS farmers (26.67%). Similar situation existed in case of knowledge of clipping off seedling tips for FFS (49.17%) and non-FFS farmers (18.33%). The data in Table-3 further show that the difference in knowledge level between FFS and non FFS farmers was the highest in case of insect trap benefits (33.33%) followed by clipping off seedling tips (30.84%) and physical destruction of pests (6.67%).

The study revealed that participation in FFS has helped them in enhancing the overall knowledge of mechanical control measures. The increase in knowledge level was high in case of insect trap benefits followed by clipping off seedling tips.

Biological control measures: With respect to biological control measures the knowledge level of FFS farmers was the highest in case of botanical pesticides (95.83%) followed by bio-pesticides (60.00%). In case of non FFS farmers a similar situation existed with the knowledge level though they had relatively lower level of percentage of knowledge. A comparative analysis of knowledge level shows that both FFS (95.83%) and non-FFS (79.17%) farmers had high level of knowledge about botanical pesticides. However a large percentage of FFS farmers (60.00%) had knowledge of bio-pesticides while only 10.83 per cent of non FFS farmers were aware of it. The data in Table 3 further show that the difference in knowledge level between FFS and non FFS farmers was the highest in case of bio-pesticides (49.17%) followed by botanical pesticides (16.66%).

The study showed that participation in FFS has helped them in enhancing the overall knowledge of biological control measures. The increase in knowledge level was high in case of bio-pesticides followed by botanical pesticides.

Chemical control measures: The investigation revealed (Table 3) that in case of FFS farmers with regard to chemical control measures the knowledge level was the highest in case of benefit of Economic Threshold Level (64.17%) followed by benefit of seedling root dip technique (54.17%), appropriateness of chemical pesticides (46.67%), registered plant protection products (40.00%) and awareness of banned chemical pesticides (35.00%). In case of non FFS farmers with regard to chemical control measures the highest level of knowledge was found with respect to benefit of seedling root dip technique (23.33%) followed by appropriateness of chemical pesticide (18.33%), registered plant protection products (15.00%), awareness of banned chemical pesticides (13.33%) and benefit of Economic Threshold Level (9.17%) respectively.

A comparative analysis of knowledge level shows that the benefit of seedling root dip technique was known to 54.17 per cent of FFS farmers while only 23.33 per cent of non-FFS farmers knew about it. Registered plant protection products were known to 40.00 per cent of FFS farmers while only 15.00 per cent non-FFS farmers were aware of it. Moreover, as much as 46.67 per cent of FFS farmers had knowledge of appropriateness of chemical pesticides when compared to 18.33 per cent of non-FFS farmers. Similar situation prevailed in case of knowledge of awareness of banned chemical pesticides for FFS (35.00%) and non-FFS farmers (13.33%). Further, a large percentage of FFS farmers (64.17%) had knowledge of Economic Threshold Level when compared to only 9.17 per cent of non FFS farmers.

The data in Table 3 further show that the difference in knowledge level between FFS and non FFS farmers was the highest in case of advantage of Economic Threshold Level (55.00%), followed by benefit of seedling root dip technique (30.84%), appropriateness of chemical pesticide (28.34%), registered plant protection products (25.00%) and awareness of banned chemical (21.67%).

The study showed that participation in FFS has helped them in enhancing the overall knowledge of

chemical control measures. The increase in knowledge level was the highest for advantage of Economic Threshold Level followed by benefit of seedling root dip technique, appropriateness of chemical pesticides, registered plant protection products and awareness of banned chemical pesticides. Similar findings were reported by *Yaswanth et al. (2008)* and *Rustam (2010).*

Independent t-test was carried out to assess the significance of mean difference between FFS and non FFS farmers in relation to knowledge about IPM practices. Data in Table-4 reveal that the calculated 't' values of all the IPM practices such as cultural control measures (3.60), mechanical control measures (4.11), biological control measures (4.44) and chemical control measures (4.86) were greater than the theoretical value of 1.97 with 238 degree of freedom. Thus it is clear that there were significant mean difference between FFS and non FFS farmers' knowledge about all IPM practices.

Table 4. Significance of mean difference between FFS and non FFS farmers' knowledge about IPM practices (N= 240)

Components	Farmers	Mean*	S.D	't' value
Cultural control measures	FFS	2.35	.932	3.60**
	Non FFS	1.90	.999	
Mechanical control measures	FFS	2.09	.987	4.11**
	Non FFS	1.62	.757	
Biological control measures	FFS	1.45	.578	4.44**
	Non FFS	1.10	.640	
Chemical control measures	FFS	2.16	1.945	4.86**
	Non FFS	1.16	1.152	

DF = 238; *= calculated based on actual knowledge score

The overall picture related to knowledge of Integrated Pest Management (IPM) practices showed that the participation of farmers in FFS has helped them in enhancing the knowledge of IPM related to cultural control measures, mechanical control measures, biological control measures and chemical control measures.

CONCLUSION

The investigation has revealed that the participation of farmers in FFS has helped them in overall knowledge of crop production practices related to integrated nutrient management, seed management and water management. Significant level of gain in knowledge also occurred in all the components of IPM practices such as cultural control measures, mechanical control measures, biological control measures and chemical control measures. The FFS methodology focuses on experiential learning where farmers learn through experimenting, observation and practical exercises. Further, farmers also learn through one another in a group situation. Thus it is clear that FFS methodology is a potential extension methodology to enhance farmers' knowledge which is a basis for adoption of improved farming practices. Thus it can be concluded that FFS has enabled the farmers to enhance the knowledge related to ICM practices. The gain in knowledge has been experienced in all the areas of crop management practices. The findings also show the need for use of ICM methods as an important tool of extension to enhance farmers' knowledge which will become as basis for adoption.

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REFERENCES

Dinpanah, G., Mirdamadi, M., Badragheh, A., Sinaki, J. M., and Aboeye, F. (2010). Analysis of Effect of Farmers' Field School Approach on Adoption of Biological Control on Rice Producer'Producer'Characteristics in Iran. *Agri. & Environ. Sci*, **7** (3), 247-254.

Kenmore, P. (2002). A perspective on IPM. ILEIA Newsletter. **13**: 4-8

Rustam,R. (2010). Effect of integrated pest management farmer field school (IPMFFS) on farmers' knowledge, farmers groups' ability, process of adoption and diffusion of IPM in Jember district. *J. of Agril. Ext. and Rural Development*, **2** (2) : 029-035,

Yasavanth Kumar Naik, L. G., Jahagirdar, K. A., Natikar, K.V. and Hawaldara, Y. N. (2008). Study on knowledge and adoption level of integrated crop management practices by the participants of Farmers' Field School on maize. *Karnataka J. Agri. Sci.*, **23** (2): (386-389).

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