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 through 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 ex post 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)

<table>
<thead>
<tr>
<th>Practices</th>
<th>% Knowledge</th>
<th>Difference %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FFS farmers (n=120)</td>
<td>Non FFS farmers (n=120)</td>
</tr>
<tr>
<td><strong>Integrated Nutrient Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose of soil testing</td>
<td>61.67</td>
<td>25.83</td>
</tr>
<tr>
<td>Method of collection of soil sampling</td>
<td>43.33</td>
<td>17.50</td>
</tr>
<tr>
<td>Organic manures</td>
<td>80.83</td>
<td>75.83</td>
</tr>
<tr>
<td>Optimum dose of chemical fertilizers application</td>
<td>70.83</td>
<td>43.33</td>
</tr>
<tr>
<td>Corrective measures for micro-nutrients deficiency</td>
<td>54.17</td>
<td>31.67</td>
</tr>
<tr>
<td><strong>Seed Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed rate</td>
<td>95.83</td>
<td>89.00</td>
</tr>
<tr>
<td>Seed treatment</td>
<td>63.33</td>
<td>34.17</td>
</tr>
<tr>
<td>Plant spacing</td>
<td>73.33</td>
<td>57.50</td>
</tr>
<tr>
<td><strong>C) Water Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical stages of water requirement</td>
<td>93.33</td>
<td>86.67</td>
</tr>
<tr>
<td>Benefit of land leveling</td>
<td>98.33</td>
<td>93.33</td>
</tr>
<tr>
<td>Timely weeding</td>
<td>95.83</td>
<td>90.83</td>
</tr>
<tr>
<td>Alternate wetting and drying</td>
<td>91.67</td>
<td>87.50</td>
</tr>
<tr>
<td>Maintenance of water depth</td>
<td>93.33</td>
<td>87.50</td>
</tr>
</tbody>
</table>

The data in Table 1 further show that the difference in knowledge level between FFS and non FFS farmers was the highest for recommended seed rate (95.83%) followed by plant spacing (91.67%) and seed treatment (93.33%). The knowledge level was higher in case of FFS farmers with regard to water management practices. The knowledge level was the highest for critical stages of water requirement (93.33%), maintenance of water depth (93.33%), and alternate wetting and drying (91.67%). The knowledge level was also high with regard to timely weeding (95.83%), critical stages of water requirement (93.33%), and maintenance of water depth (93.33%).

The study showed that participation of farmers in FFS has helped them in enhancing the overall knowledge of INM practices. The increase in knowledge level was higher in case of soil testing (35.84%), followed by chemical fertilizers (27.50%), method of collection of soil sample (25.83%), corrective measures of micronutrient deficiency (22.50%) and organic manures (5.00%).
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 (N=240).

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

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

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.

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.

**REFERENCES**


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

<table>
<thead>
<tr>
<th>Components</th>
<th>Farmers</th>
<th>Mean*</th>
<th>S.D</th>
<th>‘t’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural control</td>
<td>FFS</td>
<td>2.35</td>
<td>.932</td>
<td>3.60**</td>
</tr>
<tr>
<td>measures</td>
<td>Non FFS</td>
<td>1.90</td>
<td>.999</td>
<td></td>
</tr>
<tr>
<td>Mechanical control</td>
<td>FFS</td>
<td>2.09</td>
<td>.987</td>
<td>4.11**</td>
</tr>
<tr>
<td>measures</td>
<td>Non FFS</td>
<td>1.62</td>
<td>.757</td>
<td></td>
</tr>
<tr>
<td>Biological control</td>
<td>FFS</td>
<td>1.45</td>
<td>.578</td>
<td>4.44**</td>
</tr>
<tr>
<td>measures</td>
<td>Non FFS</td>
<td>1.10</td>
<td>.640</td>
<td></td>
</tr>
<tr>
<td>Chemical control</td>
<td>FFS</td>
<td>2.16</td>
<td>1.945</td>
<td>4.86**</td>
</tr>
<tr>
<td>measures</td>
<td>Non FFS</td>
<td>1.16</td>
<td>1.152</td>
<td></td>
</tr>
</tbody>
</table>

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