Impact Assessment of Farmers Field Schools in Chhatarpur District.

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**Aims**

Much of rural India is suffering from what Prime minister Manmohan Singh has termed “technological fatigue in agriculture” (Kshirsagar A, 2008). In order to reverse this state of affairs, considerable investment and macro scale action is required. However, for sustainable and meaningful change, community level extension is vital. One response to this demand is the farmer’s field school (FFS) model. This study looks at FFS implemented by action for social advancement (ASA) in the district of Chhatarpur, Madhya Pradesh. It aims to test whether there has been a significant change in farming practices bought about. It will also look at the lateral diffusion of this knowledge between farmers.

**FFS, Background**

Farmers Field Schools were first developed in Indonesia in response to poor farming practices, food shortages and health problems from the incorrect usage of fertilizers. Since then, this bottom up approach to rural development has been used across the world (Braun A, et al 2008). Each field school comprises of approximately 25 farmers from different communities in the area. These farmers are taught progressive farming practices through participatory learning. Demonstration plots are use to exhibit specific techniques in isolation and farmers are encouraged to experiment on their own fields. There are also inter and intra state exposures visiting other farmers field school initiatives and agricultural universities. The farmers involved can then pass this information on to their community. This has the potential to create a significant improvement in livelihoods throughout the district.

The schools are tailored to target the causes of deficit in each district. They will focus on the following areas,

- Introducing new crop varieties
- Integrated Nutrient Management
- Integrated Pest Management
- Reducing household level risk by taking up mixed cropping
- Balanced fertiliser Application
- Soil health management-application of vermin-compost/organic manure
- Crop rotation, and various other small but crucial agronomic practices.

The duration and the curriculum of each school should be dictated by the phenological characteristics of locally grown crops. This means that farmers can learn through hands on experience and then immediately apply new skills. The schools are flexible and encourage experimentation by farmers to adapt modern methods and new varieties to local conditions. (Gallagher K. D 1999) (Braun A, et al 2008)
ASA’s Mission: Ensuring livelihoods of poor people through providing developmental services, in particular through natural resources development.

ATMA keep close links with local research organisations such as a Krishi Vigyan Kendra (KVK) and Zonal Research Stations (ZRS). KVK is a ‘farming science center’ and plays a vital part in conducting in-situ research and farmer training. (Singh K M 2008)

In order to facilitate implementation, the FAC and BTT often work in public/private partnership with selected development NGOs. Where appropriate, these NGOs act as an interface between block level ATMA institutions and farmer’s interest groups (FIG)/local communities (Nager R, 2007).

ASA is a development NGO formed in 1995 by a group of experienced professionals. As an organization it operates through participatory action at a grass roots level. Its central office is situated in Bhopal and it has 18 operational field areas across Madhya Pradesh, Bihar and Chhattisgarh. Its Operations presently cover an estimated 1000 villages, and 120000 families. Its focus is on marginalized groups such as scheduled caste/tribe, women and the poor. Many of ASA’s activities in the field concern watershed management. They have been involved in financing and managing water harvesting structures in numerous districts. Water users associations have been developed to empower communities, manage water rights as well as maintain established WHS and minor irrigation schemes. (ASA 2009)
ASA has also set up 13 producer companies in tandem with the Madhya Pradesh Development Initiative Project. It holds the role of promoter for six of these. Collectively, these six cover 18979 shareholders and generate an annual turnover of 592.09 Lakhs.

The charity also provides micro finance services in rural areas. 80% of participants in this project are tribal, the remaining are OBC and SC. The Micro finance scheme is based around the development of SHGs.

In Public/private partnership with ATMA, ASA has also implemented 48 FFS across Madhya Pradesh. This project falls under its Land & Water Resource Based Livelihoods Enhancement Program. 12 of these have covered agricultural techniques for the kharif season and 36 for the rabi season. Attendance of classroom events has been high and the initial response encouraging. ASAs experience in community institution building as well as managing grass roots projects puts it in a strong position to successfully implement the FFS model. (ASA 2009)

Site

Chhatarpur lies in the upper region of the Bundelkhand Plateau. It is traversed by the Panna hills; it therefore has an undulating topography raging from 100 to 300 meters above sea level. (Umrao U, 2007).

Chhatarpur is rich in natural resources such as water, minerals, and timber. 78% of it’s population live in rural areas and it has high potential in the field of agriculture. However it lags behind the rest of India in terms of health care and income. 46% of the population live below the poverty line. (Umrao U, 2007) The indigenous community makes up 3.5% of the population, mainly comprising of Khaiwar, Sar and Gond tribes. The main scheduled castes are Chalar, Koli and Kumhar. These represent 23.3% pf the population. (Census of India, 2001)
Reasons for Chhatarpur’s low socio-economic growth were identified in a recent government report as,

- Undulating topography.
- High number of people below poverty line.
- Differentiating social relationship and structures i.e. gender, caste and class.
- Less developed Secondary and Tertiary Sector.
- Poor Education Infrastructure i.e. Schools, Colleges, etc.
- Under-developed Health Infrastructure.
- Low soil fertility.
- Traditional agriculture practices.
- Poor irrigation facilities.
- Low cattle productivity.
- Depleting Forest resources.
- High run-off and soil erosion.

(Umrao U, 2007)

Many of these issues are tackled by ASA’s activities in the district including the 21 FFS run over the last year (ASA 2009).

**Wheat/Soybean cropping system**

Much of the agriculture in Madhya Pradesh is characterized by a wheat/soybean double cropping system. The area has deep vertisols which hold moisture though the rabi period. This allows the planting of wheat during the dry season and soybean in the monsoon season (Menzies M, 2008). Studies have shown deficits in nutrients across the region. This is in both the macro and micro nutrient held in the soils. The long term use of a narrow range of fertilisers, a lack of farmyard manure and green manuring as well as incorrect fertiliser application, is seen as responsible for this deficiency.

Madhya Pradesh is one of India’s most important sources of Soybean. It contributes 75% of the total soybean production within India and holds 61% of cropped area. The crop has steadily increased in popularity in the state since the 80s. This is due to the increase in irrigated land and the comparatively high cash value of the crop. Other local factors include the construction of oil extraction plants and the availability of fallow land during the kharif season. Differing management practices have been shown to result in a 56% variability in yield. This highlights the necessity the proliferation of a suitable package of practices in soy production.

In India, a yield gap exits in wheat production of 2 tones per hectare. With more suitable agricultural practices introduced, an extra 5 million tonnes could be added to the national harvest. (Kumar, 2007)
Wheat is well suited to the hot summers and cold winters of the Madhya Pradesh region. Sowing begins in late October and harvesting in April. It prefers clayey/well drained loams. Madhya Pradesh ranks second in the area under wheat cultivation. However, among the top six major wheat growing regions, it ranks last in production. Extremely low yields of approx 1.5 to 1.7 tones per hectare mean the region’s total harvest is significantly lower than other districts. This is because the region falls within the central climatic zone where 75% of wheat relies on rainfall for irrigation. Incorrect fertiliser application is also a limiting factor. The recommended ratio of fertiliser application in the rabi season is 6.9:2.6:1 (N:P:K). However, in Madhya Pradesh fertiliser rates are often up to 105kg/ha with an N:P:K ratio of 10.6:4.5:1. Management of micronutrients such as zinc and boron are also a significant issue. (Kumar, 2007)

Another factor which needs to be addressed is the low seed replacement rate. This is as low as 13% nationally with 50-60% of farmers in Madhya Pradesh producing their own seed. Nationally, improving the seed replacement rate has the potential to increase yield by 25-30%. (Kumar, 2007)

**Method**

An exploratory interview was conducted with Chhatarpur staff to provide background information on field schools and to help tailor the study towards local issues.

ASA runs FFS within three blocks in Chhattarpur. This study covers two rabi FFS and two kharif. The Rabi orientated FFS were in Bijawar and Nowgong. The Kharif orientated FFS were in Bijawar and Bada Melehra.

The recommendations of staff were followed in selecting villages where farmers would be available within the proposed timeframe. For each of these sites a control village was also selected.

<table>
<thead>
<tr>
<th>Block</th>
<th>ATMA Village</th>
<th>Non ATMA Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nowgong</td>
<td>Purwa (rabi)*</td>
<td>Chandora (rabi)</td>
</tr>
<tr>
<td>Bijawar</td>
<td>Nalayanpura (rabi)*</td>
<td>Budgiri (rabi)*</td>
</tr>
<tr>
<td>Bijawar</td>
<td>Bharatpuri (kharif)</td>
<td>Bharguwan (Kharif)</td>
</tr>
<tr>
<td>Bada Melehra</td>
<td>Tehnga (Kharif)*</td>
<td>Karri (kharif)*</td>
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</table>

Villages covered by study. (* FGD conducted)

For all of these villages data was collected using questionnaires. Informal focus group discussions were also conducted across all three blocks. 3 ATMA villages were covered and 2 Non ATMA. The FGD at the remaining sites were not carried out due to adverse weather conditions. Data was collected for farmer field school participants, non participants in the same village and non participants in the control village. Farmers field school participants were also divided into those who received seed and those who simply attended classes.
Both the participants and the non-participants in the ATMA village were compared to the control. The aim of this was to indicate whether there has been a statistically significant change in practices and whether this is reflected in the yield. The inclusion of non-participants in the ATMA village is designed to identify any diffusion of knowledge and technologies that has taken place.

In order to assess the impact of the farmer’s field school training on agricultural techniques, the actual and the recommended seed difference were ascertained. Next, the difference/acre between these two parameters was calculated. T-tests were then employed in order to ascertain whether the control groups had significantly differed from the FFS groups in their use of seed. T-Tests and Pearson’s rank were also used to test for any correlation between seed use and yield.

The same format of analysis was used to examine data for urea, DAP, zinc, and chemical pest control quantity.

The percentage of farmers in each category utilizing foundation seed, Rhizobium and ploughing was also determined. T-tests were carried out to find out whether employing or not employing these technologies significantly effected yield.

This process will be carried out independently for the rabi and the kharif data. The use of villages from different blocks will help to insulate the results against local anomalies.

**Profile of Rabi Villages**

The villages where the rabi FFS took place typify rural communities in Chhatarpur. They are small, traditional settlements where agriculture provides the majority of income. Over the two rabi FFS studied the male female split was 58.2% and 41.8% respectively. This compares favourably with a Chhatarpur average of 53.9% male and 46.1% female (Census of India, 2001). This male female ratio exceeds the 35% quota which ASA has set for itself to bring women into FFS proceedings. For scheduled caste the quota set was 30%. Given that in Chhatarpur district schedule castes represent 23.3% of the total population, this is an ambitious target. The scheduled tribe community in the district comprises of 3.5% of the total population (Census of India 2001).
30.4% of FFS participants interviewed were scheduled caste and 8.7% scheduled tribe. Another 30.4% were from other backwards castes. This shows ASA’s focus on marginalized communities expressed in a real world setting. However, the education levels of FFS participants were much higher than other categories. 91.3% of those involved had attained some level of education. This is compared to only 32.7% of non participants in the ATMA village and the control village. Level of education also differed. The highest education attained, on average, in the ATMA households was level 8. In non ATMA households this was only level 3.

Together, the participants in both FFS have an average 7.76 acres of land. This is 2.5 times the Chhattarpur average. However, it was representative within the villages studied. All participants surveyed were involved in wheat production in the Kharif season. In Nowgong, all the farmers grew the GW273 wheat variety apart from one individual using NE1418. Nalayanpura in Bijawar was similarly dominated by GW273. However, here, 5 farmers grew lokone. 7 farmers manufactured their own local seed in the control village. Villagers migrate for 2-3 months around January/December in all the villages covered.

**Rabi analysis**

The recommended seed application for wheat is 40kg/acre. The actual average application for all categories studied was approximately 30kg/acre with an average difference of -28.15% from the recommended value. At the same time neither the participants nor the non participants in the ATMA village showed any statistically significant deviation from the control group. This was confirmed for each individual rabi FFS as well as their collective data. There was no correlation shown between amount of seed and yield.
However, 91.3% of individuals who participated in the FFS used foundation seed. This was lower in non participants at 32%. None of the farmers in the control village used foundation seed. The use of foundation seed was shown to have a highly significant effect on yield. No FFS attendees used their own seed. However, 7.14% of non participants in the ATMA village and 33% of the control village used seed they had produced themselves. The resultant low seed replacement rate is expressed in the lower yields of these smallholdings.

<table>
<thead>
<tr>
<th></th>
<th>Participant</th>
<th>Non Participant</th>
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<tbody>
<tr>
<td>Seed Difference/Acre</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Urea Difference/Acre</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Zinc Difference/Acre</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Chemical Difference/acre</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Yield</td>
<td>Y</td>
<td>Y</td>
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T-test results comparing participants and non participants in ATMA village to the control village sample.

In use of urea, both participants and non participants showed a statistically strong difference from the control group. The recommended application of Urea fertiliser was 100kg/acre. The average deviation from this was still relatively high. The average difference was as much as -34.4% in the participants compared to -39.3% in the control village. All farmers surveyed used urea as a pose to other nitrate fertilisers.
Zinc was used by 63% of those who participated in the Nowgong FFS. This shows a marked difference from the Nowgong control group who did not apply any micronutrient. One member of the non participant category in Nowgong also applied Zinc. Those who did use zinc supplements, showed an average -78.56% deviation from the recommended amount of 250kg/A. None of the farmers in Bijawar used zinc on their land.

Showing the reverse trend, no farmers from Nowgong used pesticide. However, 58.3% applied chemical pest control on the Bijawar rabi crops. This includes 66% of FFS participants, 71.4% of non participants and 30% of those in control village. In terms of amount applied, the control village had the highest quantities; an average of 246ml/A with all farmers taken into account or 120ml/A with only those who used chemical pest control included. Both the FFS participants and the non participants applied less than this, with the non participants being closer to the recommended value. However, perhaps due to the small number of farmers utilizing this technology, no statistically significant trends could be identified. IPM has not been deployed in Chhatarpur due to a lack of resources. This could be the reason behind the inconsistent use of pesticides.

Another indicator identified was rhizobium culture. It was shown, by compiling the data for all categories of farmer, that there was a strong statistical link between rhizobium use and increased yield. Despite this, only 25% of all those surveyed used the technology. Of the FFS participants 34.8% used this technology, while only 14.3% of the non participants followed this practice. Almost as much as the FFS sample, 29.1% of the control village used rhizobium. Within the FFS sample the results were skewed; 60% of beneficiaries utilized rhizobium culture while only 15.4% of those simply attending class did the same.

The recommended field preparation technique was applied with similar inconsistency. However, no statistically significant link could be identified between the use of recommended ploughing and the yield. In total, only 42.7% of farmers surveyed ploughed their land. 39.1% of farmers in the FFS group ploughed once in the rabi season, 41.7% for non participants in ATMA village and 42.7% for control.
Yield, Rabi

Finally, the yields of different categories of farmer were evaluated. This showed a strong statistical difference between both the FFS participants and the ATMA village non participants when compared to the control village. The indicated increase suggests a successful uptake and diffusion of agricultural practices.

Profile of Kharif villages

The villages where the Kharif FFS took place were similar in character to the Rabi FFS villages already discussed. They are small rural communities, culturally and economically defined by agriculture. Within the FFS the male female ratio was 55.5% male to 44.5% female. This suggests that women are successfully being included and exceeds ASA’s quota of 35%. The ratio is representative of the general population. Those surveyed who were not involved with the FFS showed a 57.3 to 42.7 male/female split and the Chhatarpur average is 53.9%/46.1% male/female.

The inclusion of scheduled caste families in the FFS scheme is lacking. 18.52% of those participating in the FFS were scheduled caste, a figure lower than the 23.3% Chhatarpur average and the 25% average of non participants surveyed. This also falls short of the 30% quota set by ASA. Other backwards casts make up 40.7% of the FFS as a pose to 48% of the general population.

In contrast to this, inclusion of the scheduled tribe community has been highly successful. Despite a Chhatarpur average of 3.5% and a local average of only 1.9%, 22.2% of those participating in the FFS are from Scheduled Tribes.
In the Kharif FFS, the disparity in education levels in the Rabi FFS, was not apparent. In the FFS the average level of education was found to be 7.9, compared to 7.5 in the non-FFS households. The general levels of education in the Kharif villages studied were higher than those seen in the Rabi FFS. Almost 100% of households held some level of education; this was a marked contrast to the population of the Rabi FFS villages.

The average land holding for FFS participants was 3.44 acres. This is only marginally above the Chhatarpur average of 2.89 acres. Those in the same village who did not participate in the FFS had larger land holdings of 5.13 acres. The control village was only slightly lower than this at 4.77 acres. This suggests that ASA may have been successful, in these villages, in bringing smaller and more vulnerable farmers into FFS proceedings. Those taking part in the FFS had 57% of their land irrigated. This is particularly important for cultivating wheat in the dry season. The other categories of farmer showed a similar proportion of irrigated land.

All those surveyed grew soybean. Almost all of those questioned grew JS 9305. 21 households in Bada Malehra produced their own seed compared to only one farmer in Bijawar. Most farmers reported that they migrated for 2-3 months of the year.

**Kharif Analysis**

No significant difference in seed application could be identified between either FFS participants, non participants in the ATMA village and the control sample. On average the FFS participants deviated 30.65% from the recommended value while the control farmers averaged 26.25% difference from the recommended value. This suggests a lack of uptake and dissemination of sowing methods in the Kharif FFS. No correlation was found between seed quantity and yield.

However, more success is evident in the type of seed used. The graph below shows a clear increase in use of foundation seed in FFS participants compared to the control group. The non participants show a slightly higher use of foundation seed. However,
there is no statistically significant difference evident when compared to the control. There is still some use of home produced seed in all groups. In the FFS group this is 22.2% of those surveyed. This was entirely among those who did not receive seed from ASA. The remaining use of own seed may have been due to lack of resources or simply due to a reluctance to take up new methods. Just as in the Rabi FFS, it was shown for the Kharif that using foundation seed significantly increases yield.

Seed Type used by FFS participants, Non participants within the ATMA village and by those in the control village.

No difference was found between DAP application in any of the different categories. On average the FFS, non participants and control deviated from the recommended value by 40.56%, 46.9% and 43% respectively.

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<th>Participant</th>
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<tr>
<td>Seed Difference/Acre</td>
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</tr>
<tr>
<td>DAP/Acre</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Zinc Difference/Acre</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Chemical Difference/acre</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Yield</td>
<td>Y</td>
<td>N</td>
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</table>

T-test results comparing participants and non participants in ATMA village to the control village sample.
Pesticide application showed a similar lack of statistical trends. The FFS participants differed as much as 56.8% from the recommended value. For the non participants in the ATMA village this figure was as high as 73.6.

Use of chemical and manual weed control was elevated in both FFS and in Non participants. A minority of all categories used no weed control. This was highest in the control village at 30% and lowest in the FFS at 11.11%.

Rhizobium application was shown to have a highly significant effect on yield. 74.07% of FFS participants used Rhizobium as a pose to 57.69% of non participants and 61.54% of the control village. This points to some change created by the FFS although a lack of dissemination to neighboring farmers. The same is true of field preparation.

Only 2 people (both in the FFS), used the recommended 2 ploughings. However 81.48% of FFS participants used at least one ploughing as a pose to 50% of non participants and 65.38% of the control village. No link could be demonstrated between field preparations used and yield achieved.

The yield of both the FFS and the non participants in the ATMA village were both compared with the control. However, only those involved in the FFS showed any significant difference. This follows the trends identified in the Kharif villages. There has been limited uptake of technologies within the FFS category but little dissemination of this knowledge.
**FGD Analysis**

It was apparent in the focus group discussions (FGD) and in preliminary discussions with Chhatarpur staff that enough time had not passed since the completion of the FFS in order to allow for measurable change in livelihood. However, all the FFS villagers recognized that their yield had increased and that this would in turn increase income. Also, with the quality of vegetables improved, a higher market value could be obtained for produce. In Nalayanpura farmers suggested that the costs of agricultural inputs had reduced since the FFS. This is due to more efficient practices. One farmer in Tehnga said that seed inputs had more than halved since he had switch from broadcast sowing to line sowing. Cost reduction may, in the short term, be partly attributed to donations of seed by ASA.

The issue of distress migration was identified during preliminary discussions with ASA staff. Older family members are left behind to tend the plot and upkeep suffers. Most farmers, when asked, perceived a reduction in migration time. However, all villagers, control and FFS, said they migrated for 2-3 months around December and January.

The development issues identified by different villages varied. However, low agricultural productivity was pervasive. In Nalayanpura and Budgiri, periods of drought had caused crop failure in the past. Tehnga farmers reported irrigation problems and those in Purwa suggested that more drought resistant varieties be introduced by subsequent FFS. This highlights the limitations of growing wheat in rain fed regions. Another local obstacle mentioned was the lack of availability of agricultural inputs from local vendors. The timing of availability was often prohibitive for farmers. ASA employees suggested that local vendors often supply unreliable information to farmers. Lack of tractors and inability to mechanise labour intensive activities was identified by villagers in Tehnga. The inconsistent electricity supply was also flagged up by villagers in Karri and Nalayanpura.

Scientific sowing techniques such as seed treatment, crop spacing and fungicide application were repeatedly mentioned as being particularly effective. Many farmers said that they had been previously unaware as to the distinction between seed and grain.
In all villages line sowing was said to be the most important practice introduced. Proper pesticide, fertiliser, herbicide use was discussed and in Nalayanpura, micronutrients were bought up as being significant. In Purwa, villagers said that they had now begun using safety equipment when applying hazardous chemicals.

In some places, especially Purwa, there had been rivalries within the community for ASA seed. This created discord within the village. Despite this conflict, it was observed that FFS events bought people together. In Nalayanpura, farmers thought that the inclusion of women and marginalized castes reduced divisions in the community. Within every FFS visited, farmers expressed trust in the extension staff. Community relations with ASA seemed positive and well maintained. Members of the Chhatarpur office observed that farmers with larger plots of land were more open to new practices and more able to take risks. This was also mentioned in preliminary interviews with staff. However, no statistical correlation was found between agricultural practices and farm size in the data.

ASA staff members as well as villagers thought more demonstrations and different crop varieties would be beneficial. Farmers in Tehnga wanted a regular FFS Run. Villagers in Purwa were not aware of the FFS model before it was implemented. However, farmers in Budgiri knew of the FFS in neighboring Nalayanpura and were keen for an FFS in their community.

Discussion

This study is only a snapshot of a highly complex sociological, environmental and economic issue. Language barriers proved an obstacle during FGD. Interpreters were used to minimise this weakness. The study period was from the 10th to the 21st November. Data collection fell within harvest time meaning that visits to the farmer’s fields were not possible. Consequently, no detailed visual assessments of agricultural techniques employed were possible. In order to obtain the necessary information, certain key indicators were decided upon. Compiling data from FFS in geographically distinct areas worked to reduce the effect of external variables. However, the assumption that the parameters examined above are not influenced by other factors would be incorrect. Likewise, this study has been unable to look at effects on livelihood and the governing socio-economic factors behind development issues in the Chhatarpur district. Follow up research, using high resolution, qualitative data would be useful to help understand the causal relationship behind trends identified in this study. For example, detailed information as to why rhizobium, zinc and pesticides have not been used by many of the farmers would be valuable. In the future, a more exhaustive study could be beneficial to show how the lives of villagers have changed. The longevity of each FFS’s impact should also be monitored.

Conclusion

The FFS model of extension has shown itself to be an effective tool in increasing yield. Both Rabi and Kharif villages showed a significant increase in wheat and soybean
respectively. This increase in yield is the ultimate goal of the FFS project and can only lead to improved livelihoods over an extended period of time. The Rabi villages showed a more consistent uptake and dissemination of new agricultural practices. This may have been due to the larger land holdings in these villages allowing farmers to take greater risks. The Kharif FFS lacked uptake of key practices. For example, some farmers in the FFS category continued to utilize their own seed. Also non participants within the ATMA village showed no statistically significant increase in yield. This points to an inconsistent diffusion of knowledge.

<table>
<thead>
<tr>
<th>FFS and neighbouring households</th>
<th>FFS only</th>
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</tr>
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<tbody>
<tr>
<td>• Use of foundation seed</td>
<td>• Rhizobium (Kharif)</td>
<td>• Seed Quantity, (Kharif, Rabi)</td>
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<tr>
<td>• (Kharif, Rabi)</td>
<td>• Ploughing (Kharif)</td>
<td>• Chemical Pesticide Quantity, (Kharif, Rabi)</td>
</tr>
<tr>
<td>• Urea, quantity applied (Rabi)</td>
<td>• Zinc (Rabi)</td>
<td>• DAP Quantity, (Kharif)</td>
</tr>
<tr>
<td>• Weed Control (Kharif)</td>
<td></td>
<td>• Zinc (Kharif)</td>
</tr>
</tbody>
</table>

Uptake of technologies in different category of farmer.

It was clearly demonstrated that certain technologies had been taken up within the FFS participants and in some cases passed onto neighboring households. However, the varied level of uptake is an issue. Chemical pest control was consistently lacking, perhaps because IPM has not been implemented in the district. Also the amount of seed applied was sporadic.

In all villages studied, use of foundation and certified seed resulted in a yield marked increase in both FFS and non participants in ATMA villages. The promotion of quality seed and improvement of seed replacement rate has been the most successful aspect of both Kharif and Rabi FFS. Rhizobium use was also correlated with higher yields. However, application of this technology was inconsistent. In the FGDs, the technology most frequently identified as being important was line sowing and fungicide seed treatment.

It became clear in FGD that development issues in the area were diverse and endemic. A coordinated and holistic effort is needed to improve conditions. While electricity supply is sporadic, access to credit low and migration levels high, it will always be an uphill struggle to create sustainable changes in livelihoods.
Recommendations

- Introduction of training on pesticide use and IPM.
- During the Rabi season reliance on rainfall is a limiting factor in wheat production. Training on water conservation methods and the introduction of drought resistant varieties would reduce this. Development of water users groups and implementation of watershed management could also be beneficial.
- Focus on encouraging uptake of rhizobium culture and zinc application among farmers. These factors were shown to have a significant effect in yield and yet were intermittently employed.
- Increase in number of demonstrations in response to requests from staff and farmers.
- Efforts to negate the bias created by focus on progressive farmers.
- Greater inclusion of farmers lacking formal education.
- Investigation into potential credit based safety net for smaller farmers to mitigate perceived risk in adopting new technologies.
- Greater sensitivity in the handling of beneficiary selection to avoid discord within community.
- Further study of Causal relationships behind trends identified.
- Longer term study to determine the nature and longevity of change in livelihood.
Bibliography


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Kumar S (2008), Raising wheat production by Addressing Supply side Constraints in India, National Center for Agricultural Economics and Policy Research, New Dheli


Menzies
Appendix A

Themes Identified in FGD.

<table>
<thead>
<tr>
<th>Block</th>
<th>ATMA Village</th>
<th>Non ATMA Village</th>
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<tbody>
<tr>
<td>Nowgong</td>
<td>Purwa (rabi)</td>
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<tr>
<td>Bijawar</td>
<td>Nalayanpura (rabi)</td>
<td>Budgiri (rabi)</td>
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<tr>
<td>Bada Melehra</td>
<td>Tehnga (kharif)</td>
<td>Karri (kharif)</td>
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(Points not attributed to specific villages are general points made in all or most FGD)

General:
- Farmers seemed keen to implement new technologies
- Trust expressed in outreach staff

Preconceptions:
- Farmers were not aware of FFS concept before it was instigated. Significant trust in outreach staff- no reservations expressed in implementing new practices. (Purwa)
- Farmers had heard of FFS in Tehnga and would like similar project. Wanted to know about different technologies and new agricultural techniques (use of urea, pesticides etc). (Karri)

Local development issues identified:
- Low agricultural productivity.
- Inappropriate seed use, 80kg/A (Tehnga)
- Lack of availability of agricultural inputs from local vendors. Urea/pesticides mentioned. (Karri). Also, availability of inputs at the correct time. (Nalayanpura)
- Irrigation problems (Tehnga)
- Tractor Availability (Tehnga)
- Drought (Nalayanpura, Budgiri)
- Inconsistent electricity Supply (Karri, Nalayanpura)
**Effect on Livelihood:**

- Significant and positive effect on farmers livelihood
- Higher productivity, more grain and higher income.
- Most FFS farmers reported a reduction in migration. However, all those asked reported 2-3 months migration between December January.
- Brings different strata of society together- caste/gender identified. (Nalayanpura)
- Reduced input costs. (Nalayanpura)
- Better quality vegetables, fetches better prices.

**Knowledge and techniques:**

- Previously unaware of difference between seed ad grain. Grain for eating was sown in fields.
- Knowledge gained- Scientific sowing techniques taught- seed treatment crop spacing and fungicide application. These resulted in less loss of seed and impacted positively on total yield.
- Proper fertiliser, pesticide and herbicide application.
- Harvesting management
- 3x plugging (Tehnga)
- Shift from broadcast sowing to line sowing very important (all villages)
- Irrigation (Tehnga)
- Micronutrients important (Nayalanpura)
- Safety equipment used in pesticide application (Purwa)

**Problems in FFS model:**

- Some competition for donated seed. Created rivalries and disputes within village.

**Suggestions:**

- More varieties should be tested- e.g. drought resistant varieties (Purwa).
- Would like regular FFS (Tehnga).
ASA staff contributions:

- Farmers perceive NGO run FFS as beneficial; government interventions less successful.
- NGO less bureaucratic and more accessible than government departments responsible for agricultural extension.
- FFS recently finished, not time yet to evaluate effect on livelihood.
- Farmers with small field sizes often reluctant to take risks, therefore resistant to change.
- Ideally, number of demonstrations would be increased from 6 to 15.
- More different crop varieties.
- Greater involvement from farmers and more farmers involved.
Appendix B

Discussion: Farmers Field School Impact Assessment.

Present: Ben Redmond: Researcher
Atul Vikram Singh: Team leader
Praveen Sharma: Team Leader
Ajay Gupta: Field Operative

A: Background information on Chhatarpur FFSs.

i. Background on Chhatarpur FFSs

<table>
<thead>
<tr>
<th>eg</th>
<th>How many FFS in area:</th>
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<tbody>
<tr>
<td></td>
<td>How many households/people covered</td>
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<tr>
<td></td>
<td>Local development issues</td>
</tr>
<tr>
<td></td>
<td>Which social groups included</td>
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</tbody>
</table>

| 6 farmers field schools in Chhatarpur. Divided into 3 geographically distinct blocks. 51 people covered through direct agro inputs, 150 people covered through field school events. Local development issues: low agricultural inputs, faulty agricultural practices. Social groups: 30% scheduled castes, 35% women (attained through quotas) |

ii. What are the most important farming practices being introduced by FFS in Chattarpur?

- Line sowing
- Seed treatment

iii. What are the main changes in farming techniques taking place?

- Aforementioned practices being introduced successfully. In terms of pesticides: less toxic, scaled down package of fertilizers applied. Fewer smaller applications. Safety measures used.

iv. Is this reflected in people’s livelihoods and their wider circumstances?

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<thead>
<tr>
<th>eg</th>
<th>Income</th>
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<tr>
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<td>Social Status</td>
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<td></td>
<td>Asset acquisition</td>
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<tr>
<td></td>
<td>Distress migration</td>
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</table>

| Income: lowering input costs, enhanced productivity |
| Social Status: considered better educated and so social position consolidated |
| Asset acquisition: N/A |
| Distress migration: previously, after sowing, older people left to tend plot. Due to improved agricultural inputs and productivity, fewer family members migrate for less |
v. What are the main obstacles to change?

- Small, poor land owners, afraid of taking risks. (no safety net)
- Less of a problem with larger farmers.

vi. Have you experienced any community resistance FFS school programs/specific farming practices?

- Difficulty selecting beneficiaries. Competition causing tensions within community and damaging relationships with ASA.

vii. What issues are there around pesticide use and health/environmental pressure?

- Lack of scientific technique in application
- No safety measures taken during application
- Too much applied causing leaching, environmental damage and leaving excessive residues.
- Unreliable information from local vendors, often accuracy secondary to profit.
- Often locally produced, unsafe fertilizers.

viii. Why has a gap in local knowledge arisen?

- Weak agricultural extension from government. Farmers sticking to inefficient traditional methods.

B: Content of IPM/INM test for farmers

- IPM kits not deployed due to lack of resources.
- INM- Biofertiliser use
  - Balanced chemical fertilisers
  - Application of micronutrients

- Perhaps extend to seed treatment/line sowing.

Documents drawn up for each farmer’s field school concerning specific practices included in curriculum. Hard copy only. Will be available on arrival in Chhatapur.

C: Content of tick list for visual survey.

- Farmers will be harvesting during study period and visits to fields will not be feasible. The household survey will be extended and farmers asked to supply information as to what they have physically implemented.

- Documents drawn up for each farmer’s field school concerning specific practices included in curriculum. Hard copy only. Will be available on arrival in Chhatapur. This info to be used in this activity.
D: Recommendations for questionnaire.

Identified indicators of change:

i. Crop yield  
ii. Acreage planted  
iii. Crop Diversity  
iv. Agricultural Input Costs  
v. Market prices attained  
vi. Domestic costs  
vii. Income/Profit/Savings  
viii. Period of Food Sufficiency  
ix. Pesticides used (Environmental/health impacts)  
x. Asset Acquisition  
xi. Distress migration/labour availability from family members

| All indicators acceptable  
| Asset acquisition may not be pronounced  
| Perhaps awareness of package of practices as extra indicator  
| New varieties and quality of seeds in addition to crop diversity.  
| Pesticides: perhaps number of applications.  
| Farmers will be able to supply exact information on pesticide application, brands used, amount sprayed and the timings of application |

E: Recommendations for study/control sites.

i. Representative socio-economic conditions  
ii. Representative environmental conditions  
iii. Access available in identified time frame

One control village for each Farmers field school studied  
3 farmer’s field schools studied, one from each block.