THE PERCEPTIONS OF FARMERS AND PARTICIPATION IN THE TADDANPALLE WATERSHED PROJECT IN 1982-83

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This study reports on farmer perceptions and participation in the Taddanpalle watershed project in 1982-83. The project was initiated in 1981-82 with 14 farmers on a 15 hectare watershed located about 40 km from the ICRISAT center. The principal objective of the project is to test a package of interrelated improved land and water management practices and cropping systems components designed to increase productivity and rainy season cropping in medium to high rainfall areas (above 750 mm) located on deep Vertisols where rainy season fallowing is commonly practiced. The experience with the Taddanpalle project in 1981-82 and the improved watershed technology is thoroughly described in Ryan et al. (1982) and ICRISAT (1981).

As much as possible, constraints, particularly institutional problems, are allowed to express themselves in the testing phase. Farmers are not heavily subsidized and must carry out the work themselves. Credit and access to inputs is provided through government organizations that will have this responsibility if the improved watershed technology is to be diffused on a wider scale. We assume that all farmers had equal access to inputs and credit in 1981-82 and hence we do not address institutional reasons for nonparticipation.

Participation is voluntary, and participants decide what to plant within a feasible set of cropping options. Despite encouraging agronomic

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1. Institutional considerations conditioning the successful replication of the Taddanpalle pilot project are discussed in Ryan et al. (1982).
and economic results during the first year of the project, seven of the eleven farmers who participated in 1981-82 decided not to continue in 1982-83. Moreover, the participants chose cropping systems in 1982-83 that do not exploit the full potential of the technology. Only two plots are planted to a cereal/pigeonpea intercrop which was the most remunerative cropping systems in 1981-82 in Taddanpalle and has also been the most economically attractive cropping system under similar conditions at ICRISAT Center over many cropping years. The other five plots are sown to a rainy season mungbean-postrainy season sorghum sequential crop which ranked only seventh in terms of profitability last year and is not markedly different from the rainy season fallow-postrainy season sorghum system traditionally practiced by Taddanpalle farmers on their deep black soils. In 1981-82, these five plots were intercropped with sorghum/pigeonpea. For rotational reasons it may be desirable to change cropping systems in 1982-83; however, participants could have chosen systems with more agronomic and economic potential than mungbean followed by postrainy season sorghum.

The objective of this study is to understand reasons for nonparticipation in the project in 1982-83. Perceptions of possible constraints to participation were elicited in a survey carried out in June 1982. The perceptions may be right or wrong, but we believe they form the basis for farmers' decisions on participation. There is nothing particularly new in this report - at least scientists associated with the project may not find any new guidelines for research - but information on participation is hopefully organized in a systematic manner and some hypotheses on the determinants of participation are formally tested.

TECHNICAL PERCEPTIONS AND PARTICIPATION

Field Drainage and Improved Land and Water Management Practices

The technology tested in 1981-82 in the Taddanpalle watershed is based on the hypothesis that poor field surface drainage on Vertisols in medium and higher rainfall areas is a severe constraint to rainy season cropping. An investment in land leveling and in the construction of field drains together with cultivation on graded broad beds and furrows should result in improved drainage and better in situ moisture conservation which in turn should stimulate rainy season cropping.

2. Fourteen farmers own land in the project, but only eleven make management decisions.

3. Because the technology was tested on a whole watershed basis, a concerted effort was made to obtain the participation of all farmers in 1981-82; therefore, it is likely that the level of participation in 1982-83 is lower than what would have occurred had a more selective approach been followed. Depending on the results this year, nonparticipants may again decide to join the project in 1983-84. Their watershed cropping activities are being monitored this year.
There are 18 plots in the Taddanpalle watershed, and in some plots farmers perceived that poor drainage was more of a problem than in others before the watershed work started in 1981-82. All farmers agreed that the new land and water management practices improved field drainage on all their plots. But not all farmers felt that poor drainage in the past was that much of a problem on some of the plots. We would expect that participation in 1982-83 would be greater for those farmers who believed that poor field drainage was a constraint to rainy season cropping on their individual plots. This expectation is tested with the simple decision model presented in Figure 1.

For 10 of the 18 plots, farmers said that drainage was not a constraint to rainy season cropping. We would predict that farmers owning these plots had less incentive to participate in 1982-83 than farmers cultivating field where they thought drainage was a problem. A negative response to the drainage question in Figure 1 was associated with non-participation for eight of the 10 fields. The other two plots belonged to participants who perceived that drainage was inadequate in their other plots in the watershed. For an affirmative response, we further asked whether management practices taken in previous years were partially effective in improving field drainage. A reply of YES is consistent with a prediction of nonparticipation, while a response of NO in Figure 1 suggests participation. For these 8 plots, the predictions are consistent with the decisions on participation.

Based on this model, we could successfully predict participation on 16 out of the 18 plots. These results strongly suggest that participation this year is influenced by the farmer's perception of the status of field drainage in the past. Nonparticipants thought that drainage was not a problem, participants believed that it was.

Participants were also quick to point out that poor field drainage was not the only or even the most important constraint to rainy season cropping. Inadequate field drainage contributed to the practice of rainy season fallowing but other constraints, such as weed and insect management problems, may have been more limiting. Before the project started, 9 of the 18 plots were planted to mungbean or chilli in 1980-81.

Tool Carrier and Attachment

The change from traditional bullock drawn implements to the wheeled tool carriers with improved attachments is a fairly substantial

4. It is impossible to measure the accuracy of these perceptions without field level information on surface drainage before the improved watershed management practices were carried out.
Figure 1. Perceptions on field drainage and participation in 1982-83.
adjustment for farmers who participated in the first year of improved technology testing in Tadappalle. Participants in 1982-83 contended that their bullock pairs were not strong enough to carry out properly all the tool carrier operations (Table 1). One participant had teamed a buffalo with a bullock to get the work done in 1981-82. The nonparticipants appeared to have either larger, healthier animals or more bullock pairs, since three of the five who own bullocks stated that they had enough draft power to carry out all the operations. While bullock quality and availability may be a source of concern, they clearly were not an impediment to participation in the project in 1982-83 for most farmers.

A few farmers mentioned problems they had encountered in undertaking specific operations. Many faced difficulties in operating the tool carrier on wet soil, particularly in replanting and in interculturating. One participant in 1982-83 strongly preferred to use his local plow and harrow to prepare land for postralsy season sorghum after mungbean. He did not think that the operation with the tool carrier went deep enough to do an adequate job of uprooting harvested mung plants and weeds. Participants delayed postharvest cultivation by about one week and therefore encountered difficulties due to soil hardness.

Fertilizer Response

Earlier conversations with farmers suggested that at least one farmer believed that the higher yields in the watershed in 1981-82 could not be attributed to inorganic fertilizer but rather to the residual effect of farmyard manure (FYM) applied in previous years. Before last year, farmers had rarely applied inorganic fertilizer on their watershed plots. In 1981-82, inorganic fertilizer was used in moderate doses, but no FYM was applied. We designed our questions to examine this perception more closely.

The responses of farmers are listed in Table 2 and show that both participants and nonparticipants attributed the increase in production to both inorganic fertilizer and the residual effect of FYM. Nonetheless, they felt that the residual effect of FYM contributed more to higher yields in 1981-82 than application of inorganic fertilizer. Beliefs about fertilizer response were essentially the same for participants and nonparticipants.

The participants expressed keen interest in seeing whether high and stable yields could be obtained again this year without applying FYM. At this time, they believe that without FYM they will gradually have to increase the dose of inorganic fertilizer to obtain the same levels of yield in the future.
Table 1. Perceptions of farmers on the use of the tool carrier and improved attachments.

<table>
<thead>
<tr>
<th>Question</th>
<th>4 participants</th>
<th>5 nonparticipantsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are your bullocks strong enough to carry out all tool carrier operations?</td>
<td>YES 0</td>
<td>NO 4 2</td>
</tr>
<tr>
<td>Did you face any problem to carry out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Plowing</td>
<td>YES 0</td>
<td>2</td>
</tr>
<tr>
<td>- Cultivation</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>- Fertilizer application</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>- Planting</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>- Interculture</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>- Land preparation in sequential cropping</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>- Postharvest cultivation</td>
<td>3</td>
<td>b</td>
</tr>
</tbody>
</table>

a. Two nonparticipants do not own bullocks and borrowed bullocks from other watershed farmers to carry out the operations in 1981-82.
b. Not applicable because of nonparticipation in 1982-83.
Table 2. Perceptions on the yield response due to inorganic fertilizer and the residual effect of farmyard manure.

<table>
<thead>
<tr>
<th>Question</th>
<th>Participants</th>
<th>Nonparticipants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did you use farmyard manure at least twice in the last five years on at least one of your watershed plots?</td>
<td>NO 0 1</td>
<td>YES 4 6</td>
</tr>
<tr>
<td>2. Do you believe that the increase in yields in 1981-82 on these plots was due to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- residual effect of farmyard manure only</td>
<td>YES 0 0</td>
<td></td>
</tr>
<tr>
<td>- inorganic fertilizer only</td>
<td>YES 0 0</td>
<td></td>
</tr>
<tr>
<td>- both</td>
<td>YES 4 6</td>
<td></td>
</tr>
<tr>
<td>3. Which contributed more?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- inorganic fertilizer</td>
<td>1 0</td>
<td></td>
</tr>
<tr>
<td>- residual effect of farmyard manure</td>
<td>3 6</td>
<td></td>
</tr>
</tbody>
</table>
Cropping Systems and Agronomy

Striga and weed management

All farmers considered that striga, a parasitic weed, was a persistent problem on their deep black soils. Compared to other years, they observed that weed infestation, particularly the incidence of striga, was higher with rainy season cropping last year. They felt that the more severe striga infestation in 1981-82 resulted in yield losses to rainy season sorghum and maize.

Some farmers also experienced difficulties in securing labor to weed their watershed rainy season crops. Weeding usually conflicted with the seasonal demand for labor in paddy production.

In the past, farmers reported that they managed striga through rainy season fallowing. Moreover, they seldom planted striga susceptible crops such as sorghum in the rainy season. For one participant and three nonparticipants who frequently grow chilli in their watershed plots, weeds are controlled through intensive harrowing and hand weeding. These four farmers felt that, as chilli is a high-paying crop, intensive weed control is economically worth the effort.

Both participants and nonparticipants shared the same perceptions on problems in weed management in rainy season cropping of Vertisols. Ineffective control of striga is probably partially responsible for the decision of some farmers not to participate this year and for the decision of some participants not to plant rainy season sorghum and maize in 1982-83.

Pigeonpeas and pod borer damage

All watershed farmers had grown pigeonpea as an intercrop with either sorghum or maize in 1981-82. Farmers felt crop damage from pod borer (Heliothis) was severe last year and that control was only partially effective (Table 3). On average, both participants and nonparticipants believed that pigeonpea production would have doubled if pod borer could have been effectively controlled on their plots.

Pigeonpea is not a new crop and pod borer is not a new problem to the farmers in Taddanpalle. Some farmers reported that in the past they had lost all their pigeonpea crop to pod borer. With low yields in traditional pigeonpea cereal intercrops, there was probably little incentive to control pod borer with costly insecticide.

Most participants and nonparticipants did not note any difficulty in obtaining sprayers or insecticide in 1981-82. But they did say that transport of petrol from Sangareddy to the field presented difficulties. Transport of petrol in buses is not permitted.
Table 3. Perceptions on pod borer damage in pigeonpeas.

<table>
<thead>
<tr>
<th>Question</th>
<th>4 participants</th>
<th>7 nonparticipants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was pod borer a problem?</td>
<td>YES 4</td>
<td>NO 0</td>
</tr>
<tr>
<td>2. Did spraying help?</td>
<td>partially effective</td>
<td>partially effective</td>
</tr>
<tr>
<td>3. If pod borer could have been controlled by how much would yield have increased?</td>
<td>75-100%</td>
<td>100-150%</td>
</tr>
<tr>
<td>4. Have you planted pigeon pea before 1981-82?</td>
<td>YES 4</td>
<td>NO 0</td>
</tr>
<tr>
<td>5. What was the incidence of pod borer?</td>
<td>Very high and variable over years</td>
<td>Very high and variable over years</td>
</tr>
<tr>
<td>6. What control measures were taken?</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Although perceptions did not differ significantly between participants and nonparticipants, pod borer like striga is a yield reducer that most likely influenced decisions on participation and cropping choice in 1982-83.

Maize

Not one watershed farmer had grown maize before 1981-82. Three farmers cultivated maize as a sole crop followed by postrainy season safflower or as an intercrop with pigeonpea in 1981-82. These farmers have decided not to participate this year.

Despite yields and profits that were fairly attractive, they do not think that maize competes favorably with other crops in the rainy season. They cited striga as a yield reducer but were unaware of the problems of zinc deficiency until cooperating scientists informed them. Poor market access was not mentioned as a disincentive to production.

We asked all farmers about the potential for maize production in Taddanpalle watershed. The farmers expressed concern that (1) maize is susceptible to theft particularly in roadside plots located near a bus stop, (2) without a mechanical sheller - last year ICRISAT provided a thresher - shelling would be costly, and (3) bullocks do not like maize fodder. These reasons do not seem particularly compelling, but watershed farmers have rejected maize as a new cropping activity.

Sequential crop of mungbean-chilli

One farmer planted this cropping combination in 1981-82. He felt that both mung and chilli yielded well, but he was convinced that his chilli crop would have been better if he had not planted mungbean. Other farmers agreed with his claim that the extra return from mungbean did not compensate for (what they expected) would be a reduced yield in chilli.

Farmers also mentioned that in some years there may not be enough "turn around" time to harvest mungbean and prepare the land for planting chilli. Another farmer wanted to plant chilli after mungbean in 1981-82 but the mungbean harvest was delayed and eventually he decided to plant safflower instead of chilli. Watershed farmers do not plan to plant this combination in 1982-83.

Hybrid Sorghum

Most farmers had experience in growing sorghum hybrids on their red soils. Last year was the first time they had planted sorghum hybrids on their black soil watershed plots. September-October rainfall was
heavier than normal last year and the infestation of grain mold was substantial in some plots. Farmers felt that mold brought the price of sorghum down by about 20-25%. Farmers said that local kharif varieties were also susceptible to grain mold. They expected that rainfall during harvesting would occur in two or three in every ten years.

Both participants and nonparticipants thought that improved sorghum hybrids were inferior in grain and fodder quality compared with the locals, but farmers were convinced about the agronomic superiority of the sorghum hybrids over the local yellow sorghum planted in rainy season. Responses in the interview suggest that farmers also evaluate the rainy season sorghum hybrids in comparison with their postrainy season 'Sai Jonna' sorghum varieties because planting rainy season sorghum means giving up a chance to grow 'Sai' Jonna' in the postrainy season. In the minds of farmers, it appears that the rainy season modern varieties compare much more favorably with the local rainy season yellow sorghums than with the traditional postrainy season varieties. In any case, perceptions on grain and fodder quality and on grain mold incidence did not differ systematically between participants and nonparticipants. Differential views on sorghum cultivars did not appear to influence participation in 1982-83.

Traditional postrainy season sorghum production

Rabi or postrainy season sorghum, commonly known as 'Sai Jonna', occupies more than 90% of the area cultivated on Vertisols in Taddanjalle. Farmers regarded last year as a normal or average year for rabi sorghum production. Farmers expect about six to seven quintals per hectare in a normal year.

In 1981-82, farmers reported that they did not buy or sell rabi sorghum. Apparently, farmers have a strong compulsion to grow their own rabi sorghum and do not view rainy season sorghum hybrids and postrainy season local varieties as perfect substitutes. A desire to be self-sufficient in postrainy season sorghum production for human and bullock consumption may only be transitory, but it does constrain the choices on cropping pattern. This is one area that requires exploratory marketing research.

ECONOMIC DETERMINANTS OF PARTICIPATION

We expected that higher profits per hectare in 1981-82 would induce more farmers to participate in the project in 1982-83. Mean profits per hectare were significantly different at the 5% level for participants and nonparticipants. The level of per hectare profits for the four participants was about Rs. 4400, while the average for the seven nonparticipants was about Rs. 2900. If we use profits per hectare to explain participation behavior in a probit (probability unit) model,
we can correctly predict the decisions of farmers in 9 of the 11 cases. A Rs. 500 increase in per hectare profits above the mean level of Rs. 3500 results in an increase in the estimated cumulative probability of participation from .28 to .56.

The improved watershed technology is much more intensive in its demand on a farmer's time particularly in management and supervision compared to traditional practices. Those farmers who have other high paying opportunities like paddy and/or sugarcane or who value leisure highly should be less willing to continue in the project. The imputed value of family labor per hectare supplied by each farm household last year is one crude measure of farmers' alternative income earning opportunities. On average, participants invested the equivalent of Rs. 490 per hectare of family labor in the project; the value of family labor put forth by nonparticipants was about Rs. 350 per hectare. The difference in the mean value of family labor supplied between participants and nonparticipants was statistically significant only at the 20% level. Participants may have fewer nonwatershed income-generating opportunities, a larger family work force, or may have prized income from watershed work more highly. More time allocated to the watershed technology tested in 1981-82 probably also gave them more information on which to make an assessment.

Based on a probit model using profits and the value of family labor per hectare as explanatory variables, we can classify the farmers who participated in the watershed experiment in 1981-82 into three groups. For two farmers, the estimated probability of participation was greater than .90; these farmers have decided to continue in the project in 1982-83. For three farmers, the estimated probability of participation was less than .05; they dropped out in 1982-83. The other six farmers were borderline cases; the expected probability of participation varied between .17 and .50. Two decided to participate in 1982-83, and four chose to drop out.

We tried without much success to capture the opportunity cost of participation in the project with other measures. Farm size adjusted for land quality and active agricultural workers in each family was insignificantly and (contrary to expectations) positively correlated with participation. On average, nonparticipants do not farm more wetland than participants.

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5. We use a cumulative probability of .50 as a cutoff point to predict participation. If the estimated probability is less than .50, we predict nonparticipation. The per hectare gross profits of each farmer in Appendix I are used to generate individual predictions.
CONCLUSIONS

We were unable to single out one overriding reason that was responsible for the level of nonparticipation observed in the Taddanpalle project this year. Our results do however suggest a number of contributing explanations. Perceptions on the adequacy of field drainage in the past differed sharply between participants and nonparticipants. Participants viewed poor field drainage (before the project was initiated) as a constraint to rainy season cropping; nonparticipants said that drainage was not a problem. This perception of participants probably magnified the potential for the improved technology to increase productivity.

Even participants believed that other constraints were equally or more important than field drainage. Striga and pod borer were cited by all farmers as persistent sources of yield reduction in rainy season cropping of cereals and pulses respectively. Uncertain control of these pests made post-rainy season cropping appear more attractive in the minds of many watershed farmers.

We documented that higher per hectare profits in 1981-82 were positively associated with participation in 1982-83. Using per hectare profits as an explanatory variable, we can correctly predict participation in 1982-83 for nine of the eleven farmers.

Participants also invested more of their family labor resources on a per hectare basis in the project in 1981-82. This result mildly suggests that the increased demands placed by the improved watershed technology on managerial and supervisory time could have acted as a disincentive to participation. This issue needs to be addressed with a whole farm planning approach.

We could not demonstrate that participation was correlated with a particular type of farmer. The largest farmer in the watershed withdrew from the project in 1982-83 and so did the three smallest.

We can speculate on several other reasons for nonparticipation in 1982-83. Perhaps frequent visits by foreigners in imported cars instilled the expectation in farmers that they could exact a higher price to participate in the project in 1982-83. Perhaps the largest farmer who is an opinion leader strongly influenced other farmers, particularly his brothers, to withdraw from the project. Each of these explanations have more than a grain of truth in them and should not be discounted; however, if farmers truly felt that it was in their economic
self-interest to participate this year it would have been difficult to keep them from joining.⁶

The perceptions of farmers underscore the importance of component and adaptive cropping systems research. If last year’s performance is indicative, a mungbean-sorghum sequential cropping system may not have the agronomic or economic potential to pay for the necessary investment needed in the first year for drainage improvements plus the tool carrier. Until we can effectively control striga and pod borer, the potential of the improved watershed technology will be compromised. Results on the cereal/pigeonpea intercropped plots in Taddanpalle and across the road in Sultanpur should be instrumental in determining participation in 1983-84.

Last year we learned much from the experience in Taddanpalle. The most important lesson we learned from farmers in the participation survey is that poor drainage is only part of the answer explaining rainy season fallowing in the medium rainfall, deep Vertisol areas like Taddanpalle. It may contribute less to the explanation than we had thought.

⁶ Moreover, the effective strength of village leadership depends upon what the leader can do for his constituents rather than on whether or not he can "control" them. If the tested watershed technology had been overwhelmingly profitable for most of the farmers, one could expect either old or new leaders to have come forth to demand its expansion.
REFERENCES


Appendix I. Data used in the economic analysis of participation.

<table>
<thead>
<tr>
<th>Level of participation</th>
<th>Gross profits per hectare (Returns to management, capital, and land)</th>
<th>Imputed value of family labor per hectare</th>
<th>Index(^a) of operated area in 1981-82 adjusted for land quality per active agricultural family member</th>
<th>Wetland in hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>3663</td>
<td>301</td>
<td>11.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Participant</td>
<td>3627</td>
<td>474</td>
<td>14.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Participant</td>
<td>5929</td>
<td>631</td>
<td>8.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Participant</td>
<td>4512</td>
<td>542</td>
<td>9.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>3793</td>
<td>388</td>
<td>10.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>3868</td>
<td>286</td>
<td>21.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>2075</td>
<td>159</td>
<td>-21.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>3025</td>
<td>531</td>
<td>2.4</td>
<td>0.15</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>2210</td>
<td>496</td>
<td>1.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>3872</td>
<td>411</td>
<td>1.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Nonparticipant</td>
<td>2268</td>
<td>173</td>
<td>15.7</td>
<td>0.6</td>
</tr>
</tbody>
</table>

\(^a\) The adjustment was made by valuing wetland: dryland Vertisols: dryland Alfisols in a ratio of 20:4:1. This figure was divided by the number of active agricultural workers in the family.
Appendix II. Profile of the Taddanpalle watershed farmers.

Farmer 1 (Progressive farmer) Participant in 1982-83

Age: 53
No. of household members: 4 (2 adults, 2 children)
No. of household members with agricultural occupation: 3
Total landholding: 4.44 ha; wet: 1.00 ha; Vertisols: 3.44 ha; watershed: 2.44 ha

Farmer 1 is a hard-working progressive farmer. He is always looking for innovations in agriculture.

Farmer 2 (Progressive farmer) Participant in 1982-83

Land survey numbers are in the names of the daughters-in-law of farmer 2. Decisions on crop activities are taken by farmer 2.

Age: 45 years
No. of household members: 11 (7 adults, 4 children)
No. of household members with agricultural occupation: 6
Total landholding: 11.1 ha; wet: 2.5 ha; Vertisols: 8.6 ha; watershed: 2.26 ha

Farmer 2 is a very hard-working, and shrewd. She pays higher labor wages than any other farmer in the village. Thus at times of labor shortage she easily obtains labor. Last year she received good returns from her watershed plots. She felt that lack of timeliness in spraying against Heliothis last year significantly reduced her pigeonpea yield. This year she is determined to control pod borer. She has decided to continue because she wanted to observe the stability of the improved watershed technology. She said that if she gets handsome profits this year she would like to continue in the future provided the tool carrier is supplied free or with a nominal rent.

Farmer 3 Participant in 1982-83

The area within watershed was given to son of farmer 3 for cultivation. The decisions on agricultural work are taken by farmer 3.

Age: 60
No. of household members: 2 (2 adults)
No. of household members with agricultural occupation: 2
Total landholding: 3.5 ha; wet: 0.4 ha; Vertisols: 1.9 ha; Alfisols: 1.2 ha; watershed: 0.5 ha

He is happy with the performance of technology in 1981-82. He partially attributed the higher yields to the residual effect of farmyard manure applied in previous years. He says he will continue in the future provided he receives the same level of profits.
Farmer 4  
Participant in 1982-83

Age: 30 years  
No. of household members: 5 (2 adults, 3 children)  
No. of household members with agricultural occupation: 2  
Total landholding: 4.3 ha; wet: 0.4 ha; vertisols: 2.3 ha; Alfisols: 1.6 ha; watershed: 0.5 ha  

He had two plots in the watershed. The yield in one plot was significantly higher than in the other. He feels that the difference in yield was because of the intensive use of FYM in one plot. As long as profits on both plots are adequate, he will continue in the project.

Farmer 5  
Nonparticipant in 1982-83

Age: 21 years  
No. of household members: 4 (4 adults)  
No. of household members with agricultural occupation: 4  
Total landholding: 7.7 ha; wet: 1.00 ha; Vertisols: 4.7 ha; Alfisols: 2.0 ha; watershed: 0.83 ha  

Farmer 5 was happy with the returns from his plot. He wanted to continue but because his brothers, farmers 6 and 7, did not participate, so he has also dropped out. This year he has leased out his watershed plot.

Farmer 6 (Progressive farmer)  
Nonparticipant in 1982-83

Age: 39 years  
No. of household members: 7 (2 adults, 5 children)  
No. of household members with agricultural occupation: 2  
Total landholding: 6.3 ha; wet: 1.4 ha; Vertisols: 3.3; Alfisols: 1.6 ha; watershed 0.83 ha  

Although he is happy with the profits he got from his plots, he complained about the HYV sorghum fodder and the yield from his chilli plot. These were only two of many reasons he mentioned for nonparticipation in 1982-83.

Farmer 7 (Progressive farmer)  
Nonparticipant in 1982-83

Age: 45 years  
No. of household members: 9 (4 adults, 5 children)  
No. of household members with agricultural occupation: 4  
Total landholding: 10.65 ha; wet: 3.00 ha; Vertisols: 5.65 ha; Alfisols: 2.00 ha; watershed: 4.35 ha  

Yields and profits from his plots were not very impressive. In fact, he neglected his watershed plots because of his busy schedule in paddy cultivation.
He used to obtain the highest chilli yields in Taddanpalle from one of his watershed plots. In 1981-82, he received a very poor yield from this plot. He and other nonparticipants were not impressed with the performance of chilli in the watershed in 1981-82.

It is clear that he does not have time to cultivate all his plots. He complained of the higher supervisory demands on his time with the improved watershed technology. He has leased out half of his watershed area this year. In the rest, he plans to grow chilli and postrainy season sorghum.

Farmer 8  Nonparticipant in 1982-83

Age : 45 years
No. of household members : 8 (4 adults, 4 children)
No. of household members with agricultural occupation : 4
Total landholding : 3.25 ha; wet : 0.15 ha; Vertisols : 1.10 ha;
Alfisols : 2.00 ha; watershed : 0.52 ha

He felt that his bullocks are very weak to pull the tool carrier. Moreover, he believed that he did not have enough time to invest in the new technology on his watershed plots.

Farmer 9  Nonparticipant in 1982-83

Age : 42 years
No. of household members : 6 (5 adults, 1 child)
No. of household members with agricultural occupation : 5
Total landholding : 1.25 ha; Vertisols : 0.65 ha; Alfisols : .60 ha;
watershed : 0.25 ha

Profits in his watershed plot were low in 1981-82. This was the main reason he does not want to continue. This year he is working as a permanent servant in the house of farmer 7.

Farmer 10  Nonparticipant in 1982-83

Age : 35 years
No. of household members : 4 (2 adults, 2 children)
No. of household members with agricultural occupation : 2
Total landholding : 1.30 ha; Vertisols : 0.70 ha; Alfisols : 0.60 ha;
watershed : 0.25 ha

Poor profitability was the main reason cited for nonparticipation this year.
Farmer 11 Nonparticipant in 1982-83

Age: 60 years
No. of household members: 5 (2 adults, 3 children)
No. of household members with agricultural occupation: 2
Total landholding: 5.9 ha; wet: 0.6 ha; Vertisols: 4.7 ha; Alfisols: 0.6 ha; watershed: 1.9 ha

He has two plots in the watershed, one owned by him and other leased in from another farmer. He had made attractive profits from his plot; in contrast, the returns from leased-in plot were very low. He wanted to participate this year, and had cultivated until March with the tool carrier. Suddenly one day without informing ICRISAT, he harrowed his watershed plot. He said that since ICRISAT did not compensate for the loss in leased-in plot that he was dropping out. ICRISAT did not pay any compensation for his leased-in plot because from the beginning he had neglected the plot. He said that the watershed technology is highly labor intensive and that he does not have time to devote to it.