Success story on Greenhouse Technology

(A case study on School & Community Horticulture Project)

National Committee on Plasticulture Applications in Horticulture
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Introduction

The National Committee on Plasticulture Applications in Horticulture (NCPAH), Ministry of Agriculture, has been promoting use of different plasticulture applications through its Precision Farming Development Centres in India. Technology Informatics Design Enterprise (TIDE), Bangalore, is an NGO that promotes use of appropriate technologies in harmony with environment, which permits grass-root participation, use of local resources and builds capacity by involving local communities as equal partners. NCPAH gave support through its PFDC, UAS, Bangalore to the TIDE for evolving a business model by using the Greenhouse technology in horticulture that promotes sustainable livelihood among small and marginal farm families. NCPAH has been instrumental through its PFDC and the local partner TIDE, to become a link between technology and the end users who are small and marginal farmers. TIDE evolved a school and community horticulture project (200sqm) with the help of a women group. TIDE and PFDC personnel provided the technical, managerial and marketing support to the women group for raising high value vegetables under a naturally ventilated greenhouse that has been a success in Tiptur, Karnataka.

Backdrop - School and Community Horticulture Project

The national mid-day meal scheme was initiated in 1995 by the Government to increase enrollment of children in schools. The school and community horticulture project was conceptualized as an empowerment tool for women group with very small landholdings that supports nutrition program under the mid day meal scheme in primary schools in Karnataka. The budget allocated under the programme for vegetables allowed about 25 gm/child per day. TIDE felt the need to explore community based interventions to increase nutrition support by supplying vegetables up to 75gm/child per day.

After economic liberalization, there is rapid urbanization; improved infrastructures and emergence of an urban middle class, creating a demand pull for high value horticultural crops in India. This provides an opportunity to directly increase the income of farmers with very small landholdings.

TIDE introduced women group in the community greenhouse horticulture as a livelihood option. They voluntarily contributed nearly 10% of their income in the form of vegetables to augment the nutrition in the mid day meal scheme of the school where their children are studying. In the beginning this charitable act of the group earned respect in the local community.

The aforesaid project is implemented in Shanthanahalli village, Tiptur Taluk, of Tumkur district in Karnataka, which is about 150 kms from Bangalore. The women self help group (SHG) is involved in growing high value vegetables such as Tomato and Capsicum under the greenhouse and supplying these vegetables to the mid day meal scheme of the school at a subsidized rate.
The school and community horticulture project was the first of its kind by the TIDE in Tiptur. TIDE realized that in the village environment, women group who made a commitment of nutritional support to the mid day meal scheme of the school would be subject to ridicule if they fail to deliver their commitments on time. TIDE carefully evolved a profile of the woman group for this project looking at following attributes:

- Availability of 200 sqm of land for construction of greenhouse and some additional land for vegetable cultivation outside the green house.
- Access to ground water and a system for water harvest from the roof top of greenhouse.
- Women with a background of farming.
- Strong leadership, willing to take risk and good communication skill in the group.
- The leader must at least have high school education with knowledge of accounting and data management.
- Ability to discharge social responsibility towards the community and at the same time manages support of her family.
- Saving of at least Rs 20,000 with the women’s group as working capital. (the cost of the green house was borne by TIDE)

TIDE selected Mrs. Jagadamba to lead the school and community horticulture project because she had the above attributes. Moreover there was good rapport between her and the field staffs of TIDE.

**Role of Precision Farming Development Centre (PFDC), UAS, Bangalore**
TIDE was aware that while they had the experience and expertise in evolving innovative livelihood options for women but they did not have the knowledge on greenhouse technology. TIDE came to know about NCPAH’s PFDC Centre in UAS, Bangalore. TIDE took technical assistance for the construction and to raise vegetables under the greenhouse. TIDE had reasonable experience in rain water harvest from its previous projects.

Following technical, managerial and training guidance provided by the PFDC, which were essential for the greenhouse project.

- Assistance in site selection and soil preparation
- Recommended greenhouse structure considering the local conditions
- Used quality materials for the greenhouse structure
- Identification of high value crops suitable in Tiptur agro-climate
- Helped in procurement of seeds and seedlings
- Periodic inspection of the crops and suggested interventions (like use of fertilizer and pesticide etc)
- Provided technical guidance during pre and post harvest
- Imparted training on handling & packaging of harvested crop

**Cost – Economics of Greenhouse**

Shanthanahalli village, Tiptur Taluk

PFDC helped to build a naturally ventilated 200sqm greenhouse. The materials used in the construction are GI frames, greenhouse polythene sheets, shade-nets, rainwater harvest system and drip irrigation system. 70 man-days were used for the greenhouse construction. The total construction cost of the greenhouse was Rs.1, 47,000. The cost of the greenhouse was slightly high as it was made for the first time in that region and at the same time offered learning to the women group. Use of greenhouse technology under the precision farming guidelines enhanced crop yield by 3-4 times in
case of Tomato and 4-5 times in Capsicum in comparison to the conventional method of farming for 200sqm area. Following recommendations were used for increasing the yield and quality;

- Select seedlings of 28-30 days old
- Used drip irrigation system @ 12 litre water/day/sqm
- Fertigation (8-10 doses) twice in pre-harvest period
- Spraying of growth regulator twice during the crop development stages

The income and expenditure statement shown in the table is the actual expenditure incurred and the income received by the project from the sale of tomato and coloured capsicum. The price received for coloured capsicum was on an average Rs. 35/kg. While for tomato it fetched an average price of Rs.5/kg. In one season the greenhouse project made a gross profit of Rs 40,225 from the sale of tomato and capiscum crops. Depending upon the market returns for different crops grown under greenhouse, the payback period on an average would be between 18-24 months.

**Income and Expenditure statement:**

<table>
<thead>
<tr>
<th>Income</th>
<th>Expenditure</th>
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</thead>
<tbody>
<tr>
<td><strong>Items</strong></td>
<td><strong>Amount(Rs)</strong></td>
</tr>
<tr>
<td>Sale of vegetables to School</td>
<td>77,000</td>
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<tr>
<td>Sale of vegetables to market</td>
<td>4,725</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Gross Profit</strong></td>
<td><strong>40,225</strong></td>
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</tbody>
</table>

**Market Linkages**

The project has managed to popularize the greenhouse technology by growing vegetables, which are supplied under the Govt. mid day meal scheme in Tiptur. At an awareness meeting conducted by the TIDE, officials from 30 schools requested for additional vegetables to be supplied in their schools through similar technology interventions. The Extension Executive Officer, Tiptur acknowledged it is not advisable to put up a greenhouse in school land, as there is no guarantee for its safety and security. Therefore they encouraged the SHG to come forward and take up such projects.
TIDE has encouraged sale of vegetables in the local markets. It also helped the growers to supply their vegetables to various retail chains like Reliance Fresh, Food World and few horticulture exporters for the coloured capsicum.

**Socio-economic impact**

The socio-economic impact of the greenhouse has been enormous, as there was no precedence of greenhouse horticulture by the women in that region. It has now been a subject interest in the neighbourhood. The local community never had seen coloured capsicum before. Thus there was lot of interest shown for this crop as it fetched higher remunerative prices. Looking at the interests shown by the farmers, PFDC organized training programme on precision farming. As a result there are three more greenhouses presently under construction. TIDE from its own project fund is supporting another woman for greenhouse horticulture. She has also made a commitment of nutrition support to the local Anganwadi. Now a local fabricator developed skill in greenhouse technology and marketing his knowledge among the progressive farmers in that region. Small farmers of these villages are now using farm ponds to harvest rain water.
Now Mrs Jagadamba is regularly supplying 75gm vegetables/child/day to the school. The procedure for accepting vegetables from the SHG for mid day meal scheme was not in place but SDMC changed the procedure to accept vegetables from this women group. The school has changed its menu for the mid day meal and now offering better nutritious “Bise bele bhat” (rice with lentils and vegetables) instead of “Chitrana” (lemon rice).

The profitable venture of Mrs. Jagadamba and her group has been applauded both by her community and the school. She has become popular among the children. Villagers seeing the work of Mrs. Jagadamba are now motivated to contribute coconuts, bananas and jack-fruits for the mid day meal scheme. The school head master approached the Karnataka Milk Federation for the supply of packed milk, buttermilk and curd for school children.

Awareness creation

The school and community horticulture project has created awareness in Tiptur Taluk about the greenhouse farming and possibilities of higher income to the farmers with small land holdings. At the same time, it augments nutrition deficiencies in the mid-day meal programme of the school with the help received from local communities. Awareness about the rain water harvest and conservation of water is exhibited by the rainwater harvesting from the roof of greenhouse and use of drip irrigation inside the greenhouse.

PFDC personnel with the help of TIDE managed awareness meetings for the interested farmers from neighbouring communities. The PFDC was very supportive during this campaign. The school children had a field visit to the greenhouse. A quiz programme was conducted on greenhouse and rainwater harvest, which helped the children to understand these technologies. As a result now there is lot of goodwill and respect for Mrs. Jagadamba and her women group.
Conclusion

➤ The project demonstrated use of naturally ventilated greenhouse for vegetables in a land belonging to small and marginal family. Yet such venture can be profitable. Greenhouse helps to increase quality, yield, optimum use of farm inputs and in some crops reduce yield duration.

➤ Use of greenhouse technology under the precision farming guidelines enhanced crop yield by 3-4 times in case of Tomato and 4-5 times in Capsicum in comparison to the conventional method of farming.

➤ 200sqm land used for Capsicum and Tomato, which fetched positive return, as the vegetables grown under the Greenhouse got market linkages through mid-day meal scheme of the Government and the market network of Reliance fresh and Food world etc.

➤ It enhanced women empowerment by adopting greenhouse technology. Women are found best suited to manage the greenhouse cultivation as it is somewhat similar to their other routine domestic responsibilities.

➤ Even if the naturally ventilated greenhouse structure is little costly to begin with, once there is year round market linkages then the payback period would be shorter for different crops grown under it.

➤ To make greenhouse more popular, one must have cluster based approach for creating greenhouse hub around Tiptur rather than spreading this intervention in isolated locations.

➤ It is important that the outcome of this project needs to be replicated in other places by involving women to create better socio-economic impact in the villages which would become a means to transform the lives of small and marginal farm families.

➤ In Karnataka there are nearly 2, 00,000 Self-help Groups (SHGs) in 29 districts, which cover nearly 29,000 villages. If Mrs Jagdamba and her women group could bring success in Tiptur then the greenhouse technology in horticulture can be a reality among millions of farm families in India. This would slowly eradicate the myth that greenhouse technology is not meant only for the large scale farmers in India.
Cultivation of vegetables under Naturally ventilated Greenhouse PFDC(NCPAH) in collaboration with TIDE, Bangalore

Cranking system with handle

**Materials used in Greenhouse**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Area</td>
<td>200 m^2 (18m x 11m x 3.5 m – LxWxH)</td>
</tr>
<tr>
<td>2.</td>
<td>Supporting GI Pipes, Trusses, Door, side top &amp; bottom frame</td>
<td>46 mm GI pipes “B” Class</td>
</tr>
<tr>
<td>3.</td>
<td>Cranking system &amp; handle</td>
<td>A Class GI Pipes- 30mm</td>
</tr>
<tr>
<td>4.</td>
<td>Arch</td>
<td>B Class GI Pipes- 30mm</td>
</tr>
<tr>
<td>5.</td>
<td>Insect Net</td>
<td>40 S mesh</td>
</tr>
<tr>
<td>6.</td>
<td>Cladding material</td>
<td>200 micron UV stabilized LDPE film</td>
</tr>
<tr>
<td>7.</td>
<td>Drip irrigation system</td>
<td>Lateral dripper &amp; accessories</td>
</tr>
<tr>
<td>8.</td>
<td>Rainwater harvest system</td>
<td>For supplementary irrigation</td>
</tr>
<tr>
<td>9.</td>
<td>Civil work &amp; fixtures</td>
<td>Sand, cement, stone, bolts, nuts, metal plates, welding, brazing etc</td>
</tr>
</tbody>
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**Disclaimer:**

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