

# **CROP POST HARVEST PROGRAMME**

**Sustainable retailing of post-harvest technology to  
the poor: alternative institutional mechanisms for  
developing and transferring technology**

**R 7551 (ZB 0278)**

## **PROJECT EVALUATION REPORT**

**1 July 2001 – 30 September 2003**

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## **Section A      Executive Summary**

*A very brief summary of how the outputs of the project contributed to the purpose, the keyactivities and highlights of dissemination outputs.*

The project “Sustainable retailing of post-harvest technology to the poor: alternative institutional mechanisms for developing and transferring technology” involved identifying demand for niche technologies among the poor and establishing technology development, production and distribution systems. International Development Enterprises (India) or IDEI had developed this approach over the last decade in eastern India and Bangladesh. The key features of this approach are:

- Firstly, it uses commercial marketing principles to identify market demand and establish retail networks. Viable opportunity exists for rural entrepreneurs, but these often require market and technology development interventions before individual entrepreneurs invest and create a supply chain. IDEI fills this critical ‘pre-competitive’ gap.
- Secondly, it uses networks of partners in the research, production, distribution and rural development sectors. Relationships are developed and managed to create a *total system* of technology development and supply. This feature is particularly critical because it builds capacity in a system that links the poor, through markets, to science and technology.

It was this approach that was used as a way of adapting the post-harvest technology system of small-scale tomato producers to cope with the urgent demand for a new technology resulting from a change in government environmental policy. The project developed partnerships and systems to develop and supply a packaging alternative to wooden tomato boxes, a key cause of unsustainable timber exploitation in tomato production and adjacent areas.

Within 3 years, the project:

- Investigated the packaging issue, estimating user demand in target communities and understanding production, distribution and market systems (for both existing packaging technology and for tomatoes) in the context of livelihood options and strategies pursued by small-scale producers.
- Identified a development partner who designed and produced prototype cardboard cartons. After testing with farmers, and conducting a major trial when 1,000 cartons were transported from field to market, fourth-generation cartons were in commercial production in time for the 2002 season.
- Established partnerships with self-help groups, grass-root NGOs, farmers, traders, transporters, and buyers that ensured the product’s acceptability in the market.
- Modified design and construction of cartons, and built a network of manufacturers prepared to make them, some so committed as to invest significantly in the product.
- Formed a distribution network to make sure cartons reach farmers as and when needed. This involved traders, shopkeepers, banks, NGOs and self-help groups all of whom were willing to invest in the product, or to provide credit to farmers.

## Section B Project Background

### B.1 Administrative data

Period under report: July 2001 to September 2003	Project Leader/Institution: International Development Enterprises (India)
NRIL Contract Number: ZB 0278	Collaborating institution(s): RUCHI, IIM (A)
DFID Contract Number: R 7551	Target Institution(s): Tomato growing small farmers in Himachal Pradesh, India
Project Title: Sustainable retailing of post-harvest technology to the poor: alternative institutional mechanisms for developing and transferring technology	Start Date: July '01 End Date: September '03
Research Programme: Crop Post Harvest	Budget (i.e. Total Cost): £ 119,030
Production System: Agriculture	

## Section C Evaluating the identification and design stage

*Please describe the importance of the livelihood constraint(s) that the project sought to address and specify how and why this was identified.*

*If relevant, how and to what extent did the project team understand and work with different groups of farmers?*

*Did the project work with a specific target institution. Which one? And how did they plan for the future adoption of project outputs at the design stage? Please describe the strategy the project team agreed upon with the target institution(s).*

*How was the collaborating institution involved in the design of this project and why did they collaborate?*

IDEI began this project by making an assessment of critical post-harvest issues relevant to small-scale producers in Himachal Pradesh. This state was chosen because of existing relationship that IDEI had established through its work on the water resources sector. In this region poor households exploit their small plot sizes and family labour to grow a range of out of season fruit and vegetables. This produce commands high prices in other states, getting to the Delhi market at a time when other growing areas cannot produce a crop. Tomatoes offer the highest income-generating potential and highest return per hectare. In recent years production has increased more than five-fold. More than 70% of these tomatoes travel to market in wooden boxes.

The six Indian metropolitan centres of New Delhi, Kolkatta, Mumbai, Chennai, Hyderabad and Bangalore have a population between 60–65 million people. This enormous urban market relies on fruit and vegetables from production zones across various regions of the country. Estimates suggest that 7000 tons (t) of fruit and vegetables arrive in the Delhi market, 365 days of every year. Much of this produce is packed in wooden crates, each holding approximately 15 kg. At the height of the tomato season 200,000 boxes of tomatoes arrive from Himachal Pradesh and pass through this market in transit for other parts of the country. In the two and half months of the peak season 100,000 trees must be felled to make the boxes in which these tomatoes are packed. Vegetable consumption throughout the country is subsidized by tremendous environmental damage in distant production zones.

Cutting down of trees for packaging material and the environmental damage that this causes have not, however, gone unnoticed. The introduction of environmental protection legislation by the Himachal Pradesh State Government has banned tree felling in the state. This has had two implications.

- Firstly, it shifted timber felling to adjacent states of Uttar Pradesh, Punjab and Haryana. The environmental threat has not been removed but simply transferred.
- Secondly, shortages in packaging material and rising costs restrict access to the lucrative all-India off-season market. This threatens the livelihoods of the approximately 50,000 small-scale farmers who depend on the crop as their main source of income.

### **Livelihood context of the post-harvest system**

Hill farmers, working in small single-family units, growing tomatoes on 0.25 ha can earn about US\$ 1500-2000 in the short harvest season. These incomes are far higher than those accrued from any other type of farming in the hill area, and have raised farm families well above the poverty line. Changes in environmental policy banning tree felling, while clearly needed, threatened the livelihood of poor households. If, as a result, tomatoes could not be packed in wooden boxes, but sold only in the local market to which they are transported in baskets, or plastic crates, farmers would lose 70% of their income. Local market prices are around Rs.7/kg while graded tomatoes can fetch Rs.20/kg, or more in the Delhi market.

### **Working through others**

IDEI realised at an early stage of the project that, other than its expertise in identifying a technology niche using market analysis principles, it had no relevant skills in post-harvest issues. As a consequence a decision was taken to implement the initiative by working through others, with IDEI viewing its role as one of managing relationships with its partners, establishing systems and coordinating innovation.

Once IDEI had identified that environmental policy changes was making the wooden packaging for tomatoes an obsolete technology, the key task then was to establish a network of partners around the development and supply of an alternative packaging technology – corrugated cardboard cartons (also known as “CCC box” or “carton”). In fact this involved identifying and accessing four existing informal networks and establishing partnerships with them. These were as follows.

- *Technology network.* This consisted of scientists from the Indian Institute of Management, Ahmedabad and a box manufacture with a design studio with whom they had previously worked on packaging development. The scientists and their industry partners were willing to design and test tomato boxes. This involved conducting a major trial when 1,000 cartons were transported from field to the Delhi market. The adaptive development of the carton went through four generations before an appropriate design was arrived at.
- *Local knowledge network.* A local grass roots NGO (named RUCHI) in the focus area was identified that had already established a relationship with farmers in a network of different communities. The communities formed the focus for the adaptive trials of the cartons. It also included a partnership with the local agricultural university for information on local crop production systems. The communities have subsequently taken a lead in pre-financing the manufacture of cartons.
- *Market network.* This consisted of the all those linking farmers to the Delhi market, including transporters, commission agents, wholesale traders and the farmers themselves. This market network was important, as these were the people who would have to accept and use the cartons in their transactions. They had to be willing to promote its use.

- *Production and distribution network.* This consisted of local carton manufacturers in the focus area and box traders. Obviously it was important to partner with such organisations as these would form the backbone of the supply and distribution chain. To establish the first commercial production of cartons, farmers used a loan from a micro-finance institution to pre-finance a local carton manufacture. 30,000 cartons were produced and sold to farmers in time for the 2002 season.

The various partners involved in the project were:

Indian Institute of Management, Ahmedabad (IIM-A): This is the best known management institution in India and has a specialised division working on agriculture. Rather than a formal institutional partnership, what seems of greater relevance is the collaboration with one specific faculty member at IIM-A in this division. He had worked on food packaging and in fact had assisted Gujarat farmers take to CCC boxes.

Rural Centre for Human Interest (RUCHI) is an established NGO that works in Solan district of Himachal Pradesh on a range of development issues including watershed development, quake proof housing, promotion of horticulture and micro-credit. RUCHI has created a network of SHGs in over four dozen villages in the district. RUCHI had collaborated with IDEI in demonstrating its micro-irrigation equipment around the same time. Due to personal rapport of CEO of RUCHI with a key functionary of IDEI, the two organisations had developed a mutually supportive relationship. RUCHI looked at IDEI as the source of new and beneficial technology and provided them access to farmers and local support.

Farmers and Self Help Groups: Besides being project participants in trials of alternative packaging technology, they served as critical partners in providing continuous feedback all through the project duration.

Transporters, agents: The transporters and commission agents provided valuable inputs on carton design and modification. They also participated in transportation trials and promotion of the new carton in the larger wholesale fruit and vegetable markets.

In addition, three other organisations were involved. The Indian Institute of Packaging (IIP) in Delhi is a public agency concerned with research, development and testing of packing materials supported by Council of Scientific and Industrial Research of GoI. IDEI approached them and explored the possibility of collaborative development work. Eventually, IIP did help in testing of CCC boxes developed for a fee. The two other agencies were manufacturers of CCC boxes. One of them, the largest manufacturer in India is based in Ahmedabad and the top management there had live and vibrant relations with IIM-A which they cherished. The second manufacturer is based in Delhi and had commercial interest in the success of the CCC Box.

## **Section D      Evaluating the implementation process**

*How was participation achieved among the different stakeholders (the lead institution, the collaborating institution(s), the target institution(s), the CPHP and, where relevant, farming communities) in the research process?*

*What were the major changes that took place during the implementation period. For each one, explain why they came about and how well do you think the project team managed them?*

*What were the strengths and weaknesses of your monitoring system? How did you use and how useful was the information provided by your monitoring system?*

IDEI persuaded IIM-A to take interest in the project. IIM-A involved the largest CCC box manufacturer in India (based in Ahmedabad) to design and test the technology. IDEI collaborated with RUCHI, an NGO that was engaged in development work with the farmers in the area as an interface to work with the farmers. IDEI had previous association with RUCHI in the process of demonstration and development of its mountain Micro Irrigation kits. The first phase concluded with the identification and first field level as well as transportation trials of the CCC box (VC-15 box of dimension 363X192X373 mm made out of 5 ply 150 gsm material with 8 ventilation holes) technology in June 2001. The second phase directly implemented by IDEI, envisaged further adaptation and modification of the technology (for reducing carton volume, improving its moisture resistance, improving its acceptance in trade circles and reducing its costs) and commercialisation of the technology through sustainable engagement of local private sector players. IDEI tied up with a manufacturer based in Delhi to manufacture cartons with credit arrangements with a local bank facilitated by IDEI as well as RUCHI. RUCHI, the box manufacturer, IDEI and the trade circle expected quick expansion of this scale and application of CCC box for packing of peach, capsicum and some other produce from this region.

#### Analysis of the partnership processes

Keeping IDEI as the focal organisation, three institutional partnerships are of importance in this whole process. These are:

IDE-Farmers

IDE-RUCHI

IDE-IIM-A

The process variables of interest to be further explored can be stated as:

- pre-partnership relationship, if any
- personal rapport between key persons
- mutual assessment of ability, standing, competence etc.
- existence of a formal agreement
- perception about “ownership” of the tasks
- frequency and nature of contacts etc.
- transparency and mutual accountability
- irritants if any and how are they sorted out
- social distance
- centrality of financial relationship

The process outcomes can be stated as:

- trust
- enhanced mutual respect
- enhanced sensitivity to the other’s concerns
- willingness/ability to continue relationship beyond project period etc

An attempt was made to characterise the three partnership processes in terms of process variables and process outcomes as in the following table:

Process outcomes

**IDE partnership with**

<b>Process outcome</b>	<b>Farmers</b>	<b>RUCHI</b>	<b>IIMA</b>
mutual trust	fairly high	High	High
enhanced mutual respect	Significant	significant	Substantial
enhanced sensitivity to the other's concerns	High. IDEI understands that cost consideration, freedom from drudgery are key concerns for the producers.	high. IDE knows that it will have to prolong its staff presence beyond project period to satisfy expectations from RUCHI/SHG side	moderately high
willingness/ability to continue relationship beyond project period etc.	not demonstrated but producers stated their intent to use CCC boxes for their other high value produce as well.	stated emphatically as high desire, need and ability	indicated willingness to support second transportation trial

Process Variables

**IDE partnership with**

<b>Process variable</b>	<b>Farmers</b>	<b>RUCHI</b>	<b>IIMA</b>
pre-partnership relationship	None	informal association in demo of MI kits. mutually satisfying experience	none
personal rapport between key individuals	None	rapport existed between ED RUCHI and a key senior manager in IDE	rapport existed between a senior manager who was student of the concerned faculty member
mutual assessment of abilities and standing	good assessment that enabled well defined roles, clarity of needs and requirements	clear assessment of mutual strengths	good assessment of mutual strength
formal agreement ownership of the task	None IDE owned the task, but farmers participated fully and with complete involvement	none between them IDE was the owners, but for the farmers, the lines between the two were blurred	none IIM came as an interested, keen and responsive consultant and owned jointly the devp process
frequency and nature of contacts	frequent and long personal visits of IDE staff	frequent and long personal visits of IDE staff	several visits/contacts from both the sides
transparency and	high	high	fairly high

mutual accountability irritants, if any and how are they sorted out	Too much time may have been claimed by project meetings	“too much time and efforts” of RUCHI may have been claimed by IDE	None
Social distance centrality of financial relationship	Moderately high No financial relationship but for the boxes sponsored by IDEI for the initial transportation trials.	moderately high no financial relationship	moderately high marginal financial relationship

### Significant changes in the project period

There has been a significant occurrence in the last 2 years that required adjustments within the project activities. This is explained below.

#### *Establishment of Solan Mandi*

So far, off season tomatoes were transported from Solan region to large regional markets of Delhi for sale in Delhi and/or onward supply to other north Indian cities. It was in this context that the project started and worked on an alternative technology to supply tomatoes to the Delhi market in CCC boxes. The boxes were designed to withstand long distance travel in the monsoon period on Indian roads. This system of supply resulted in several actors being involved in this process with various relationships and dynamics.

In the last year there has been a major intervention by the Himachal Pradesh state government in the market. They have invested Rs. 300 million in the development of a wholesale market (mandi) at Solan itself. This mandi is in the process of being set up and has even started initial operations/ trade in the summer of 2003.

What this has meant for the project is that tomatoes that were till now transported from Solan to Delhi, will now need to be transported by the farmers from their farmers upto Solan mandi only. The exact implications of this change are as yet unclear. However, some anticipated fallouts are:

- Farmers will transport their produce in plastic crates upto Solan mandi
- Traders in Solan mandi will repack with or without grading for onward supply
- Packing in wooden or CCC boxes will shift from farmer point to trader point
- The boxes will undergo reduced transportation as from Solan they can go directly to markets in Delhi, Kanpur, Punjab, Calcutta, etc. instead of reaching these markets via Delhi. This could mean a modification in the carton specifications and maybe reduced price of the box.

The project in the season of 2003 was to establish a supply chain that could be sustainable. Keeping these changes in mind, IDEI staff approached the mandi officials and discussed the options of stocking CCC boxes at the mandi itself for sale to both farmers as well as traders. Since this was only the first season, the officials were not sure whether they wanted to experiment with new ideas. So IDEI established relations with some local traders and appointed them as dealers of CCC boxes. These dealers were then linked directly to the manufacturer from where they could place orders for onward sale to traders and some farmers.



## Monitoring process

Broadly, IDEI used the logframe to keep track of its performance and progress. The way this is done at IDEI is explained below:

IDEI's Monitoring systems flow from the mission statement. Within IDEI we have categorised information needs into three main categories:

1. Information pertaining to the physical delivery of the structures and services provided by the project, together with the relevant financial records
2. Information pertaining to the use of the structure and services by the targeted population and the initial consequences of that use
3. Information on the social, economic or environmental reasons for any unexpected reaction by the target population that is revealed by the information about the use of structure and services

Within the organisation, IDEI has a structured and well laid out system whereby staffs get opportunities to discuss identified problems in implementation, means of sharing experience across offices within a region and outside of it, learn from experiences in other organisations.

The following table explains in detail as to how the process is carried out in IDEI:

Monitoring Mechanism	Location	Responsibility	Purpose
Monthly meetings	Field Office	Area Managers	Review & adjustments in operations
Monthly meetings	Regional Office	Regional Heads	Review & adjustments in regional operations Inputs for policy decisions
Planning Meeting	Central Office	Programme and other Functional heads	Review & adjustments in national operations Review of policy / strategy
Field visits	Regions	Donor representatives, Regional Heads and Central office managers	Identifying problems, conducting diagnostic studies, meeting farmers
Regional Co-ordination meetings	Region / Delhi	Regional Heads and Central office managers	Review of operations, Suggested changes in policy/ strategy, Finalising new initiatives
Annual Review & Planning Exercise	Region	Regional Heads, Area Managers	Learnings, Incorporation of these into planning
Annual Meeting	Region / Delhi	Accounts staff	Problems encountered, need for adjustments in Accounts system
Donor meetings	Region / Delhi	Donor representatives, Central office managers	Review against plans, feedback from donor visits, Project impacts, Future design of projects
Board meeting	Delhi	Board members, Executive Director	Changes in policy/ strategy, Approval of plans

**Internal evaluation** is done through:

- a) The Management Information System which collects information from Field Offices
- b) Quarterly Review at Regional Coordination Meetings with senior staff from the regions
- c) Annual programme review for each region / project
- d) Evaluation visits by IDEI Board of Directors and Donor Partners

IDEI's donors have played an important role in both planning and monitoring the programme. IDEI also completed an extensive self evaluation in 2002.

**External evaluation** is also accomplished by market research and socio-economic impact studies. Our consultants have played a key role as external evaluators, providing regular feedback on the working of the programme. The CPHP South Asia regional office has been instrumental in several studies being conducted. Partnership process case studies, poverty relevance studies and process documentation have been carried out. A list is provided in Annex VI.

## **Section E      Evaluating your activities**

*This section should include a summary analysis of all the research activities (studies, surveys etc.) conducted to achieve the outputs of the project set against their respective OVs in your project LogFrame.*

*Information on any facilities, expertise and special resources used to implement the project should also be included.*

**Needs assessment.** During the first year of the project IDEI conducted a "needs assessment" study in order to help give greater focus to the handling packing and storage themes outlined in the project proposal. To do so IDEI conducted interviews with the following stakeholder groups:

- (i) *Marginal and small-scale farmers.* These were from 8 villages in 2 districts (4 in each), Kullu and Solan. Use was made of intermediaries to facilitate research. The intermediary used in the Solan district was RUCHI, an NGO that subsequently become a key actor in technology testing with farmers. In Kullu IDEI used a local agricultural input dealer.
- (ii) *Wholesale vegetable markets.* These were both inside and outside Himachal Pradesh and those interviewed included farmers, traders and auction agents (*adtis*).
- (iii) *Box traders.* Visits were made to saw mills, plank sellers and warehouses.
- (iv) *Transporters.* They transported tomatoes from Solan to Delhi mandi
- (v) *State Departments of Agriculture.*
- (vi) *The Solan University of Horticulture.*
- (vii) *Local NGOs (RUCHI, Society for Technology Development and Serve India)*
- (viii) *Agricultural Input Dealers*

This research enabled IDEI to obtain a detailed understanding of the total supply chain for high value horticultural produce. It concluded that the most suitable crop to focus its attention on would be tomatoes as:

- It is a high value crop widely grown in Himachal Pradesh

- It is an important crop commonly grown by small and marginal farmers giving greater profitability than any other off-season horticultural crop; and
- There was a clear need for post-harvest intervention.

IDEI did not start the research with a pre-conceived notion that its work will concern tomato packaging. During this research it was found that:

- it was much easier for the IDEI researchers to interact with farmers when they worked in collaboration with RUCHI than when they went through the input dealers. RUCHI had presence in villages in the form of Watershed Committees or SHG, had credibility and enjoyed trust of the people. Farmers were free and interacted with confidence with IDEI personnel there. The input dealer could primarily introduce the researchers to his clientele but since his own equation with them was in the commercial realm, he had little influence on the social processes.
- farmers in both areas expressed grave concern about the impact of government ban on tree felling on the packaging and hence their ability to transport their produce over long distances.
- Tomato was a crop of the small and marginal farmers who could deploy their family labour in its cultivation, harvesting and post harvest. Some of them had also gained access to irrigation through RUCHI's watershed development work.
- two traditional packaging forms (kilta and wooden box) and one relatively new form (plastic crates) were seen to be in practice. Of these, wooden boxes were used for tomatoes sold in Delhi market, often for subsequent transportation beyond Delhi. This form of packing was the one affected by the ban. Since Delhi market was the most lucrative, farmers perceived a major threat to their income in the coming years.
- packing in wooden boxes was labour intensive. Wooden material had to be first procured and then boxes prepared by nailing pieces together in the prescribed style. Men, women and children all would be busy in making the boxes one day ahead of the predetermined time for harvesting and sending the material to Delhi. Farmers reported that if they could not make enough boxes ready, then even top quality produce would have to be sold at a discount in the local market. An alternative to this was thus sorely needed.

**Technology search.** Having identified packaging as the focus of project intervention, IDEI then went about a technology search. Literature searches as well as visits to research organisations were made. These visits were used to explore the physical technology that was available; to talk to experts about technological options; to access information sources in these organisations (libraries etc) and later on to search for partners that not only had technology and expertise, but also had sufficient empathy to partner effectively with IDEI. During this process of technology search, in August 2000, two key members of the IDEI team visited the UK for discussions with ITDG. While in the UK they also had a chance to study the past history of packaging technology with a view to finding out what had been the UK experience with wooden boxes and alternatives. Through visiting supermarkets they learned that the U.K. had shifted from the use of wooden crates to cardboard boxes (as opposed to plastic or other alternatives) for packing and shipping of fruits. This information confirmed IDEI's conclusion that cardboard technology was the approach needed for India. On return to India the team continued their search for suitable cardboard technology and associated expertise. One of the organisations visited was the Indian Institute of Packaging Technology. While this organisation clearly had relevant experience it showed little interest, however, in working with IDEI.

Through a publications search the IDEI team then discovered a paper written by an agricultural engineer from the IIM-A. He had independently been working on cardboard packaging technology for tomatoes. The underlying rationale for this work was that wooden box use was preventing small-scale farmers in Gujarat from accessing long distance markets. In turn this was because wooden boxes gave rise to unacceptable damage to fruits during long distance transportation. The problem became particularly acute during those times of the year when supply was abundant and local prices dropped often by so much that a surplus could not be sold, and farmers were thus dependent on other distant markets. His work assumed that the use of cardboard boxes could widen market access by reducing levels of fruit damage, and he was currently investigating the most appropriate technology for this purpose. To do this, IIM-A had made an alliance with a nearby large commercial cardboard box manufacturer who had design, R&D and testing facilities.

The reason for IDEI's interest in promoting a change to cardboard boxes was different from the rationale for the IIM-A work in Gujarat. IDEI was tackling technological redundancy brought about by changes in environmental policy in Himachal Pradesh, whereas IIM-A had been addressing an issue of technical performance in the context of market access. Still, IDEI concluded that this group should play the major role in technology development and assist to organise and conduct a first set of trials with cardboard boxes in Himachal Pradesh. This was not a contractual arrangement. Instead the scientist undertook development and field-testing of his packaging design with IDEI as way of further exploring the technology and promoting its use, an agenda that clearly overlapped with that of IDEI. The scientist felt that success in this way would reflect well on both himself and IIM-A. This set a pattern for subsequent relations.

### ***Technology development***

With respect to the relationship with the local box manufacturer at Ahmedabad for development of the first test batch, there was a longer term view. The manufacturer, CORE, agreed to develop and provide samples of the trial boxes free of charge and was willing to assist in any way he could. While the incentives may have been the possibility of future orders, also important seems to have been the need to maintain goodwill with IIM-A, which has a powerful presence in local commercial activities. CORE top management has close contacts with IIM-A and they saw a possibility of being able to contribute to development in this association, as also a potential business opportunity. The latter perception became misplaced as it became clear that IDEI wished for an affordable solution.

Interestingly, IDEI team identified two basic post-harvest problems: loss of value to farmers produce due to this inability to make all the boxes in time and the fact that traditional forms of packaging made possible and hence encouraged marketing un-graded materials with consequent impact on realised price. RUCHI saw the regeneration of tree cover in the region as the task to be addressed by the project. Farmers saw reduced drudgery and expenses in obtaining the boxes as the key benefits. (while making wooden boxes, nails had to be hammered in the wooden planks, most men, women and children working on the task would end up having bleeding hands.) The choice of the post-harvest problem to be addressed thus perhaps coincidentally addressed all these concerns. *Clearly, unless a new technology effectively addresses genuine but possibly differing concerns of all the parties involved, it may not be acceptable.*

### ***Technology testing***

As noted above, during the course of previous work in Himachal Pradesh IDEI had already developed a relationship with a local NGO – RUCHI. The needs assessment work had also used the RUCHI contact as a way of gaining access to rural communities in the study area. RUCHI and its rural network therefore became the obvious choice when looking for a partner to assist in packaging and

road transport trials. Similarly the needs assessment work had required contact with traders, auction agents and transporters, and so in another study area an auction agent and his network of farmers was chosen as the partner for the trial. This first trial took place in May-June 2001 (at the same time as the UK partner had sub-contracted a local organisation to conduct the socio-economic study discussed earlier). This was a major trial in which IDEI paid for the cost of the new packaging, but farmers contributed their tomatoes.

The trial involved road transport to the Delhi market, physical analysis of the packaging and its contents and discussion with all participants in the marketing chain. The conclusion was that although the Gujarat technology was suitable in principle, there were a few adjustments needed, due to differing needs of Himachal Pradesh farmers and traders. These related firstly to transportation practices whereby in Himachal Pradesh, boxes were shifted and carried using ropes in a way that put undue stress on the box (and on those shifting the box). The second factor related to greater exposure to rainfall in Himachal Pradesh, which risked damage to the box and its contents.

The IIM-A scientists assisted in the first two generation box trials. At the same time IDEI started to develop a relationship first with a box manufacture in Delhi and subsequently one in Himachal Pradesh, although the scientists from IIM-A still provide technical backstopping. In all, four generations of box were tested with farmers and marketing agents, with a series of modifications taking place in terms of dimension, stacking height, moisture resistance, road roughness index, and of course cost. The process of producing the boxes and distributing them to farmers also helped build a relationship with the manufacturers and box traders that form the production and supply chain.

### ***Pilot commercialisation***

By June 2002, the packaging had been through transportation trials, had been promoted amongst the farmers and was well accepted by both farmers and agents in the market chain. IDE then felt the time was right for testing it for its commercial application i.e. commercial production and purchase by farmers. The number of boxes to be supplied was negotiated between the local manufacturer and the farmers, assisted by IDEI and the local NGO RUCHI. The manufacturer insisted on advance payment of half the cost of the boxes. This was a problem as farmers usually operated by receiving wooden packaging on credit. RUCHI resolved this by facilitating financing of the boxes through a loan from a local bank to the self-help groups in its network. These groups then on-lent to households who in turn pre-financed the manufacturers. In the season of 2002, 30,000 boxes were manufactured and supplied and farmers transported about 400 MT of tomatoes in these boxes. This was a significant number in the very first commercial production season and could have been even higher but for a poor crop season. It is worth pointing out here that the introduction of the new packing was resisted initially by traders in the Delhi market. However efforts by local agents in Himachal Pradesh, IDEI, and RUCHI have been able to bring about changes in market behaviour to the extent that cardboard packaging is now acceptable.

## **Section F      Evaluating Project effectiveness**

*This section of the report uses the rating criteria for the purpose and your outputs previously used in your annual reports.*

### **• The Purpose**

*Based on the values of your purpose level OVIs, to what extent was the purpose achieved? In other words, to what degree:*

- Have target institutions adopted or are likely to take up the research outputs and how have they done this or plan to do this? And/or*

- *Have the results of the research been validated as potentially effective at farmer level and how was this done?*

The project purpose and the specific indicator of the IDEI project as stated in the logframe was:

**Project purpose:** Strategies developed which improve food security of poor households through increased availability and improved quality of horticultural foods and better access to markets.

**Purpose OVI:** By project end, policy makers and practitioners will have a greater knowledge and understanding of the strategies necessary in commercialising technology and information transfer to the poor.

The project has documented key learning and the institutional development process through a series of dissemination material and participation in workshops and seminars (refer annex VI). These have been disseminated to policy makers, NGOs, academics and donors. What is also very significant is that a large amount of literature was published on IDEI's experience of using a systems approach. This literature/articles have been circulated amongst national and international audience.

IDEI was also invited by The Global Forum on Agricultural Research (GFAR) to make a poster presentation on its CPHP work at its 2<sup>nd</sup> Triennial Conference in Senegal, 22–24 May 2003, under the theme "Linking Research and Rural Innovation to Sustainable Development".

#### • **The Outputs**

*What were the research outputs achieved by the project as defined by the value of their respective OVIs?*

*Were all the anticipated outputs achieved and if not what were the reasons?*

*Your assessment of outputs should:*

- *be presented as tables or graphs rather than lengthy writing, be provided in as quantitative a form as far as is possible; and*
- *include a qualitative assessment as to their quality and relevance as perceived by their intended users (if this last aspect is not covered in your assessment of the purpose).*

*For projects aimed at developing a device, material or process, and considering the status of the assumptions that link the outputs to the purpose, please specify and justify:*

- What further market studies need to be done?*
- How the outputs have been made available to intended users?*
- What further stages will be needed to develop, test and establish manufacture of a product by the target institution?*
- How and by whom, will the further stages be carried out and paid for?*
- Have they developed plans to undertake this work? If yes, what are they? If why not?*

<b>Project Outputs</b>	<b>Objectively Verifiable Indicators</b>	<b>Project Achievements</b>
1. Improved packaging material for tomato adapted to the conditions of Himachal Pradesh.	1. Appropriate, low-cost packaging technology developed and field tested that meets the needs of the intended user.	1.1 3 <sup>rd</sup> generation corrugated cartons produced and finalised (5 ply of which 2 plys of 180GSM and 3 plys of 140 GSM)  1.2 3rd generation cartons lab tested by IIP, New Delhi and the results are as follows:

<p>2. Local manufacturing</p>	<p>2. Necessary information and support packages developed and field tested.</p> <p>Test batch of technology produced in and around Himachal Pradesh and</p>	<p>Average Busting strength –12.02 Kg/sq. cm.</p> <p>Average compression strength –395 kg.</p> <p>Average water absorption-114.33 gm/sq. metre</p> <p>Average moisture content-6.69%</p> <p>This test has been conducted as per IS-1060, IS-7028.</p> <p>Results endorsed by IIM-Ahmedabad.</p> <p>Based on the tomato transportation requirements, these results were found to be highly satisfactory. The cartons were called “Kisan Bandhu” cartons meaning “Farmers friend”.</p> <p>1.3 Prototypes of 3rd generation boxes produced by a local manufacturer, Jai Ambey Containers of Nahan (HP).</p> <p>1.4 Demonstration of the improved boxes carried out amongst retailers, farmers, agents and transporters. The activity was repeatedly carried out for local NGOs, SHG groups and private retailers.</p> <p>1.5 Farmers’ visits were organised to Delhi where they interacted with the auction agents.</p> <p>1.6 Demonstration of the improved boxes to the transporters of Solan, Nahan and Delhi both for transporting the cartons and produce. Kisan Bandhu carton demonstrations were also conducted to some new transporters from Bandh, Subathu, Deothi, Ghatti, Koti and Phagoti.</p> <p>1.7 Training on proper packing of tomatoes and importance of grading of the same was provided to farmers and retailers.</p> <p>1.8 Some promotion material such as leaflets/handbills were designed and printed for promoting this alternative packaging amongst all stakeholders</p> <p>2.1 Feedback from field-testing of the 3<sup>rd</sup> generation boxes was used to identify two local packaging manufacturers who had the capability and were interested in producing the finalized boxes. These were Supreme Packers- Delhi and Jai Ambey Containers, Nahan, H.P.</p>
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<p>capacity built to produce the improved box.</p> <p>3. Supply chain developed to deliver the improved packaging material to the end users.</p>	<p>delivered to pilot retailers.</p> <p>Pilot marketing of the technology and information package to identified intermediaries.</p>	<p>2.2 Following positive feedback from stakeholders on 3rd generation samples produced by Jai Ambey containers, Nahan, 2 other local manufacturers were commissioned to produce a batch of 500 cartons each - M/s Lambardar Udyog, Chail, and M/s Thakur Industries, Parwanoo</p> <p>2.3 Himachal being an apple belt, most carton manufacturers were involved with manufacturing of apple cartons were not very responsive to taking orders on a pilot scale for the tomato boxes.</p> <p>2.4 Supreme Packers of New Delhi involved in manufacturing batches of 4000 1st, 2nd and 3rd generation cartons expressed a willingness to open a camp office in the project area to supply tomato cartons.</p> <p>2.5 5000 3rd generation boxes were subjected to rigorous testing in the villages during the rainy season.</p> <p>2.6 Farmers' visits were organised to Delhi where they visited the factory of carton manufacturer, M/s Supreme Packers, suggested modification in the carton and negotiated the price with the manufacturer for the first season.</p> <p>3.1 Training on 3rd generation boxes was provided to the 4 packaging manufactures.</p> <p>3.2 Retailers were contacted for stocking cartons in the tomato season. They expressed willingness to stock the boxes based on local demand.</p> <p>3.3 Self Help Groups were linked to UCO Bank through the local NGO Ruchi. SHGs of Sargaon, Gajju and Dhalli purchased 5000, 4000 and 4000 cartons respectively. Besides these some local dealers and retailers also purchased 18000 cartons for onward sale to farmers.</p> <p>3.4 Farmers from Chail sent their produce to Punjab mandi and received a very positive response. In all farmers transported 393 MT of tomatoes in cartons to Delhi and Punjab mandis</p> <p>4.1 An overview paper has been developed and printed for dissemination of project concept amongst different stakeholders.</p> <p>4.2 Dr. Sanjiv Phansalkar (reputed</p>
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<p>4. Documentation and dissemination done on the 'research – commercialization process' adopted and institutional linkages developed by the project.</p>	<p>Dissemination of project results through stakeholder workshop, publications and promotional campaigns.</p>	<p>management consultant) has completed the process documentation study. The study objectives were:</p> <ul style="list-style-type: none"> <li>a. To document the systematic process adopted by the research team</li> <li>b. To document the lessons learnt during the process and analyse the implications of the lessons learnt.</li> <li>c. To draw out guiding principles for similar initiatives in the future</li> </ul> <p>4.3 A case study on partnership of different stakeholders in the CPHP project was developed by Dr. S. Phansalkar, Consultant and presented in a CPHP workshop held at ICRISAT, Hyderabad, India</p> <p>4.4 An Indian Institute of Management team visited to observe the process of commercialization.</p> <p>4.5 Dy. Director General, Indian Council of Agricultural Research visited the Mandi in Delhi and interacted with the auction agents.</p> <p>4.6 IDEI and the CPHP South Asia regional office jointly organised a workshop on "Post-harvest innovation: Partnership, learning and institutional change". The purpose of this meeting is to share some of the findings from the past three years work. The approach was to present some of the case study work that had been conducted and then provide a synthesis of the critical findings of this work. This was then used to discuss ways of understanding institutional learning and change process more comprehensively in the area of post-harvest innovation.</p>
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#### **Qualitative assessment and post project adoption**

The farmers have shown immense interest in this technology. They have proposed amongst their own groups that these boxes also be used for their other high value produce such as capsicum and peach. What can be expected in the coming season is that that wooden box manufacturers may drop the prices of the wooden planks substantially to retain their markets. Also, some commission agents who further sell these used boxes at reduced rates, are likely to put pressure on the farmers to sell in wooden boxes as they may lose out on this additional money. What will become critical is that the environmental ban on tree felling be enforced in a much stronger and consistent manner.

For this dissemination material has been circulated amongst relevant state authorities. A group of farmers with IDEI staff also visited the authorities in Shimla to discuss large scale off take of these boxes. The

state authorities may eventually waive off the sales tax on these boxes which will bring the price of these boxes down and would be able to compete with the wooden boxes that are almost sure to reduce their prices. Though the project is not really envisaging a price war to decide which box will be used and will expect strict enforcement of environmental laws and lower drudgery levels to be influencing factors, it does recognize that affordability is key to the off-take of any technology targeted at the poor.

IDEI itself has recently started work on another CPHP project, this time in a tribal belt of Orissa state. In this project, the focus of the work is on value addition marketing in the horticulture sector. This is a difficult area but IDEI has learnt much from its CPHP work in Himachal Pradesh. While the Himachal project was not designed as a partnership project, the Orissa CPHP project will attempt to use a total systems approach with several institutional actors with complementary skills participating in it. As a result this project will develop and test systems and strategies for institutional arrangements to function effectively such that poor tribal horticulture growers through value addition gain higher returns.

### **Project outcomes**

This project has had a number of outcomes associated with the development and implementation of post-harvest innovation. These include:

*Poverty relevance outcomes.* A recent donor sponsored poverty relevance review (Underwood 2002) of this intervention concluded that (i) its impact would be *inclusive* of the poor, i.e. both the poor and the non-poor would benefit from this intervention; (ii) it addressed gender concerns in the sense that it recognised that women rather than men suffered the drudgery of existing package technology (making wooden boxes); and (iii) that it addressed the *enabling* environment of the poor by reducing their vulnerability to policy changes – in this case environmental policy related to raw materials for packaging. The review also concluded that IDEI's approach to targeting the poor while successful in this case could be considerably strengthened by a range of existing and well-developed livelihood and stakeholder analysis approaches (*Ibid.*).

*Technological innovation outcomes.* A cardboard carton has been developed that can transport tomatoes from Himachal Pradesh to the Delhi market with acceptable levels of tomato quality deterioration.

*Institutional innovations outcomes among partners.* All the partners involved in this project have been affected in various ways. In Himachal Pradesh new relationships have been formed between organisations and individuals in the post-harvest system. This represents a considerable investment in social capital that did not exist before the project. The scientists from IIM-A have indicated that the project's impact on them is that it has opened their eyes both to the need to work with partners from the rural development sector, and to the enormous success that can be achieved by embedding their research in the work of others.

*Institutional innovation outcomes in IDEI.* This was the first time IDEI had worked in the post-harvest sector and it has learnt many lessons from this experience. It has also built new relationships as a result of its work, including a relationship with the donor involved. The use of a self-evaluation exercise for all of the organisation's activities that coincided with the intervention has helped it learn more effectively, thus further evolving the IDEI approach. An outcome of this learning is that IDEI recognises that formal social science skills should complement the commercial marketing principles that are at the core of its approach.

Signature

Date

Collaborating institution

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Project leader

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## **ANNEXES**

- I Project Logical Framework
- II Analysis of expenditure over implementation period (modified format needed)
- III Results of end of project workshop (guidance needed)
- IV Target Institution's workplan for adopting project outputs
- V Feedback on the process from collaborating institution(s) and farmers (where appropriate) (Criteria needed)
- VI List of publications
- VII A catalogue of data sets and their location

## Project Logical framework:

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<b>Goal</b>			
Poor people benefit from new knowledge applied to food commodity systems in peri-urban interface areas.	By 2005, new knowledge arising out of programme research being implemented by poor people operating within peri-urban systems.	Programme reports	
<b>Purpose</b>			
1. Strategies developed which improve food security of poor households through increased availability and improved quality of horticultural foods and better access to markets.	By project end, policy makers and practitioners will have a greater knowledge and understanding of the strategies necessary in commercializing technology and information transfer to poor.	1. A methodology for the market transfer of post-harvest technologies to resource-poor small-holders or their intermediaries. 2. Case study reports arising out of the project.	1. National and/or International affairs do not interfere with the execution of research projects. 2. Food security continues to be a priority of National governments.
<b>Outputs of phase 2</b>			
<p>1. Improved packaging material for tomato adapted to the conditions of Himachal Pradesh.</p> <p>2. Local manufacturing capacity built to produce the improved box.</p> <p>3. Supply chain developed to deliver the improved packaging material to the end users.</p>	<p>1. Appropriate, low-cost packaging technology developed and field tested that meets the needs of the intended user. 2. Necessary information and support packages developed and field tested.</p> <p>1. Test batch of technology produced in and around Himachal Pradesh and delivered to pilot retailers.</p> <p>1. Pilot marketing of the technology and information package to identified intermediaries.</p>	<p>1. Project quarterly reports, workshop reports, retail figures for the technologies promoted and assessment of their availability to the user groups, case study findings. 2. Project quarterly reports, workshop reports, case study findings.</p> <p>1. Project quarterly reports, stakeholder attendance records for project meetings / workshops, manufactures records, retailers records, case study findings.</p> <p>1. Project quarterly reports, retail figures for the technologies promoted and assessment of their availability to the user groups, annual assessment of the change in income for a) small-holder farmers and</p>	<p>1. Stakeholders able and willing to participate in project activities. 2. Manufactures willing to produce a test batch of technology, and retailers willing to pilot retail the technologies. 3. Shortage of raw materials or skilled labour prevent local manufactures from producing the technologies.</p>

<p>4. Documentation and dissemination done on the 'research – commercialization process' adopted and institutional linkages developed by the project.</p>	<p>1. Dissemination of project results through stakeholder workshop, publications and promotional campaigns.</p>	<p>b) the intermediaries following the introduction of the promoted technologies, stakeholder records, case study findings.</p> <p>1. Workshop attendance, at least 1 peer review publication, project documents, final report. 2. Best practice followed in design of new CPHP project.</p>	
<p><b>Activities of phase 2</b></p>	<p><b>Inputs</b></p>	<p><b>Means of Verification</b></p>	<p><b>Important Assumptions</b></p>
<p>1.1 Development of the 2<sup>nd</sup> generation box 1.2 Production of the 2<sup>nd</sup> generation box 1.3 Field trial and design finalization</p>	<p>Total: £119, 030</p>	<p>1. Project reports, quarterly project invoices, company accounts.</p>	<p>1. Staff remain with project or suitable replacement staff can be appointed. 2. Economic / political climate in India does not change significantly thus causing large-scale inflation. 3. Stakeholders able and willing to participate in project activities.</p>
<p>2.1 Demonstration of the improved box to the local manufactures 2.2 Training of interested manufacturers</p>			
<p>3.1 Demonstration of the improved boxes to the retailers 3.2 Demonstration of the improved boxes to the auction agents 3.3 Demonstration of the improved boxes to the transporters</p>			
<p>4.1 Support in development of case study outline 4.2 Hiring of consultant 4.3 Publication of report 4.4 Dissemination of project learning</p>			

## Analysis of expenditure over implementation period

BUDGET LINE ITEM	Staff Costs	Overheads	Capital Equip.	Travel and Subsistence	Misc.	VAT	TOTAL
<b>BUDGET ( in £ )</b>	43,410.00	32,557.00	-	15,639	27,424.00	-	<b>119,030.00</b>
07/2001 - 09/2001	5165	3873.75	0	1420	1382	0	<b>11840.75</b>
10/2001 - 12/2001	4990	3742.5	0	2940	3771	0	<b>15443.5</b>
01/2002 - 03/2002	9030	6772.5	0	5029	8058	0	<b>28889.5</b>
04/2002 - 06/2002	4325	3243.75	0	2050	2564	0	<b>12182.75</b>
07/2002 - 09/2002	4510	3382.5	0	1750	1010	0	<b>10652.5</b>
10/2002 - 12/2002	5420	4065	0	810	2507	0	<b>12802</b>
01/2003 - 03/2003	4845	3633.75	0	390	3932	0	<b>12800.75</b>
04/2003 - 06/2003	2725	2043.75	0	650	1779	0	<b>7197.75</b>
07/2003 - 09/2003	2400	1800	0	600	2421	0	<b>7221</b>
<b>ACTUAL ( in £ )</b>	<b>43,410.00</b>	<b>32,557.50</b>	-	<b>15,639.00</b>	<b>27,424.00</b>	-	<b>119,030.50</b>

## Results of end of project workshop

It was agreed with the principal agency that there would not be an end of project workshop. IDEI has participated in several forums in which it has had an opportunity to share experiences and learnings. However in April 2003, IDEI organized an workshop jointly with project R7502 "Optimising institutional arrangements for demand driven post-harvest research, delivery, uptake and impact on the livelihoods of the poor through public and private sector partnerships" led by Dr. Andy Hall. The proceedings of this workshop are provided below:

### Post-harvest innovation: Partnership, learning and institutional change.

14th 15 April 2003, Himachal Pradesh

#### Background

Over the last three years the Crop Post-Harvest Programme of the Department for International Development (DFID), UK has support a policy research project exploring partnerships in the area of post-harvest innovation. In our research we have explored innovation in the broad sense of the activities and processes associated with the generation, distribution, adaptation and use of new technical, institutional and managerial knowledge. We make this distinction to emphasis that our work is not about innovation in the narrow sense of the invention of new technology in R&D laboratories -- although R&D is clearly important. Rather our research is about how R&D needs to be viewed as part of a bigger process that brings about changes in post-harvest systems.

Among the many findings of this research has been the growing realisation that innovation happens when arrangement are in place that support learning and institutional change among groups of partners and stakeholders. By this we mean arrangements whereby those involved in research and rural development reflect with their partners on their successes and failures and adapt approaches and procedures in order to achieve success.

This process is referred to in a number of ways – "learning by doing", "failing forward", "participatory learning and action". We use the term institutional change as shorthand for this concept and by this we simply mean changing the norms and routines of the way post-harvest innovation is approached. This might mean reconsidering who is involved in research or implementation activities; who decides priorities and approaches; and how successes are judged and by who. In the last three years we have observed that this combination of cycles of learning and institutional change is a powerful way of bringing about post-harvest innovation that supports the livelihoods of poor people.

While we have realised the importance of institutional learning and change, we know far less about how to encourage and promote this process in organisations and clusters of partners. In the next two years we will be exploring these learning and change processes and attempting to draw out principles that post-harvest researcher and practitioners can use to strengthen innovation.

The purpose of this meeting was to share some of the findings from the past three years work and discuss the meaning of these in the light of the next phase of work on institutional learning and change that is just starting. The approach was to present some of the case study work that has been conducted and provide a syntheses of the critical finings of this work. This was then used to open up a wider discussion on ways of understanding institutional learning and change process more comprehensively in the area of post-harvest innovation.

The workshop programme can be found at the end of this report along with a list of the workshop participants.



Based on the discussion arising from the presentations at the workshop five questions were arrived at for detailed deliberation by the participants. Breakout groups worked on all five questions and provided suggestion which are detailed below. The workshop concluded with a commitment to explore ways in which the All India Co-ordinated Post-harvest Project could work with NCAP and others in post-harvest interventions where partnership and reflective learning processes were given emphasis.

### **Question 1. The other story.**

How can organisations better understand the broader innovation process in which they are involved, learning from the hits and the misses? How can social scientist help.

#### Group 1.

- Continuously reflect on processes as well as end results
- Failures should also be treated as learning.
- Feed back from users must also be encouraged and included in the research process.
- Create forums in the organisation for reporting on process
- Social science is not only for social scientists.
- Social scientists should contribute constructively.
- Social scientists should be an integral part of the team.

#### Group 2.

- Mechanisms for self-reflection and reporting.
- Research group should be multidisciplinary, some disciplines might need to be brought in from outside
- Other actors should be associated with the process throughout.
- In order to do this, organisational management should have a stake in this.
- Agenda for social scientist – integral role, social science disciplines are also multi disciplinary.
- Social scientist should address- communications, lessons learnt, assessment of these, impacts of previous work, HRD aspects, look at work both inside and outside the organisation.

#### Group 3.

- Get rid of the culture of blame, and replace with one of cooperation and understanding.
- Senior management should play a strong direct role in integrating social science research into other research.
- Choice and design should involve social scientists, including building flexibility and learning.
- Capacity building by encouraging workshops facilitated by social scientists
- Social scientist should have primary role in linking with external actors.

### **Question 2: Going soft around the edges.**

How do we as scientists cope with the need to work in partnerships in more participatory ways, recognising the skills and innovations of others? How do we expand our professional mandate while remaining good scientists, or technology transfer experts?

#### Group 1

- Lead partners should be responsible for bringing in partnership and should make it interesting for the partners
- Developing an attitude for listening to others
- Being open
- Scientist should drop their label
- Scientist should be encouraged to participate in multi partner and Inter- disciplinary workshop

- Joint ownership of results
- Re-evaluate the incentive system for scientists
- Create learning materials for future use from our experiences

#### Group 2

- Get rid of hierarchy. There are a number of hierarchies. All must be got rid of through team based work. Team management of research groups should be trained with a view to achieving this method of non-hierarchies research
- Partnership with all actors should be key organizing principle of the research design and its implementation
- In order to do this, research design and its execution should include exposure visits and opportunities to learn from others
- Develop performance indicators of research projects of these items, evaluation should be on-going and not post project

#### Group 3

- Partnership should be joint ventures with all actors having an explicit role
- Share of resources.
- Acknowledge our weaknesses and use this as a mechanism to bring in other skills that we don't have (from the start of the project)
- Scientist should be exposed to special mechanisms like attending specially designed workshops like these
- Conduct refresher course in research methodology
- Scientists should be evaluated professionally in ways that allows them to be soft around the edges
- Accountability of scientist should be encouraged and with both internal and external auditing
- Part of the job of scientists and others that work in research should be to get involved in extension activities

### **Question 3: Lumpy and continuous change**

We are all changing in the way we work in post-harvest innovation. How can we increase the rate of the change. How do we learn to learn faster. How do we cope with the need to respond quickly to the dynamic economic systems associated with post-harvest.

#### Group 1

- Spend more time on defining research questions
- Do not reinvent the wheel – reviews etc
- Let field testing and technology development go simultaneously
- Select short term projects, deal with simpler problem. Have small wins
- Viability should continuously be discussed and tested

#### Group 2

- Change should be substantive rather than small
- Change not just in post-harvest but also at the research system level
- Market assessment and technology forecasting should be built into research design
- Look at on-going experiments outside the system
- Technology up-gradation be made integral part of research and innovation with scope for up-gradation of mechanism
- An effective and continuous feedback between the field and the technology be built in. Identify partners to do this
- External evaluation be carried out not just by peers but by multiple stakeholders, capacities study should be done on completed and on-going research
- Advocacy should be included in the culture and style of research organization.

#### Group 3

- Judicial balance about the pace of change. So that it is not too fast to manage
- Incremental change rather than discontinuous change.
- More frequent in-house monitoring with reflective or introspective meetings.
- Recruitment policy should be responsive to the changing needs and with capacity building for already recruited staff.
- Entrepreneurial skills should be an integral of university courses
- Action learning within universities
- Mechanism to integrate other stakeholders including NGO's and private sector
- Joint projects between R&D institutions and private sector in the development and promotion of technology
- Establishment of technology incubators with possibility of spin off with R&D getting a fair share.

#### **Question 4: Tip of the post-harvest iceberg**

An enormous amount of exciting work is going on in the area of post-harvest innovation in both research and development sectors. How do we better learn from this and share experiences?

#### Group 1

- Establish a documentation center at the national level
- Create a network of post-harvest individuals and organizations.
- Encourage newsletters website, allow organizational advertisements on web. Create interactive web sites.

#### Group 2

- Facilitate more sharing, interaction etc
- Too much segmentation of disciplines, provide access to larger community through publications of the processes and their outcome. A journal or website for multidisciplinary narratives required and should be open to non-scientists also.
- Senior management should support and fund the platforms to allow this sharing of broader experiences

#### Group 3

- Organise public debates on associated issues related to post-harvest e.g. biotech GM foods etc
- Documentation and digitization of research and development stories (particularly successes) for widespread use and easier access through newsletters, popular articles and web sites
- Sensitization of issues arising out of innovations within the organisation
- Devising suitable mechanism for learning from Indigenous Traditional Knowledge (ITK)
- Involvement of clients at the time of final decision on project funding
- Extensive use of patent search at the time of project formulation.

#### **Question 5: Making a difference in post-harvest**

We all know the challenges of promoting post-harvest innovation, we also know what needs to be done about them. But how do we make a difference in the wider post-harvest sector?

#### Group 1

- Do all the above
- Need to spend time in the mundis (local markets) and markets – weekly transect walks – do aggressive market research
- Involve government agencies, marketing agencies, rural development departments and others
- Improve the habit of writing among scientists (hold writing workshops?)
- Encourage local consumption. Focus on local markets.

#### Group 2

- What would we do new when we get home? We should be formulating and seeking funding for multi stakeholder partnership based projects
- Do we know? Prepare a strategy document setting out how to do things
- For institutional work, to make an impact we need to do more outreach work, linking up with line departments and banks
- Quicker way of making rapid impact, link up with grouping of partners that are already established and on going and in our own niche in these existing partnerships.

#### Group 3

- Influence public policy through greater interaction with government.
- Greater role for banks
- Helping the government formulating national post-harvest policy
- Promotional policies through tax holidays, fiscal policy etc
- Removal of infrastructure constraints.
- Increasing awareness about codes and standards (WTO) etc
- Encourage greater links with markets particularly international markets and technology
- Strengthen backward and forward linkages.

### Workshop programme

#### Post-harvest Innovations – Partnerships, Learning and Institutional Change

15-16 April, 2003

15 April, Tuesday

Session 1. 9.00 – 12.30

Chairperson. *Norman Clark, University of Strathclyde, UK*

9.00 – 9.30 Welcome, participants introduction, workshop outline overview.  
*Andy Hall, Crop Post-Harvest Programme South Asia regional Office, Hyderabad*

9.30 – 10.30 Systems for crop and marketing innovations in arid areas: the case of pomegranates in Maharashtra.  
*Rajeswari Raina, NISTADS, New Delhi.*

10.30 – 11.00 Tea

11.00 – 11.30 Rural agro-processing centres for income and employment generation – some success stories of Karnataka.  
*B.Ranganna, UAS, Bangalore*

11.30 – 12.00 Title to be announced  
*V.V. Satanaryana, ANGRAU, Bapatla*

12-12.30 Open discussion, *facilitated by Rasheed Sulaiman V., NCAP*

12.30 – 1.30 Lunch

Session 2.

Chairperson *S.M. Ilyas, CIPHET, Ludhiana.*

1.30 – 2.30	Technology transfer in fruit and vegetable processing to farmers. <i>R.Raghuandan, CTD, New Delhi.</i>
2.30 -- 3.00	Tea
3.00 -- 3.30	Agro- processing centres. <i>Ashwini Kumar, CIPHET, Ludhiana.</i>
3.30 – 4.00	IDE's approach to development. <i>Shivani, M. IDEI, New Delhi</i>
4.00 – 5.00	Open discussion, facilitator, <i>Rajeswari Raina, NISTADS.</i>

16 April Wednesday

### Session 3

Chairperson *Guru Naik, Livelihood Solutions, New Delhi*

9.00 – 10.00	Food system innovations and civil society organisations: the case of Spirulina algal technology. <i>Shambu Prasad, CPHP, Chennai.</i>
10.00 – 10.30	Tea
10.30 – 11.00	Post-harvest management in Agro-Processing Complexes. <i>Vinod Sehgal, CIPHET, Ludhiana.</i>
11.00 – 12.00	Open discussion, facilitated by <i>S.M. Ilyas</i>
12-00 – 1.00	Lunch

### Session 4

Chairperson *Archana Godbole, CPHP, Hyderabad*

Facilitators *Andy Hall, Rasheed Sulaiman V. Rajeswari Raina, Guru Naik*

1.00 – 1.30                      Synthesis, overview of emerging issues, suggestion of key discussion points  
*Andy Hall, Rasheed Sulaiman V. Rajeswari Raina, and Guru Naik*

1.30 – 3.00                      Discussion

Workshop Administrator                      *Pradnya K., CPHP, Hyderabad*

Workshop Rapporteur                      *Yoganand, B., CPHP, Hyderabad*

### Workshop participants

Dr. Norman Clark	Director	Graduate School of Environmental Studies. Wolfson Centre. Glasgow. G4 0NW Scotland. UK
Dr. C. Shambu Prasad	Consultant-CPHP	14, Vijaynagar(North) Velachery Chennai-600042
Dr. Ashwani Kumar	Proj Coordi.(APA)	CIPHET, PAU, Ludhiana. 141004
Dr. S.M.Ilyas	Director	CIPHET, PAU, Ludhiana. 141004

Dr. D. Raghunandan	Director	Centre for Technology & Development D-158, Lower Ground Floor, Saket New Delhi- 110017
Dr. B. Ranganna	Professor & Research Engineer	PH Tech Centre. University of Agricultural Sciences. GKVK Bangalore-560065
Dr. V. Rasheed Sulaiman	Dscientist	National Centre for Agricultural Economics & Policy Research. PUSA- New Delhi- 110012
Dr. Guru Naik	Director	Livelihood Solutions, F-208/D II and Floor. MB Rd. Lado sarai. New Delhi-
Dr. V.V. Satyanarayana	Scientist	PH Technology Centre ANGARU, Bapatla. 522101
Dr. V.K. Sehgal	Sr. Research Engineer	Dept. Of Processing & Agrl Structures College of Agrl. Engg. PAU, Ludhiana. 141004
Ajay Kumar	Scientist	VPKAS (ICAR), Almora. Uttaranchal. 263601
Dr. V.K. Dixit	Prog Coordinator	IDE-India, C-5/43, SDA, New Delhi- 110016
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**Target Institution's workplan for adopting project outputs**

The project outputs essentially looked at putting systems in place that would lead to adoption and commercialization of the technology developed. To that extent, the manufacturers have shown evidence of their capability to produce quality boxes at a reasonable price. Supply chain members such as traders, dealers are stocking the boxes for onward sale to farmers and farmers in the season of 2002 displayed their preference for the new technology by purchasing it at market prices. As long as there is demand for the boxes, it can safely be said that the market systems will react to this demand and make sure that boxes are available.

Additionally, the project experience had led to IDEI submitting a proposal for a new CPHP grant – this time designed using a total systems approach. The summary of this project is provided below:

**Title: Integrating markets, products and partners: An action research to explore *and develop* a management system for linking tribal communities to markets through value addition.**

While significant opportunities in the post harvest sector exist for poverty reduction, institutional means of developing and delivering solutions emerge as the overriding constraint to meeting this objective. Although several technical constraints have been identified, the key learning that emerges is a need to identify institutional arrangements for actually achieving impact with new knowledge and technology.

This project attempts to use a total systems approach with several institutional actors with complementary skills participating in it. As a result this project will develop and test systems and strategies for institutional arrangements to function effectively such that poor tribal horticulture growers through value addition gain higher returns. This research project will use management principles, further building on IDEI's approach of using market principles to explore technology and livelihood interventions for the tribals and will further explore and build a series of relationships that can support and sustain technology development and supply, markets and the integration of poor people into these market and technology systems.

This project contributes to theme one in the CPHP south Asia regional strategy -- horticulture / rural diversification / value addition. It addresses the broad theme of the CPHP strategy of exploring the institutional and organisational issues that surround the success of technology based interventions in poverty alleviation.

### **Feedback on the process from collaborating institution(s) and farmers**

All the partners involved in this project have been affected in various ways. In Himachal Pradesh new relationships have been formed between organisations and individuals in the post-harvest system. This represents a considerable investment in social capital that did not exist before the project.

a) The scientists from IIM have indicated that the project's impact on them is that it has opened their eyes both to the need to work with partners from the rural development sector, and to the enormous success that can be achieved by embedding their research in the work of others.

b) Farmers especially the women have at various stages reiterated their commitment to switch to CCC boxes. The women and children bear the brunt of the wooden box making and often during the season spend several days just nailing the wooden planks together to make boxes. The reduction in drudgery and time saving experienced by them in the project period has strengthened their desire to shift to CCC boxes for not just tomatoes but other high value produce as well.

c) RUCHI has been working in the area for several years and sees the environmental benefit of switching to this form of packaging. They have indicated that their staff will continue to promote this environmental agenda and will push for the use of CCC boxes for packaging even after the project is completed.



**List of publications**

Phansalkar, S.J. (2003). Evolving technology through collaboration and partnership: the case study of International Development Enterprises (India) work with tomato packaging in Himachal Pradesh, India.

Sharan, G., and Rawale, K., (July 2001). New packaging options for transporting tomato packaging in India. ITDG Food Chain–29, November 2001

Sharan, G. (December 2002). Vastrapur cartons for shipping tomatoes. IIMA research news letter of the research and publication committee

Sharan, G., and Rawale, K., (October 2002). Kisan Bandhu cartons for Himachal tomato: Special report. Alumnus IIMA, pp 10

G. Dibeyendu (September 2001). Handle with Care News Report Economic Times, New Delhi, Monday 10<sup>th</sup>. September 2001.

Clark, N.G. (July 2001). The case of tomato packaging. International Development Enterprises (India)

Axtell, B. (March 2001). Consultancy report, NRI Contract No. ZB0227

Naik, G. (March 2001). Sustainable relating of technologies to the poor (internal report)

EDA Rural systems (May 2001) – Tomato cultivation in Himachal Pradesh: A socio economic assessment with reference to marketing and packaging

Manaktala, S., and Sadangi, A. (December 2002). The two faces of innovation – how combinations of institutional and technical innovations are changing the post harvest systems of small scale tomato producers in India. A report for private circulation.

*Other dissemination of material*

Hindi leaflet – for promotion amongst stakeholders

CPHP Brochure for private circulation – Crop Post Harvest Programme and IDE(India): The logical Link – Fighting poverty with profit: The IDEI Way.

**A catalogue of data sets and their location**

Not applicable