Tomato Cultivation in Himachal Pradesh

A socio-economic assessment with reference to marketing and packaging

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1 Project background

The project on **sustainable retailing of post-harvest technology to the poor: alternative institutional mechanisms for developing and transferring technology** is being implemented by Intermediate Technology Consultants (UK) in collaboration with International Development Enterprises – IDE (India). The project is aimed at transferring post-harvest packaging technologies to enable access by small farmers to high value markets.

Studies in the hills of northern India have highlighted the predominance of smallholder farming in these areas and the resource opportunities for small farmers to grow temperate fruits and vegetables which have high commercial value in the city markets of the plains.

In this context, IDE conducted a needs assessment study in 2001 in Himachal Pradesh – a hill state which has good road links from its main towns to the plains (and markets) of Punjab and Delhi. The study identified tomato as a key vegetable crop (high growth, significant area, high returns to the farmer), which is marketed outside the state. For transport out of the state, wooden boxes and plastic crates are used. Following the recent ban (3 years ago) by the State Government on tree cutting in the state, wood for packing boxes is now sourced from the neighbouring state of Punjab. This is expected to affect the supply and cost of these boxes, and reinforces the apparent need to explore alternative packaging options.

2 Socio-economic study

This study was commissioned to understand the community level socio-economic issues in relation to the proposed introduction of post harvest packaging technology. The study focused upon

- the current practices of vegetables and fruit cultivation
- prevailing packaging and marketing mechanisms, and
- likely effect of the proposed packaging technology for tomato

The study also covered background information on small-holder families (the potential beneficiaries) disaggregated by three - upper, middle and lower - economic classes and gender.

The study was carried out in the districts of Solan, Sirmour and Kullu in Himachal Pradesh. Tomato production in these districts constitutes about 85% of the total tomato production in the state.

The main tools used during the study were semi-structured interviews with checklists for individual meetings (market players, individual farmer case studies), group discussions, PRA exercises (wealth ranking) and key informant interactions.

Discussions and field work for the study were carried out at the following levels:

- Farmers – men and women in four villages
- Auction agents (*adatis*) and traders involved in intermediary marketing of horticultural produce in Delhi, Solan and Kullu
- Local NGOs working with farmers – RUCHI (Solan) and the Society for Technology and Development (Kullu)
- A farmer co-operative (Kullu)
- The University of Agriculture and Forestry (Solan).

3 Findings and conclusions

- Almost all rural households own some land – partly grazing land and partly cultivable land. In the lower hill districts of Solan and Sirmour, around 43% of the farmers have holdings of less than 1 hectare and a similar proportion have holdings of 1-4 hectare. In the middle to higher hills of Kullu, over 90% of farmers have less than 2 hectares of land.

- The farmers in these districts grow maize and wheat for household consumption. Farmers with access to irrigation grow vegetables as commercial crops (tomatoes, peas, cucurbits, cabbage, radish, capsicum).

- In general, women appear to have an important role in family decisions. Men normally consult their women before making any important decision, be it choice of crops, use of fertilisers or spending. Women also actively participate in agricultural activities in addition to their household chores. In tomato cultivation, except for certain tasks - ploughing, application of fertilisers, composting - women are equal partners in farm activities.

- Cultivation of tomatoes depends on access to irrigation. Socio-economic status is directly linked to ownership of irrigated land. However, small and marginal farmers too have small plots (1 *bigha*) which they can irrigate, and in Solan and Sirmour tomatoes are cultivated by all economic classes as a source of cash income. Returns to tomato cultivation are affected mainly by variations in cultivation practices and inputs.

- The main packaging materials used for transporting tomatoes in Himachal Pradesh are wooden boxes, plastic crates, *quiltas* and baskets. Wooden boxes are prevalent for the produce supplied to the Delhi market. Plastic crates are mainly used for local and nearby markets of Punjab. Farmers use baskets and *quiltas* to carry produce from the farm to the road head or to local *mandis*.

- The concept of using cardboard boxes has already been thought of and tried out by enterprising individuals – *adati*, farmer and cooperative. But it has not been successful so far, because it seems that relatively light weight versions were used.

- Packaging requirements and costs are determined by the market channels. Farmers (all socio-economic categories) who supply to local markets in HP, incur insignificant packaging cost. Farmers in Solan and Sirmour (again all categories),

however, who supply directly to the Delhi market, do incur the cost of packaging – in wooden boxes.

- Whilst most of the tomato produced in Solan and Sirmour is sent directly to the Delhi market, sales via local *mandis* have been increasing over the last three years. The sales in local *mandis* now represent around one quarter of the total production in these two districts as against only 10% about three years ago.

- The average rates for tomatoes in Delhi are higher than those obtained at the local *mandis* in HP, but given the costs of packaging and transport, and the effect of increased supplies of summer tomatoes to Delhi from other parts of north India, there no longer seems to be a substantial advantage to the farmer in direct sales to Delhi. This may be an important factor behind the increase in sales through local markets in Solan and Sirmour. As sales through local markets increase, farmers will be less directly involved in arranging and paying for packaging. In this scenario, the main channel for a new packaging technology will be the commission agents – and buyers.

- A shift in technology has already started with the introduction of plastic crates – these are increasingly used in the local markets of Solan and Kullu where tomatoes are purchased by buyers from the Punjab, Haryana and other markets of north India – apart from Delhi.

- The investment cost of a plastic crate is high at Rs 150/crate of 25 kg carrying capacity. This is paid for by the local commission agents and the buyers (and in Solan by very large farmers). Depending on their scale of business, these stakeholders make an initial investment of Rs 50,000 or more in plastic crates

- Plastic crates are popular, and increasingly so, because the unit cost over the 'life' of a crate works out to Rs 0.12/kg. This compares with the Rs 1.24/kg unit cost of a wooden box. However, commission agents at the Delhi market still require produce to be packed in wooden boxes. This is because much of the produce from Delhi is transported on to other parts of the country. Tomatoes in wooden boxes are sent on as they are and not repacked. Tomatoes in plastic crates would have to be repacked.

Is packaging an issue?

The state government ban on tree felling in Himachal Pradesh was one of the factors that led to this project and the study and a concern that maybe other states would follow suit – affecting the availability of packaging, the costs involved and ultimately reducing the returns to farmers.

Currently, however, packaging does not seem to be a major concern among farmers or other stakeholders engaged in tomato marketing. Despite the state ban, there is no perceived shortage of wood which is supplied now from the nearby state of Punjab (involving a small additional transport cost) – and illicit supplies within Himachal Pradesh do probably continue. Local stakeholders also believe that plastic crates will provide the replacement – even if other state governments too impose a similar ban. Plastic crates are being used extensively in local markets. However, this is unlikely to be an option for more distant markets, or for smaller farmers, given the high initial costs and the problems of retrieval.

In the case of shortage of wooden boxes farmers would have two choices. One, shift to plastic crates which would limit their choice of selling tomatoes to local markets only. Two, find out an alternative material for packaging. The first option may have implications for the returns to farmers, while the second option is possible only if an alternative technology exists.

Local stakeholders seem to be open to the idea of a new cardboard packaging technology. Currently, however packaging is not being seen as a major issue because of an adequate supply of wooden boxes and plastic crates. Therefore, at present the new cardboard packaging technology is likely to be accepted only if it fulfills the packaging requirements (strength, aeration), and competes on cost with wooden boxes. In the other likely scenario of the future, when adequate wood is not available, farmers will have the limited choice of local markets only if an alternative packaging material for the Delhi market does not exist. In either case, it is important to introduce the technology at this stage in order to avoid a difficult situation likely to occur from a shortage of wooden boxes in the future. Otherwise also, an alternative technology is important to help farmers to exercise more options and be less dependent on wooden boxes.

1 Study Background

1.1 The project

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

Implemented by Intermediate Technology Consultants (UK) in collaboration with International Development Enterprises – IDE (India)

This project is intended to explore and build on commercial principles for the development and transfer of technologies in the post-harvest sector. The strategy is to identify and work through those institutional linkages, which are key in meeting the needs of the poor. The target is to enable access by small farmers to high value markets. Intermediary traders and co-operatives marketing high value horticultural produce will also benefit.

Studies in the hills of northern India have highlighted the predominance of smallholder farming in these areas and the resource opportunities for small farmers to grow temperate fruits and vegetables which have high commercial value in the city markets of the plains. Whilst production and sale of these horticultural crops has a significant impact on income generation and livelihood options in the hills, crop wastage due to post-harvest losses – between farm and market – can be very high (reported as 30-50%).[1] This reduces the returns both to the farmer and to trading intermediaries.

In this context, IDE conducted a needs assessment study[2] in Himachal Pradesh – a hill state which has good road links from its main towns to the plains (and markets) of Punjab and Delhi (only 6-8 hours away). The study identified tomato as a key vegetable crop (high growth, significant area, high returns to the farmer), which is marketed outside the state. For transport out of the state, wooden boxes and plastic crates are used. Following the recent ban (3 years ago) by the State Government on tree cutting in the state, wood for packing boxes is now sourced from the neighbouring state of Punjab. This is expected to affect the supply and cost of these boxes, and reinforces the apparent need to explore alternative packaging options. The IDE study identified local commission agents (adatis) as key market players – who represent a nodal link for farmers and who also are often directly responsible for arrangement and purchase of packaging.

1.2 Socio-economic assessment

This study was commissioned to cover the following, with main reference to tomato cultivation and marketing:

1. Community level socio-economic information including information on: the types of vegetables and fruit grown; what level of surplus produce is generated; current prices obtained from the sale of vegetables and fruit; where the current markets are; what types of market are being accessed; background information on small-holder families (the potential beneficiaries) disaggregated (by gender); information on who tends to the farm and who sells the produce

[1] Proposal document to NRI, ITC 1999, and studies referred to therein

[2] IDE, 2001

2. Current materials available or in use for storage and packaging; ease of access to these; constraints to their use; their advantages and disadvantages

3. Traders, cooperatives, farmers' groups present in the area who facilitate the marketing of produce and technologies; current pattern or path of flow of goods from and to the farmers.

1.3 Study area – tomato growing districts in Himachal Pradesh

Tomato production – estimated at 145,000 metric tonnes in the latest Agricultural Census of the State Government, for 1991 - accounts for nearly 30% of total vegetable production in Himachal Pradesh. Most of this (more than 75%) is from Solan and Sirmour, two districts lying in the low hills of the state, where over 3,000 hectares of land are cultivated with tomatoes. Another 10% of tomato production comes from the middle hills district of Kullu (**Table 1.1**). Other important crops at lower levels of production include peas, cucurbits, cabbages, radish and capsicum (**Annex 1**).

Table 1.1

Tomato cultivation in Himachal Pradesh

	Main vegetables	Production (metric tonnes)	Percent of state
State:			
Himachal Pradesh	**Tomato**	**144,900**	**29**
	Peas	78,800	16
	Cucurbits	73,200	15
	Cabbage	54,900	11
	Onion & Garlic	27,500	6
	(Other	114,920	23)
		499,655	100
Districts:			
Solan	Tomato	67,200	46
Sirmour		43,500	30
Kullu		15,000	10
		125,700	**86**

Source: Agricultural census, State Government of Himachal Pradesh, 1991

According to the 1991 Agricultural Census, 21% of cultivable land in the state is irrigated. The highest level of irrigation was in Sirmour – 34%, followed by Solan - 21%. It is much less for Kullu – just 4%.

Small holdings predominate with about 42 percent of farming households owning less than half a hectare of land. The majority of farmers (over 80%) owns 2 hectares or less. Farm classification size depends on irrigation: in the case of unirrigated land, under 1 ha. represents a marginal holding, 1-2 ha. represents a small holding; in the case of irrigated land, up to 1 ha. represents a small holding. The available data on land distribution is shown in **Table 1.2** for the main tomato growing districts.

Table 1.2

Land holding pattern – distribution of rural households and cultivated area

HH (households) in '000, cultivated area in '000, hectares

	Himachal Pradesh		Solan		Sirmour		Kullu	
	HHs	**Area**	**HHs**	**Area**	**HHs**	**Area**	**HHs**	**Area**
Number ('000)	1,037		65.42		58.62		59.23	
Area ('000 ha.)		621		91.3		43.8		46.3
Distribution (%)								
Category (ha)	100	100	100	100	100	100	100	100
< 1	63.5	21.3	41.7	10.4	43.8	8.6	73.5	34.6
>1 to 2	20.0	23.3	25.1	18.7	21.4	13.1	17.9	30.9
>2 to 4	11.6	25.5	21.1	30.5	18.5	22.2	7.1	23.7
> 4 to 10	4.3	20.3	10.9	31.9	12.8	32.8	1.4	9.2
> 10	0.6	9.6	1.2	8.5	3.5	23.3	0.1	1.6

Source: State Government of Himachal Pradesh, 1991

In the lower hill districts of Solan and Sirmour, where farmers have easier access to irrigation, just under half (around 43%) have (marginal and small) holdings of less than 1 ha. and a similar proportion have (medium) holdings of 1- 4 ha. In the middle to higher hills of Kullu, where access to irrigation is very limited, over 90% of farmers have less than 2 ha of land. This pattern is depicted in **Figure 1**.

Figure 1.1

Farmer distribution by farm size
(farm size in hectares)

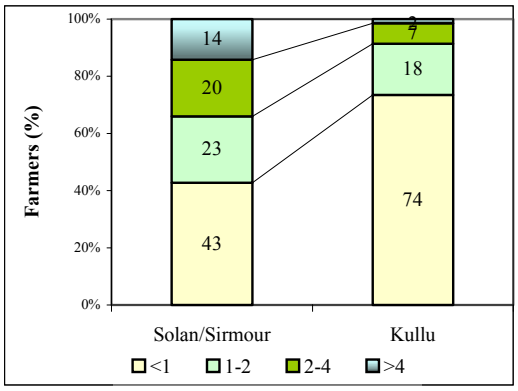
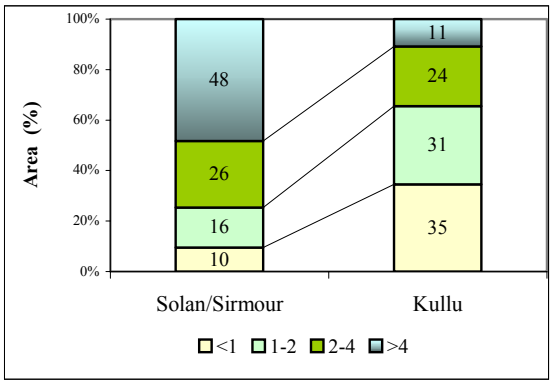


Figure 1.2

Land distribution by farm size
(farm size in hectares)



1.4 Scope of study

The main issues and research questions for this study are outlined in **Table 1.3**

Table 1.3

Research questions

Issues	Related Questions
Socio-economic patterns	What is the socio-economic profile of the villages and tomato farmers? What are the important socio economic categories? Which socio-economic group will benefit from the project?
Cropping Patterns	What cropping pattern is currently followed by different farmer categories? Which farmers grow commercial crops? What are the factors affecting cropping decisions?
Importance of tomatoes as a commercial crop	Details of tomato cultivation (in comparison with other main commercial crops): land quality and irrigation requirement, labour requirement, and financial returns, perceived risk. How important is tomato relative to other commercial crops? What is the contribution of tomato farming in the family's income (different socio-economic groups)? What are the reasons for farmers not cultivating tomato?
Gender	What is the role of women in farming activities and decision-making? What role do they play in commercial cropping, including tomatoes?
Post harvest operations	What are the various post harvest operations for tomatoes and other important crops? What are the costs involved with these operations and who bears these costs? What is the level of wastage involved at each stage?
Packaging	What are the packaging technologies currently used for tomatoes (and other crops)? What are the problems related to these technologies? What are the alternatives available and why are they not being used? Who markets these packaging technologies and what are the channels used? What are the costs associated with packaging and who bears them?
Marketing channels	What are the marketing channels presently being used for tomato? Who are the main players? How do they operate? What are the systems of payment? What are their perceptions of the market (in terms of product quality, wastage, opportunities)? What are their livelihood systems? What are the margins that accrue to them at various stages involved in tomato cultivation and marketing? How can existing channels be utilized for disseminating new technology?

Discussions and field work for the study were carried out at the following levels:

- Farmers – men and women
- Auction agents (*adatis*) and traders involved in intermediary marketing of horticultural produce
- Local NGOs working with farmers – RUCHI (Solan) and the Society for Technology and Development (Kullu)
- A farmer co-operative (Kullu)
- The University of Agriculture and Forestry (Solan)

The team visited the wholesale vegetable market of Azadpur in Delhi and in Himachal Pradesh carried out field work in Sirmour and Kullu. In these districts, the team visited the main markets for vegetable produce, meeting the local auction agents and agricultural input suppliers.

Four villages were selected, in consultation with IDE, for farmer discussions. The villages were selected on the basis of extent of tomato cultivation and access to the district market. The villages were relatively small with populations of 8 to 42. (Villages in the state range in size from 5 to 80 households.

The sample for the study is summarised in **Table 1.4**

Table 1.4

Study sample and respondents

	Himachal Pradesh				**Delhi**
	Sirmour		**Kullu**		
Sample villages:	1 Shargaon	2 Jubbal	3 Dhalasni	4 Hawai	
Total households	42	8	29	29	
Farmers cultivating tomato	nearly all	1 or 2	nearly all	none	
Farmer discussion groups	3	3	3	3	
Individual farmers	6	3	6	4	
	Solan				
Local markets visited	KB *mandi* Kotlanala		Bhuntar Takoli		Azadpur
Adatis – main markets	2		4		5
Input traders	1		2		
Box maker			1		
NGOs	1		1		
Cooperative			1		
University	1				

The main tools used during the study were semi-structured interviews with checklists for individual meetings (market players, individual farmer case studies), group discussions, PRA exercises and key informant interaction (**Table 1.5**).

Table 1.5

Methodologies

Level	Respondents	Methodology
Market NGO Other players	▪ Commission agents/*adatis* ▪ Agriculture input suppliers ▪ Box maker ▪ University scientists	▪ Semi structured interviews
Village	▪ Farmers – men/women ▪ Key Informants	▪ PRA -Timeline and wealth ranking ▪ Group discussions ▪ Individual case studies

At the village level, the methodology was as follows:

- A meeting was held with a group of 10–15 men (in one village 5 women also participated in the discussions) and a brief history of the village was outlined using a timeline
- A listing of households in the village was done with the help of the group
- Then, the group was asked to rank the village households into different socio-economic categories based on their own indicators and perceptions
- Group discussions were then held within and across the categories
- Individual interviews were held with farmers – both men and women – selected from each socio-economic category.

Some limitations

- Information on farm incomes was collected through group discussions as well as individual farm interviews. However, and not surprisingly, farmers were reluctant to discuss absolute figures and where they were given, these were probably understated. We have therefore tended to use relative proportions in preference to absolute estimates.
- Interaction with box makers and wood suppliers was limited since these are a group who migrate into the district towns for work during the marketing season – which starts in May.
- Small group discussions raised some expectations among the villagers. At times, their hope of getting some assistance influenced their responses. For example, in Jubbal village, after the wealth ranking, one of the upper category farmers started making extra efforts to be included in the lower category!
- Women were not freely allowed by men to participate in the group discussions. This may have been partly because the men thought that the women might divulge information that could affect their prospects of receiving benefits. However, women were more directly involved in household level discussions.

Overall, this was a rather quick study, aiming to cover a range of different issues. In the time available, coverage was not entirely adequate on some questions. Therefore, the findings do not constitute a baseline survey in the full sense but, on the basis of a small focused sample provide a socio-economic assessment of the context to tomato cultivation, the pattern of tomato marketing and use of different packaging materials.

2 Tomato cultivation

This chapter draws upon the findings in the study villages to profile the pattern of tomato cultivation. Analysis in relation to different economic categories of farmers is based on wealth ranking conducted with local village groups and case studies of individual farmers.

Villages in Himachal Pradesh can be as small as 5 households, ranging up to 75-80 households depending on their geographical location. Houses are scattered over a considerable area. Almost all villages have electricity and telephone facilities, and larger villages usually have a school, a post-office and access to a pucca road. All rural households own some land – partly grazing land and partly cultivable land.

All farmers in these districts grow maize and wheat for household consumption. Farmers with access to irrigation grow vegetables as commercial crops (tomatoes, peas, cucurbits, cabbage, radish, capsicum).

Tomato cultivation in the state started during the 1970s in a few villages around the main district market town of Solan. Since then, tomato has become an important crop, cultivated by farmers in the neighbouring district of Sirmour and also in the higher hills of Kullu district, and a few other districts.

2.1 Study villages

Two of the study villages were selected for the predominance of tomato cultivation – one in Sirmour district, the second in Kullu. Two other study villages were selected in each district where there is little or no tomato cultivation.

A summary profile of each village is given in **Table 2.1**

Table 2.1

Summary profile of study villages

Districts	Sirmour		Kullu	
Sample villages	Shargaon	Jubbal	Dhalasni	Hawai
No of HHs	42	8	29	29
Land holding (*bighas*)[1]	550	77	257	143
Irrigated land (*bighas*)	212	10	98	-
HHs growing tomatoes	42	1	29	-
Distance from link road (km)	At road side	3	At road side	2
Nearest local market (distance in km)	Rajgarh (20)	Rajgarh (15)	Takoli (4.5)	Bhuntar (25)

Source: Field work and Agricultural Census 1991

[1] The local unit is used throughout this report. 5 *bigha* = 1 acre 12.3 *bigha* = 1 ha

2.2 Socio-economic status – sample villages and households

The socio-economic status of households in the study villages was analysed through the relative wealth ranking exercise. The villagers divided the households into three different classes/categories: upper, middle and lower. The villagers' perception for different classes provides an indication of how people see their socio-economic status. A summary of indicators used by the villagers is presented in **Table 2.2** (details in **Annex 2**).

Table 2.2

Wealth ranking indicators

Indicators	Upper	Medium	Lower
Land holding* (*bighas*)			
Shargaon	15-25	5-20	5-15
Jubbal	10-15	5-12	5-10
Dhalasni	10-15	3-8	2-4
Hawai	2-10	3-10	1-9
Main income source	Agriculture and service	Agriculture and labour	Labour and agriculture
Size of house	4-10 rooms	3-6 rooms	1-3 rooms
Telephone connection	Almost all	Some	None
Attitude	Ambitious and hardworking	Not so ambitious	Work as and when required

* In villages with access to irrigation – Shargaon and Dhalasni – all farmers have some irrigated land. Upper category farmers have more land irrigated than the other categories.

Table 2.3 presents the household classes by wealth ranking in the four sample villages. The **internal ranking** (**Table 2.3.1**) represents the relative ranking within each village.

The economic categories match the social caste hierarchy to some extent (**Table 2.3.2**). Nevertheless, there is considerable overlapping across caste and, in comparison with other areas of north India, caste distinctions do not seem so strong. During our field work, we were able to interact with mixed social groups in which harijans (or scheduled castes) were as vocal as (high caste) Rajputs.

A **comparative ranking** (**Table 2.3.3**) compares across villages, reflecting different levels of prosperity and poverty in the four villages. For, Shargaon is a very prosperous village where an upper class household has at least 7-8 acres of irrigated land, and the lower class has at least 1-2 *bigha* land under irrigation. In Jubbal, in comparison, the higher class has just 1 *bigha* irrigated land.

Table 2.3.1

Household classes by wealth category: 'internal' ranking (by villagers)

District	Villages	Upper (%)	Middle (%)	Lower (%)	Total
Sirmour	Shargaon	14 (33)	19 (45)	9 (22)	42 (100)
	Jubbal	3 (37)	2 (25)	3 (37)	8 (100)
Kullu	Dhalasni	8 (28)	12 (41)	9 (31)	29 (100)
	Hawai	9 (31)	15 (52)	5 (17)	29 (100)

Table 2.3.2

Social caste distribution across economic categories

Economic Category	Sirmaur district				Kullu district		
	Shargaon			Jubbal	Dhalasni		Hawai
	Rajput	*Brahmin*	*Harijan*	*Rajput*	*Rajput*	*Harijan*	*Rajput*
Upper	3	11		3	8		9
Middle	9	4	6	2	12		15
Lower	3	1	5	3	5	4	5
Total	15	15	11	8	25	4	29

Table 2.3.3

Comparative economic ranking across 4 villages

District	Villages	Upper (%)	Middle (%)	Lower (%)	Total
Sirmour	Shargaon	33 (79)	9 (21)		42 (100)
	Jubbal		4 (50)	4 (50)	8 (100)
Kullu	Dhalasni	6 (21)	15 (51)	8 (28)	29 (100)
	Hawai		7 (24)	22 (76)	29 (100)

2.3 Opportunities for tomato cultivation

Farmers are interested in tomato cultivation because of the high returns, which are related to easy access to major markets in the plains of northern India – in the Punjab and in Delhi. The relatively short distance to the Delhi market in particular makes transport by truck relatively fast – 10-12 hours journey by truck from Solan, 15-17 hours from Kullu – and helps in realising competitive prices.

Shargaon and Dhalasni, are both roadside villages, relatively low-lying with access to irrigation, as well as other sources of income. In both these villages, nearly all the households – from all social and economic classes - grow tomato on at least 1 *bigha* of land. Tomato cultivation and sale contributes a major share to overall household income.

Irrigation is one of the main factors determining tomato cultivation. Tomatoes are grown where irrigation facilities are available. The major sources of irrigation in in Shargaon and Dhalasni are springs and water tanks. In Shargaon, farmers obtain water for irrigation from a community tank built by a local NGO – RUCHI. In Dhalasni water flowing through natural springs is diverted to the fields through plastic pipes or by irrigation channels called '*Kulhs'*.

In contrast, Jubbal and Hawai are situated on hilltops, more than 2 km away from the nearest road. Water for irrigation is scarce making it difficult – if not impossible -for farmers to undertake tomato cultivation. This has not stopped some of them trying! (**Box 2.1**).

Box 2.1 Is tomato cultivation possible in a village like Jubbal?

Jubbal village, like many other villages in Himachal Pradesh, is situated on a hilltop. One of the farmers - Netra Singh – tried to cultivate tomatoes in 1997. He failed and now says he will not try unless he manages to access irrigation. His current plans are to create an irrigation facility of his own. He has already constructed a concrete tank to store water half way up the hill, and he hopes to buy a pump set to lift water from the tank to his farmland. As his son points out: "*Obviously, we are interested in growing tomato -that is why we are making such an effort*".

Another farmer also tried growing tomato last year (in 2000). He just managed to break even (excluding family labour). Inadequate irrigation was a problem – so was transport. Produce has to be taken down the hill and 3 km to the road. For this donkeys have to be hired, and that is an additional cost: *"Poor production, additional cost on transport and a market that is down – what else do you get in a village like Jubbal!"*

Farmers in Jubbal have fruit trees (peaches) which do not require regular irrigation and yield a good cash income. If they do need irrigation (for ginger for example) they may end up using the drinking water supply.

But irrigation may not be the only factor. One of the lower economic categories of farmers in Dhalasni has a small landholding of 2.5, of which 0.5 bigha is irrigated. However the family cultivates only maize for their own consumption and depends entirely on casual labour for cash income (**Box 2.2**).

Box 2.2 A non-tomato grower in Dhalasni

Kisni Devi: *We use all our land – 2.5 bighas (including half a bigha which is irrigated) for maize. We need that to feed the family. Otherwise we depend on casual labour.*

I would like to grow tomatoes – but I don't see how we can. Tomato seeds are very expensive, and so are other inputs.

2.4 Area under tomato cultivation

Details for individual farmers of the area they cultivate with tomato are shown in **Table 2.5**.

Table 2.5

Area under tomato cultivation (average/farmer)

Village	Sample	Category	Landholding (*bigha*)		Land under tomato	
			Total	Irrigated	*Bigha*	% of irrigated land
Shargaon	2	Upper	14.8	14.8	3	20
	2	Middle	6.5	2.1	2	95
	2	Lower*	13.5	5.5	2	36
		Average	**11.6**	**7.4**	**2.3**	**31**
Dhalasni	2	Upper	25.5	11.0	5.0	45
	2	Middle	4.0	1.5	1.5	100
	1	Lower	2.0	1.0	1.0	100
		Average	**12.0**	**4.3**	**2.8**	**54**

* A high land holding in this category is because one of the sample households – with 10 *bighas* of irrigated land – is in the lower category because there are no men in the family. This has affected cultivation costs and returns significantly.

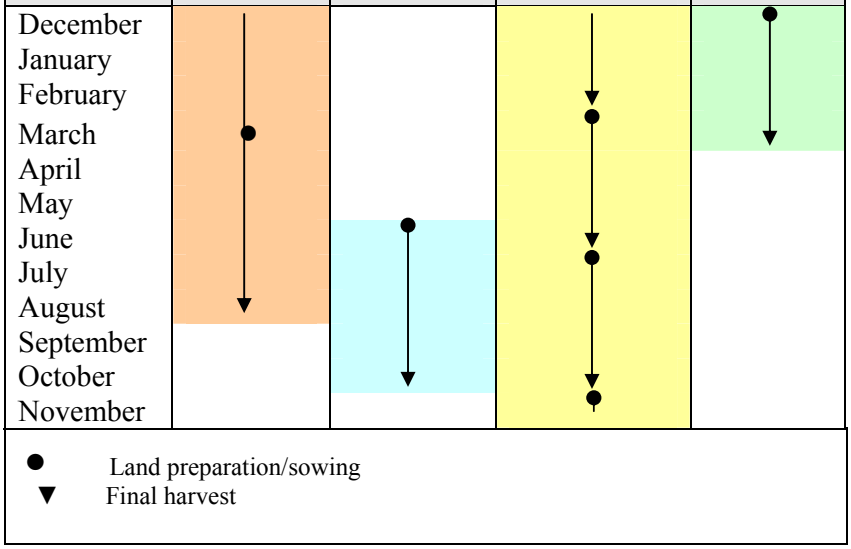
Around the average of 2-3 bighas under tomato, the Table shows an interesting trend. In Shargaon, the upper category households have all cultivated land under irrigation. Despite this, they do not go for large scale tomato cultivation. The limiting factor for them, which emerged from the group discussions, is the high labour requirement for tomato cultivation.

Middle category households in both villages put nearly all their irrigated land under tomato, because that is an area they can mange with little or no hired labour.

The lower category households in both the villages grow tomato on 1-2 *bigha* land.

Apart from tomatoes, our sample farmers cultivate cabbage, cauliflower and green beans on irrigated land. The seasonality of the main crops is shown in **Box 2.3**.

Box 2.3: Seasonality of main vegetable crops



The combination and extent of cultivation depends largely upon the availability of family labour or the capacity to spend on hired labour.

2.5 Tasks

The tomato cultivation season in Himachal Pradesh starts in December with preparation of nursery and ends in August. The main tasks involved are outlined in **Box 2.4**.

Tomato cultivation is more labour intensive than other vegetable crops because of the additional care required during irrigation, spraying of insecticides/pesticides, harvesting and packaging. Upper and middle economic categories of farmer usually hire some labourers – whereas in lower economic categories, family members (men, women and children) carry out almost all farm activities themselves. All categories of farmers may need to hire labour for packaging and transport.

Tomato cultivating households remain very busy during the main part of the tomato season from March to August. As Box 2.3 indicates, they are relatively less occupied during the months November-January.

Box 2.4: Tomato cultivation – main activities

December	▪ Purchase of seeds and fertilisers ▪ Preparation of nursery
January & February	▪ Land preparation which includes alternate ploughing and application of compost and NPK ▪ Making trenches for irrigation
March	▪ Purchase of pipes for arranging irrigation to field. Generally, farmers purchase low quality plastic pipes which last for around 2 seasons. ▪ Transplantation from nursery to farmland ▪ Irrigation two times a day – early morning and evening – for 60 days
April	▪ Purchase of insecticides, pesticides and fungicides ▪ Irrigation cont. ▪ Spraying of medicines
May	▪ Purchase of packaging materials ▪ Irrigation ▪ (Mulching – some farmers) ▪ pruning ▪ Spraying of medicines
May to August	▪ Harvesting ▪ Packaging ▪ Marketing

2.6 Women's involvement

In general, women appear to have an important role to play in family decisions. Decision-making within a household seems to be consultative. Men thus consult their women before making any important decision, be it choice of crops, use of fertilisers or spending. Women also actively participate in agricultural activities in addition to their household chores.

Figure 2.1 presents the proportion of work contribution by men, women and children in a family in tomato cultivation. This is based mainly on the perception of the men and reflects a significant contribution by women to farm-based activities. Except for certain tasks - ploughing, application of fertilisers, composting - women are equal partners in farm activities. Their role diminishes with the movement of the produce from the field to the market.

Although, men agree that women are equally important for on farm tasks, there is not much room for women to handle the marketing issues or access agricultural income.

Figure 2.1

Women's involvement in cultivation tasks – tomatoes

Activity	Men	Women	Children
Agriculture			
Ploughing/Tilling and Application of fertilisers/insecticides			
Composting			
Transplanting			
Trenching/Staking			
Pruning			
Weeding			
Irrigation			
Harvesting			
Sorting/grading			
Packaging			
Transport			
Field to store			
Store to road			
Village to market			
Marketing			
Payment collection and Accounts keeping			
Access to markets			
Spending			

While there does not seem to be much gender difference in decision-making across the three economic classes, women's contribution in farm activities varies with greater involvement from family members in lower categories of household. In upper category households women are still involved but with increasing prosperity, women's involvement is likely to reduce. This is certainly the view of one large and progressive farmer in Solan who commented: "*Why should women of better off families go to the farm? They have enough domestic work to do in the house!"*

In women headed households, on the other hand, women have little choice but to play the main role – which is not easy to do alone in agriculture (**Box 2.5**).

Box 2.5: A women headed household

Kesari Devi is a 40 year old resident of Shargaon. Her husband died a couple of years ago and now she lives with her two young daughters, managing her 12 *bigha* landholding. 10 *bighas* are irrigated and she grows tomatoes on 3 *bighas*, peas on another 3 *bighas*.

She says she finds peas easier to cultivate since the labour requirement is less. However, tomatoes are more remunerative – even though she did not obtain a good yield last season. She said she had to spend a lot of money but did not have enough time to look after the crop properly.

For both these crops, Kesari Devi must rely on other men in the village to help her in the purchase of inputs and arranging marketing. She has to hire labour for land preparation, irrigation and harvesting. Local relatives support her by providing small loans when she needs money.

2.7 Productivity

Scientists at the university of Horticulture and Forestry, and input suppliers too, say that tomato productivity in Himachal Pradesh can go up to 5,000 kg/*bigha* (61.5 MT/hectare). Some large farmers of the upper economic category agreed that this is possible and achieved by farmers who invest quality inputs.

The estimates contained in **Table 2.6** suggest much lower levels of productivity in all classes, ranging from under 1,000 up to 2,400 kg per *bigha* (12.3 to 29.5 MT/hectare).

Table 2.6

Estimates of tomato productivity

Economic Category	District Sirmaur – Village Shargaon			District Kullu – Village Dhalasni		
	Area/farmer (bigha)	Input costs (Rs/bigha)	Prod'y (kg/bigha)	Area/farmer (bigha)	Input costs (Rs/bigha)	Prod'y (kg/bigha)
Upper	3	1,692	2,383	5	1,482	2,000
Middle	2	958	1,842	1.5	913	1,000
Lower	2	942	953	1	1,250	2,000
Average	2.33	1,197	1,726	2.8	1,321	1,607

Notes:
1. Figures based on 2 farmers from each class in each village, except lower class in Dhalasni – only 1 farmer.
2. Break-up of input costs for different categories of farmers is provided in **Annex 3**
3. Some farmers hired labourers for cultivation (see Annex 3). Cost of labour has not been included in the input cost in order to compare across classes.
4. Production figures in Dhalasni are round figures reported by farmers while in Shargaon figures are based on reported number of boxes sold.

Some of these figures may be underestimates – especially for the upper category of farmers. But the relative results are interesting, and, combined with farmer discussions suggest the following:

1. Overall productivity is better in Solan district in comparison with Kullu. There are mainly three reasons for this: better quality of land, easier access to irrigation and a more suitable climate (villages in Kullu are located at a higher altitude which is less suitable for tomato cultivation)
2. Productivity seems to be higher for upper categories of farmer in both districts. The main reason was the ability to invest more on the crop and a higher awareness level.
3. Productivity is quite closely linked to investment. Those who provided better inputs – in terms of quality seeds, adequate amount of fertilisers, timely irrigation and spraying of medicines – have usually got better results.

There are of course exceptions. For example, one of the lower category farmers in Dhalasni had very good results, without significant investment. He says that he purchased good quality seeds and pesticides and took extra care in the one bigha that he cultivated.

Other factors also affect productivity – over which the farmer has less control. Kesari Devi – managing her rather large farm by herself - could not spend enough time (cp Box 2.5). Another farmer lost his father – and his time was affected. Another, in Dhalasni, could not arrange for adequate irrigation – his productivity was only 500 kg per *bigha*.

In addition, farmers mentioned seed quality and attacks of new insects and pests – as a problem. They are dependent on the inputs supplied and depend for information on the input

suppliers and fellow villagers. There is considerable scope for improvement in this area in terms of providing information to farmers to enhance productivity. One inputs supplier in Kullu cited an instance in 1999 when seven new varieties of tomato seeds were introduced in the market. Out of these only two were of good quality – but who was going to tell the farmers which those were? For information, farmers generally rely on adatis, input suppliers and, most of all, on the experience and feedback from other farmers.

Productivity is also affected by natural factors. Low temperatures, hailstones, and untimely rains are very common in the mid to high hills. The villagers did not point out any specific case, but said that in general they experience about 10-20% loss due to these factors.

The returns to farming depend on productivity, and may also vary depending on the market. Market linkages are discussed in the next chapter.

3 Tomato Marketing and Packaging

Marketing conditions appear favourable for horticultural produce from Himachal Pradesh. There is substantial summer demand for fruits and vegetables in the big city markets of the plains (mainly Delhi and Chandigarh), with certain districts – especially the border districts of Solan and Sirmour - well connected by road to these markets.

The main market destinations for tomatoes from Solan & Sirmour and from Kullu are shown in **Table 3.1**.

Table 3.1

Market destinations for tomatoes from Himachal Pradesh

Districts	**Solan & Sirmour**	**Kullu**
	(% district sales – by volume)	
% tomato production in the state#	76	10
Direct channel by farmer to outside markets:		
Delhi	75	10
Punjab		5
Jammu		5
Through local *mandis* to outside markets	20	70
Local sales through local *mandis*	5	10

Based on 1991 figures Source: discussion with market players

The different market channels are characterised by various packaging methods and patterns of payment. These are described in this chapter.

3.1 Market systems – Solan and Sirmour

Mainly direct sales to Delhi (Azadpur)

The bulk of tomato sales from Himachal Pradesh goes to Delhi through direct marketing links between the commission agents in the Azadpur market and local farmers in Solan and Sirmour districts - with no local market intermediary. Direct sales to Delhi from these districts is also the norm for other important horticultural crops (apple, peaches and plums).

Over the past two decades, commission agents from Delhi have developed a business relationship with the farmers. The agents visit the area at the beginning of each season, (in January – March), (re)establish links with tomato farmers and provide an advance payment towards production costs. For transport to Delhi during the harvest months of May-August, the farmers pack their produce into wooden boxes on farm and carry the boxes to the road head to be picked up by a truck and taken to Delhi. Trucks are owned by a local district union and ply the Delhi route daily. The truck driver issues a bill to each farmer, noting the number of boxes being sent by that farmer to a particular *adati* in Delhi. The truck reaches Delhi in about 10-12 hours, going usually to the Azadpur mandi. Here the *adatis* auction the produce – still in wooden boxes – to buyers from all over the country (**Box 3.1**).

From the price obtained at auction, the agent deducts his commission (6%), the advance already paid and other transaction costs (transport, labour, postage) and credits the balance due to the farmers. He sends payment to farmers by draft cheque, or, in some cases, a farmer may come to collect the money himself.

Box 3.1 The Azadpur *mandi*, Delhi

Located in North-West Delhi, this *mandi* is the main vegetable trading centre of India and the largest such market in Asia. All kinds of vegetables and fruit come here from all over the country. Tomato arrivals throughout the year now come mainly from Maharashtra, Karnataka and Haryana. Tomatoes from Himachal Pradesh during May-August represent a small proportion of total arrivals.

There is a separate shed in the *mandi* for tomato where more than 20 *adatis* deal in tomato exclusively. Adatis serve as commission agents for the sale of tomatoes in the market and charge a 6% commission on the sale price of tomatoes.

The *adatis* in Azadpur insist on tomatoes being packaged in wooden boxes since these can be traded on without repackaging.

Plastic crates are also in use, but only for produce from a nearby state such as Haryana for purchase mainly by buyers from local *mandis* or retailers.

Other sales through local markets

Around one quarter of tomato production in Solan and Sirmour goes to local district markets. There are only two markets serving the two districts - K B mandi and Kotlanala in Solan. These are quite small markets (just 1,500 square metres of space) privately owned and managed by around 12 commission agents. These commission agents strengthen their links with local farmers, by providing credit to meet agricultural and household needs.

Farmers usually bring their produce in their own *quilta* or baskets. Though some large farmers have begun to use plastic crates – which they own themselves, or which belong to the local commission agents who charge a service fee for the use.

The local *adati* auctions directly to buyers – who come mainly from wholesale markets of Punjab, Haryana and also Delhi. After purchase, and paying the commission, the buyer arranges and pays for its packaging for further transport. Again, for the Delhi market only wooden boxes are used. For the other markets, tomatoes are now increasingly (more than 50%) packed in plastic crates.

Tomato sales through the local market in Solan town are said to have increased substantially in the last 3-4 years (**Box 3.2**).

Box 3.2: Growth in a local district market

The main market in Solan town is a private *mandi* owned and run by Mr Jagdish Chandra. He has been trading in tomatoes and other vegetables for the last 15-20 years. He has seen a significant increase in tomato sales through his market. Three years ago, he says, only farmers nearby the town brought tomato produce to his *mandi.* His average daily sales were then 1,500-2,000 kg. Nowadays, farmers also come from the neighbouring district of Sirmour and his tomato sales have increased to 7,500-10,000 kg - 300-400 plastic crates requiring 3-4 truckloads per day.

He attributes this increase to the introduction of plastic crates. He uses plastic crates for about 65% of his tomatoes which he sends to markets in the Punjab. He adds a packing charge to his commission and charges this to the buyers. He also purchases wooden boxes for the rest of his tomato sales which go to the Delhi market.

Key differences between the two types of market channel – direct to Delhi and via local markets – are summarised in **Table 3.2**.

Table 3.2

A comparison of market channels

Key aspects	Direct to outside market	Via local markets
Market links	• Farmers have direct links to commission agents at Azadpur *mandi*; bring produce to road side for transport direct to Delhi	• Farmers bring produce to local *mandi* where commission agents purchase and sell to traders from outside the state, or to local wholesalers
Packaging	• Wooden boxes only – as required by Delhi traders for onward sale outside Delhi • Farmers organise and pay	• Increasing use of plastic crates to markets in north India, though wooden boxes continue to be used (for other markets as well as Delhi) • Commission agents organise • Buyers pay
Price*	• Rs 4-12/kg • From this amount, adatis deduct transport cost, commission and transaction costs;	• Rs 4-6/kg • Normally paid a day following the sale – no deduction to farmers – buyers bear commission charge, and cost of packaging and transport

* Range reported for 2000 season

Farmers usually market through a single channel – adati - during a season. The choice is probably determined by the reputation of an adati and the advance offered at the beginning of the season. Once an agreement is reached – whether with a local adati or one from Delhi, the farmer stays with that arrangement during the season, but may explore prices offered by different *adatis* in a particular market to ensure that they are getting a competitive rate.

Prices appear to be mainly a factor of supply and demand – linked to arrivals at the Delhi market and other markets in the plains of the Punjab and Haryana. Buyers and adatis keep in touch with other markets by phone. Tomatoes destined for Delhi do not necessarily realize a higher price nor do they represent a different (higher) quality level. In fact, quality differences do not seem to be a significant factor in price (though it was difficult to assess this outside the season) except for the case of Mother Dairy, Delhi (See Box 3.3 below).

In our sample, all economic categories of farmers were using the various market channels. The additional costs involved in sending produce to Delhi do, nevertheless suggest that this route is more accessible to better-off farmers.

3.2 Market systems – Kullu

Farmers in Kullu have very limited direct links to Delhi – and they depend almost entirely on local markets for sale of tomatoes. About 80% of the tomato produce of the district comes to either of two local *mandis* – in the towns of Bhuntar and Takoli. These have been set up by the government (providing the space – around half an acre - and infrastructure).

During the main season, around 50 truck loads of tomatoes (450 MT)[1] are traded each day at these two mandis (**Table 3.3**). They operate in the same way, with similar market rates, as local markets in Solan & Sirmour (Table 3.2) with the commission agents organising packaging in wooden boxes or plastic crates and these being paid for by the buyers.

Whenever there is low buyer demand, *adatis* assist the farmers by themselves buying the produce at the prevailing market rate and selling them on to their buyers outside the state.

Table 3.3

The main markets in Kullu

	Bhuntar	**Takoli**
Number of *adatis*	22	12
Number of buyers	90-100	
Peak season for tomato trading	80 days (May-July)	
Tomato trade during peak season		
Truckloads/day	40-50	50-60
(metric tonnes)	360-450	450-540

From these *mandis*, the bulk of production goes outside the state, mainly to markets in the Punjab - Jalandhar, Ludhiana, Kangra, Palampur, Phagwara, & Pathankot - and a smaller proportion to other northern states of Rajasthan, Jammu and Delhi. Around 10% of the produce goes to local markets in Kullu.

[1] Trucks are loaded with 9 metric tonnes of produce, or more – compared to the legal limit of 8.

A farmers' cooperative

We came across one enterprising example of a farmers' cooperative based near Kullu town - the Himalayan Fruit and Vegetable Growers Cooperative Marketing Society. This cooperative has established direct market links outside the district. These include Mother Dairy, an important retail outlet for fruit and vegetables operating in Delhi (**Box 3.3**).

Box 3.3: A Cooperative Marketing Society, Kullu

The Himalayan Fruit and Vegetable Growers Cooperative Marketing Society Ltd. was started in 1985 by an enterprising farmer in his village Piplage, 15 km from Kullu town. The society has about 140 members from about 15 villages in a 25 km radius around Piplage. The society deals mainly in apples and tomatoes. Members are marginal farmers with less than 0.5 acre under tomato/vegetable cultivation.

The society sells tomatoes to Mother Dairy (of the National Dairy Development Board) in Delhi, which buys around 30% of the members' produce. Mother Dairy has very strict quality control norms that the cooperative has to follow failing which their consignment may be rejected.

To maintain the required quality, the cooperative helps its members in obtaining appropriate seed varieties and other inputs (pesticides, fungicide) and provides technical support at all stages. Produce for Mother Dairy is sorted and graded first by the grower members and again by cooperative staff. Mother Dairy provides its own plastic crates for packaging. The cooperative and Mother Dairy agree the sale price for the produce at the start of the season and this remains constant throughout the season.

The remaining 70% of the produce is sent to Pathankot, Jalandhar, Jammu and Delhi, mainly in wooden boxes arranged by the cooperative.

The Managing Director of the cooperative observes that overall wastage in tomato marketed by the society is less than for other farmers. He estimates his members' on-farm wastage at 5%, handling wastage during packaging at around 2% and wastage during transit at around 5%. The grower members of the society realise an average of Rs 5 per kg of tomato as against an average of Rs 4 in Kullu local *mandis*.

This cooperative appears successful and quite enterprising. They have experimented with carton packaging. They have also tried to purchase their own truck to transport produce outside the district. However, the Kullu truck union insists that only its members can transport produce at rates that they decide.

3.3 Packaging

The main packaging materials used for transporting horticultural produce in Himachal Pradesh are shown in **Table 3.4**. Apart from traditional baskets used by farmers to carry produce from the farm to the road head or to local mandis, the use of wooden boxes continues to be prevalent, not only for tomatoes but for important fruit crops too. Plastic crates are increasingly used, although not for the important Delhi market. Cartons are used for other produce.

3.3.1 Wooden boxes

Wooden boxes are extensively used, not only for tomatoes, but also for the main fruit crops - apples, peach and plums. They are used by farmers marketing direct to Delhi, and also by commission agents in local markets for onward sale. Roughly 90% of tomato sales from Solan/Sirmour and Kullu is packed in wooden boxes (Table 3.5 below).

Until the State Government banned tree felling in Himachal Pradesh, local pinewood was the main source of wood used for making boxes. Since the ban, wood is imported – mainly eucalyptus from the neighbouring districts of Punjab. Neither farmers nor adatis reported any problems in the supply of wood following the ban on tree felling in the state. Prices may have risen, due to additional costs of transporting wood from outside the state, but the increase has not been significant. Also, it is unlikely that the ban on tree felling is fully effective, and some trade in local timber does continue, especially from more remote areas.

Wooden planks come from the border areas of Punjab with the state. The main markets for wood are Pathankot and Mukuri in the Punjab.

In Solan/Sirmour there are a number of timber dealers in the main towns who purchase wooden tree trunks and planks from the Punjab markets, and sell planks to local farmers and to local adatis. Adatis and large farmers (upper/middle categories) employ labourers to make the boxes; the majority of farmers make the boxes themselves.

In Kullu, there are two or three adatis who directly source timber from the Punjab, have it made into boxes and sell to their buyers. The main system, however, is that during the season, traders from the Punjab markets themselves bring wooden planks to the district. They (around 10) settle around the local mandis, employ local labourers to make the boxes (very simple carpentry), and sell the boxes to local commission agents and to the outside buyers who come to purchase at the market.

Some buyers bring wood with them. When they come to buy produce from the Kullu *mandis* the buyers bring wooden planks with them by truck. Once in Kullu, they pay local labourers to make the boxes.

The size of wooden boxes for tomatoes varies – from a capacity of 12-14 kg in Solan/Sirmour to up to 20 kg in Kullu. (For apples the usual box capacity is 18-20 kg).

Farmers, buyers/*adatis* have to invest in boxes for each transaction. It seems likely that once the wooden boxes reach their final destination, the wood is recycled – and much of this finds its way back to be used again for packaging.

Table 3.4

Packaging material used for vegetables and fruits

Packaging material	Description	Capacity (Kg)	Cost (Rs)
For a local destination:			
Quilta	▪ Cylindrical bamboo baskets carried on the back. They last for at least 2-3 seasons ▪ Most commonly used to transport produce from the field to place of packaging or to local *mandis*	40-50	80-100
Baskets/ *tokara*	▪ These are bamboo baskets used for transporting vegetables from farm and road head to local *mandi* and sometimes for transport over short distances by tractors and mini trucks	20-25	25-30
For markets outside the state:			
Wooden boxes	▪ The traditional method for packaging apple, peach, plum and tomatoes	12-20	16-22
Plastic crates	▪ Introduced about 3-4 years ago as a packaging material mainly for vegetables ▪ Used to transport tomatoes to nearby markets of Chandigarh, Pathankot and Jalandhar ▪ Use is increasing – even by large farmers for local *mandis* in Solan and Kullu	23-25	110-130
Cartons	▪ These are cardboard boxes introduced a few years ago for apple and capsicum ▪ Not used for packaging tomato	10-14	14-18
For both near and distant markets:			
Gunny bags	▪ Mainly used for less perishable crops such as peas, beans, cabbage and cauliflower	40-60	18-20

Based on our estimate of the proportion of tomatoes marketed using wooden boxes – all sales to Delhi (direct and indirect) and roughly half of other sales, and using figures for the districts of Solan, Sirmour and Kullu, around 21,500 mt of wooden planks are currently needed for packaging Himachal Pradesh tomatoes for export outside the state (**Table 3.5**).

Table 3.5

Estimates of wood and wooden boxes used to package tomatoes

Current estimates of tomato production (mt) *		
Solan		73,920
Sirmour		47,850
Kullu		16,500
Total		138,270
Tomatoes packed in wooden boxes (mt)		
Solan & Sirmour	85%	103,505
Kullu	50%	8,250
		111,755
Requirement of wooden boxes		
(ass. capacity of 12-14 kg/box)		8,596,500
Cost (@ Rs 18 per box)		Rs 1,547 lakhs
This represents:		
Ass. material weight/box	2.5kg	
Weight of wooden planks (mt)		**21,500**
Truckloads of wood		**2, 400**

* roughly estimated as a 10% increase over 1991 - based on local feedback and an assumed increase in access to irrigation

A substantial proportion (roughly 70-80%) of the wood used for tomatoes is recycled from the wooden boxes used to pack apples – which find their way back to the Punjab mandis. It may be that the recycling is more than once (we do not have information on this). It is interesting, nevertheless, to translate the wood requirement into forest area, and this is done in **Table 3.5.1**. The estimates use data for eucalyptus plantations and suggest that wooden boxes used for packaging tomatoes for the Delhi market are equivalent to eucalyptus trees from 119 hectares of plantation.

Table 3.5.1 Wooden boxes: forest area

Assumptions (based on general practices followed in Eucalyptus plantations)			
1	Species used for making the boxes	Eucalyptus	
2	Number of harvestable trees per hectare	1000	
3	Weight of a 4-5 year old tree	300	kg
4	Volume of tree used for making planks	60%	
5	Net weight of tree used for planks	180	kg
Calculation			
Total wood requirement for tomato boxes		21,491.25	MT
Wood used per tree		0.18	MT
Number of trees therefore required		119,396	
	from an area of	119	Ha.

3.3.2 Plastic crates

Roughly 13-14% of tomato exports from Himachal Pradesh is transported in plastic crates.[2] These are increasingly used for nearby markets of Chandigarh (in Haryana) and Pathankot and Jalandhar in Punjab.

Plastic crates come from a number of dealers in the Punjab where the crates are made in small and medium size manufacturing units. From here they are supplied via (Punjab) dealers and/or (Himachal Pradesh) agricultural inputs suppliers to *adatis* in the main districts of Solan and Kullu. In both these districts, buyers usually hire the plastic crates provided by the *adatis*. However, larger buyers are more likely to have their own stock of crates.

In both districts, some of the very large farmers also purchase plastic crates to carry tomatoes from farm to local market.

Plastic crates are very strong and can be used for many trips (at least 50). Once the crates are delivered to the destination market, they have to be returned for re-use. For *adatis*, this is sometimes a problem – when there is a delay in returning the crates, or not all are returned. Based on an estimated 13-14% of tomato exports being transported in plastic crates, roughly 9,400 plastic crates are used each day for 80 days of main trading business (**Table 3.6**).

Table 3.6

Estimated requirements for plastic crates - to package tomatoes

Tomatoes packed in plastic crates (MT):		
Solan & Sirmour	10%	12,200
Kullu	40%	6,600
Total		18,800
Capacity of each plastic crate	25kg	
This represents:		
No. of total plastic crates used		**752,000**
No. of plastic crates required each day		**9,400**
(Ass. 80 main trading days in a season)		

3.4 A comparison of the main packaging mediums

Inside the wooden boxes, tomatoes are layered using sheets of old newspaper and dry grass. This provides some protection during transport, as well as helping aeration. In plastic crates, on the other hand, there is no layering or additional packaging. The crates have latticed sides to maximise aeration.

Assuming that a plastic crate can be used for around 50 trips, this works out to be a far cheaper medium – just 12 paise per kg, in comparison with Rs 1.24 paise when a wooden box is used, including the various additional costs - layering (material and labour) inside a wooden box, some non-retrieval of plastic crates (**Table 3.7**).

[2] As far as we are aware, plastic crates are not used for packaging other perishable commodities in HP

Table 3.7

Packaging – a comparison of unit costs (Rs)

	From farm or local market to external market		From farm to road or local market	
	Wooden box	**Plastic crate**	**Quilta**	**Tokara**
Capacity (kg)	16.50	25	50	25
Material cost	20.00	120.00	90.00	25.00
Additional costs - layering	0.50			
- crate loss*		30.00		
Total cost	20.50	150.00	90.00	25.00
Number of times can be used	1	50	30	30
Effective cost/kg	**1.24**	**0.12**	**0.06**	**0.03**

* Around 20% in a season. Plastic crates are brought back as part of the circular route of the truck, and this transport does not represent an additional cost.

The market analysis indicates that farmers in Solan & Sirmour usually bear the cost of the wooden boxes when marketing direct to Delhi. However, when produce is sold via local markets, then it is the adati or the buyer who pays – whether for wooden boxes or for plastic crates. In Kullu it is usually the buyer who pays (**Table 3.8**).

Table 3.8

Packaging – who pays?

Packaging Material	**Market**	**Responsibility and payment**		
		Farmers	**Local adatis**	**Buyers**
Wood	Delhi	For direct sales	For direct despatch to outside markets	Purchase from local wood dealer/adati or bring planks from Punjab
Plastic crates	Markets in Punjab, Haryana	----	Purchase and hire out to buyers	Hire from adatis or bring own from Punjab
	Local	(For delivery to local markets – some large farmers)	Sometimes hire out to local farmers	

Both wood and plastic are quite strong, and boxes can be stacked one upon the other. A comparison between wooden boxes and plastic crates provides an indication of why plastic crates are increasingly used as a packaging medium – by buyers, adatis and some large farmers (**Table 3.9**).

Table 3.9

Comparing wooden boxes and plastic crates

	Wooden boxes	Plastic crates
Capacity	12-20 kg	25kg
Strength	Medium	High
Aeration	Medium – through gaps between planks	High – latticed sides
Cost	High at Rs 1.24/kg but unit cost/box is relatively low	Low at Rs 0.12/kg but initial investment is high
Use	Packing requires additional labour/time	Filled very fast
Est. wastage	Reported to be similar	
Local employment effects	High – in box-making and in packing	Low – come ready made from Punjab

It may appear surprising that the rate of wastage is reported to be similar for wooden boxes (in which tomatoes are layered) as for the plastic crates (in which loading capacity is greater and there is no layering). The report may be similar because plastic crates are used generally for shorter distances of up to 200 km involving a travel time of six hours or less. Over the longer distance to Delhi, wooden boxes continue to be used.

If there are obvious losses during transport - if, for example, a box is crushed or a crate is broken - the cost is borne by the trucker, as a reduction in his payment, calculated at the prevailing market rate. Otherwise, quality is taken more or less on trust – the crate/box is covered by a cloth during auction, the produce is not fully displayed, and buyers assess quality by touching the upper layer only.

For the Delhi market, the issue of retrieval too is important: plastic crates have to be returned to their owners, or back to the market source. There is no such requirement for wooden boxes.

4 Returns to tomato farmers

"Prices have gone down – there is more competition, since farmers in the plains are now using hybrid seed to grow tomatoes in the summer. But we will continue to grow tomatoes since it is still profitable compared to other crops"

- Farmers in Shargaon

This chapter explores the returns to tomato cultivation for different classes of farmers using different market channels in Solan/Sirmour and Kullu. On the inputs side, costs and productivity were discussed in Chapter 2. Packaging and marketing systems were described in Chapter 3. These form the basis for the analysis here, using average prices for the last season – summer 2000.

4.1 Fluctuations in market prices for tomato

The returns to tomato cultivation depend on a number of factors. When asked what is the most important factor that affects profitability, farmers in Shargaon said: *"It is the Delhi market"*. Prices in the Delhi market range from Rs 4 to 12 per kg for the same quality. The price obtained is a matter of chance, depending on the arrivals in the Azadpur mandi on a particular day. Nowadays, with more arrivals during the summer season from a number of other states, Himachal Pradesh farmers no longer enjoy a seasonal premium. Last year – summer 2000 – farmers say the market was down. Many had to sell at Rs 4-5/kg, though some sales were at a higher rate. In previous years, the average selling price would have been higher.

Farmers have limited capability to respond to market fluctuations. They do access market information to some extent. For example, farmers in Shargaon get information on current market prices over the telephone. Sometimes, they may decide to delay sending the produce by a couple of days in the hope of fetching better prices. But even this is limited because, due to the perishable nature of the produce, they cannot delay transport by more than a few days.

The local market price also depends upon the Delhi market, but the price fluctuation is less (within Rs 3-8/kg) compared to the Delhi market. .

4.2 Post harvest costs

Post harvest costs – of packaging, transport and commission – are determined by the market channel. Once a farmer decides to sell the produce in a particular market, they follow the systems prevalent in that market and bear the costs involved.

For the farmer sending tomatoes direct to Delhi, post harvest costs are high since the farmers bears all costs of wooden packaging, transport and the 6% commission of the Delhi based *adati*. In the case of local markets, these costs are paid by the buyers, and the farmers pay only the cost of transporting produce from the farm to the local *mandi*. As **Table 4.1** shows, estimated post-harvest costs per kilogram work out to Rs 2.62 for a farmer sending direct to Delhi, and Rs 0.16 for a farmer selling through the local *mandi*.

Table 4.1

Post harvest costs

Post harvest transactions	Cost per kg of produce (Rs)		Remarks
	For Delhi market (wooden box)	For local market (*quilta*)	
Packaging	1.24	0.06	Farmer is responsible for bringing produce to the local market. Further packaging, transport costs and *adati* commission and other expenses are paid by the buyer.
Transport	0.77	0.10	
Adati commission and labour+misc	0.61	-	
Total post harvest costs	**2.62**	**0.16**	

In fact, the cost of wooden boxes has to be paid at the beginning of the season – in order to ensure that the packaging material is available at the time when it is needed throughout the harvest season. Farmers estimate their requirement in March/April. With an average production of say 2,000 kg per *bigha*, a farmer with two *bigha* under tomato cultivation pays out about **Rs 5,000** as a lump sum cost to purchase wood for packaging.

4.3 Economics of tomato cultivation

An analysis of returns to farmers of different economic classes on a per *bigha* basis is presented in **Table 4.2**. This is based on background information presented in Chapter 2.

The calculation shows that average returns last summer were only slightly higher for a farmer selling direct to Delhi, rather than through a local market. Probably, in earlier years when average Delhi rates obtained by Himachal Pradesh farmers were higher, the comparison would have been more favourable for direct marketing. A decline in the Delhi rates is likely to lie behind the increasing trend to local markets in Solan and Sirmour.

Kullu farmers anyway have to depend on local markets because Delhi based adatis do not find it economical to maintain direct farmer contacts in a district with relatively low production levels.

Net returns per bigha are highest for upper category farmers in Shargaon. Otherwise, returns would be usually more than Rs 6,000 per bigha, including lower category farmers in Dhalasni. Low returns of less than Rs 3,000 per bigha (for the lower category in Shargaon and the middle category in Dhalasni) were the result of specific problems faced by the family, as described in Chapter 2.7.

Table 4.2

Economics of tomato cultivation
(per *bigha* basis)

	District Sirmaur – Village Shargaon			District Kullu – Village Dhalasni		
	Upper	**Middle**	**Lower**	**Upper**	**Middle**	**Lower**
Input costs (Rs)	1,692	958	942	1,482	913	1,250
Production (kg)	2,383	1,842	953	2,000	1,000	2,000
Direct marketing to Delhi						
Post harvest costs for produce from 1 *bigha* (Rs)	6,243	4,826	2,497	Produce is not sent to the Delhi market		
Total costs (Rs)	7,935	5,784	3,439			
Revenue @ Rs 6.5/kg	15,489	11,973	6,194			
Net returns (Rs)	**7,550**	**6,200**	**2,760**			
For local market						
Post harvest costs for produce from a *bigha* (Rs)	381	295	152	320	160	320
Total costs (Rs)	2,073	1,253	1,094	1,802	1,073	1,570
Revenue @ Rs 4.0/kg	9,532	7,368	3,812	8,000	4,000	8,000
Net returns (Rs)	**7,460**	**6,110**	**2,720**	**6,100**	**2,930**	**6,430**

Overall, however, some of these figures are likely to be underestimates, especially for upper category farmers.

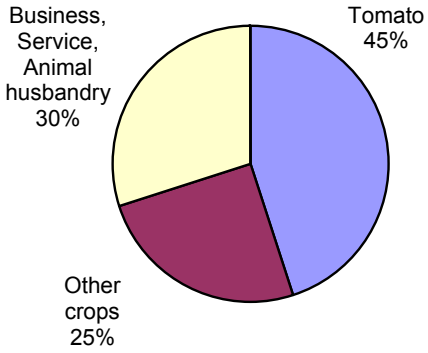
4.4 Contribution to household income

People are often reluctant to provide their actual income figures. The approach used for this study was to estimate the relative contribution from different sources. This is shown on the basis of cash income for the tomato farmers of Shargaon and Dhalasni, in **Figure 4.1** (details in **Annex 4).**

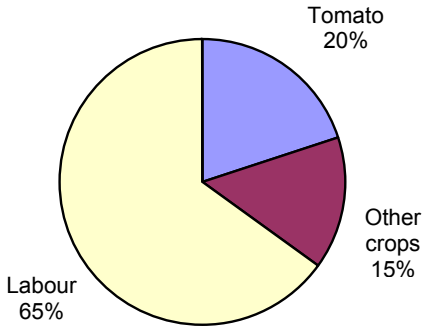
Figure 4.1

Household income profile of tomato growers in Shargaon and Dhalasni

Upper and middle economic categories



Lower economic category



The pattern of cash income for tomato growing farmers is quite similar in both villages. For upper and middle economic categories, tomatoes contribute 40-50% of total income. Other vegetables like peas, beans, cauliflower, cabbage, and horticultural crops (peach and plum) together contribute 25-30%. The rest comes from service opportunities, local business or animal husbandry.

For the lower economic category, the contribution from tomato cultivation represents 20% of total income which is mainly dependent (60-70%) on casual labour employment and partly also on other vegetable crops. However, the casual labour employment is partly in farm based activities, including tomato – irrigation, harvesting, packaging and transport.

4.5 Non tomato growing households

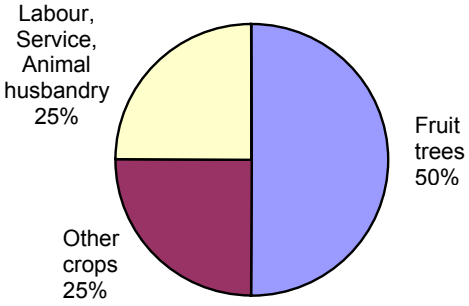
Families in the two non tomato growing villages are not so prosperous (cp Table 2.3.3). The main source of cash income in Jubbal is horticulture (primarily fruit trees - peaches) which contributes about 50% to people's income across economic categories. In Hawai, on the other hand, there is no commercial agriculture or horticulture. Here, middle and lower category households are entirely dependent on labour as the only source of cash income in the village. For the upper category, service employment is the main source of income contributing about 60% to household income (**Figure 4.2**).

Figure 4.2

Income pattern in non tomato growing households

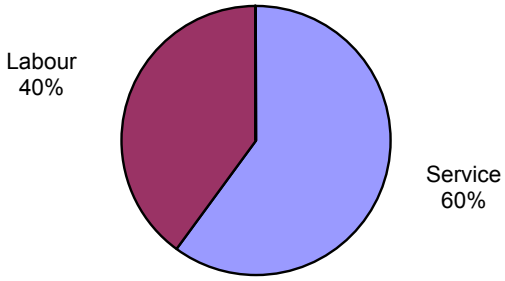
Non tomato growers: Jubbal

All economic categories



Non tomato growers: Hawai

Upper economic category



5 Market players

The tomato business in Himachal Pradesh is supported by a number of market players – especially commission agents (adatis) based in the Delhi Azadpur market who play a key role for farmers of Solan & Sirmour, and adatis in Himachal Pradesh who play some role in Solan & Sirmour and a major role in Kullu. Other local players are timber traders, box-suppliers/makers, labourers and truckers.

5.1 *Adatis*

The *adatis* play a key role for the farmers of Himachal Pradesh. As described in Chapter 3, they not only link farmers to the market, they also provide advances and crop information, and develop long term business relations with them.

In local *mandis* (well established in Kullu, growing in Solan), the *adatis* also supply wooden boxes or plastic crates to outside buyers.

There are approximately 12 adatis in Solan and more than 30 adatis in Kullu. Most of these have been in the business for over 15 years. Some of them combine their work as commission agent with agricultural inputs supply. One we met, started as a farmer (**Box 5.1**)

Box 5.1 From farmer to inputs supplier

Shri Rakesh Kohli comes from a farming family near Solan town. As a farmer cultivating vegetable crops, he was impressed by the 'easy money' that he felt the *adatis* were making – from what he could see of their business! So, about twenty years ago, he gradually handed over responsibility for the farm to others in his family as he began to make contact with Delhi based *adatis* and other buyers. He established his own mandi in Solan and 10 years later, set up his own business in agricultural inputs.

Whatever business he has turned to - farmer, *adati* or input supplier - tomatoes have been a common mainstay, contributing over half of his overall business.

All of the *adatis* usually deal in a range of produce – not only tomato, but other vegetables (cabbage, cauliflower, radish, capsicum) and fruits (apple, peach and plum). For all produce, they charge a commission of 6% on the market price obtained at auction.

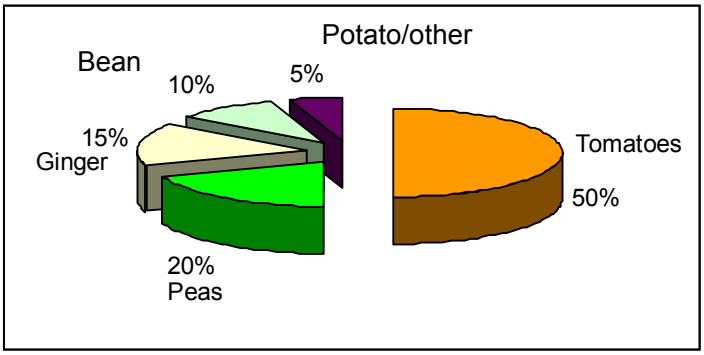
In both districts, tomatoes represent an important part of the overall business ranging from 20-50% (cp **Figure 5.1**).

Figure 5.1

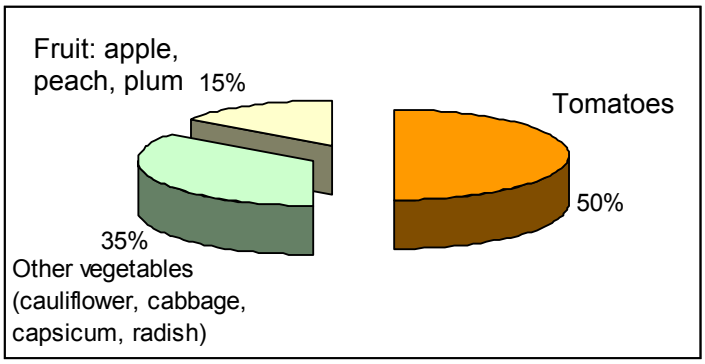
Contribution of tomato to adati business

(two cases where tomato is a main crop)

Solan – a private mandi



Kullu (Takoli Mandi)



Source: individual interviews

Local adatis must make a substantial investment in packaging – plastic crates and wooden boxes. The costs involved are estimated to be in the range of Rs 1.0–2.5 lakhs (**Table 5.1**) In most cases these costs are passed on to the buyer.

Table 5.1

Packaging costs incurred by local adatis (lakh Rs)

Packing materials	**Solan**	**Kullu**
Wooden boxes		
– annual cost	1.60	1.20
Plastic crates		
- initial investment	350 crates	120 crates
	0.50	0.20
- annual cost of replacement/expansion	0.10	0.40
Total	**2.20**	**1.60**

Source: individual interviews

5.2 Box suppliers

Box suppliers are both local wood dealers (who obtain wood from outside the state, or sometimes too from remote places within Himachal Pradesh) and suppliers who come from the Punjab with wooden planks. Both employ local casual labour to make the boxes and sell to adatis and to buyers who visit the mandis.

In Solan, wooden boxes are sold for roughly 10 percent of total tomato production. (For the bulk of production, farmers make their own arrangements). These are mainly supplied by local wood dealers.

In Kullu, on the other hand, in addition to local dealers, there are around 10-12 Punjabi dealers operating during the market season.

During the main market season, box-making provides seasonal employment for about 4 months (May-August) to workers/labourers who temporarily migrate from nearby villages of Himachal Pradesh and from other districts of the Punjab (Hoshiarpur and Batala).

We estimate that wooden box making for tomatoes represents employment of about 550 labourers for at least 80 days every year with an average earning of Rs 80-100 per day (**Table 5.2**). This represents a significant contribution to local employment, especially for a middle hill district such as Kullu – and supplements box-making activity for other horticultural crops (such as apples, peaches and plums).

Other labourers are also employed in packaging and loading/unloading of boxes/crates at the *mandi*s.

Table 5.2

Estimated employment in making wooden boxes

Total boxes required for packing tomatoes in a season (Table 3.)		85,96,500
Boxes made by farmers themselves*	50%	
Boxes for which labourers are employed		42,98,250
Market season (number of days)		80
No of boxes required in one day		53,728
No of boxes made in one day by one labourer		100
No of labourers per season of 80 days		**537**
Labour payment/box		Rs. 0.90
Total labour earnings in a season		**Rs 38.5 lakhs**
Average earnings/labourer/season		**Rs 7,200**

* In Solan/Sirmour

5.3 Timber dealers

Apart from obtaining ready made boxes, farmers in Solan and Sirmour and adatis in Solan and Kullu purchase planks directly from local timber dealers. The role of these dealers has increased as farmers can no longer (openly) purchase wood directly from forest areas in the state.

Timber dealers provide wood for a variety of purposes – furniture as well as boxes. Many of them are based on the border areas of Himachal Pradesh and Punjab. For vegetable and fruit packaging, these dealers also recycle the wooden boxes that come back from outside markets.

5.4 Truckers

Truckers lift farmers' produce from the road head or local *mandis* and deliver it to *adaits* at outside markets. There is a truckers' union in both Solan and Kullu which does not allow any other means of transport for the produce going out from their area. The farmers (mainly in Solan/Sirmour) and adati/buyers (in Kullu) are therefore fully dependent on these truckers for transport of their produce to the outside market. Transporting tomatoes represents an annual income of Rs 100,000-150,000 for a trucker and contributes about 25-30 % to his total income.

5.5 Significance of tomato marketing and packaging

Tomato marketing and packaging provide an important source of income to a number of players. As shown in **Table 5.3**, it represents at least 20% of total income and in some cases goes up to 50%. The players are listed in the Table roughly in descending order of economic status.

Table 5.3

Tomato business: significance for different market players

Market players	Period of business or employment	Source of income	Estimated income during tomato season (Rs)	Estimated contribution in overall income (%)
Adati	4 months (May-Aug)	▪ commission on sale price	75,000-200,000 (average: 100 boxes/day)	20-50
Wood suppliers	4 months (May-Aug)	▪ supply of wooden planks from Punjab		
Box makers/ suppliers (mainly in Kullu)	4 months (May-Aug)	▪ sale of wooden boxes to farmers and *adatis*	25,000-40,000	20-30
		▪ rent of storage space provided to proprietors	3,000-5,000	additional income
		▪ commission from buyers for distribution of wooden boxes to farmers	5,000-8,000	additional income
Truckers	4 months (May-Aug)	▪ transport from road head to local/outside mandis	100,000-150,000	25-30
Labourers	6 months (Mar-Aug)	▪ box making	7,000-8,000 (0.90/box)	25-35
		▪ irrigation, harvesting and local transport	6,000-10,000 (50-80/day)	40-50

6 Supporting tomato farmers

This chapter reviews some of the issues relating to packaging as well as other avenues of support to tomato farmers in Himachal Pradesh.

6.1 Packaging

6.1.1 Is this an issue?

Wooden boxes are used extensively for marketing of horticultural produce from Himachal Pradesh. They are used not only for tomatoes, but for other important fruit crops too (apples, peaches, plums). The state government ban on tree felling in Himachal Pradesh was one of the factors that led to this study and a concern that maybe other states would follow suit – affecting the availability of packaging, the costs involved and ultimately reducing the returns to farmers.

At present, packaging does not seem to be a major concern among farmers or other stakeholders engaged in tomato marketing. Despite the state ban, there is no perceived shortage of wood which is supplied now from the nearby state of the Punjab (involving a small additional transport cost) – and illicit supplies within Himachal Pradesh do probably continue.

Few farmers forsee a problem in future – even if other state governments too impose a similar ban. Farmers using local markets (all in Kullu, some in Solan & Sirmour) are least concerned, since they are not responsible for packaging. Some farmers involved in direct marketing, as well as local commission agents and scientists at the Y S Parmar University of Horticulture and Forestry, believe that plastic crates will provide the replacement. Some of the larger farmers in Solan/Sirmour have already started investing in plastic crates – for transport to local markets. However, this is unlikely to be an option for more distant markets, or for smaller farmers, given the high initial costs and the problems of retrieval. In this case, farmers would have to shift to using local markets. Even then, plastic crates may not be accepted easily by Delhi market commission agents, if it means repacking the produce for onward sale, and sending back the crates to Himachal Pradesh.

6.1.2 Who would adopt a new packaging technology?

The target adopters for a new technology would be:

Farmers who market direct to Delhi
Adatis in local markets of Himachal Pradesh
Buyers from local markets of Himachal Pradesh

Important channels which will influence acceptance, will include:

Adatis in Delhi
Buyers

For all these players the issues affecting choice of packaging relate to:

- Cost
- Strength
- Aeration

6.1.3 What are the alternative packaging materials?

Alternative materials for packaging are under review. In the case of apples, bamboo boxes are being tested at the Indian Plywood Industry Research Institute, Bangalore.

In the case of tomatoes, a few local players in Himachal Pradesh have experimented with cardboard cartons. These appear to have been lightweight cartons that were not strong enough when stacked one on top of the other (**Box 6.1**).

Box 6.1 Local farmers try out different packaging materials

We came across a few local experiments in alternative packaging for tomatoes. One of the first, probably, was Mr Rakesh Kohli – an adati and agriculture input supplier in Solan.

His first attempt was to pack tomatoes in *tokris* – but this did not work, he said, because baskets cannot be stacked compactly in a truck, they slip about and damage the tomatoes.

In the 1980s, he also tried using the cardboard cartons that were available – but this did not work either, mainly because the cartons were not strong enough to be stacked one on top of the other.

And in Kullu, The Himalayan Fruit and Vegetable Growers Cooperative Marketing Society Ltd. had the same result when they tried using the cartons supplied (at subsidised rates) by the Himachal Pradesh Fruit and Vegetable Marketing Cooperative (HPMC).

We do not have detailed information about the characteristics of the cartons used. Those who have tried them indicate that apart from being light weight - not strong enough to support stacking without damage to the contents – moisture and heat retention is high. And the unit costs are slightly higher than for wooden boxes (Rs 14-18/carton of 10-12 kg capacity or Rs 1.45/ kg).

The cartons that IDE is planning to test will be good quality, heavy duty boxes. Whilst these may be technically appropriate, cost will be a factor affecting demand.

6.1.3 Potential channels of introduction

Given the sort of experiments that have already taken place in Himachal Pradesh (cp Box 6.1), and the pattern of introduction of plastic crates, the potential channels for introducing a new packaging technology are likely to include

Adatis
Agricultural input suppliers
Local cooperatives

Adatis

Local adatis maintain very close links not only with farmers but also with buyers and outside markets. If they are convinced about the costs and feasibility of a new packaging material, they will be the first to adopt it.

Agriculture input suppliers

Input suppliers, in addition to their traditional role of supporting farmers with cultivation inputs and information/guidance, have also started to deal in plastic crates which they supply to (large) farmers.

Local Cooperatives

The Himalayan Fruit and Vegetable Growers Cooperative Marketing Society Ltd in Kullu is an example of an enterprising unit with strong farmer and market links – as well as an interest in new packaging material (cp Box 6).

In addition to these, it is possible that box suppliers who currently trade in wooden boxes, would be interested in supplying alternatives – cartons – especially if wood becomes scarce or expensive.

Other routes for dissemination of information would include:

(a) local NGOs – such as RUCHI in Solan – which has worked for a number of years with local farmers and established a good rapport with them; and
(b) the YS Parmar University of Horticulture and Forestry in Nauni (Solan) and its research station in Kullu.

6.1.4 Possible effects on different players

The possible effects of a new packaging technology – with at least equivalent if not better qualities of strength and storage and at a price comparable to wooden boxes - could be as outlined in **Table 6.1**

Table 6.1

Possible effects on different players

Player	Possible effect
Farmer – direct marketing	▪ Savings – if packaging costs are reduced ▪ Maybe – a shift to sales through local markets – if packaging requires a 'lumpy' expenditure
Farmer – local marketing	▪ Negligible
Adati (local mandi) and buyers	▪ Savings – if packaging costs are reduced ▪ Reduced wastage if storage is improved
Box suppliers	▪ May see a new trading opportunity
Agriculture input suppliers	▪ May see a new trading opportunity
Wood suppliers	▪ Decline in business – which may be something about to happen if supplies of wood reduce
Labourers	▪ May lose current income earning opportunities in making wooden boxes

These effects will be offset to the extent that wooden boxes continue to be the main packaging material for fruit.

6.2 Promoting local markets in Solan & Sirmour

The analysis in Chapter 4 indicates that, unless rates obtained in the Delhi market are considerably higher than those in local markets, direct sales outside the state have little comparative advantage for farmers. Whilst most of the farmers in Solan and Sirmour are sending their produce direct to Delhi, sales via local mandis have been increasing over the last three years and now represent around one quarter of total production in these two districts.

One of the constraints is that the existing private mandis do not have the capacity to handle large volumes. The establishment of larger mandis in Sirmour as well as Solan would provide a useful service especially for smaller farmers. The local adatis of Solan say they have been lobbying the district authorities for a couple of years to provide space and infrastructure for at least one mandi in the district.

6.3 Potential for tomato processing

Tomato processing accounts for an insignificant proportion of total tomato production in Himacha Pradesh. There are two processing units in Solan (one belonging to the Himachal Pradesh Fruits and Vegetables Marketing Cooperative Federation – HPMC) but neither of these are presently used for tomatoes. In Kullu, there are 7-8 small plants which process tomatoes but are mainly used for fruit processing which is more profitable. Plants in both districts have tried supplying tomato pulp (an intermediate tomato product) to national companies (Kissan and Maggie). However, they could not provide the quantities required nor meet the quality control standards of the established brands.

Awareness of the potential for tomato processing seems quite limited in the state. However, one NGO in Kullu is running a commercial processing unit (**Box 6.2**)

Box 6.2 Tomato processing – a small beginning in Kullu

The Society for Technology and Development (STD) is a small NGO in Talidhar village, Kullu district. STD was registered in 1990 and in 1995 started processing tomatoes into ketchup and puree under the brand name "Farmer". Apart from tomatoes, STD also processes apricots, mangoes, plums, apples and litchis.

In one season, the STD unit uses about 15 MT of tomatoes, most of which (about 60%) is purchased directly from farmers, the rest from local markets. The unit purchases tomatoes at an average rate of Rs 3-3.5/kg. Processing is not viable if the price goes higher than this. psfor 5 MT of processed product. However procurement from farmers is always the cheaper option. The average procurement price for tomatoes generally ranges, beyond which production is not viable.

The unit produces about 5 MT of processed tomato are sold in a range of packs (from 400 gm to 1,200 gm) mainly to retail markets or hotels/*dhabas* in Kullu, Mandi and Manali in Himachal Pradesh. STD has tried outside markets - Chandigarh and Delhi - but finds it difficult to compete with the established brands (Kissan and Maggi).

At present, low quality or damaged tomatoes – whether on farm, or sorted out at local mandis – are merely thrown away. On a rough estimate, the level of wastage at this level could be 10-20%. This represents a resource which could be processed – as a means of supplementing farmers' income.

Glossary

Adati	Commission agents of vegetable/fruits and can be found in wholesale vegetable markets. Their job is to sell the farmers' produce to the buyers for which they charge a certain percentage (6-8%) of the total selling price of a stock.
Mandi	A market of vegetables/fruits where sale and purchase of farmers' produce takes place.
Sundi	A kind of insect that attacks tomato plants and destroys the leaves and fruits – drastically reducing productivity.
Quilta	Cylindrical wooden baskets carried on the back. They are mainly used for transporting vegetables (tomatoes) and fruits (apples, plum and peach) from farm to packaging centre or road head and to local *mandis*.
Tokra	Wooden/bamboo baskets used for transporting vegetables (mainly tomatoes) from road head to local *mandi* and sometimes for transportation over short distances by tractors and mini trucks.
Peti	Local term used for wooden boxes used for packaging tomato.
Dhaba	A kind of restaurant, located on the roadside of highways and used by the travellers and drivers.
Pucca	Strong, "cooked" - made of cement, stone or metal. With reference to a house it means made of bricks or cement. With reference to a road it means a fully surfaced road.
Kuchha	"Raw" or relatively weak. For a house, it means made of mud. For a road it means a dirt road.
Maan	A unit measurement of weight = 40 kg
Bigha	A unit measurement of area = 0.2 acre

VILLAGE PROFILE

Name of the village	**Bhavpar**
Taluka	Maliya
Location	NA
Date of assessment	9-02-01
Demographic profile Population No of Families No of houses	 2200 540 470
Social composition Caste wise breakup	92% - Hindus and 8 % Muslims. Patel, Muslims, Koli, Harijan, and Bharwad.
Economic Profile Source of Livelihood	 Farming, Wage work in factories and farms.
Damage Assessment Loss of Life	 18 Injured - 46, Orthopedic injuries - 34 100% Houses are fully destroyed.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC, Hospitals, etc.,	Approach road, Electricity, communication are totally destroyed Panchayat office, School, PHC and community center fully destroyed. Godown and Ration shop destroyed but still providing services.
Drinking Water	Water is provided by water supply dept. through tanker from Nana Bhela. According to villagers supply is inadequate.
Health Status	Fear of recurring Earthquake. Diarrhea, vomiting, cold and fever.
Live stock Death Fodder and water availability	 Nil Water is available. Fodder available only form their own private stocks.
Administration **Relief Status**	Panchayat term over. Administrator appointed from Taluka. Govt. has paid cash doles. Different NGO's providing basic relief materials.
Observation and comments **Requirements**	People unable to act, still suffering from shock, tremors are continuing to create fear, people have not migrated, are living in temporary shelters created from their own resources. Tents and tarpaulins. No new ration cards issued since last two years hence 25% families without ration cards. Need wage work.

VILLAGE PROFILE

Name of the village	**Vajalpur**
Taluka	Maliya
Location	25 Km from Maliya.
Date of assessment	10/2/2001
Demographic profile Population No of Families No of houses	 3500 509 509
Social composition Caste composition	100% are Hindus Harijan, Patel, Darbar, Koli, Bharward and Bawaji.
Economic Profile Source of Livelihood	 Farming and wage labour.
Damage Assessment Loss of Life Injuries House damage	 2 Injured – 18, Orthopaedic injuries - 6 More than 95% houses damaged
Community Structure Roads, Electricity, Social infrastructure, ration shops, PHC, Hospitals, etc.,	Panchayat office is completely destroyed. One school is destroyed and other are badly damages. Community center, Anganwadi and Sahkari Mandli are functioning normally. PDS has provided Kerosene but is less than what is normally due.
Drinking Water	Two bore well are functioning normally. Water is being supplied to 7 surrounding villages from here.
Health Status	Widespread fear of recurring earthquake. Govt. Health staff has been attending to patients.
Live stock Death Fodder and water availability	 Nil Adequately available
Administration **Relief Status**	
Observation and comments **Requirements**	People have demonstrated a high sense of self-reliance. Willing to take responsibility for design and construction themselves Need financial assistance to build house on their own. Need PDS supplies to be regularized. Tents and tarpaulin

VILLAGE PROFILE

Name of the village	**Mandarki**
Taluka	Maliya
Location	35 Km from Maliya.
Date of assessment	10/2/2001
Demographic profile Population No of Families No of houses	 225 41 41
Social composition Castewise breakup	100% Hindus. Koli, Ahir, Bharwad and 4 families of other castes.
Economic Profile Source of Livelihood	 Farming and wage labour.
Damage Assessment Loss of Life Damage	 NIL 95% damaged.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC, Hospitals, etc.,	Approach road is Kaccha. Electricity supply functioning normally. Panchayat and community centre is not affected. One school is destroyed other is intact. Telephone, PDS, PHC/Hospital did not exist before quake.
Drinking Water	People get water from well. No large storing facility in the village.
Health Status	Infections such cough, cold and fever common.
Live stock Death Fodder and water availability	 2 Buffaloes Water is available. Fodder is in short supply.
Administration **Relief Status**	Panchayat term over. Administrator appointed from taluka. Cash doles provided on the basis of Ration cards (white cards). NGO's like Kankeshwari Devi Trust and Sadguru Trust has provided Relief material.
Observation and comments **Requirements**	Literacy rate is very low. As village is located far away not much aid has reached here. New vidya sahayak is very effective and doing good work. Need temporary shelters, Tinsheets, blankets, food grains and kitchenware.

VILLAGE PROFILE (ask Dhirubhai)

Name of the village	**Ghantila**
Taluka	Maliya
Location	36 Km from Maliya.
Date of assessment	10/2/2001
Demographic profile Population No of Families No of houses	 6000 810 810
Social composition Caste wise break up	99.5% Hindus and 0.5% Muslims. Patel, Harijan, Koli, Bharward and Muslims.
Economic Profile Source of Livelihood	 Farmers, wage labour, animal husbandry.
Damage Assessment Loss of Life Injuries Damage to Houses	 3 35; Orthopedic injuries - 3 95% houses are totally destroyed
Community Structure Roads, Electricity, Social infrastructure, ration shops,PHC, Hospitals, etc.,	Approach Road Kaccha. Electricity and Telephones are functioning. Panchayat office totally destroyed. School is partly destroyed. PHC/Hospital is not present before quake.
Drinking Water	Water is brought from Devaliya by pipeline
Health Status	Cold, cough and other common ailments. Private doctor provides medical services.
Live stock Death Fodder and water availability	 Nil Water is available. Fodder is enough.
Administration **Relief Status**	NA 1) Govt & Swaminarayan Trust has distributed Tents and Tarpolins. 2) BPL Company has given blankets, Flour and Food grains.
Observation and comments **Requirements**	- Received relief from various sources.

VILLAGE PROFILE

Name of the village	**Sarvad**
Taluka	Maliya
Location	15 Km from Maliya.
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 4000 652 725
Social composition Caste wise Break up	100% are Hindu. Patel, Rabari, Harijan, Waghri and others
Economic Profile Source of Livelihood	 Farmers, wage work, employees in schools, government.
Damage Assessment Loss of Life Injuries House Damage	 1 5 Orthopedic injuries - 2 Fully destroyed – 75% Partly destroyed 25 %
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC, Hospitals, etc.,	Approach road is pucca. Electricity, Telephones, Ration shop are functioning normally. Panchayat office, school and bus station are fully destroyed. PHC and Godown destroyed.
Drinking Water	Tankers are providing drinking water.
Health Status	Minor injuries reported and common ailments like cough, cold etc.
Live stock Death Fodder and water availability	 5 Fodder and water available.
Administration **Relief Status**	Ex- sarpanch continues to provide services. Flour, oil, blankets, Wheat, received. Tents provided by Swaminarayan Gurukul (Raj).
Observation and comments **Requirements**	People demand monetary relief from govt. People feel that village can return to normalcy only if donor agency constructs houses. Tents, tarpaulins and blankets.

VILLAGE PROFILE

Name of the village	**Targhari**
Taluka	Maliya
Location	18 Km from Maliya.
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 1480 288 326
Social composition Caste wise break up	99.5% Hindus and 0.5% Muslims. Patel Harijan, Rabari, Muslims
Economic Profile Source of Livelihood	 Majority of them are daily wages labourers and currently have no source of income.
Damage Assessment Loss of Life Injuries House Damage	 3 5 Injured Orthopedic injury - 1 92% Totally destroyed.
Community Structure Roads, Electricity, Social infrastructure, ration shops, PHC, Hospitals, etc.,	Approach road is Pucca. Electricity and Telephones functioning normally. Panchayat office totally destroyed. School Partly destroyed. Ration shop destroyed.
Drinking Water	Water supply pipelines damaged, hence supply of water done through tankers.
Health Status	Cold, cough and fever commonly found. Widespread fear.
Live stock Death Fodder and water availability	 2 Water is available. Fodder is not available.
Administration **Relief Status**	Panchayat term is over, administrator appointed from the Taluka Andhra pradesh govt and Gujarati samaj (Hyderabad) have provided rice, flour, and blankets. Received cash doles from Guj govt.
Observation and comments **Requirements**	Most of the families living on the outskirts of the village. Lack of employment opportunity is a greater problem. Urgent need of Tents and tarpaulins.

VILLAGE PROFILE

Name of the village	**Rasangpar**
Taluka	Maliya
Location	5 Km from Maliya.
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 1000 160 160
Social composition Caste wise break up	100% Hindus. Patel, Brahmins and Sadhu.
Economic Profile Source of Livelihood	 Farming and factory wage labour.
Damage Assessment Loss of Life Injury Damage	 Nil 5 all orthopedic injuries 100% houses destroyed.
Community Structure roads, electricity Social infrastructure, , ration shops, PHC, Hospitals, etc.,	Electricity and Telecommunication services functioning normally. panchayat office, school and community centre fully destroyed. PDS completely destroyed but services still continue.
Drinking Water	Water is providing through Tankers. Stock of fodder is not enough.
Health Status	General status is satisfactory. 5 Orthopedic Patients reported.
Live stock Death Fodder and water availability	 1 Water is available Fodder is scars.
Administration **Relief Status**	Panchayat is working normally. Govt. has provided ration kit. NGO's like Gayatri parivar and Vivekanand (Madhya Pradesh) has Provided relief.
Observation and comments **Requirements**	1) People are economically backward so that they are not in a position to re-construct their own houses. 2) Unemployment rate is very high. 3) They want to rebuild their houses thought govt. as well as NGO's help. Tents, tarpaulin and Food grain.

VILLAGE PROFILE

Name of the village	**Chachavadhar**
Taluka	Maliya
Location	20 Km from Maliya.
Date of assessment	
Demographic profile Population No of Families No of houses	 1500 362 362
Social composition **caste wide break up**	Patel, Darbar, Rabari, Musloims, Harijan and others.
Economic Profile Source of Livelihood	 Farming and Diamond labours.
Damage Assessment Loss of Life Damage	 2 (11 Injured and 10 Fractured) 83% Houses fully destroyed. 15% Partially destroyed.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC/Hospitals etc.,	Roads are badly damaged. Electricity is not available in houses. Panchayat office and school is fully destroyed. Telecommunication and PDS is functioning normaly. PHC/Hospital and Godown not available in the village.
Drinking Water	Water Pipeline is broken. Water is provided through Tanker.
Health Status	Whispered fear of recuring EQ. Minor infections like fever, cold and cough.
Live stock Death Fodder and water availability	 NA Fodder Stock is available, which is not enough to meet the future demand.
Administration **Relief Status**	Panchayat body present. Civil supply dept. has distributed 50 Kg flour, oil and spices.
Observation and comments **Requirements**	A) Unemployment due to damage of Diamond factory. B) They want economic help to rebuilt their own houses. Tents, tarpaulin and food grains.

VILLAGE PROFILE

Name of the village	**Nana Bhela**
Taluka	Maliya
Location	20 Km from Maliya.
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 1150 189 161
Social composition **Caste wise break up**	97% Hindus, 3% Muslims Patel, Brahmin, Luhar, Suthar, Muslims and others.
Economic Profile Source of Livelihood	 Farming and factory labours.
Damage Assessment Loss of Life Damage	 4 (41 Injured, 20 Orthopedics) 98% fully destroyed, 1% partially destroyed.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC/Hospitals etc.,	Road is badly damages. Panchayat office, School, Temple, PHC and water tanks fully destroyed. Telecommunication, Ration shop and PHC is not present in the village.
Drinking Water	Tankers provide water. Earlier they were getting through pipelines.
Health Status	Major injuries reported. People are hospitalized at Rajkot and Morbi.
Live stock Death Fodder and water availability	 1 Fodder is in short supply. Water is not available.
Administration **Relief Status**	Panchayat was working prior to Earthquake. A committee is form to help each other. Food grains received.
Observation and comments **Requirements**	Need assistance for rebuilding houses, landless people will need support for land Village does not want relocation. Wants to build their own houses, and wage labour work immediately. Tents, tarpaulin and food grains.

VILLAGE PROFILE

Name of the village	**Moti Barar**
Taluka	Maliya
Location	7 Km from Maliya.
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 1200 235 200
Social composition **Caste wise break up**	100% are Hindus. Ahir, Darbar, Harijan, Bharwad and others.
Economic Profile Source of Livelihood	 Farming and wage labours.
Damage Assessment Loss of Life Damage (Houses)	 5 (10 Injured, 3widows) 91% Totally destroyed, 5% Partially destroyed.
Community Structure Roads, electricity Social infrastructure, ration shops, PHC/Hospitals etc.,	Road is badly damage, get repaired now Panchayat office and school is fully destroyed. Electricity, Telecommunication, Ration shops and Private Hospital is functioning normally. PHC/Hospital not present.
Drinking Water	Water is supplied by water supply dept. through Tankers. There is no water storage tank present in the village.
Health Status	Those villagers are feared and badly injured (fractured) are hospitalized in nearby PHC's.
Live stock Death Fodder and water availability	 35 NGO has provided fodder.Water is providing by tankers.
Administration **Relief Status**	NGO not present in the village. Sarpanch alone solve the problem of the villagers. Swaminnarayan Sampradyay has provided Ration, food packets, Blankets, tents and vessels.
Observation and comments	They think of rebuild their houses but they are economically backward. They need monitory help form Govt or NGO's.

Requirements	Needed fodder

VILLAGE PROFILE

Name of the village	**Mota Bhela**
Taluka	Maliya
Location	NA
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 1800 426 540
Social composition **caste wise break up**	100% Hindus. Ahir, Koli, Harijan, Bharwad and Kumbhar.
Economic Profile Source of Livelihood	 Farming and landless labours.
Damage Assessment Loss of Life Damage	 7 (42 Injured) 98% fully destroyed, 2% partially destroyed.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC/Hospitals etc.,	PHC, PDS, Electricity and Telecommunication are functioning normally. School, Balmandir, Anganwadi and Godown is fully destroyed.
Drinking Water	Water supply dept. is providing drinking water every two days.
Health Status	Cough, cold and other common ailments.
Live stock Death Fodder and water availability	 2 Water and fodder is enough.
Administration **Relief Status**	NA Govt. has provided 5 liter Kerosene free and ration on cheap rate. Other relief received from Sahkari Mandli.
Observation and comments **Requirements**	Need debris removal and rapid building construction. Water storage tank broken. Need house hold items for storage of water.

VILLAGE PROFILE

Name of the village	**Songadh**
Taluka	Maliya
Location	NA
Date of assessment	9-02-2001
Demographic profile Population No of Families No of houses	 300 50 60
Social composition **caste wise break up**	100% Hindus Ahir, pujari and Bharwad.
Economic Profile Source of Livelihood	 Farming and landless labours.
Damage Assessment Loss of Life Damage	 NA 100 % fully destroyed.
Community Structure Roads, electricity, Social infrastructure ration shops, PHC/Hospitals etc.,	Panchayat is not present. Approach road is kachha. Electricity, Telecommunication, Ration shop, PHC and other services are not present.
Drinking Water	Water supply department provides water.
Health Status	NA
Live stock Death Fodder and water availability	 NA Water and fodder both available.
Administration **Relief Status**	Common Panchayat between Sarwad and Songadh. Maliya Taluca Panchayat has provided Plastic sheet.
Observation and comments **Requirements**	Need livelihood for diamond workers and agriculture workers. Tents and tarpaulins.

VILLAGE PROFILE

Name of the village	**Kumbhariya**
Taluka	Maliya
Location	23 Km from Maliya.
Date of assessment	10-02-2001
Demographic profile Population No of Families No of houses	 1570 207 195
Social composition Caste wise break up	100% Hindus Patel, koli, Harijan, Bharwad and others.
Economic Profile Source of Livelihood	 Farming and Wage labours.
Damage Assessment Loss of Life Damage	 Nil (Injured-2) 50% Totally destroyed. 10% Partially
Community Structure Roads, electricity Social infrastructure, ration shops, PHC/Hospitals etc.,	Pucca road is present.Electricity is only available in market not working in houses. Panchayat office and school are fully destroyed.Ration shop, PHC and Godown are not present.Communication is functioning well.
Drinking Water	Water is providing through pipelines.
Health Status	Cough, cold and other common ailments. General status is satisfactory.
Live stock Death Fodder and water availability	 Nil Stock of fodder is there with them, yet not received from authority. Water facility is good.
Administration **Relief Status**	Panchayat is working regularly. Received Tents, blankets, Wheat, flour and spices.
Observation and comments **Requirements**	- 25 to 30 old people reported. - They wants to re-construct concrete houses. - They want Loan for purchase of row material of houses.

VILLAGE PROFILE

Name of the village	**KhaKhrechi**
Taluka	Maliya
Location	21 Km from maliya.
Date of assessment	10-02-2001
Demographic profile Population No of Families No of houses	 4400 942 1200
Social composition Castewise break up	100% Hindus. Patel, Koli, Harijan, Bharwad and others.
Economic Profile Source of Livelihood	 Wage labours
Damage Assessment Loss of Life Damage	 12 (Serious injured - 15 and minor - 102) 30% fully destroyed and 70% partially.
Community Structure Roads, electricity, Social infrastructure, ration shops, PHC/Hospitals etc.,	Pucca road is present.Electricity is not working.Panchayat office and school are fully destroyed.Communication and ration shops are functioning normally.
Drinking Water	Water supply dept. providing drinking water through pipeline.
Health Status	Cough,cold and other common ailments. 102 Orthopedic injuries
Live stock Death Fodder and water availability	 49 Bombay authorities have provided fodder. Water is brought from outside.
Administration **Relief Status**	Administrator from taloka level. Rs.1500 received family wise from govt. Received Tents, Tarpaulins, blankets, clothes, cooking row materials as etc.
Observation and comments **Requirements**	Need help for temporary shelters, need to look into distribution, which is equitable. Blankets and food grains.

Annex 1

Main vegetable crops in Himachal Pradesh

State/main	Area			Production		
Districts	Crop	Ha	%	Crop	MT	%
Himachal	Peas	8,550	29	**Tomato**	**144,900**	**29**
Pradesh	**Tomato**	**4,500**	**16**	Peas	78,800	16
	Cucurbits	2,400	8	Cucurbits	73,200	15
	Beans	2,100	7	Cabbage	54,900	11
	Cabbage	2,000	7	Onion & Garlic	27,500	6
	Other	9,450	33	Other	120,700	24
	Total	29,000	100	Total	500,000	100
Solan	**Tomato**	**1,890**	**40**	**Tomato**	**67,200**	**64**
	Peas	1,010	21	Peas	9,545	9
	Capsicum	390	8	Cucurbits	8,330	8
	Cucurbits	300	6	Radish, turnip & carrot	4,505	4
	Beans	295	6	Capsicum	3,200	3
	Other	845	18	Other	12,455	12
	Total	4,730	100	Total	105,235	100
Sirmour	**Tomato**	**1,355**	**35**	**Tomato**	**43,500**	**56**
	Peas	980	25	Peas	8,722	11
	Cucurbits	240	6	Cucurbits	7,170	9
	Beans	200	5	Cabbage	2,970	4
	Capsicum	185	5	Onion & Garlic	2,390	3
	Other	920	24	Other	12,570	16
	Total	3,880	100	Total	77,322	100
Kullu	**Tomato**	**500**	**19**	**Tomato**	**15,000**	**28**
	Cabbage	410	16	Cabbage	10,780	20
	Peas	360	14	Cucurbits	8,120	15
	Cauliflower	325	12	Cauliflower	6,425	12
	Cucurbits	190	7	Peas	3,200	6
	Other	860	33	Other	10,435	19
	Total	2,645	100	Total	53,960	100

Source: Agricultural census of Himachal Pradesh, 1991

Annex 2

Indicators of relative wealth ranking

Economic Category	District Sirmour		District Kullu	
	Shargaon	**Jubbal Chandesh**	**Dhalasni**	**Hawai**
Upper	▪ Own heavy vehicle (truck, tractor) ▪ Land holding 15-25 bigha ▪ Own 3-4 pucca houses in the village and in other towns in HP l ▪ One or more members in service ▪ May own shops ▪ Are hardworking and ambitious ▪ Employ labourers on their farms	▪ One or more members in Government service ▪ Land holding 10-15 bigha ▪ Less dependent on agriculture than middle category ▪ Yearly income is assured and slightly higher than other categories ▪ Pucca houses with 4-6 rooms ▪ Telephone connection	▪ Pucca house with 7-10 rooms ▪ Some own heavy vehicles ▪ Average monthly income Rs 10-15,000 ▪ Land holding around 10-15 bigha ▪ Telephone connection ▪ One or more member of a family in service ▪ Standard of living (wrt food, clothes, number of livestock etc)	▪ Land holding – 2 to 10 bighas ▪ One or more members in service employment ▪ Source of income apart from service is agriculture (8-10 months) and labour (1-2 months)
Middle	▪ Land holding 5-20 bigha ▪ Own one or two houses ▪ No heavy vehicles ▪ Own small shops ▪ If any member is in service then it is generally 4th (lowest) class ▪ Not ambitious ▪ Have taken loans from local bank	▪ No service employment ▪ Land holding 5-12 bigha ▪ Some work on daily wages ▪ Totally dependent on agriculture ▪ Own pucca houses with 2-4 rooms ▪ No telephone connection	▪ No service employment ▪ Only one household has a tractor ▪ Land holding is around 3-8 bigha ▪ Only one household has telephone connection ▪ Some casual labour employment ▪ Pucca houses with 4-6 rooms ▪ Average monthly income is around Rs 2-3,000	▪ Land holding – 3 to 10 bighas ▪ Main source of income is agriculture (6 months) and labour (6 months)
Lower	▪ Land holding 5-15 bigha ▪ Lack ambition - work only to meet basic requirements ▪ Own kuccha house ▪ Mainly labourers and small cultivators (for their own consumption)	▪ Low yearly income is very little as compared to other categories ▪ Land holding 5-10 bigha ▪ Pucca houses with 2-3 rooms ▪ No telephone connections	▪ Land holding around 2-4 bigha ▪ Family size is very large ▪ Labour is the main source of income ▪ Pucca houses with 1-2 rooms	▪ Land holding – 1 to 9 bighas ▪ Labour (8-10 months/year) is the only source of cash income ▪ Agriculture is for own consumption (2-3 months)

Annex 3

Cost break-up of input costs/*bigha* in tomato cultivation (Rs)

Households	Eco' Category	Input Costs					Total		Average	Production (kg)	Average production (kg)
		Seeds	Fert.	Irrig.	Pesti-cides	Hired Labour	With hired labour	Excl. hired labour	Excl. hired labour		
Shargaon (Sirmour)											
Rakesh Kumar	U	333	750		667	750	2,500	1,750	1,692	2,167	2,384
Vidya Dutt	U	800	167		667	417	2,051	1,634		2,600	
Madan Lal	M	500	250				750	750	959	1,950	1,842
Jeet Ram	M	667	167		333		1,167	1,167		1,733	
Kesridevi	L	467	167		500	583	1,717	1,134	942	1,517	954
Ved Prakash	L	500	250				750	750		390	
Average		**545**	**292**		**542**	**583**	**1,489**	**1,198**			**1,726**
Dhalasni - district Kullu											
Jaichand	U	500	143	107	714	357	1,821	1,464	1,483	1,500	2,000
Jai Singh	U	667	167		667	583	2,084	1,501		2,500	
Ram Singh	M	400	250		500		1,150	1,150	913	1,500	1,000
Dhani Ram	M	300	125		250		675	675		500	
Neeraj Singh	L	500	250		500		1,250	1,250	1,250	2,000	2,000
Average		**473**	**187**	**107**	**526**	**470**	**1,398**	**1,208**			**1,600**
										Solan	**Kullu**
'General standard'#		*1,300*	*1,200*	*500*	*3,000*	*1,000*	*7,000*	*6,000*		*5,000*	*4,000*

Source: individual interviews and group discussions # *'General Standard' as stated by some key informants*

Annex 4

Sources of household income

Economic Category	Income sources	Tomato grower		Non tomato grower	
		Shargaon	Dhalasni	Jubbal	Hawai
Upper	Tomato cultivation	50%	40%	–	–
	Other vegetables/crops	20%	25%	15%	–
	Horticulture	5%	–	50%	–
	Animal husbandry	10%	15%	10%	–
	Labour	–	–	–	40%
	Service	10%	20%	25%	60%
	Other (business)	5%	–	–	–
Middle	Tomato cultivation	50%	50%	–	–
	Other vegetables/crops	30%	30%	25%	–
	Horticulture	–	–	50%	–
	Animal husbandry	–	–	5%	–
	Labour	–	10%	20%	100%
	Service	20%	–	–	–
	Other (small shop)	–	10%	–	–
Lower	Tomato cultivation	20%	20%	–	–
	Other vegetables/crops	10%	10%	20%	–
	Horticulture	–	–	50%	–
	Animal husbandry	–	–	5%	–
	Labour	60%	70%	25%	100%
	Other (share cropping)	10%	–	–	–