VALUE CHAIN STUDY ON APPLE
IN
NARKANDA BLOCK,
SHIMLA, HIMACHAL PRADESH

CONDUCTED BY

PRECISION FARMING DEVELOPMENT CENTRE
DR Y S PARMAR UNIVERSITY OF HORTICULTURE AND FORESTRY
NAUNI, SOLAN, HIMACHAL PRADESH
AND

DEPARTMENT OF HORTICULTURE
GOVERNMENT OF HIMACHAL PRADESH
Value Chain Study on apple in Narkanda block

The present study to “Value Chain Management in Apple” in Narkanda Block of Shimla district of Himachal Pradesh was carried out from July 5th to 27th, 2017 and 12-17 Mar, 2018 by the Precision Farming Development Centre, Dr Y S Parmar University of Horticulture and Forestry, Solan in collaboration with Department of Horticulture, Government of Himachal Pradesh.

The study was conducted by surveying 146 farmers of Narkanda block. The main objective of the study was to identify the gaps between the available technologies for apple production and needs of farmers for increasing the production and productivity of apple in Shimla as well as in Himachal Pradesh. Main points identified for undertaking Value chain study were:

- Managing the inputs including:
  - Availability of planting material
  - Fertilizer/Pesticides
  - Irrigation water
  - Credit facility

- Organizing production
  - Cultural practices being followed
  - Availability of organic manure

- Post production practices
  - Cleaning, sorting and packing
  - Primary processing
  - Storage facilities
  - Market linkages

- Organization of farmers

- Infrastructural gaps

Based upon these points, the survey was undertaken in the Narkanda block. As per the data available, a total of 6000 ha area is under fruit production engaging 12651 farmers covering 173 villages.

### Narkanda block

<table>
<thead>
<tr>
<th></th>
<th>Total panchayat</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Total villages</td>
<td>173</td>
</tr>
<tr>
<td>3</td>
<td>Total farmers</td>
<td>12651</td>
</tr>
<tr>
<td>4</td>
<td>Total area under apple orchards</td>
<td>6000 ha</td>
</tr>
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</table>
The study threw open following points:

I. Managing the inputs:

a. **Planting and varieties:** As compared to traditional planting of 6mx6m, farmers are now opting for high density planting though no farmer was found adopting ultra high density. The farmer, therefore, is going for spur type or early varieties which can be grown in high density planting as compared to standard Delicious varieties. The main varieties being preferred by the farmers are, Top Red, Gale Gala, Super chief, Red Fuji etc. apart from these, farmers are demanding imported or Italian varieties (Red Vlox, Redlam Gala, A E Fuji) introduced by the Department of Horticulture, Govt. of HP but these are under multiplication and only few plants are being available to the farmers.

b. **Availability of planting material:**

The farmers of Narkanda block are considered as one of the most progressive farmers in the state. The farmers are continuously upgrading their techniques of apple production for improving productivity and production. At present, in place of seedlings or rootstocks from nurseries, farmers are opting for tissue cultured clonal rootstocks which are said to be free of diseases and true-to-type. At present, farmers get their plants from 2 Government nurseries, 5 private nurseries and 3 Tissue culture labs. The requirement, however, is being met through these nurseries as demand for apple plants is going down. The cost of plants in each nursery is given below:

Table 1: Cost of apple rootstock/plant

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Lab/nursery</th>
<th>Cost of plant (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Government nurseries:</td>
<td>25 (delicious variety)-32 (Spur variety)</td>
</tr>
<tr>
<td></td>
<td> Dr Y S Parmar university of horticulture and Forestry and research station</td>
<td></td>
</tr>
<tr>
<td></td>
<td> CSK HP Krishi Vishwavidyalaya, Palampur and research station</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Private nurseries:</td>
<td>50 (standard var) 100 (Spur var)</td>
</tr>
<tr>
<td>1</td>
<td>Thakur Nursery (Prop. Inderjeet Negi) Village Sainj Post Office Kirti Tehsil Kumarsain, Shimla, H.P.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jishtu Nursery (Prop. Kanwar Singh Jistu) Village Chimla Post Office Kotgarh, Shimla, H.P.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hari Chand Mehta Nursery Village Kawnu Post Office Batari Tehsil Kumarsain, Shimla, H.P.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bali GHR Nursery (Prop. Chet Ram Bali) Village Kacheen Post Office Galani Tehsil Kumarsain District Shimla H.P.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Vijay Stokes Nursery Village Thanedar Post Office Thanedar, Shimla, H.P.</td>
<td></td>
</tr>
</tbody>
</table>
c. **Fertilizer application method and time:**

The farmers are following traditional method of fertilizer application i.e. basin application wherein the fertilizers are applied in December-January and March-April in two split doses (Full amount of Phosphorus and Potash and half Nitrogen in December-January and remaining half dose of Nitrogen is given in March-April). The quantity varies with the age of plant and are given as per the recommendations of Dr Y S Parmar University of Horticulture and Forestry, Solan. As none of the farmers are using drip irrigation, fertigation is not being followed. However, farmers give foliar application of potash, urea, calcium, boron and zinc in different growth stages to improve the quality of fruits. The fertilizers are procured from Himfed and Local market.

d. **Pesticides:**

Apple production faces lot of challenges in the form of attack of diseases and pests and the farmers are forced to use pesticides/fungicides to protect the crop from being destroyed. According to the recommendations of Dr Y S Parmar University of Horticulture and Forestry, Solan, farmers spray the pesticides/ fungicides at different growth stages viz. Tight Cluster Stage, Pink Bud Stage, Pea Stage, Walnut Stage, Fruit Development stage. Apart from spraying, farmers also drench the soil. Soil drenching is the process of adding diluted pesticides and fungicides directly to the base of the plants to overcome the soil bone diseases and pests viz. Root Rot, Collar Rot, Root Borer etc. the pesticides/fungicides are mainly sourced from Department of Horticulture at subsidy rates and local market.

e. **Irrigation water:**

Apple in Narkanda block is totally rainfed as the farmers lack permanent source of water. Some of the farmers have created permanent source of water by constructing RCC water storage tanks but that is not sufficient for irrigating the orchard as the mode of irrigation is only flood irrigation. Farmers are aware about the benefits of micro irrigation but still they are not adopting it due to lack of subsidy as most of the farmers surveyed said that they have no hesitation in adopting micro
irrigation lest government provides them subsidy. The department of horticulture is providing subsidy on MI system but the funds for meeting the subsidy requirement is not sufficient. Moreover, farmers are demanding lifting of irrigation water from rivers/nallahs (wherever available) so that permanent source of irrigation can be created for saving apple during summer season.

Table 2: Supply/availability of irrigation water vs requirement of LDPE farm ponds (50m$^3$)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Requirement (in cu.m.)</th>
<th>Supply through irrigation channels (in cu.m.)</th>
<th>Gap (in cu. m.)</th>
<th>Approx cost for new structures (LDPE lined farm ponds of 50m$^3$ capacity) (Rs in Crores)</th>
<th>Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Farmer (50%)</td>
</tr>
<tr>
<td>1</td>
<td>1941600</td>
<td>0 (Totally rainfed)</td>
<td>1941600</td>
<td>135.9120 @ 35000/50m$^3$</td>
<td>67.956</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>67.956</td>
</tr>
</tbody>
</table>

Table 3: Drip Irrigation + plastic mulching system requirement for apple orchards

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Requirement</th>
<th>Currently installed</th>
<th>Gap</th>
<th>Approx cost for new drip irrigation / mulch system (Rs in crores)</th>
<th>Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Farmer (15%)</td>
</tr>
<tr>
<td>1</td>
<td>800000 kg mulch @ 3m$^2$ mulch per tree</td>
<td>0</td>
<td>800000 kg mulch</td>
<td>16.00 @ Rs. 200 /kg mulch</td>
<td>2.4 Crores</td>
</tr>
<tr>
<td>2</td>
<td>6000 ha drip required</td>
<td>0</td>
<td>6000 ha drip required</td>
<td>60.00 @ 100000/hectare</td>
<td>9.0 Crores</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.4</td>
</tr>
</tbody>
</table>

Kcc or Loan:
The farmers are aware about the credit facilities being provided by the government and are taking the credit/loan for undertaking agricultural activities. The credit facilities have in fact helped many farmers in meeting the expenses on purchasing the plants and plant protection measures.

Gap:

- Government/private nurseries are not able to meet huge demand for Italian/other varieties.
- Sufficient funding for lifting of water, creation of low cost water storage tanks and subsidies for micro irrigation system is not available.
SYNOPTIC VIEW OF APPLE ORCHARDS
II. Organizing Production:

a. Cultural practices: the plants are transplanted according to the recommendations of Dr Y S Parmar University of Horticulture and Forestry, Solan at proper spacings and basins are prepared in circular manner according to size of plant spread. Labour is involved in preparation of basins which charge about Rs. 350/day. Some of the big farmers use power tiller for making basin of the plant.

The main operation of apple cultivation is Training & Pruning which is very necessary for obtaining good and quality yield. The training and pruning requires specialized knowledge as false method can lead to loss in yield and quality of apple. Training and pruning is being undertaken by the village level experts who have undertaken short training course conducted by Dr. Y S Parmar University of Horticulture and Forestry Nauni, Solan and Department of Horticulture, Government of Himachal Pradesh. Still, there is shortage of trained hands for undertaking training and pruning of apple trees.

Training and pruning is done in Dec-Jan by the trained personals. Training is done to maintain strong framework of the plant and mostly Modified Leader System is followed in Standard varieties while Spindle Bush system is followed in Spur varieties. Pruning is the removal of dead or unwanted branches and is done during Dec-Jan.

b. Disease and Pest Management:

Apple crop is attacked by various pests and diseases during the production period which require timely interventions for which spray schedule have been developed by the Dr Y S Parmar University of Horticulture and Forestry, Solan. Mostly the farmers face challenge of controlling the attack of pests and diseases by following below given schedule:

Diseases: Premature Leaf Fall, Canker, Root Rot, Collar Rot

Premature Leaf Fall:
1. Spray of Dodine @150g/200L of water at Pea Stage
2. Spray of Mencozeb @ 600g/200L of water at Walnut stage
3. Spray of Carbendazim@100g or Propinab @600g/200L of water at fruit development stage

Canker:
1. During winter season scratch the effected part and put the Chaubatia paste.
2. Postharvest spray of Copper oxychloride @600g 200Lof water

Root Rot:
1. Management of water drainage in field
2. Drenching with carbendazim @200g or copper sulphate @ 100g/200L of water

Collar Rot:
1. Expose the plant collar in sun during November-December
2. Scratch the effected part and put the Chaubatia paste.
3. Drenching with Mencozeb @600g/200L of water

**Pests: Root Borer, Wooly apple aphid, Mite, Scale**

**Root Borer:**
1. Drench the basin soil with chloropyriphos @50ml/10 L of water at Nov- Dec

**Wooly apple aphid:**
1. Spray of chloropyriphos @400ml/200 L of water
2. Basin application of Thimet or Carbofuran @ 70-80 g /Tree during October

**Mite:**
1. Spray of Fenzaquin @ 50ml or Hexythiazox @ 200ml/200L of water

**Scale:**
1. Spray of TSO (Tree Spray Oil) Or Horticultural mineral oil @ 4L/200L of water
2. Spray of Chloropyriphos @ 400ml or Dimethoate 200ml/200L of water

The farmers use power sprayer for spraying of fungicide and insecticides. The fungicides and pesticides are available through Department of Horticulture Government of Himachal Pradesh and local market.

c. **Vermicompost and Farm Manure:**

Farmers of Narkanda block are aware about the benefits and necessity of using FYM/organic manure. Most of them are using FYM (Farm Yard Manure) in their orchard while some of the farmers are using vermicompost. Farmers prepare the FYM and Vermicompost themselves, however, the percentage of such farmers is very less, and they are not able to meet the requirement of their orchards.

**Technology Adopted:**

The farmers are progressive in nature and are open to adoption of new technologies. They are using different technologies in small scale like power tiller, power sprayer, grass cutter etc. some of the
farmers are using bi-coloured mulch in the basins. However, in absence of drip irrigation the effect of mulch is not observed significantly.

**Gap**

- The farmers are facing lot of problems in meeting the requirement of FYM/Vermicompost for apple orchards. Some of the farmers have started preparation of vermicompost but still 90 per cent organic manures is being bought from outside the district
- Farmers have huge demand for mulch material and irrigation which is not available at present
FARMERS USING MULCH AND ANTI-HAIL NET IN APPLE
III. Post Production Facilities

a. Cleaning, packing and sorting:

The farmers undertake post production operations for marketing the apples at their own farm or at HPMC facility at Oddi, Shimla. The method adopted for cleaning, sorting and packing depends upon the size of the land holding by the farmer as small and marginal farmers having lesser produce prefer to do the manual cleaning, sorting and packing as it cuts down the production cost. The cost of cleaning, sorting and packing under manual method is Rs. 150/box. However, large farmers take help of mechanical method at HPMC (Grading, Packing-cum-CA storage) at Oddi. The cost comes out to be Rs. 165/box.

b. Storage Facilities

Most of the farmers sell their produce directly to fruit contractors and do not store for more than 2 days. However, large farmers who can afford to hold on to the produce till the price of apple goes up after the glut period is over prefer to store their produce in CA storage facilities in and around Shimla. At present, there are 3 CA storage facilities available for the farmers namely, CA storage of HPMC at Oddi, Kumarsain District Shimla, Cold storage of Dev Bhumi at Matiana District Shimla and Cold storage of Adhani Agrifresh at Rewali (Bitthal) District Shimla. HPMC at Oddi, Kumarsain charge Rs. 1.70/Kg/Month for maximum 5 months storage and have capacity of storing capacity of 750 MT fruits. Cold storage of Dev Bhumi at Matiana and Cold storage of Adhani Agrifresh at Rewali (Bitthal) Shimla buy the fruits from farmers directly and store the fruits for selling in the distant market when the rates of apple rise.

c. Market linkage:

The farmers sell their produce in the local as well as distant markets depending upon the rate and quantity of produce. Most of the farmers are selling their fruits at local mandi in Narkanda and Shimla. The produce is transported through Utility vehicles/trucks. Distant Markets like Chandigarh and Delhi are preferred by large farmers as they get good price for apple. The apple is transported through trucks after packing the produce in specially designed cartons.

d. Processing

Farmers do not sell good quality produce to processing industries and only ‘C’ Grade fruits are given to HPMC for preparing processed products. This helps in getting some returns from poor quality fruits.
The farmers need setting up of more CA storage facilities in the area so that they are able to store their produce during glut and sell later when demand is high. The CA storage facilities may be on PPP mode or wholly controlled by the Government so that farmers are not cheated.

The farmers are forced to transport their produce in trucks/other vehicles which leads to deterioration of quality by the time it reaches local or distant markets. There is great demand for refrigerated vans/vehicles that can transport the produce at proper storage temperature.

### Table 4: Availability of cold storage facility vs Requirement

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Requirement</th>
<th>Availability</th>
<th>Gap</th>
<th>Requirement of cold storage in 2030 @ 30% increased production</th>
<th>Approx cost for new structures (Rs in crores)</th>
<th>Share %</th>
<th>Farmer (50%)</th>
<th>Govt (50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20,00,000 boxes*</td>
<td>2,70,000 boxes</td>
<td>17,30,000 boxes</td>
<td>26,00,000 boxes</td>
<td>44.40 @ Rs.18500/MT (in 2018) and Rs. 57.72 (in 2030)</td>
<td>22.20 Crores</td>
<td>22.20 Crores</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*One box contains 12 kg apple
*Total storage required 24000 metric ton in 2018
*Total storage required 31200 metric ton in 2030

### REQUIREMENT OF REFRIGERATED VANS

Farmers required 15 to 20 refrigerated vans at the time of apple season
CLEANING, GRADING AND PACKAGING OF APPLES AT FARMERS’ ORCHARD

STORAGE OF APPLE IN LOCAL MANDI
MECHANICAL SORTING AND GRADING FACILITY
CA STORAGE FACILITY IN NARKANDA BLOCK
IV. Organization of farmers into FPO/FIG and other producer group

Each village of Narkanda block has at least one number of Self Help Group for women empowerment. SHGs are village based financial intermediary committee usually comprising of 10-20 local women. They produce processed product and sell to the local markets, local mela and exhibitions.

Some of the Self Help Group working in Narkanda Block of District Shimla are:

2. Saraswati Swayam Sahayta Samuh at village Narthi Tehsil Kumarsain.
3. Laxmi Suyam Sahayta Samuh at village Mohan Tehsil Kumarsain.
5. Maxmi Mata Suyam sahayta Samooh village Zar Tehsil Kumarsain

However, there are no FIG/FPO in Narkanda block.

A. Crop Insurance

The farmers of Narkanda block have not covered apple under crop insurance scheme.

B. Trainings: The Department of Horticulture, government of Himachal Pradesh conducts training programmes from time to time for farmers of Narkanda block. The main topic of training is “Training and Pruning” and “Grafting”.
INFRASTRUCTURE GAPS AND RECOMMENDATIONS

- Farmer require large quantity of tissue cultured clonal rootstocks which are not easily available as the tissue culture labs are not in the vicinity. Moreover, the Italian varieties being imported by the Department of Horticulture are not available in sufficient quantity therefore, there is a need of setting up of more number of tissue culture labs and registered nurseries for meeting the demand of planting material.

- Due to non-availability of irrigation water, the quality and productivity of fruits is very low therefore, facilities for lifting of water and its storage for judicious use of irrigation water through micro irrigation system needs to be created.

- The farmers need training cum research institute which may fulfill the demand for trained labour as well as immediate need for updating the latest technical knowhow regarding apple production. The institute will cater to the demands of Shimla, Kinnaur, Kullu and Mandi Districts which are major apple producing Districts of Himachal Pradesh. The institute can be run on PPP mode.

- There is need for creation of CA storage facilities so that produce can be kept for off season along with running of refrigerated vans for transportation of produce. The creation of such facilities will help in reducing the cost of storage as well as providing higher remuneration to the farmers.

- The total requirement for creating above facilities is Rs 154.76 Crores (Govt. share).

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PRECISION FARMING DEVELOPMENT CENTRE
Solan

MISSION DIRECTOR
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