

## Strategies for establishing cool chain infrastructure, IQF & concentrate plant in Kumaon division of Uttarakhand

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**ABSTRACT :** Uttarakhand is blessed with varied agro climatic regions (temperate as well as tropical), which gets further strengthened by its differing geographical and topographical conditions. These attributes make Uttarakhand most acquiescent destination for production of a good number and variety of Horticulture (Fruits & Vegetables) and Agricultural crops (though horticulture is a subset of agriculture, but same has been separately mentioned for laying emphasis). The additional advantage that Uttarakhand enjoys over other hill states viz., Himachal Pradesh, Jammu & Kashmir etc, is that here temperate fruits mature three weeks earlier than the states mentioned. Still the farmers of Uttarakhand, despite of growing various commercial fruits and vegetables, have not succeeded in getting good or deserving prices for their produce. Only 30 per cent of the price paid by end consumer is being received by the farmer. The reasons, identified by the study, as responsible for such situation are the existing gap between required level of infrastructure and the present level of same; indirect access to market (i.e., excessive dependence on middle men); less than requisite awareness about, crop specific post harvest, measures to be followed to reduce wastage and preserving quality of produce etc. The government realizing this fact has initiated several policy measures to boost the establishment of food processing industries in Uttarakhand. The present study focuses on the strategies required for setting up or creating cool chain infrastructures, individual quick freezing (IQF) and concentrate plant so that the farmers could get better access to market as well as price. While at the same time entrepreneurs investing their fortune should also have a continued access to quality raw material. The location identified for establishment of cool chain infrastructure as a resultant of study, in Kumaon are Haldwani (Golapaar), Rudrapur, Kaladungi, and Chafi. All these locations are within 30 Kms radius from Haldwani Mandi, the largest mandi of fruits and vegetable is Kumaon division.

**Key words:** Cool Chain Infra-structure, Individual Quick Freezing (IQF), Concentrate Plant, Horticulture Crops.

The economic reforms, though got initiated in India in 1980s from historical view point, but in real sense, they ushered a new era in Indian economy in 1991. The fact being that neo – liberal policies were framed and adopted by the Indian government under regime of the then Prime Minister Shri P. V. Narsimha Rao who had Dr. Manmohan Singh as Finance Minister in his cabinet and the year was 1991 (Ashok *et al*, 2008). Policies and phenomenon of economic liberalization, by 2009, have already rescued about 300 million people (Ali *et al*, 2008) out of extreme poverty. In this journey towards prosperity, year 2007 turned into a milestone, as this year witnessed the highest ever GDP growth rate of 9 per cent recorded by Indian economy (Acharya *et al*, 2008).

Rapid industrialization, agriculture and allied activities have been the engines and pivot of this phenomenal growth (Chauhan *et al*, 2013). Agriculture and allied activities still contribute approximately 18 per cent to GDP besides providing employment to near 50 per cent of the available workforce (Ali *et al*, 2008). India is

the largest producer of fruits and second largest producer of vegetables in the world contributing 10.23 per cent and 14.45 per cent respectively of the total fruits and vegetables production of world (Bandookwala *et al*, 2013).

### MATERIALS AND METHODS

Sampling method adopted for selecting the districts in Kumaon Division for the purpose of the study was (a) a list of all the districts of Uttarakhand comprising Kumaon Division (arranged alphabetically); (b) a random number table was generated with the help of RAND () function provided in MS – Excel Software in one worksheet; (c) first two districts as per random number list were selected to be used as sample area for study (Deolia *et al*, 2009). The process resulted in two districts namely Nainital and Udham Singh Nagar as sample to represent the universe, which is about 33.5 per cent of the universe, i.e., two out of six.

The sampling units for achieving the objectives comprised farmers, government officials and processing unit owners. Convenient at random sampling method was adopted for selecting farmers; whereas for identifying processing unit owners snowball method was applied. The selecting sample of government officials, since being limited in number, an attempt was made to go for census but due to few of them being on leave or outstations on duty made it possible to cover only sixty per cent of them. Final sample size rested as Farmers 60 in numbers (30 from each district) and ten processing unit owners.

The data was collected with the help of structured questionnaires, which had both close and open ended questions. Majority of questions were closed ended and open ended questions turned insignificant in proportion of questionnaire when contrasted with close ended questions. Further analysis was attempted and depicted with graphs, charts, percentage etc.

## RESULTS AND DISCUSSION

Under this section, the findings of the study with respect to different objectives of the study are presented.

### *Availability of fruits and vegetables in Kumaon region, Uttarakhand*

Uttarakhand is a State which comprises of varied agro climatic zones that vary from subtropical to high altitude cold deserts. This varied agro climatic conditions provide Uttarakhand a comparative advantage over other states in growing various subtropical and temperate fruits (Chouhan *et al*, 2013).

### *Classification of state according to various agro-climatic conditions*

Uttarakhand comprises of 13 districts VIZ. Dehradun, Uttarkashi, Nainital, Almora, Pithoragarh, U.S. Nagar, Haridwar, Champawat, Pauri, Tehri, Rudra Prayag, Chamoli and Bageshwar. Climate of the state varies according to the elevation. Table 1 illustrates the four agro-climatic sub-regions and their features. Because of the climatic advantage, farmers are able to raise and harvest some of the fruits and vegetables twice a year.

### *Fruits Availability time in Uttarakhand*

Only March and October are only two seasons when there is no availability of fruits in Uttarakhand. December, January and June are the three months where 3 or more than 3 fruits are available in large quantities. November is the only month with no availability of vegetables. March, April, May and October are the lean months in terms of availability of vegetables.

### *Seasonal details of crops according to month these produce are available In Nainital district, Uttarakhand*

January, February, March and April are four months when there are no fruits and vegetables available in Nainital district, Uttarakhand. In the month of May only pea is available from this district in the market. From the month of June various fruits start coming to the market from this district like plum, apricot, bean, etc. Apple and pear are available in the market from this district from July onwards till September (Esham *et al*, 2010).

Table 2 and Table 3 show the district wise production

**Table 1: Agro-climatic sub-regions and their features in Uttarakhand**

Valley	(Up to 1000 meters)	Plain/ tarai area and valleys between Shivalik hills and other hills	Paddy, wheat, maize, sugarcane, soyabean oilseed and pulses. Fruits include mango, leechi, papaya and guava.	U.S. Nagar, Haridwar and parts of Dehradun district fall under this zone.
Low Hills	1000 to 1500 meters	is un-irrigated	Wheat and pulses are generally grown. This area is also suited for pears, apricot and other stone fruits. Vegetables	Dehradun, Nainital, Pauri-Garhwal districts and Tehri-garhwal.
High Hills	1500 to 2500 meters		Kharif crops Apple, off-season vegetables such as tomatoes, peas and cauliflowers, cabbage and hill capsicum	Uttarkashi, Nainital, Rudraprayag, Pauri-Garhwal, Bageshwar, Champawat, Almora and parts of Chamoli districts
Alpine Zones	Above 2500 meters	agriculture is not practiced here. Only pastures are available which are suited for raising sheep and goats.	medicinal plants and herbs	Uttarkashi, Pithoragarh and Chamoli districts.

**Table 2: District wise Production under different Fruits in Kumaon region, Uttarakhand (Year: 2008-09)**

District	Apple	Pear	Peach	Plum	Apricot	Walnut	Citrus Spp.	Mango	Litchi	Others
Nainital	28489	16881	11003	3880	2330	580	7400	15124	2911	2160
U.S.Nagar	0	676	0	0	0	0	1284	23110	1590	6238
Almora	14150	35023	20497	20538	17837	8374	33312	23265	70	1624
Bageshwar	75	7075	680	180	80	300	4050	2490	0	26335
Pithoragarh	1802	8286	3308	1844	1190	599	15475	2801	399	1278
Champawat	740	3682	1453	1292	796	171	5000	2683	651	3563

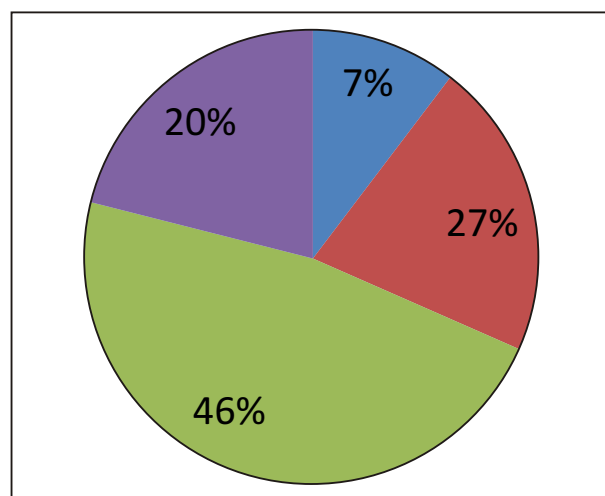
**Table 3: District wise Production under different Vegetables (Year: 2008-09)**

District	Pea	Radish	French Bean	Cabbage	Cauliflower	Onion	Capsicum	Lady's Finger	Tomato	Brinjal	Others
Nainital	10481	5965	2840	14448	1252	892	932	2592	19987	2675	16563
U.S.Nagar	12685	2979	294	6177	4624	3255	594	4830	13413	5615	6755
Almora	3366	15524	4401	3408	2296	1480	1191	1351	4820	922	3479
Bageshwar	790	2500	550	700	300	950	200	235	520	415	4010
Pithoragarh	5295	8160	6479	5280	1626	5034	3865	3081	5599	1022	4830
Champawat	1385	2292	1476	3882	508	758	794	965	7954	2110	4595

of different fruits and vegetables in Kumaon region, Uttarakhand in the year 2008-09. According to Table 2, Nainital district ranked first in the production of apple and litchi while Almora district ranked first in the production of peach, pear, plum, apricot, walnut, citrus spp. etc. According to Table 2, U.S. Nagar district ranked first in the production of peas, brinjal, cauliflower and ladyfinger while Pithoragarh district ranked first in the production of french bean, onion and capsicum. Nainital district was highest in the production of cabbage and tomato. Almora has highest production of reddish in comparison to other districts (Gandhi *et al.*, 2011).

***Post harvest measures adopted, constraints faced in post harvest management and marketing of fruits and vegetables by farmers in Kumaon region, Uttarakhand***

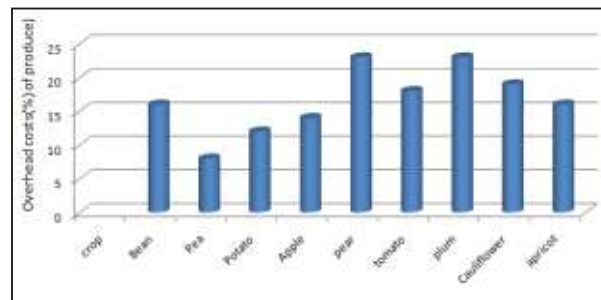
Socio-economic profile of farmers

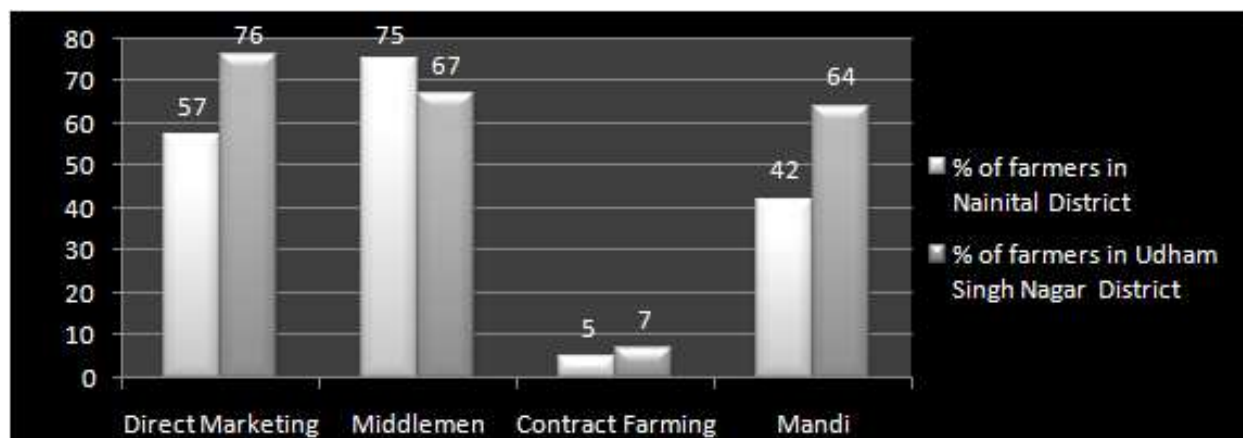


Maximum number of farmers among surveyed are primary educated i.e. 46% followed by farmers who are uneducated i.e. 27%. 20 % of them are senior secondary pass. Only, 7% of farmers are graduate or above (Gulati *et al.*, 2008). The education level has direct or indirect effect on the motivation level of farmers towards improved agricultural practices. The farmers who are graduate and above, following improved agricultural practices on their farm and orchard and are able to fetch good prices for their produce. Also, they are using the name "Organic" in marketing their produce in NCR and Bombay market. Also, they are not exploited by middleman in the mandis. Whereas the farmers who are primary pass or uneducated are highly exploited by middleman in the mandis despite having good quality agriculture produce. The farmers who are senior secondary or graduate are mostly large farmers (Kalamkar, *et al.*, 2011).

***Cost Analysis (Including all overheads in % paid by farmer while marketing their produce through middleman at Haldwani mandi)***

The percentage overhead costs deducted from farmers produce. At Haldwani mandi, most of the





produce does not fetch good prices and also, farmer suffer from huge overhead costs e.g. transportation charges, agent fees, bar-dana, service charges, labour charges, postage etc which decrease their income (Joshi *et al*, 2010). Marketing of Fruits and Vegetables by different farmers in Nainital and Udham Singh Nagar district, Uttarakhand

Around 83% of the farmers are marketing their fruits and vegetables in Nainital district through middleman i.e. arhatias while 70% farmers are marketing their produce mainly fruits like guava, mango and litchi through middleman. This may be due to the fact that farmers in the Udham Singh Nagar are well connected with the mandis, hotels, processing units etc. Also, they do not have face any transportation problem while some farmers in the Nainital district do have transportation problem as their villages are not well connected with roads (Singh *et al*, 2009).

#### ***Post harvest measures adopted by farmers to improve quality of production in Nainital and U.S. Nagar District***

As far as post harvest management adopted by farmers in both the district are concerned, among surveyed farmers no farmer is following any post harvest

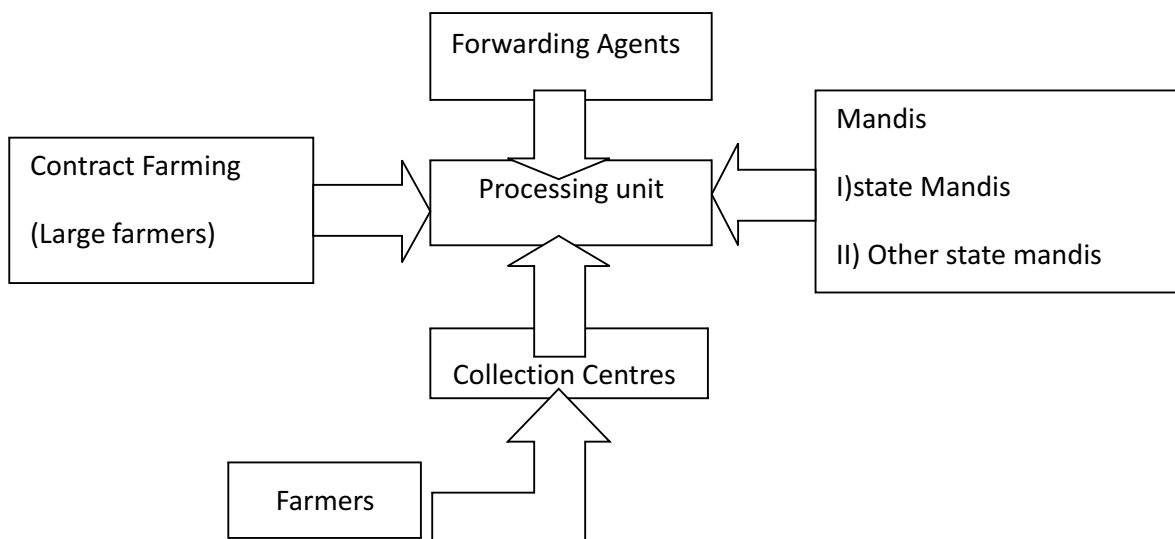
method. The various reasons cited by farmers in Nainital district are as follows: All the farmers were of the opinion that they do not have knowledge of post harvest measures nor they were informed about these measures by the government extension agencies (Reddy *et al*, 2013). They were of the opinion if the government or any other private extension agencies inform them, they cannot follow it because of lack of money. 95% farmers commonly shared this opinion. 90% farmers were of the opinion that they are totally dependent on agriculture for income, so, they grow vegetables and fruits and immediately after harvest sell it to the arhatias which provide them with prompt cash. Around 93% farmers said they do not have any knowledge of potential market, so, they sell immediately after harvesting otherwise they can learn the post harvest measures and treat the produce and take the price advantage (Mittal *et al*, 2007).

#### ***Study of different Food Processing Units including IQF and Concentrate plant in terms of procurement of fruits and vegetables during on and off season***

At present in Nainital district, 35 registered food processing units with different production capacities are running. For the purpose of the study, some of the food processing owners (10 in number) dealing in

**Table 4: Opinion of farmers in Nainital and Udham Singh Nagar district regarding post harvest management**

S.No.	Particular	Opinion of farmers in Nainital District	Opinion of farmers in U.S. Nagar District
1	Lack of knowledge of post harvest measures	57	55
2	Lack of money to follow post harvest measures	76	72
3	Agriculture is only source of revenue	87	81
4	Lack of storage facility	78	70
5	Lack of knowledge of potential market	67	64
6	Lack of knowledge of actual market prices	56	52
7	Not able to get good prices of produce	92	87



**Fig 1:** Raw Material Procurement Model for processing unit.

Concentrate(6) and IQF(4) were surveyed regarding food processing plants (Raddy *et al*, 2013).

All of the food processing owners and managers of the processing units were of the common opinion that the food processing industry has immense potential to grow in the near future as people from around the country as well as other parts of the world are ready to try different kinds of processed food products. With the technology advancement the fruits and vegetables can be made available for consumption in off season at remunerative prices. None of the food processing unit either Concentrate or IQF was involved in contract farming with the farmers. For the raw material requirement, they were dependent on mandis. Some of the plants Like Mother Dairy, Jindal Frozen Foods were involved in direct purchase of raw material from the farmers as per their requirement. The food processing units located in the Tarai region didn't have any problem in raw material procurement as most of them are located near to mandis while some of the plants located in hill region have been facing following problem like raw material procurement. They are procuring raw material from the mandis which is available at their door steps which increases their cost of production due to transportation inspite of providing them comparative advantage to other food processing units operating in the tarai region. Every processing unit have problem in packaging material as they are procuring it from Delhi (Kachru *et al*, 2010).

Some of the government officials from State Horticulture Department were also interviewed. They

were of the opinion that the home scale and cottage scale food processing units are suitable for the hill region due to raw material availability and location. They were of the opinion that large scale processing units should be located in the plain region which are well connected to metro cities by road and rail and have accessibility to the local mandis and also, to electricity. The rationale behind this is peak season availability of fruits and vegetables in the hill region is only five months and in case of adverse weather the road connectivity is also one of the major problem.

#### ***Preferred locations***

The sites will be at equal distance from Haldwani and Kashipur mandi and they will be well-connected with the town through an all-weather pucca road. There are numbers of small and medium industries around the periphery of the sites as the location at some places are declared as approved Industrial area by Govt. of Uttarakhand.

#### ***Accessibility***

Proposed sites are having almost equal distance from Delhi. They are well connected with Delhi through road and railway stations. They are also well-connected with other cities such as Moradabad, Pantnagar, Bareilly and Lucknow. The locations can provides an easy accessibility for the unit to Delhi facilitating export as well as supply to domestic market.

### **Infrastructure**

Locations are well-endowed with water and power. Uttarakhand being a power surplus state, availability of uninterrupted power is also not an issue. Power tariffs in Uttarakhand are also amongst the lowest in the country. Direct power supply provided by State Govt. at the rate of Rs 2.5/unit.

### **Industrial climate**

Uttarakhand is home to a number of temperate fruits and off season vegetables and have some small food processing units in the area. Availability of skilled and semi-skilled labour for these is not an issue with a number of industrial training centers being present in the vicinity. State Govt. is also providing number of incentives for establishing new industrial units.

### **Raw Material Availability**

The conducive agro climatic conditions of the adjoining temperate zone in hills and sub tropical/tropical zone of Tarai area would help the unit in procuring all types of fruits and vegetables such as Green peas, Okra, Green Beans, Carrot, Cauliflower, Broccoli, Bell pepper, Sweet Corn, Baby Corn, leafy vegetables and fruits such as Litchi, Papaya, Mango, Peaches, Apricots, Plums and Apples.

### **Package and policies launched by Ministry of Food Processing Industries, Government of India in respect to establishment of Cool Chain Infrastructure**

The Ministry of Food Processing Industries is the main central agency of the Government responsible for developing a strong and vibrant food processing sector; with a view to create increased job opportunities in rural areas, enable the farmers to reap benefit from modern technology, create surplus for exports and stimulating demand for processed food.

Since liberalization several policy measures have been taken with regard to regulation & control, fiscal policy, export & import, taxation, exchange & interest rate control, export promotion and incentives to high priority industries. Food processing and agro industries have been accorded high priority with a number of important relieves and incentives. Some of the important policy changes are as follows:

### **Regulation & Control**

- No industrial license is required for almost all of the

food & agro processing industries except for some items like: beer, potable alcohol & wines, cane sugar, hydrogenated animal fats & oils etc. and items reserved for exclusive manufacture in the small scale sector. Items reserved for S.S.I. include pickles & chutneys, bread, confectionery (excluding chocolate, toffees and chewing-gum etc.), rapeseed, mustard, sesame & groundnut oils (except solvent extracted), ground and processed spices other than spice oil and olio resins, sweetened cashew nut products, tapioca sago and tapioca flour (Dhillon *et al*, 2006).

- Automatic investment approval (including foreign technology agreements within specified norms) up to 51% foreign equity or 100% NRI (including Overseas Corporate Bodies (OCBs)) equity is allowed for most of food processing sector, except malted food, alcoholic beverages including beer and those reserved for S.S.I. For some industries dividend balancing with net foreign exchange earnings is necessary for automatic clearance (Gulati, *et al*, 2008).
- Upto a maximum of 24% foreign equity is allowed in SSI sector.
- Use of foreign brand names is now freely permitted.
- MRTP (Monopolies & Restrictive Trade Practices Act) rules and FERA (Foreign Exchange Regulation Act) regulations have been relaxed to encourage investment and expansion by large corporate (Mittal *et al*, 2008).
- Most of the items can be freely imported and exported except for items in the negative lists for imports & exports. Capital goods are also freely importable.

### **Fiscal Policy & Taxation**

- Wide ranging fiscal policy changes have been introduced progressively. Excise & Import duty rates have been reduced substantially. Many processed food items are totally exempt from excise duty.
- Custom duty rates have been substantially reduced on plant & equipments, as well as on raw materials and intermediates, especially for export production.
- Corporate taxes have been reduced and there is a shift towards market related interest rates. There are tax incentives for new manufacturing units for certain years, except for industries like: beer, wine, aerated water using flavouring concentrates, confectionery & chocolates etc.

- Indian currency (rupee) is now fully convertible on current account and convertibility on capital account with unified exchange rate mechanism is foreseen in coming years.
- Repatriation of profits is freely permitted in many industries except for some, where there is an additional requirement of balancing the dividend payments through export earnings.

### ***Export Promotion***

- Food processing industry is one of the thrust areas identified for exports. Free trade zones (FTZ) and export processing zones (EPZ) have been set up with all infrastructure. Also, setting up of 100% Export oriented units (EOU) is encouraged in other areas. They may import free of duty all types of goods, including capital goods (Sindhu *et al*, 2011).
- Capital goods, including spares upto 20% of the CIF value of the Capital goods may be imported at a concessional rate of Customs duty subject to certain export obligations under the EPCG scheme. Export linked duty free imports are also allowed.
- Units in EPZ/FTZ and 100% Export oriented units can retain 50% of foreign exchange receipts in foreign currency accounts.
- 50% of the production of EPZ/FTZ and 100% EOU units are saleable in domestic tariff area.
- All profits from export sales are completely free from corporate taxes. Profits from such exports are also exempt from Minimum Alternate Tax (MAT).

### ***Schemes by Government of India***

As per the discussion with Government officials, two government schemes are running in Uttarakhand which supports the entrepreneurs in establishment of Food Processing Plant. The schemes are as follows:

1. Horticulture Technology Mission, Mini Mission - IV
2. Small Farmers Agri-Business Consortium

#### ***Horticulture Technology Mission, Mini Mission - IV***

Under this scheme, Horticulture based Food Processing Units establishment, up gradation/modernization of established units is included. The funds for the scheme are provided by Ministry of Food Processing Industries, Government of India. The details for the scheme are shown in annexure-I.

1. The government will bear 50% of expense on civil

work and plant machinery, the maximum limit of which is Rs 400 lakh on the establishment of Horticulture based processing unit.

2. The government will bear 50% of expense on civil work and plant machinery, the maximum limit of which is Rs 100 lakh on the upgradation/modernization of established Horticulture based processing unit.

### ***Small Farmers Agri-Business Consortium***

1. Assist Entrepreneurs to make investments in setting up agri-business projects through **Venture Capital participation.**
2. Encourage Producer Groups/Organizations to establish suitable agro-based projects by assisting them in formulation of commercially viable projects through **Project Development Facility.**
3. Venture Capital assistance will be provided to projects that meet the following criteria:
  - i) Dependent upon agriculture or allied produce
  - ii) Provide assured market to producers
  - iii) Encourage farmers to diversify to high value crops
  - iv) Accepted by banks for grant of project term loan after satisfactory techno-commercial feasibility
4. The amount of Venture Capital that SFAC will ordinarily provide to Qualifying Projects shall be the lowest of any of the following:
  - i) 10% of the total project cost assessed by Lending Banks
  - ii) 26% of the project equity
  - iii) Rs. 75 lakhs

Higher Venture Capital assistance can be provided to deserving projects on merit and/or to projects that are located in remote and backward areas, North-Eastern and hilly states and projects promoted by State/State SFACs.

### **CONCLUSION**

Strategies required for setting up or creating cool chain infrastructures, individual quick freezing (IQF) and concentrate plant so that the farmers could get better access to market as well as price. While at the same time entrepreneurs investing their fortune should also have a continued access to quality raw material. Finally, the agricultural marketing should be integrated with the existing agricultural extension services to transfer the post harvest management techniques along with production techniques on regular basis to fruits and

vegetables growers. If these issues are properly looked into not only the production and profitability level of fruits and vegetables growers will increase, the post harvest losses and marketing cost will substantially reduced. If small and medium farmers deliver the produce in group it can be reliable source for processing firm.

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