

Punjab Horticultural Postharvest Technology Centre Punjab Agricultural University, Ludhiana

PHPTC Newsletter

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About Us

Punjab Horticultural Postharvest Technology Centre was established in October 1998, at Punjab Agricultural University Campus, Ludhiana. It came into existence with the signing of MOU between Punjab Government, Punjab Agricultural University, USAID-ACE Project and University of California Davis.

Mission

"To be a leader in the collaborative efforts of Government, Universities and the Private Sector to build and strengthen linkages between post-harvest professionals and horticulture sector in India".

Mandate

- To conduct applied need based research and develop appropriate postharvest technologies.
- To conduct training courses on postharvest handling for farmers, marketers etc.
- To assist the domestic horticulture industry to achieve international standards and to set a bench mark for quality produce in India.
- To provide laboratory services for trade and industry (pesticides residues, heavy metals and other quality parameters).

Importance of Postharvest Technology

Postharvest technology plays an important role not only in minimizing the postharvest losses but also maintains the quality and regulates the marketing of horticultural produce. Importance of post-harvest technology lies in the fact that it has the capability to meet food requirement of growing population by eliminating losses from farm to consumers. The farmer whose role has been reduced to producer can be transformed into producer cum processor and thus getting more dividends for hard labour, input, kind of risk taken and generating resource for socio-economic advancement keeping pace with the modern times. The use of some of the techniques like sorting, grading, packaging and storage leads to value addition of horticultural crops and income generation.

Status of Postharvest and Cold Chain Infrastructure in Punjab

1. **Cold Stores:** There are 562 cold storage with total capacity of 19.63 lakh MT, which are mostly used for storage of potato. However, under MIDH the following postharvest infrastructure has been created.

Sr. No.	Name of activity	No. of units Established
1.	Cold Store	141 (5.70 lakh MT)
2.	Packhouse	515
3.	Ripening Chambers	11 (800 MT)
4.	Minimal Processing Unit	5
5.	Pre Cooling Units	4
6.	Low Cost Preservation Unit	8
7.	Reefer Van	1



Ripening chambers and cold storages at fruit and vegetable market, Ludhiana

2. **Mechanical washing, waxing and grading lines:** At present, there are five mechanical washing, grading and waxing plants established by Punjab Agro Industries Corporation (PAIC). These washing and waxing plants are established at Chhauni Kalan and Kang Mai in Hoshiarpur district, Abohar, Jattan Tahliwala in Ferozepur district and Badal in Muktsar district. Besides, many progressive growers (more than 100 nos.) have also installed such facilities privately at their own farms.



Kinnow washing, grading and waxing lines established By PAIC at Hoshiarpur and Ferozepur

3. **Processing plants:** The Punjab Government has established two pilot scale processing units for processing of Kinnow juice and other fruits & vegetables at Hoshiarpur and Abohar.



Fruit and Vegetable Processing Unit, Hoshiarpur and Abohar

4. **Fruit Estates:** In order to boost the production and marketing of major fruits, Punjab Government has established five citrus estates in Hoshiarpur, Ferozepur, Fazilka and Muktsar districts, one litchi estate at Pathankot and one pear estate at Amritsar.

5. **Centre of excellence:** Three centres of excellence each for vegetables, fruits and potato has been established at Kartarpur (Jalandhar), Khanaura (Hoshiarpur) and Dhogri (Jalandhar), respectively. One centre of excellence for flowers has been proposed at Doraha (Ludhiana).



Two center of excellence of fruits and vegetables with state of art production and postharvest infrastructure established at Hoshiarpur and Kartarpur

6. **High-tech pack houses:** Five pack houses with cold storage and grading/sorting lines have been established by PAGREXCO at Mushkabad (Ludhiana), Saholi and Lalgah (Patiala), Kangmai (Hoshiarpur) and Babri (Gurdaspur).



7. **Self-help groups:** At present few cooperative societies like FAPRO (Hoshiarpur), Unati (Talwara), KAFRO (Ramgarh Sikri) etc. are proving role model for development of rural entrepreneurs and income as well as employment generation.



Role of PHPTC in the Development of Postharvest Infrastructure in Punjab

- The centre provided technical consultancy to the Punjab Mandi Board for establishment of modern postharvest and cold chain infrastructure at different fruits and vegetables markets of Punjab, Citrus Estates, Centre of Excellence for fruits and vegetables etc.
- Guidance to farmers, traders, marketers and entrepreneurs for setting up postharvest and cold chain infrastructure.
- Know-how to farmers for marketing of Kinnow from Punjab to distant and export markets.

Postharvest Handling of Kinnow Fruits for Export Marketing

1. Introduction : The area under Kinnow is increasing at faster rate due to its wide range of adaptability, attractive fruit colour, high juice content and good shipping quality for distant transportation. These quality traits have also made Kinnow suitable for export. Kinnow is in high demand not only in Indian markets stretching from Delhi to Kolkatta, Hyderabad, Bangalore and Chennai but also in Sri Lanka, Thailand and some middle east countries.

2. Harvesting: Kinnow fruit should be harvested when it attains proper size, peel colour, and internal quality. Kinnow fruits with TSS/acidity ratio of 12:1 to 14:1 are preferred, but this ideal ratio prevails only for a month under Punjab conditions. The best period for harvesting of Kinnow fruit is from mid January to mid February. As the Kinnow fruits are harvested when fully ripe, tender care during all the handling operations maintain its quality. The fruits should be cut with clippers, close to the peel of the fruits retaining shortest stalk and green button. All necessary precautions should be taken to prevent injuries, any contamination or cross contamination of the product after picking.

3. Waxing: World over, citrus fruits are waxed with edible coating. During mechanical sorting and washing, brushes removes natural waxes from the peel surface, leading to

faster rate of water loss and shriveling and these natural waxes are replaced with coatings, primarily of plant origin. The coatings, primarily based on Shellac, Carnauba and Bees wax have been approved by Food Safety and Standard Authority of India (FSSAI). Use only those waxes, which are safe and approved by CODEX and regulatory authorities. The wax coating helps in checking the water loss from fruit surface, thereby preventing the aging of fruits during transportation and marketing. It also imparts fresh glossy appearance, which enhances the market value. The waxing of fruits can be done either mechanically (spray brush or spray nozzle type application) or manually (with foam pad, mist spray or dip method). After waxing, the fruits are again dried at temperature of 35°C. The washing and waxing should preferably be done before fruits are sent to market.

4. Grading: For getting premium price and assuring quality to consumers, the fruits are graded for different sizes. The various grades recommended for Kinnow fruits by APEDA are as under: -

Size range (mm dia)	No of fruits in 10 Kg pack
a 60-64	84
b 65-69	72
c 70-72	60
d 72-74	54
e 75-79	51
f 80-85	45
g* 50-60	96
h* 45-50	120

* Only for domestic market

5. Packaging: The fruits should be packed in corrugated fibre board boxes, having 10 kg capacity. Usually 2 pieces, telescopic, CFB boxes of 3 to 5 ply with waterproof coating to tolerate high humidity during shipment are preferred. Normally a box of size 45 cm x 24 cm x 18 cm having 10 kg capacity is very common and acceptable for export marketing. The box must have 5% area punched as holes for ventilation. A divider having ventilation holes is inserted in between layers, which will act as cushioning material. It has been seen that 10 Kg boxes containing 42-54 Kinnows fetch maximum price in markets. During retail marketing, Kinnow fruits can be sold after wrapping with shrink film in paper moulded tray containing four to six pieces.

6. Precooling: The fruits should be pre-cooled at 6-8°C and 90-95% RH in order to avoid postharvest losses in distant transportation. Forced air-cooling method has been most suitable for Kinnow fruits. The circulation of forced air should be ensured for adequate cooling of produce by proper alignment of side holes of the boxes. The produce should be kept in pre-cooling chamber for a period of around 6-8 hours or until the temperature at the centre of box reaches 8°C. The temperature should not fall below 5°C, otherwise it will results in chilling injury.

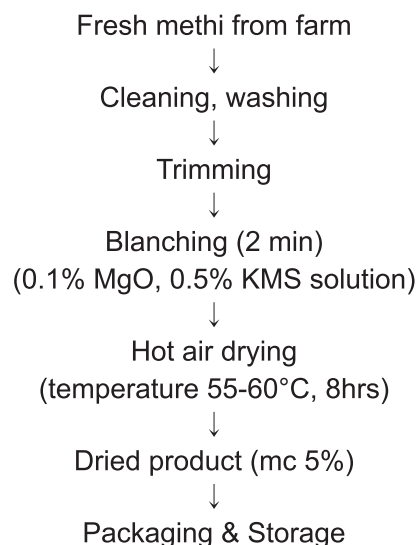
7. Transportation: Loading in trucks/containers should be done in such a way that there is proper air movement. The corrugated boxes should be gently and properly stacked to avoid vibration, bouncing and load shifting. The temperature inside the refrigerated van should be monitored to 6-8°C during entire transit period.

8. Storage: The fruits should be stored in cold store at 5-6°C and 90-95% RH. It must be ensured that temperature of the cold store should not fall below 5°C otherwise it can result into chilling injury. Unbruised and mature Kinnows can be stored up to 45 days at 5-6°C and 90-95% RH with acceptable quality.

9. Marketing: India itself is a huge market and potential for fresh Kinnow in different Indian markets needs to be explored. Many agencies like APEDA and Punjab Agro Industrial Corporation (PAIC) are promoting and facilitating distant marketing of Kinnow. The desirous farmers should contact these agencies and Deptt of Horticulture of Punjab and PHPTC, PAU, Ludhiana for help and guidance. The farmers are advised to make their own association for marketing their quality produce by creating the postharvest infrastructures. It will help in minimizing their exploitation in the hands of traders. Various schemes are available for creation of postharvest infrastructure under National Horticulture Mission programme. The farmers and traders can contact or visit the offices of Punjab State Department of Horticulture at block or district level for further information and guidance.

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Technology for Preparation of Dried Methi



Message from Chairman

Dr. Nirmaljeet Singh Kalsi, IAS

Additional Chief Secretary (Development), Punjab

The improvement in economic growth and changes in dietary habits of people have made both the production and consumption of fruit and vegetables increasingly important. The horticulture sector has, thus, gained an immense focus in the recent years and has played a vital role in income enhancement, poverty alleviation, food & nutritional security. However, horticultural crops are highly perishable and are bound to spoil within short period of time after harvest, if not handled/cared properly. Post-harvest losses during the supply chain are the major challenge which affects the overall economic well-being of farmers and communities through reduced income. Some estimates suggest that about 25-30% of fruits and vegetables are lost or abandoned after leaving the farm gate. Obviously the importance of postharvest technology is being felt to meet this ever growing challenge. In order to push diversification in agriculture sector, Punjab must focus on research and extension services on post-harvest management, value addition and marketing of horticultural crops. Punjab Horticultural Postharvest Technology Centre was established in 1998 to undertake training and applied research in the area of post-harvest technology of horticultural crops. I am delighted to learn that PHPTC is going to launch first issue of News Letter. The goal of this newsletter is to update the farmers and entrepreneurs with latest techniques on postharvest management, marketing and value addition of horticultural crops. I look forward for the success of this Newsletter and welcome the feedback and ideas of the farmers and other stakeholders.

Message from Vice Chairman

Dr. Baldev Singh Dhillon, Vice-Chancellor, PAU

Horticulture has been identified as an important sector for diversification of agriculture to ensure a faster and sustainable agricultural development in Punjab. The lack of awareness about postharvest handling practices and non-availability of adequate postharvest infrastructure, a huge quantity of valuable produce goes waste. Keeping in view the challenges of postharvest losses and global competition for export of fruits and vegetables, there is an urgent need to focus on formulating research programmes in the direction of postharvest handling, packaging and storage of fresh horticultural produce.

Punjab Horticultural Postharvest Technology Centre is a blend of five departments of Punjab Agricultural University namely Fruit Science, Vegetable Science, Food Science & Technology, Processing & Food Engineering and Chemistry. The various technologies developed by PHPTC such as ripening of banana, packaging and storage of Kinnow, pear, plum, peach, ber, potato, tomato, capsicum, cabbage etc have been included in *Package of Practices for Fruit and Vegetable Crops* published by Punjab Agricultural University Ludhiana for commercial adoption by farmers and aspiring entrepreneurs. I wish all the best for the launch of this Newsletter and hope, PHPTC will generate practical ideas on postharvest management and value addition of horticultural crops for the benefit of farmers.

Message from Managing Director, PAGREXCO

Kahan Singh Pannu, IAS

The PAGREXCO is dedicatedly promoting export of fruits and vegetables outside the country and also to the distant markets within the country in order to help the farmers realize better returns for their produce. The increased area and production under horticultural crops may put Punjab in a stronger position in terms of horticultural exports. PHPTC has been continuously working for the welfare of fruit & vegetable growers of Punjab through its technology development and training programmes. Recent efforts of PHPTC in the development of protocol for de-greening of Kinnow are well appreciated. With the success of this technology the PAGREXCO exported de-greened Kinnow to Bangladesh. PHPTC also provided technical know-how to farmers for pre-cooling, storage and transportation of Kinnow fruits to export markets of Russia, Ukraine and Middle East countries under cold chain system. Such interventions will surely help in reducing the postharvest losses of fruits and vegetables. I wish all the best for the success of this News Letter and hope PHPTC would strive hard to develop protocols for export and distant marketing of perishables.

Message from Secretary Punjab Mandi Board

Parminder Singh Gill, IAS

The PSAMB started "farmers market" in 1987 with a view to give boost to the small farmers around cities so as to provide direct access to the consumers by eliminating the middlemen. It is also known as the "Apni Mandi" because it belongs to both the farmers and the consumers who can mutually help each other. PHPTC has been providing hands-on-training to *Apni mandi* farmers of Punjab since its inception. In addition to this, PHPTC also provided technical support to Punjab Mandi Board in establishment of postharvest and cold chain infrastructure in 12 fruit and vegetable markets of Punjab. The standardization of health safe ripening technique for banana and establishment of commercial ripening chambers and adoption of technology by traders in Punjab is a success story of PHPTC. I wish all the best for the launch of this News Letter and hope that PHPTC would endeavor to generate farmer friendly technologies especially for prevention of postharvest losses of fruits and vegetables.

Message from Director of Horticulture, Punjab

Dr. Gurkanwal Singh

Horticultural crops typically have a high moisture content, tender texture, high perishability and deteriorate rapidly. Losses during post-harvest operations are enormous and the matter of great concern. State horticulture department is working tirelessly for the progress of this sector and farmers through various schemes of National Horticulture Mission (NHM) operational in the Punjab State. PHPTC is acting as a nodal agency to guide farmers and entrepreneurs for establishment of cold chain infrastructure. The state-of-the-art postharvest units at Citrus Estates & Centre of excellence for fruits, vegetables, potato and flowers are being established with the technical assistance of PHPTC. I wish all the best for the launch of this news letter and hope PHPTC would develop a road map for establishment of cold chain connecting farms to markets so that issues of glut and postharvest losses of perishables are adequately managed.