

## Acknowledgement

This study report is submitted for the partial fulfillment of the BSc. Agriculture Third Semester, Final Practical examination of the course titled **Fruit and Plantation Crop Production** i.e., HRT 203. Practical field visit to **Temperate Horticulture Nursery Center**, Daman and **Center Horticulture Center**, Kirtipur was conducted with the broad objective to study the behavior of temperate fruits and to learn the ongoing researches and the horticultural practices that are currently being carried out in order to improve the production.

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B.Sc.Ag III<sup>rd</sup> Semester

Agriculture and Forestry University

## INTRODUCTION

### Temperate Horticulture Nursery Center, Daman, Makawanpur

Temperate Horticulture Nursery Center “शितोष्ण वागवानी नर्सरी केन्द्र” was established in 2019 B.S with the joint collaboration between the Government of Nepal and the Government of India. It is situated in Daman V.D.C ward no. 7, Makawanpur district, Narayani zone. It was established as Orchard cum Nursery at the time of establishment.

After establishment production of vegetable seeds and seedlings was started. Shortly after 2022/2023 rootstock development began and from 2025 onwards importing the various seedlings from India and carrying research in local condition was done. At present the center produces and distributes various seedlings, off seasonal vegetables, potato and vegetable seeds and saplings of Apple, Pear, Peach, Walnut, Plum, Kiwi and Strawberry. Potato Production was stopped from 2033/34 due to the incidence of brown rot disease which again started from 2042/43. Because of the timely change in structure and organization of different divisions under Ministry of Agriculture Development this Center has also attained different names in different dates of timeline; Horticulture Farm Daman in 2029, Horticulture Center Daman in 2052 and Temperate Horticulture Nursery Center from 2061 onwards. The major objectives of this center are:

- Production and distribution of cool season saplings.
- Production and distribution of vegetable seeds.
- Working for Fruit Germplasm Collection and conservation.
- Providing technical support to the Farmers within the command area.
- Organizing different trainings related to vegetables and fruits.
- Monitoring and Evaluation of private nurseries and gardens and providing them technical support.
- Acting on issues related to nursery and orchard management.

### Fruit Development Directorate, Kritipur

Fruit Development Directorate (FDD) was first established as Horticulture Section in 1955, which evolved as Fruit Development Section in 1966, Fruit Development Division in 1990 and the directorate

in 2000. FDD is the central technical body responsible for the overall development of fruits, coffee, tea and ornamental crops in the country.

The major objectives are:

- Enhance income level of farmers by improving farm level production and productivity of the crops through development and dissemination of improved technology,
- Support import substitution and export promotion of the crops,
- Improve public health through increased fruit consumption.

### **National Citrus Development Program, Kirtipur**

It was established in 2029 in Horticulture Research Center, Pokhara and was transferred to the area of Center Horticulture Center Complex, Kirtipur. The major objectives are:

- Planning and executing programs for varietal improvement of citrus.
- To promote the production and market of citrus fruit.
- To develop related agri-technology and extend it to the farmer.
- To reduce import and gain export potential.
- To develop, protect and manage the orchards and gardens thought the country.

### **Tea and Coffee Development Section, Kirtipur**

It was established in 2050/51 in Kirtipur. It was granted Technical Autonomy from 2061. The objectives of this Section are:

- To promote and develop tea and coffee production in Nepal.
- To identify the potential areas for tea and coffee production.
- To manage the quality planting material.
- To provide the technical assistance to the farmers.

### **Central Horticulture Center, Kirtipur**

It was established in 2018 B.S with the name of Kathmandu Research Garden. It was given present name in 2046/47 and is gaining focus on the research related activities. The major objectives are:

- National promotion and conservation of cool season and citrus species of fruits.
- Development, production and distribution of rootstocks.
- Helping the commercial and small scale farmers to gain the technical skills.
- Soil testing, identification and control measures of diseases, insects and pest and food quality development.

## **OBJECTIVES**

- To be acquainted with the various temperate region crops of Nepal.
- To be familiar with the horticultural practices and technologies related with the production of these crops.
- To gain idea about the research activities being carried out.
- To know about the overall status of fruit production in Nepal.

## **METHODOLOGY**

Two day long field visit tour was organized by the Department of Horticulture, AFU on 2079 Mangsir 23 and 24 to Temperate Horticulture Nursery Center, Daman and Central Horticulture Center, Kirtipur. Field observation and briefing from the personnel at the visit stations were the key source of information. Moreover, description and explanation by our course teacher cleared the queries. Photographs were taken, available booklets and leaflets were collected and rounds of friend circle discussion were carried out.

## **FINDINGS**

Daman is located at 2322 meter above sea level. Here we were briefed about the farm and basic knowledge about temperate fruits and other vegetables. Temperate Horticultural Nursery Centre is called as “**Sitotsan Bagwani Nursery Kendra**”. The main aim of the Nursery Centre is to promote the temperate plants, facilitate the seedlings and planting materials to other. The farm doesn’t provide planting materials directly to farmer rather they provide to District Agriculture Development Offices, NGOs, INGOs, etc. Farmers get the seedlings rarely if materials get stocked. The total area of Farm is 76.7 hectares. Among which 49 ha is cultivated. They use 24 ha of land to cultivate Walnut, 3 ha to

Apple, 3 ha to Potato, etc. The Daman farm use to cultivate temperate fruits like Apple, Peach, Pear, Plum, Kiwi, walnut, etc.

Apple of High Chilling, Mid Chilling and Low chilling varieties along with improved varieties. Apple block contains 504 plants belonging to varieties red delicious, royal delicious, golden delicious and vered. Walnut block contained 871 plants of varieties thinsel, etc.

Kiwi is grown only in two farms of Nepal i.e. Daman Farm and Boj Farm of Dolakha. Kiwi development and cultivation Program was started at Daman and Kirtipur almost together during 2056/57 BS. They have Kiwi of Hevard, Tomeri and Bruno varieties. Hevard has big fruit size. They primarily develop seedlings rather than fruits. They also cultivate Potato in about 3 ha of land. They provide Potato planting materials to farm itself, Daman, Palung, Tistung, Gorkha, Dhading. They also cultivate vegetables like Kerau, Rayo and fresh vegetables like Cabbage, Cauliflower, etc. They are going to start the program on Flower cultivation from this year. They will be extending the program related to flowers. The place has demand of Khurpani, Kagati, Almond, Persimonn too. They are developing the provision of bringing Khurpani and Almond from Mustang. They use Cutting, Budding, Grafting techniques. They are not research based like NARC. But perform research for their own data. They will be providing proper grafted or cut planting materials of demanded varieties in affordable price from next season onwards. They grow almost 21,000 planting materials.

The Common Fruits observed during the Daman Visit:

We got the chance to observe and taste the temperate fruits like Apple, peach, Plum, Pear at Daman Farm. We observe the climate where temperate fruits are grown. Our objectives were almost fulfilled in my view.

S.N.	Common Name	Scientific Name	Varieties
1.	Apple (स्याउ )	<i>Malus pumila</i>	Golden Delicious, Red Delicious, Red June, Anna
2.	Pear (नास्पाती )	<i>Pyrus communis</i>	Pharping, Housi, Kousi

3.	Peach (आरु )	<i>Prunus persica</i>	Maitiheli
4.	Plum (आरुबखडा )	<i>Prunus domestica</i>	
5.	Kiwi	<i>Actinidia delicosa</i>	Heward, Tomeri, Bruno
6.	Orange	<i>Citrus reticulata</i>	

A visit to Kirtipur Horticulture Complex was organized the following the day. Here we were explained about the various activities being conducted at the Center. The Kirtipur Complex covers 20 ha land and contains Central Horticultural Center, National Citrus Development Program, Tea and Coffee Development Section and Fruit Development Directorate. All these fall under the Department of Agriculture, Ministry of Agriculture Development. The area of the complex was divided into various blocks. The Production blocks contained pear, peach, plum, apple, apricot, and persimmon.

**S.N.                      Blocks**

1.	Pear production block A
2.	Kumquat production block
3.	Healthy mother plant conservation area
4.	Vermicompost production site
5.	Citrus production block
6.	Pear production block B
7.	Grape block

8. Olive mother plant orchard
9. The screen house/Glass house
10. Kiwi fruit/ Grape vine yard
11. Pear production block C
12. Model home stead garden

### **Conclusion and Recommendation**

The visit was able to meet all the objectives targeted at the beginning. It is satisfactory to mention that we are now able to describe various practices related to the Temperate Fruit Crop production. We are highly obliged to observe the scientific management of Daman Center and Kirtipur Horticulture Complex. We adore the work of concerned authorities involved in maintenance and management. We further forward the suggestion to expand the area of research and initiate the farmer and commercialization related technology development. It is mandatory to establish the similar nature research and promotion centers in other parts of the country as well.

### References:

1. Agriculture and Forestry University. (n.d.). Retrieved from <http://www.afu.edu.np/>
2. Ministry of Agriculture and Livestock Development. (n.d.). Retrieved from <http://www.moald.gov.np/>
3. Fruit Development Directorate. (n.d.). Retrieved from <http://www.fdd.gov.np/>
4. Center Horticulture Center. (n.d.). Retrieved from <http://www.chc.gov.np/>

### Pear Production in Nepal:

Pear production in Nepal is mainly concentrated in the mid-hill regions, particularly in areas with elevations ranging from 800-1600 meters. Pear cultivation is carried out by small-scale farmers and is considered a promising horticultural crop in Nepal, contributing to the country's agricultural economy.



Table: Pear Production Detail in Nepal

SN	Particulars	Details
1	Best Elevation Range	800-1600 m in the mid hills
2	Planting Major Season	Poush-Magh (December-January)
3	Flowering and Fruiting Main Season	July-August (Shrawan-Bhadra)
4	Harvesting Timeframe	After 2-3 months of flowering
5	Propagation Methods	Grafting, Seed, and Cutting
6	Manure and Fertilizer	30-50 kg FYM or Compost (2 doko), 434 gm DAP, 700 gm Urea, and 66 gm Potash
7	Plant Density	300 plants/ha (15 plants/ropani)
8	Spacing	6-8 m x 6-8 m
9	Varieties	Pharping, Hosui, Chojuro, Sinko

### Elevation Range:

Pear cultivation in Nepal is suitable in mid-hill regions with an elevation range of 800-1600 meters. This elevation provides the optimal climatic conditions for pear trees to grow and thrive.

### Planting Season:

The major planting season for pears in Nepal is Poush-Magh, which falls in December-January according to the local calendar. This is the recommended time for planting pear trees to ensure proper growth and development.



### **Plant Density and Spacing:**

The recommended plant density for pear cultivation in Nepal is 300 plants per hectare or 15 plants per ropani (a local unit of area). The spacing between pear trees is typically 6-8 meters by 6-8 meters, allowing enough room for proper growth and canopy development.

### **Popular Varieties:**

Some of the commonly grown pear varieties in Nepal are:

<b>European Variety</b>	<b>Description</b>
Bartlette	Large in size, Yellowish in color at maturity, Suitable for harvesting in Bhadra, Fruit weight: 220g, Can be grafted with Japanese varieties
Conference	Medium in size, Green color, Ready to harvest in 1st week of Bhadra, High chilling requirement variety
Anjou	Larger size, Shiny greenish in color, Late maturing and high chilling requirement variety
Hawana	Large tree, Ready for harvesting in late Shrawan, Grey or yellowish in color

<b>Asian Varieties</b>	<b>Description</b>
Pharping local	Flowering in Falgun 1st week, Ready to harvest in last week of Bhadra, Fruit weight: 350g, Low chilling requirement variety
Hosui	More number of productive branches, Flowering at second week of Chaitra, Fruit weight up to 400g

Kosui	Early maturing Japanese variety, Ready to harvest in third week of Asar, Fruit weight up to 300g
Shinko	Spreading type, Flowering in third week of Chaitra, Ready to harvest in third week of Bhadra, Fruit weight up to 400g, Low chilling requirement variety
Other varieties	Chojuro, Niitaka, Aatago, Okusangkichi, Yakumo, Kikusui, Baseaaka, Meyigechu, etc.

Varieties such as Pharping, Hosui, Chojuro, and Sinko are well-adapted to the local climatic conditions and are preferred by pear growers in Nepal for their productivity and fruit quality.

### **Propagation Methods:**

Pear trees in Nepal can be propagated through grafting, seed, and cutting methods. Grafting is a common method used to propagate pear trees to ensure desirable traits and characteristics in the resulting plants.

Selection criteria of mother plant for propagation:

1. **Health and Disease-Free:** Choose healthy and disease-free pear trees for use as mother plants to ensure healthy offspring.
2. **High-Yielding and Productive:** Select pear trees with a history of high-yield fruit production and desirable fruit characteristics.
3. **Genetic Purity:** Choose true-to-type pear trees that exhibit the desired traits of the specific variety you want to propagate.
4. **Environmental Adaptability:** Consider the environmental conditions of the planting site and select mother plants that are adapted to similar conditions for better adaptation and performance of propagated plants.

### **Training and Pruning:**

- Training: Shape pear trees early on using techniques like central leader or modified central leader training, considering protection from cold and snow in higher altitudes in Nepal.
- Pruning: Prune during dormant season to remove dead, diseased, or overcrowded branches, and shape the tree for optimal health and form, using sharp and clean tools.
- Fruit Spur Pruning: Encourage fruit spur development through techniques like spur pruning or renewal pruning, removing non-productive wood or entire branches to maintain a balance between vegetative growth and fruit production.

### **Manure and Fertilizer Recommendation:**

To optimize pear production, it is recommended to apply 30-50 kg of Farm Yard Manure (FYM) or compost (2 doko) per plant, along with 434 gm of Diammonium Phosphate (DAP), 700 gm of Urea, and 66 gm of Potash. These nutrients provide essential elements for healthy growth and development of pear trees in Nepal.

### **Flowering and Fruiting Season:**

Pears in Nepal typically flower and fruit during the main season of July-August, which corresponds to the local calendar months of Shrawan-Bhadra. This is the period when pear trees bloom with flowers and set fruits.

### **Harvesting Time:**

Pears are usually harvested in Nepal after 2-3 months of flowering. The exact timeframe may vary depending on the specific variety, local climate, and other factors that can affect the growth and maturity of pears.

### **Challenges for Pear Production in Nepal:**

There are several challenges faced by pear growers in Nepal, including:

- Limited access to modern agricultural technologies and practices, such as improved varieties, irrigation facilities, and pest and disease management strategies.
- Lack of adequate post-harvest handling and storage facilities, which can result in losses and reduced quality of harvested pears.

- Vulnerability to climatic changes, including irregular rainfall patterns, temperature fluctuations, and extreme weather events, which can affect pear tree growth and yield.
- Inadequate market linkages and low demand for pears, resulting in limited opportunities for profitable marketing and sales of pear produce.

### **Efforts to improve Pear Production in Nepal:**

Various efforts have been undertaken by the Nepalese government and other organizations to improve pear production in Nepal. These include:

- Promotion of improved pear varieties that are well-adapted to local agro-climatic conditions, resistant to pests and diseases, and have higher yields.
- Provision of training and extension services to farmers on modern pear cultivation techniques, including proper planting, pruning, nutrient management, pest and disease control, and post-harvest handling.
- Development of infrastructure for post-harvest handling, storage, and processing of pears to minimize losses and improve fruit quality.
- Facilitation of market linkages and value chain development for pears, including promotion of local and export markets, to enhance the income and livelihoods of pear growers.
- Research and development initiatives to address challenges related to climate change, including the development of climate-resilient pear varieties and adaptation strategies.
- Despite the challenges, pear production in Nepal has shown potential for growth and improvement. With continued efforts in research, technology dissemination, and market development, the pear industry in Nepal has the potential to thrive and contribute to the country's agricultural and economic development.