

## Horticulture Scenario in Bhutan

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### Introduction

Bhutan is a small country located in the southern slopes of the eastern Himalayas, sandwiched between China and India. With a total land area of 38,384 square kilometers and a population of over 727,145, Bhutan has a unique agricultural system that is self-sustaining, integrated and subsistence-based. The land lock country provides a distinctive agro-ecological environments or zones, based on altitude, temperature and rainfall. The agri eco-zones provide diverse conditions suitable for growing a wide range of crops, including rice, maize, wheat, barley, buckwheat, potatoes, diverse vegetables, fruits, mushroom and cordyceps.

Bhutan has a forest cover of 70.46%, which provides significant ecological services such as water catchment, soil conservation and climate regulation. The forests also provide non-timber forest products (NTFPs) such as bamboo, medicinal plants and mushrooms, which supplement farmers' income. The government of Bhutan implements sustainable forest management practices that ensure the forests' preservation and utilization, promoting a balance between conservation and development.

Despite Bhutan's significant forest cover, only 2.93% of its land is arable, making agriculture a crucial sector for the country's economy and food security. Of the total cultivated area, only 15-20 % is devoted to horticulture crops. Farmers practice integrated farming that combines crop cultivation with livestock rearing, resulting in a closed-loop agricultural system that utilizes waste and by-products to maintain soil fertility and improve yields.

Agriculture contributes about 19% of Bhutan's Gross Domestic Product (GDP) in 2021 and provides employment to around 50% of the population (NSB,2021) . Given the sector's importance to the economy, the government has implemented policies and programs aimed at promoting agricultural productivity and growth. The cultivation of high-value crops has been emphasized as a means to enhance the sector's contribution to the economy.

### Role of horticulture crops

Many horticulture crops are popular with the Bhutanese farmers as their main source of cash income. The major crops are presented in Table 1. The increased production of horticulture crops makes a significant contribution to achieving a higher level of self – sufficiency and for export, which augments rural incomes and national export earnings. In addition, horticulture crops play a crucial role in improving the nutritional level of the Bhutanese populace. An important characteristics of Bhutanese horticulture crops is that many of the crops suited to local oconditions have a high value –to-weight ratio, sustaining road transport costs and freight. In economic terms, these crops constitute an optimal use of the country's scarce resources of land and labor.

**Table 1.** Major Fruits of Bhutan with Nos of trees and production, 2021.

Fruits	No of trees	Production ( MT )
Apples	224,313	2323.81
Mandarin Orange	1,502,347	15,966.39
Other Temperate Fruits	287017.36	8667.33
Subtropical Fruits	1019353	4821.49

**Table 2.** Major Horticultural crops with sown area and production, 2021

Crops	Sown Area ( Acres )	Production ( MT)
Ginger	3237.07	7153.99
Cardamom	12813.45	1609.08

Crops	Sown Area ( Acres )	Production ( MT)
Chilli	25984.87	40080.82
Asparagus	189.08	177.73
Other Vegetables	7641.25	13188.23
Potatoes	8825.20	38572.70

**Table 3.** Export, Import and values from some of the Horticulture Crops:

Crops	Quantity Imported	Value in Nu	Quantity Exported	Value in Nu
Apples	629692	104419774	837459	21013626
Mandarin Orange	103831	12529570	12533282	448827616
Temperate Fruits	2508454	99307652	2591	63010
Subtropical Fruits	1956616	170942863	2120	52000
Potatoes	Nil	Nil	27104932	500699079
Ginger	1961	143536	4716447	91708350
Cardamom	6708	3279053	3430627	1713225312
Chilli	2042	595163	7217	2224681
Asparagus	Nil	Nil	14	1462
Other vegetables	14056012	396859051	4041025	52154372

### Balance of Trade and Deficit in Horticultural Sector

In terms of the balance of trade, Bhutan is a net importer of agricultural products, which means that it imports more agricultural products than it exports. According to the latest data available from the World Bank, in 2019, Bhutan's imports of agricultural products were valued at US\$285 million, while its exports were valued at US\$23 million. This resulted in a trade deficit of US\$262 million in the agricultural sector out of which approximately US\$ 46 million is from the horticultural sector as per the latest data from the Royal Monetary Authority, Bhutan.

The main agricultural and horticultural products imported by Bhutan include cereals, vegetables, fruits and animal products such as meat and dairy. On the other hand, Bhutan's main agricultural exports are fruits, vegetables and spices.

Overall, Bhutan's trade deficit in the agricultural sector highlights the country's dependence on imports. Thus, the Royal Government of Bhutan has made many amendments in the policies and investment in the horticulture sector that can improve agricultural productivity and increase exports in the long run.

### Government Support and recent technologies in Horticulture Production:

Protected cultivation is becoming increasingly popular in Bhutan, particularly in areas with harsh climatic conditions. Farmers use poly houses to protect their crops from adverse weather conditions such as extreme temperatures, heavy rainfall and hailstorms. Poly houses provide a controlled environment that enables farmers to cultivate high-value crops such as tomatoes, cucumbers and peppers. The use of smart irrigation techniques such as drip irrigation minimizes water usage and ensures efficient use of resources.

Customized small-scale hydroponics is a relatively new innovation in Bhutan's agricultural sector. Hydroponics involves growing plants without soil, using nutrient-rich water instead. Customized small-scale hydroponic systems enable farmers to cultivate high-value crops such as lettuce, spinach and herbs, providing a year-round supply of fresh produce. The systems are adaptable to small-scale farming, enabling farmers to maximize their limited arable land.

The Royal Government of Bhutan has implemented several measures to support farmers and enhance agricultural and horticultural productivity in the country. For instance, subsidy on poly houses and mechanized farming tools and equipment to enable farmers to invest in modern farming methods and technologies to increase their yield and income. Free distribution of seeds and saplings, ensuring a reliable supply of good quality seeds and promoting cultivation of high-yielding crop varieties. Making farmers access to free training and consultation programs whereby, Agricultural experts are deployed in the rural areas to train farmers on modern farming techniques, pest

and disease management and soil conservation. The government has also constructed proper irrigation channels, enabling farmers to irrigate their crops efficiently and minimize water usage. Moreover, the credit facility is enhanced through the financial institution and market assured through Food Cooperation of Bhutan and the Department of Agriculture and Marketing Cooperatives which is under the Ministry of Agriculture & Forest.

To increase access to credit and markets for farmers, the government has set up the Food Cooperation of Bhutan and the Department of Agriculture and Marketing Cooperatives under the Ministry of Agriculture and Forests. These institutions provide financial assistance and access to markets for farmers, enabling them to sell their produce at a fair price.

Apart from the government, international organizations such as Japan International Cooperation Agency (JICA), Food and Agriculture Organization (FAO), Food Security and Agriculture Productivity Project (FSAPP), Commercial Agriculture and Resilient Livelihoods Enhancement Program (CARLEP) and United Nation Development Program (UNDP) have also played a pivotal role in shaping agriculture in Bhutan through grants and Aid. These organizations have provided funding for various agricultural projects with the objective at promoting sustainable and integrated farming practices and ensuring food security for the Bhutanese population.

The Bhutanese agriculture is an example of how sustainable and environmentally conscious farming practices can support economic development, food security and environmental conservation. Through its commitment to Gross National Happiness and traditional farming practices, Bhutan has created a unique and successful model for sustainable agriculture and horticulture. However, still several challenges that the sector faces.

### **Constraint to Horticulture Development:**

**Climate change:** Bhutan is particularly vulnerable to the impacts of climate change, including changes in precipitation patterns and increasing temperatures. These changes can have significant impacts on agricultural production, particularly for small-scale farmers who may not have the resources to adapt to changing conditions.

**Limited land availability:** Bhutan is a small country with limited arable land, which makes it difficult to expand agricultural or horticultural production. This is particularly challenging given the growing demand for food due to population growth and changing dietary patterns.

**Rural-urban migration:** Many young people are leaving rural areas for urban areas in search of better economic opportunities. This is leading to a decline in agricultural production and a loss of traditional farming knowledge and practices.

**Pests and diseases:** Pests and diseases can have significant impacts on crop yields, particularly for small-scale farmers who may not have access to pest and disease control measures.

**Limited access to markets:** Due to Bhutan's small size and remote location, farmers often struggle to access markets for their produce. This can limit their ability to sell their crops and generate income.

**Land degradation:** Bhutan's mountainous terrain and steep slopes make it vulnerable to soil erosion and land degradation. This can affect soil health and reduce crop yields.

Apart from the inevitable challenges, Bhutan's agricultural sector also offers several opportunities for development, particularly in the areas of sustainable production, organic farming and high-value crops. However, several opportunities exist.

### **Opportunities:**

**Organic farming:** Bhutan has banned the use of synthetic pesticides and fertilizers, creating opportunities for organic farming. The country's rich biodiversity and clean environment provide ideal conditions for organic agriculture, which can command premium prices in international markets.

**High-value crops:** Bhutanese farmers can take advantage of the country's unique climate and geography to grow high-value crops such as apples, oranges and cardamom. These crops can command higher prices in domestic and international markets, providing a potential source of income for farmers.

**Eco-tourism:** Bhutan's commitment to environmental conservation and sustainable development has made it a popular destination for eco-tourism. Agriculture can play a role in eco-tourism by providing opportunities for visitors to learn about traditional farming practices and sample locally grown produce.

**Agro-processing:** Bhutan has significant potential for agro-processing, which involves adding value to agricultural products through processing and packaging. This can create jobs and increase the income of farmers by allowing them to capture a greater share of the value chain.

The future of Bhutanese agriculture and horticulture is likely to be a shift towards more diversified and resilient farming systems. This will involve promoting traditional crops as well as introducing new crop varieties that are more resilient to climate change and pests. The ongoing trend of focusing on high value crops will be supplemented by establishing more RND centers, investing more on marketing and branding, value –added processing and technological innovation to make farming easier and more profitable.

### **Public – Private Partnerships**

The Royal Government of Bhutan actively continues to support sustainable farming in Bhutan within its only mandate or policy framework. Since the government has so much to do, several NGOs in Bhutan have stepped up to work with local communities, farmers and government agencies to promote sustainable agriculture practices, improve food security and support rural livelihoods. The NGOs committed to shape farming and rural development are as follows:

**Tarayana Foundation:** A non-profit organization that works to promote sustainable livelihoods in Bhutan. They support farmers by providing training on sustainable agriculture practices, improving access to markets and supporting value-added processing.

**Royal Society for Protection of Nature (RSPN):** A non-governmental organization that works to protect Bhutan's environment and promote sustainable development. They support farmers by providing training on sustainable agriculture practices, supporting the establishment of community-based natural resource management initiatives and promoting the conservation of agro-biodiversity.

**Loden Foundation:** A non-profit organization that works to promote rural development and entrepreneurship in Bhutan. They support farmers by providing training on sustainable agriculture practices, supporting the establishment of rural enterprises and promoting the conservation of local agricultural knowledge and practices.

**Bhutan Association of Women Empowerment:** A non-profit organization that works to empower rural women in Bhutan. They support women farmers by providing training on sustainable agriculture practices, supporting the establishment of women-led agricultural enterprises and promoting gender-sensitive agricultural policies.

### **Conclusion**

In conclusion, Bhutan's unique geography, agro-ecological zones and limited arable land have led to a distinctive agricultural system that is self-sustaining, integrated and subsistence-based. Agriculture is a crucial sector for Bhutan's economy and provides employment to around 60% of the population. However, with the increasing population and demand for diverse food, farming is gradually becoming commercial and market oriented. Agriculture is a crucial sector for Bhutan's economy and provides employment to the majority of the population. Protected cultivation and hydroponics are becoming increasingly popular in Bhutan, particularly in areas with harsh climatic conditions. The Royal Government of Bhutan has implemented several measures to support farmers and enhance farming productivity in the country, including subsidies on modern farming methods, free distribution of seeds and saplings and free training and consultation programs. Despite the success, Bhutan faces several challenges such as climate change, limited land availability, water scarcity and market access. There is a need to develop collaboration with regional and international research and development institutes for sharing of technologies, latest information and expertise. In addition, linking with regional and global markets is indispensable for the promotion and development of horticulture in Bhutan.

### **Reference:**

- National Trade Statistics (Import & Export Data), 2021
- RNR Statistic (MOAF), 2021
- World Bank (Balance of Trade), 2019
- RMA (Trade Deficit Report), 2021