# Precision and Protected Horticulture in Nepal

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## Abstract

*Precision horticulture is a holistic system designed to maximize production and productivity of crops using advanced information technology along with various management practices. It includes protected cultivation, genetic engineering, integrated crop management, integrated nutrient management, micro-irrigation, soil less production system, post-harvest technology, and genetic conservation. Increasing pressure on natural resources, population growth, decreasing land holdings, climate change and its impact on agricultural production system forced to shift towards modern technologies of crop production. Horticultural crops production under protected condition can easily increase productivity by 3-5 folds over open field condition. This technology has very good potential especially in urban and peri-urban areas of Nepal with ever growing market for fresh production. In order to compete in national and international market, those models have high potential for improving both productivity as well as quality. It helps to strengthen our national economy by solving unemployment problem as well as selling of quality product to the consumers. In Nepal, total estimated area under protected horticulture is about 702.86 ha, out of which 695.16 ha (98.9%) under vegetables and 7.7 ha (1.1%) under flower production. Protected horticulture in Nepal was started earlier in 199s from Lumle, Kaski by disseminating plastic tunnel technology but now GI tunnels, naturally ventilated greenhouse, hi-tech & semi hi-tech green houses and net houses are adopted for offseason vegetable, flower and fruit sapling production. This paper has tried to give short glimpse of principle, present status, major success, prospects, and challenges of precision and protected horticulture in Nepal.*

***Keywords:*** *Precision horticulture, protected cultivation, different structures*

## 1. Introduction

Nepal is bestowed upon by nature with varying agro-ecological situations that allow cultivating different types and cultivars of fruits and vegetables successfully ranging from tropical to temperate region (Shahi, 2016). Agriculture play a pivotal role in the Nepalese economy providing livelihood and jobs for 65.6% of total population and contributing to one third of the national gross domestic

product (Atreya and Manandhar, 2016). Agriculture and forestry sector contributes 28.89% in national GDP (AICC, 2018). Agricultural land of Nepal is becoming less and less due to population growth and rapid urbanization, CBS (2011) shows that, the average land holding is limited to 0.68 ha per household. Precision agriculture a comprehensive system designed to optimize agricultural production through the application of crop information system, advanced technologies on production, and improved crop management practices. It includes several activities like crop planning, tillage, planting, intercultural operation, harvesting, and post harvest processing of the crop. Technological interventions in precision horticulture include genetic conservation, genetic engineering, integrated nutrient management, protected cultivation, post harvest technology, micro irrigation and fertigation technologies (Nabi *et. al.*, 2017). Thus, Precision and protected horticulture are the tools of modern agriculture and more precisely, protected horticulture comes under precision horticulture. Nepal has progressed significantly in developing horticultural technologies like tissue culture, True Potato Seed (TPS) technology, Integrated Pest Management (IPM) & Integrated Plant Nutrient System (IPNS), vermi-composting, drip and sprinkler irrigation system in the recent days (Pradhan *et. al.*, 2016). Arora (2005) indicates that, successful application of information, technology and crop management is the keys to success in this production system. Nabi and coorker (2017) defined precision agriculture as precision farming, precision horticulture, Site Specific Farming (SSF), Site Specific Management (SSM), Site Specific Crop Management (SSCM), Variable Rate Application (VRA). Precision farming/precision agriculture aims to minimize environmental impact at increasing productivity with decreasing costs of production (Maheswari et. al., 2008). The challenges to feed the world after some decades are becoming more clearer. This situation force for producing more with intensifying production system in a sustainable way. Precision and protected horticulture contributes greatly to food and nutrition security by maximizing more and high quality production per unit of land. This can be achieved by best utilization of scarce resources as well as management techniques (WUR, 2018). According to Montero and his coworker (2011), protected cultivation provide a better way than the open field so as to increase production, productivity along with quality and off-season production of fruits, vegetables and ornamentals. The main objective of this paper is to explore the theoretical part of precision and protected horticulture and the development scenario in Nepal and based on that suggest ways for improvement. In this paper, we tried to collect secondary information's and data from different sources and were interpreted.

The total protected cultivation area in South East Europe amounts to about 101888 ha, accounting for approximately 5.15% of the total vegetable cultivated area. The vegetable production from the above area is about 7962240 Mt, i.e. approximately 19.09% of total vegetable production (Gruda and Popsimonova, 2017). China is a largest producer of horticultural crops under protected environment than that of other continent combined. Among all horticultural crops in China, protected vegetable cultivation covers more than 4 million hectare in 2010 AD, which account more than 95% of all protected production in China and more than 80% of all protected vegetable cultivation in the world. Asian protected technology ranges from low cost poly tunnel to very expensive and sophisticated plant factories (Yunyan *et. al.*, 2013).

# 2. Precision and Protected Horticulture

## 2.1 Precision Horticulture

### Objectives of Precision Horticulture

- Increasing profitability and sustainability is one of the major objectives of precision horticulture. It balances inputs (seed, variety, fertilizer and pesticides) with crop needs according to agro climatic condition and is profitable business in long run.
- Precision farming also aims at optimization of product quality by way of using sensors, which detect the quality attributes of the crop, and thus inputs are to be applied accordingly.
- It optimizes production efficiency of each site or within each region using different modern management system.
- Effective and efficient pest management can be achieved by using precision farming as site specific variable rate application puts insecticides/pesticides in target area only.
- The risk of environmental damage is reduced if better crop management decisions are being made and decrease in the net loss of any applied input like water, fertilizers and other chemicals to the environment.
- It generates large amounts of data that are spatial records of inputs and outputs for fields, which help to create more and accurate planning.
- It also helps to improves production decision and on farm research for profit maximization in sustainable way.

### Constraints Involved in Precision Agriculture

- High associated cost for production i.e. need high initial investment.
- Small land holding of farmers and heterogeneity of cropping system.
- Subsistence farming system
- Lack of technical expertise and knowledge.
- Technological gaps among research, education and extension organization and at farmers level.

### Elements of Precision Farming

Information, technology and management are combined into a production system that can increase productivity, improve product quality, allow more efficient use of chemicals, conserve energy and provide for soil and ground water protection.

**I. Information**

Information like crop characteristics (different growth stages, water and nutrient requirement, crop health, insect pest incidence), soil characters (physical and chemical properties, colour, texture, nutrient status, salinity and toxicity, soil temperature), microclimatic data (daily, weekly, monthly, seasonal), agro metrological information (canopy temperature, wind direction, speed, humidity, solar radiation and light intensity, light composition), irrigation and drainage facilities, water availability and other planning inputs of interest according to farm are major information needed for precision farming.

**II. Technology**

It incorporate Global Positioning System (GPS), Geographical Information System (GIS), Yield monitors (Crop yield measuring devices installed on harvesting equipment), Variable Rate Technology (VRT), remote sensing and etc. are some of technology widely used in precision farming.

**III. Management (decision support system)**

- Use of information technology and different tools like robotics, sensors, control system, GPS, drones, VRT, autonomous vehicles, GPS based soil sampling, automated hardware and software are the key component of farm management.
- Identification of crop growth stages, environmental condition and insect/pest population in the field for better crop production.
- Choose suitable sensors and supporting technology to record data on these stages and processes.
- Collect, simplify, store and communicate the field recorded data.
- Process and manipulate the data into useful information and knowledge.
- Present the information and knowledge in a form that can be interpreted to make decisions and for profitable crop production choose a suitable action.

## 2.2 Protected Horticulture

Protected horticulture practice means cropping techniques of horticultural commodities wherein the micro climatic condition surrounding the crops is partially or fully controlled as per specific crop requirements (Slathia *et. al.*, 2018). Various types of protected structure suitable for specific types of crops and agro climatic condition have emerged with the advancement in agriculture technology (MoAFW, 2018), among them green house, plastic house, lath house, cloth house, net house, shade house, hot beds and cold frames are use in Nepal (IDSC, 2009).

## Advantages of Protected Horticulture

- Higher yield per unit time and area, recorded increase in yield up to 4 to 8 times.
- Hilly lands and unfavourable and undulating hilly region, terrains, water logged area and unproductive sandy soil can also be brought under cultivation.
- Suitable for water scarce area, it saves water up to 50% as compare to open field condition.
- We can produce uniform quality with more healthier in consistent way.
- Early harvesting and faster return on investment.
- Fertilizer use efficiency also increases by 30%. Inter culturing and labor reduced.
- Better insect, pest and disease control and less use of pesticides
- Offseason production and efficient use of scarce resources.
- Grow plants anywhere at any season.
- Less use of agrochemicals, environmental friendly.
- Nursery raising and hardening of sapling/seedling under protected cultivation.

## Disadvantages of Protected Horticulture

- Higher initial investment.
- Need higher degree of management, labor intensive.

- Not all crops are profitable under controlled condition.
- Need advanced technology, technical manpower and continuous support for production.

# 3. Use of Different Structures in Protected Horticulture

## a. Protected Cultivation

i. **Plastic tunnel:** Plastic tunnel are miniature structures producing greenhouse like effect. It facilitates the entrapment of carbon dioxide thereby enhancing the photosynthetic activity. It protects plants from harsh climatic conditions such as rain, wind, hails and snow etc. Those are mainly used for rasing nursery. We can construct different shape and size of poly tunnel according to our requirement. Degree of sophistication also varies according to producers need from very simple to fully automatized.

ii. **Green/glass house and poly house:** The structure of glass house is ranges from small sheds to industrial sized buildings. In green/glass house, solid structure with walls and roof made mainly from transparent material eg glass and climatic condition inside house can be regulated according to crop demand. While poly house are basically naturally ventillated, built from pre-galvanized channel and roof and side wall with transparent polythene. Inside such house crops are grown under favourable controlled environment like light intensity, temperature, relative humidity, air movement, irrigation, soil media use, insect/pest control and other management practices throughout the season.

iii. **Shade net house:** Structures allow sunlight, moisture and air to pass through the gaps or pore of covering materials. The covering materials help to modify environement such as reduced light or protection from extream heat. Size and height of the structure may vary from place to place according to producer and crop need.

iv. **Walk in tunnels:** It is suitable for all of horticultural crops from annual vegetables, flowers and fruits. It is covers with UV film. Mostly, these types of structures are suitable for forcing of cucurbits during winter season.

v. **Screen house/plant protection nets/net houses:** Screen houses are structures which are covered in insect screening material instead of plastic or glass. They provide environmental modification and protection from severe weather conditions as well as exclusion of pests. They are often used to get some of the benefits of greenhouses in hot or tropical climates. Bird nets are use in fruit and vegetable farming to protect from birds.

vi. **Lath house:** Lath house having flat top with straight sides. It is usually used to protect from high light intensity. Light sensitive plants are being grown under lath house. Mostly ornamentals and flower nursery use lath house to protect their produce from scorching sun shine.

vii. **Hot beds:** The frame of hot bed made of concrete blocks which acts as an effective insulator but obstruct light. Reinforced polyster plastic is also used for frame.

viii. **Cold frames/frost cover:** The cold frame is made with frame and the cover. Cold frames are used to protect plants from frosts heavy rains and heavy winds. Mostly, these are used during winter season for raising leafy herbaceous plants. Its better to remove cover during hot summer season.

## b. Surface Cover Cultivation

i. **Plastic mulching:** Plastic mulching helps to conserve soil moisture, prevent weed growth and regulate soil temperature. Covering the soil around the plants canopy with plastic film. Different colored plastic films are being used as mulches for horticultural crops like white, silver black, black, red, yellow and etc. It help to accelerate micro nutrient uptake and efficient nutrient utilization.

ii. **Soil solarization:** Mainly transparent plastic sheets are used during hotter season for sterilization of the field soil so that insect eggs and spores of fungus lying on the surface of soil can be destroyed.

## c. Water Management

i. Drip irrigation system
ii. Sprinkler irrigation system
iii. Farm pond and reservoir lined with plastic films

## d. Organic Farming

i. Vermi-composting
ii. Mass production of bio-control agents
iii. Use of indigenous technologies and farmers knowledge for crop production (wood ash, compost tea etc)

# 4. History and Development of Precision and Protected Horticulture in Nepal

Protected cultivation can be recorded back to Rana era may be century old. Those days Rana families were the only well off family who can afford for gardening. Their family had gone to Europe for further studies or visit where they had learned or got interested in gardening. During this time, they have imported and introduced different types and varieties of flower and plants. At the same time, it can be seen that simple glass houses were used to keep tropical plants. That cannot be said as cultivation but as hobby. During early seventies Royal Botanical Garden, Godavari had built a tropical house inside the botanic garden to keep tropical plants. In late seventies, protected cultivation in floriculture began. In the beginning poly tunnels was made of bamboos. It was used to keep plants away from monsoon rain and frost during summer and winter months. Similary Dabur Nepal has also introduced semi-hitech greenhouses for medicinal and aromatic plant seedling production in Banepa.

Similarly, in early 90's concept of shade net was introduced in Nepal. Shade net was not available in Nepal and even neighboring countries that time. However in mid 90's. Only several years' later China and India started manufacturing and became cheaper too. In mid 90's with introduction of commercial cut flowers varieties like roses, carnation, gerbera etc.

After establishment of Floriculture Association Nepal (FAN) in 1992 several promotional, skill development, marketing, networking activities were carried out. Since then many private companies and governmental sector including agriculture and forestry university (AFU) are trying to promote protected cultivation in Nepal.

## 4.1 Protected Vegetable Production Scenario in Nepal

Offseason cultivation of vegetable by using bamboo tunnel started since 1996 AD from LARC, Kaski which was the first government initiative in this sector. Later the use of silpaulin of 90-120 gsm plastic as roof cover was introduced for producing offseason vegetable commercially. Mainly rain-shelter types of structures from bamboo and silpaulin plastics were used till 2010 AD in vegetable sector for producing offseason tomato in midihills. Production were confined to the adjacent areas of Kathmandu and Pokhara valley Use of GI tunnels, naturally ventilated green house, high-tech green houses in midhills areas of Nepal is increasing at faster rate since 2012 AD. In order to promote protected farming matching grant schemes inititated from government projects like PACT, HVAP, RISMFP, IWRMP and HIMALI to vegetable and flower growers. Mostly protected farming concentrated on 45-120 GSM silpauline plastics in mid hill condition whereas polythene/fiber tunnel are in use in high hill for offseason vegetable production. In Terai areas, nowadays net houses are used for vegetables, whereas green nets are common for flowers and fruit sapling production. Beside different project of Nepal government, MoAD develop directory of High-tech green house since 2014/15 AD and tried to implement hitech vegetable production program. Vegetable Development Directorate (VDD) started precision and protected vegetable farming program since 2016/17 AD.

## 4.2 Policy and Program Level Intervention

**A. Policy level initiatives**

- National Agriculture Policy (2004 AD)- Increasing production and productivity of agricultural crops.
- Agribusiness Promotion Policy (2006 AD)- Business support activities and market linkage development
- Floriculture Promotion Policy (2011 AD)- Public private partnership, production and marketing support.
- Agriculture Development Strategy [ADS] (2015-2035 A.D.)- Accelerate agricultural sector growth through four strategic components related to governance, productivity, profitable commercialization, and competitiveness.
- Fourteenth plan (2016/17-2018/19 AD): Competitive and self-reliant agriculture sector, increase agriculture production and productivity (value chain approach- pre to post production, output based incentive and youth focused program).

**B. Program level interventions**

- Youth focused vegetable farming program focusing on bamboo tunnel and open field condition was implemented under the leadership of the VDD from 2011/12 to 2013/14 AD.
- The MoAD developed guidelines for hi-tech-greenhouse grant program in 2014/15 AD.
- The VDD has implemented hi-tech seedling production program in Kathmandu and Bhaktapur in 2015/16 AD.
- The Fruit Development Directorate (FDD) has launched hi-tech fruit sapling production program focusing on olive sapling production in 2016/17 AD.
- With the initiation of FDD, Fruit Year 2018/19 and Fruit Decade 2015/16 to 2024/25 has launched and promote protected and semi high tech and hight tech fruits sapling production nursery establishment.

- The then Vegetable development directorate has implemented precision and protected horticulture program for supporting construction of plastic house, GI plastic house, naturally ventilated greenhouse, net house and hi-tech greenhouse for offseason vegetable production in the year 2016/17 AD. It has provisioned grant support for the abovementioned five structures based on per square meter costing and this program has discontinued from year 2018 AD.
- Prime Minister Agriculture Modernization Project (PMAMP) in its zone and super-zone area has constructed different protected structures since its first year of implementation from 2016 AD.
- From the year 2018 AD seven provincial governments are operating precision and protected horticulture programs as well as commercial farming programs in their respective command areas.
- The Nepal government has strategic aim of doubling farmers' income within five years period for this vegetable is the most potential sector.

## 4.3 The Current Statistics/Situation of Protected Cultivation in Nepal

Government projects like PACT, HVAP, HIMALI has contributed significantly for the area development in protected vegetable cultivation (83.19 ha). District Agriculture Development Offices (DADOs) has significantly contributed to the plastic house area through their own budgets and central level programs like youth focused vegetable production (595.31 ha) under plastic house. Then VDD has launched hi-tech seedling production program and precision and protected horticulture program and has contributed 16.66 ha within 2 years period. The exact database on protected and precision farming in Nepal is still lacking and there is variation in data due to lack of systematic data collection organization.

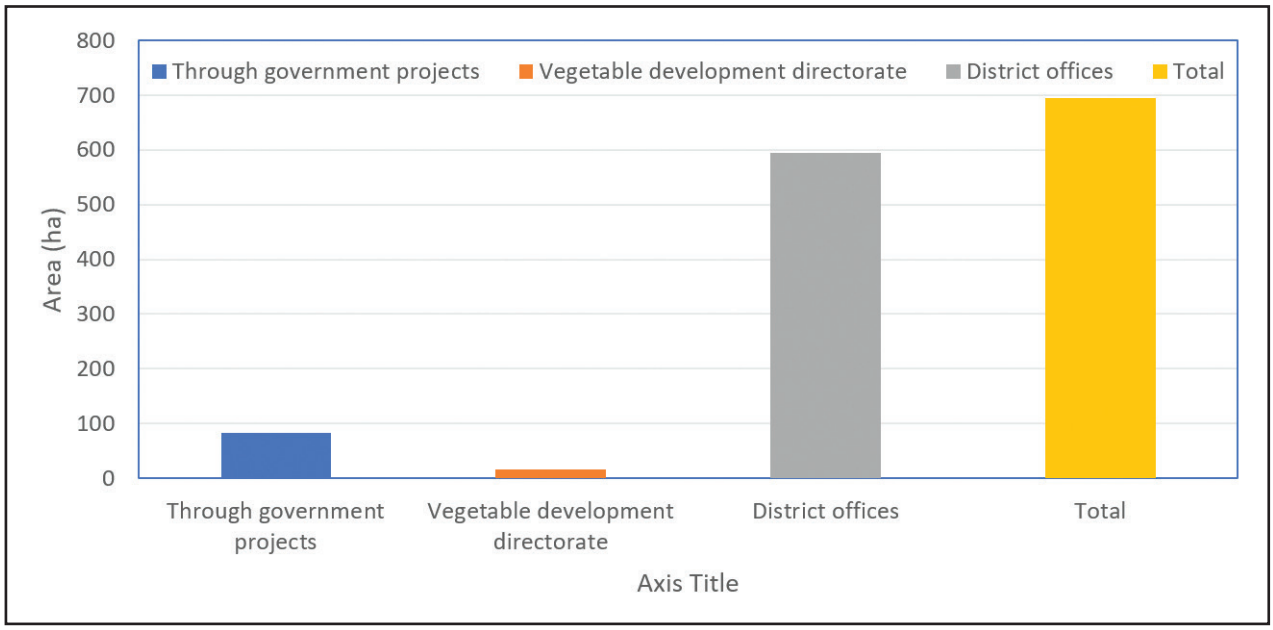


**Figure 1:** Area (ha) under protected vegetable production through different governmental organizations

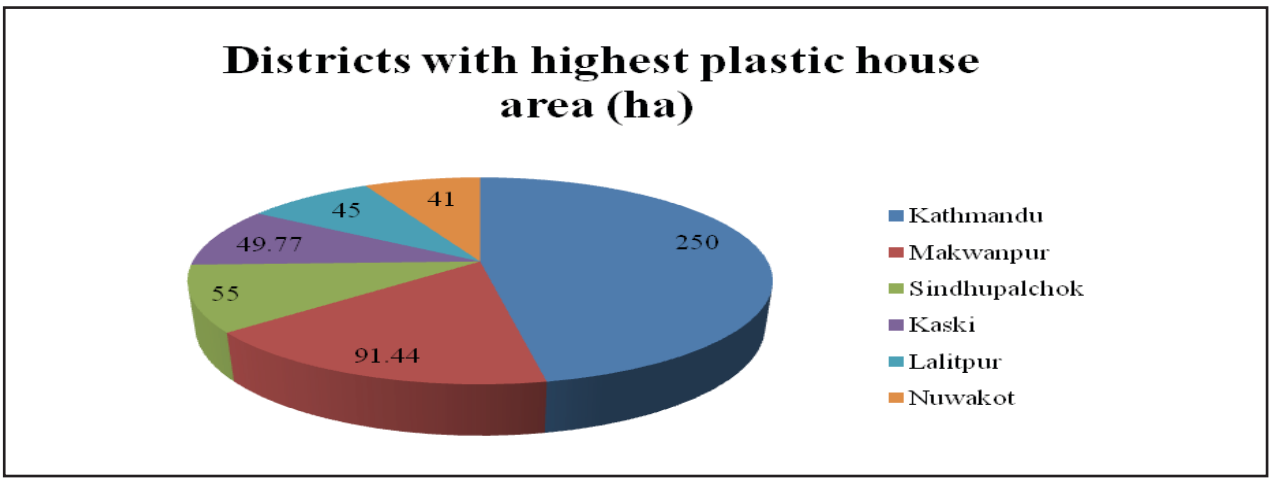


**Figure 2:** The districts with highest plastic house area (VDD, 2015/16)

**Table 1:** The total area covered by different protected structure for flori-business is given below:

| Types | Area in sq Mt | Area ha |
|---|---|---|
| Bamboo structures | 18624.46 | 1.86 |
| GI Pipes structures | 7699.43 | 0.76 |
| MS pipe greenhouse | 9619.18 | 0.96 |
| Nursery | 22582 | 2.25 |
| Production farms | 18528 | 1.85 |
| **Total** | **77053.07** | **7.7** |

*Source, CBS, 2016 and FAN compiled data*

**Table 2:** Types, present technology use and need for further improvement:

| Type | Present technology | Need for improvements |
|---|---|---|
| Rain shelter/ plastic house/ tunnel | ■ Use of silpaulin plastic as roof covering, size of house ranges from 5*12 and 5*20 meter based on topography, Ignorance on factors like wind velocity , altitude, relative humidity, temperature etc<br>■ Faulty design and lack of proper crop planning<br>■ No use of insect exclusion net<br>■ Less durable/dependent on bamboo quality<br>■ Location specific height and ventilation mechanism not considered | ■ Modification on structures based on altitude and micro climatic condition.<br>■ Careful consideration while using covering material as plastic is needed (better to use 100-200 micron plastic for better light intensity and UV stablization).<br>■ Use of ventilated poly house in mid hills and lower hill condition and dome structure in high hill, Temperature and RH controlled system, Use of mulching and fertigation facility for better yield is needed.<br>■ Mandatory use of insect exclusion net for avoiding whitefly, aphids and *Tuta* damage |

| | | |
|---|---|---|
| GI pipe tunnel | ■ Use of MS pipe so iron rusting problem after 1-2 years, Lack of proper ventilation system and height maintenance is not considered.<br>■ Ignorance on technical parts like light intensity, wind direction, RH and temperature maintenance. | ■ Height adjustment according to altitude, and climatic parameters.<br>■ Proper attention on ventilation, mulching and irrigation system is needed<br>■ Insect exclusion net with temperature and humidity control is necessary. |
| Naturally ventilated plastic house | ■ Better than other structures for the mid-hills regions of Nepal.<br>■ Problem in temperature and RH management, Height adjustment according to altitude. Variation in price and quality of materials | ■ Modification of structures based on altitude and other climatic parameters is needed.<br>■ Proper temperature and humidity maintenance with the use of fertigation and mulching needed. |
| High-tech plastic house | ■ Use of fan and pad system for cooling and heating system, costly technology, high energy consuming, difficulties in operation. | ■ Need to develop low cost technology eg sensor based and use of alternative energy |
| Net house | ■ Thermal net/double layer, use of poor quality net, durability and quality issue | ■ Need to develop cheap and location specific technology<br>■ Need more study and research on impact of net house on offseason cultivation<br>■ Quality parameters should be considered |

## 4.4 Some Technological use in Precision and Protected Horticulture in Nepal

1. Green house monitoring system
2. Farm Management System (Vegetable Crops Development Center, Khumaltar)
3. Mobile apps for technology dissemination on fruits, vegetables and flowers production
4. Sensor based temperature and RH management by the use of mobile apps for greenhouses (VCDC, Khumaltar).
5. Quality sapling production of citrus fruits species under screen house at Warm Temperate Horticulture Center, Kirtipur.
6. Germplasm collection and conservation of citrus fruit species under glasshouse (WTHC, Kirtipur).
7. Tissue culture lab and screen houses in government farm and private sector for prebasic potato seed and banana sapling production

8. Soilless farming support grant (hydro and aeroponics)
9. Vegetable (tomato, capsicum, cucumber) and flower production under structures (roses, gerbera, carnation)
10. Vegetable seedling and flower seedling production using hitech structures

**Table 3:** Analysis of different stakeholders involved in Precision and protected horticulture of Nepal

| S.N. | Stakeholders | Positive aspect | Negative aspect |
|---|---|---|---|
| 1 | Technology development organization (Agri-engineering), research and Agriculture and Forestry University (AFU) and Institute of Agriculture and Animal Science | Availability of skilled manpower, research and extension organizations<br>Course curricula on protected farming | Lack of budget, lack of specific technology for different microclimates, poor knowledge on design and installation of structures. Lack of field exposure to the students and researchers |
| 2 | Agriculture extension organization (AKC, Farm Centers) | Availability subject specific SMS in most part of Nepal | Lack of technological knowledge on structure, crop husbandry and insect/ disease management<br>Manpower development is at weaker pace. |
| 3 | Green house importers | Large number importers importing wide ranges of product | Variation in price and quality, weak post maintenance service , lack of microclimate specific technologies ( one size fits all principle adopted) |
| 4 | Farmers/farmer groups and cooperatives | Widely concentrated for producing range of vegetable, flowers for urban and peri-urban consumers | Lack of technical knowhow<br>On time delivery of materials is big issue<br>Lack of water soluble fertilizers and insect/ disease control materials<br>Technology extension is too weak |
| 5 | Fertilizers and input suppliers | Large number of suppliers, range of products available | Quality is big issue, huge variation on content and composotion, lack of crop specific product, water soluble fertilizer is not legalized yet, lack of research and development on high yielding and suitable varieties for protected cultivation. |
| 6 | Irrigation, mulching and other machinery importer | ranges technology and machinery, small to large size machine availability | weak repair and maintenance service, lack of crop specific technology |

| | | | |
|---|---|---|---|
| 7 | Agriculture marketing | Market price information on place | poor post harvest service, monopoly in market price, post harvest chain maintenance is too weak (high postharvest loss) |

## 4.5 Problem/Constrains of Precision and Protected Horticulture in Nepal

- **Land:** Fragmented land and high renting price of land in urban areas. Major market being nearby cities and most of the productions are also located in the cities, but due to increase land value in real estate landowners tend to build houses and sell to the other for same purpose rather than leasing land to nursery or farm due to lack of land contract act, the contractors shall breach the agreement anytime.
- **Workers:** There are not sufficient skilled workers available in the market. Most of the male labour forces are going for foreign employment. Only ladies, old people and children are left back home. Farmlands are left uncultivated due to shortage of workers. Most of the nurseries and farms are forced to hire female workers. So there is difficulty in doing heavy works in the farm.
- **Technical manpower:** There is very little people involvement with technical knowledge or academic background. This is hindering speed of development of this sector.
- **Inputs:** Quality and timely delivery of necessary production inputs like seed, water soluble fertilizers are the pertinent issue.
- **Policy:** Although government has come up with several policies/plan/program and directives but they have not being able to address the entire requirement for development of protected horticulture sectors. For example, there is provision for tax exemption if greenhouse is imported directly by farmer or farm. There are not many farmers who can correspond directly with companies outside, get EXIM code, and send money via bank and import. Similarly government is promoting commercial farming for better production, import substitution and even for export. To meet all above mentioned points it should have favorable policy as well as implementation and monitoring arrangement Water soluble fertilizer is the most effective way to feed crop via drip irrigation system but there is no provision for importing total water soluble fertilizers in fertilizer control order. So farmers are forced to use illegally imported fertilizers and other growth promoter at higher price despite of quality.
- **Market:** Limited market, consumers unaware about quality, porous border, lack of production planning and market information, weak postharvest handling, lack of competitiveness (small scale, low production, traditional technology).
- **Environmental Management issue:** No recycling facility for mulching and covering plastics, so problem of environmental pollution.

## 4.6 Way Forwards and Future Needs

- Need separate precision and protected horticulture research and development unit under Ministry of Agriculture and Livestock Development (MoALD).
- Need clear policy regarding costume duty simplification, liquid fertilizer import, high yielding variety registration in fast track manner and proven technology import.
- Strong monitoring and evaluation mechanism for material quality harmonization.
- Establishment of structure manufacturing units /upgrading of present units which saves time as well as money.

- Focus on skilled manpower development under research, education, and extension system for proper technology generation and dissemination.
- Revision of present course curricula on agriculture by the current agricultural institutions like TU, AFU, PU, CTEVT and etc.
- Develop some horticulture farm center as centre of excellence on protected cultivation for technology development, training and extension.
- Soft loan/zero interest subsidy based on initial investment for youth and progressive farmers and agri-entrepreneurs.
- Output based subsidy on marketable products and market linkages
- Support for postharvest activities (pre-cooling, packaging, labeling, transportation and marketing)

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