Horticulture in the Food and Nutrition System of Nepalese Economy

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Abstract

Nepal enjoys a comparative advantage in growing all major food crops including fruits, vegetables, and spices despite its food deficit and nutrition insecurity. Those who are completely dependent on agriculture are vulnerable to nutrition. Poverty and under-nutrition are also associated with geographical region, caste hierarchy, and farm size of the household. Majority of the Dalits are vulnerable to food and nutrition insecurity compared to the non-Dalits. The problem is also related with seasons of the year. The level of education of the household, family size, and the number of children below seven years also affect nutrition. Inaccessible districts are more prone to food and nutrition insecurity where market economy is rudimentary. Under-nutrition or over-nutrition prevails among the rich family and in food surplus households. To improve nutrition security, one of the key interventions considered is increased production, productivity, and consumption of nutritious horticultural crops. To achieve this, improved technology transfer through demand-based horticulture extension service delivery has been envisaged where the major components include: i) improving home-gardens for year-round production and consumption of vegetables and ii) promotion of commercialization of fruits, vegetables, and spices for cash income through improved technology and marketing system.

Keywords: agro-climate, agro-biodiversity, comparative advantage, horticultural products, high value crops.

1. Background

1.1 Geophysical Settings and Opportunities

Nepal is a land-locked, rather India - locked, and mountainous country located between China on the north and India, on the other three sides. The country is almost rectangular in shape and lies between 26 ^{0} 22" to 30^0 27" north latitude and 80 ^{0} 4" to 88^0 12" east longitude, and lies in a temperate region. Its length east to west is about 800 km and width north to south between 130 km to 240 km. The total land area is 147,181 sq km, out of which 45,493 (30.91%) sq km is under cultivation.

Topography varies from 60 m from the sea level to 8848 m, the top of the world Mount Everest. The three major ecological belts (mountain, hills, and tarai) and four distinct seasons (spring, rainy, autumn, and winter) make 12

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major combinations of agro-climatic zones. Nepal is a land of extremes as has all climatic variations within and is rich in agro-biodiversity. It receives monsoon rain from June to September from the Bay of Bengal, Indian Ocean, and Arabian Sea. Winter rain is received from the Mediterranean Sea. Sporadic rains are received both during autumn and spring. Specific forms of crop are cultivated at altitudes up to 4000 m. Temperature in the cultivated areas may go as low as -9^0 C during winter (December/January) in the Trans-Himalayan region to as high as 41^0 C in Tarai during summer (May/June). Such diversity in its climate is a great natural asset.

The eco-comparative advantages for horticultural crops for different seasons in Nepal could be summarised as follows:

a. Trans-Himalayan and High Hill Region

Trans-Himalayan and high hill region varies from 2000 to 4000 meter from the sea level. Trans-Himalayan region ranges from 2800 m to 4000 m which resembles the Tibetan plateau, the dry and cool valleys. The average daily temperature during winter (December /January) fluctuates between -9^0 C and 10^0 C, and summer temperature between 10 and 21^0 C, which favors specific perennial fruit crops and temperate vegetable cultivation. The high hill region between 2000 and 3000 m mostly lies in Mahabharata range. The average temperature during summer here varies from 10-15^0 C and goes beyond -0^0 C and where during winter snow fall and snow cover is common. During summer cabbage, cauliflower, carrot, radish, broad leaf-mustard, etc. can be grown and supplied to the lower hills and Tarai as off-season products for higher cash income.

Mid-Hill Regions

The mid-hills extend east to west from the width, elevation ranging 600 to 2000 meters. The summer temperature ranges between 20^0 and 35^0 C with hot and warm weather. Winter temperature ranges between 0^0 and 15^0 C and generally is cool and warm. In the mid-hills many fruit crops can grow such as citrus, guava, peach, pear, persimmon, litchi, banana, papaya, even mango and many other fruits. During different seasons of the year, seasonal and off-season fresh vegetables can be grown for both home consumption and income generation of high value. Both the trans-Himalayan/ high-hills and the mid-hill areas, have a potential for export - oriented farming of high value horticultural products.

b. Tarai, Inner Tarai, and Low River Basins

The elevation of Tarai, inner Tarai, and low river basin areas varies from 60 to 600 meters with summer temperature ranging between 30^0 and 41^0 and winter average between 15^0 and 20^0 with the minimum between 5^0 and 10^0 C. Cold waves and foggy days often bring very cold weather during winter. These areas can grow tropical fruits such as mango, litchi, papaya, pineapple, and bananas both as homestead and commercial crops. During winter, vegetables such as tomato, eggplant, and sweet pepper together with temperate vegetables can be grown in the plains of Tarai. Vegetables grown in Tarai and inner Tarai during winter are the off-season products for markets and cities of the hills and high hills.

c. Special Situation

In addition to the three major ecological zones, special pockets exist within the mid-hills and high hills. These pockets are the low lying deep valleys, and deeply cut river basins. In these zones of hill tops lie special pockets. In such special pockets, the micro-climates differ from place to place and valley to valley.

Horticultural output is the result of agro-climatic variation and is strongly affected by road accessibility. Mountain areas are suitable for commercial production of deciduous fruits and off-season temperate vegetable production during the summer rainy season. If there is road access, commercialization of such fruits and vegetables is possible. In inaccessible areas these crops can be promoted for home consumption to improve nutritional security. If harnessed properly, all major food crops grown in the world can be grown in Nepal. High value and highly nutritious horticultural crops such as various kinds of fruits, vegetables, and spices are the most favored crops. Hence, fruits and vegetables are the specific agricultural/horticultural commodities whose promotion could significantly drive rural economic growth to contribute to food and nutritional security.

1.2 Hunger, Poverty, and Food Security

Despite such a large agro-climatic comparative advantage, Nepal remains a food deficit and nutrition, insecure country. Food security in general term is related with caloric food availability: especially cereal crops. Nutrition security is more than caloric food sufficiency. Nutrition the security is to meet the protein, minerals, and vitamins for the healthy growth of the human body. In Nepal hunger, poverty, and food needed rity are related to livelihood options available

to the people. A large portion of the population who are predominantly food producers are themselves half-fed and under-nourished. Among all the Nepali households, 76.3% are engaged in agriculture with average landholding size of 0.7 and live in rural areas. Most of them are subsistence farmers. Among the subsistence farmers nearly 53% own less than 0.5 ha of land and only 4% hold 2 ha or more of land (NLSS/NPC, 2011). Those who are completely dependent on agriculture are mostly poor and lack cash income. The estimation of poverty in Nepal is based on the cost of basic needs. The overall poverty line is obtained by aggregating the food and the non-food poverty lines. The food basket of the poverty line is measured by estimating how much the poor spend to reach a minimum caloric requirement of 2,220 kcal per day. The aggregate poverty line, based on 2010/11 prices, has been estimated at Rs19, 261 per head, per year, the food poverty line is Rs11, 929, and the non-food poverty line Rs7, 332.

1.3 Distribution of Poverty

Though the country has an average poverty incidence of 25.2 %, the incidence of poverty differs as per the ecological region. The mountain and high hill region have as high as 42% poverty. It is 15% in urban areas in the hills and the Tarai around 24%. Food poverty also varies with season. Seasonal poverty is lowest from October to January as it is the harvesting period and agricultural labourers get farm employment and wages. Food poverty is highest during April-June (Reports of WFP). Thus, poverty is related to harvesting season and availability of labor wage. Poverty also increases with family size. If the number of kids below 7 years is large, food poverty increases. Poverty also differs with so called caste hierarchy. Among Dalits, 42% are poor, compared to 23% among the non-Dalits. Poverty decreases with level of education. Higher education is dependent on the economic status of the household. Households headed by agri-wage workers are the poorest compared to those headed by educated professionals. Thus it is a vicious cycle.

Poverty and under-nutrition are also related to the farm size of household. Farming households with less than 0.5 ha of land are overwhelmingly poor and vulnerable to food and nutrition. Households with less than 0.5 of land holdings are completely dependent on agriculture and labor-wage. Among Nepal's 75 districts, 41 districts are categorized as food deficit where majority of the people have agriculture as a source of livelihood. Those who are completely dependent on agriculture and agriculture wages are vulnerable to nutrition. Hunger and under-nutrition is linked with food security and food security is linked with farm size and agriculture.

2. Challenges in Improving Nutrition Security

Despite the comparative advantages of nutritious food production and consumption major challenges and drawbacks exist.

Challenge at Macro-Level (Sector Level)

The challenges at macro-level include:

- Absence of household level nutritious food production and consumption strategies;
- Absence of comprehensive food and nutrition policies for the different ecological regions;
- Inadequate coordination among the concerned ministries in food and nutrition security;
- Low investment in marketing, post-harvest management, and storage facilities for perishable products like fruits and vegetables.

Challenges at Micro-Level (Community Level):

The impeding factors or reasons for not growing fruits and vegetables at the community level, despite favorable climatic and seasonal opportunities include:

- Poor technical knowhow and non-availability of quality planting materials (seed, seedlings, saplings etc.) at the grassroots level;
- Absence of appropriate production technical service delivery to the needy households;
- Absence of appropriate food preparation, preservation, and consumption knowledge, skill, attitude, and behavior among the target groups.

Challenges at the Household Level:

A third challenge at the HHs level or among the members of HHs is that of low consumption of nutritious food or uneven distribution among family members. This challenge is related to certain traditional beliefs, taboos, and misconceptions. These can be explained as:

- Wrong concept of hot and cold food among pregnant and lactating women, and among children below five years about fruits and vegetables consumption that this would create stomach disorder;
- Poor knowledge about nutritious fruits and vegetables and their preparation and use;
- Among cereal-based diets, pulses and vegetables are considered merely as items to accompany cereals and not as nutritionally important food items;

- Misconception that green leafy vegetables, legumes, and some fruits and root-vegetables are not suitable for children, lactating mothers, and elders because they are not digestible and are the cause of stomach ache and diarrhoea;
- Production of a few high value commercial products like cauliflower, cabbage, tomato, and potato for income generation, and not linked to nutrition and family consumption.

3. Food Security and Nutrition Security

3.1 Definition and Dimensions of Food and Nutrition security

Any hungry person needs food security first and then goes for nutrition security. As defined by the 1996 World Food Summit, food security *"*...exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.**"** (WFS, 1996)

Thus there are four dimensions of Food and Nutrition Security:

1. Physical access to nutritious food
2. Economic access to nutritious food
3. Utilization of nutritious food
4. Sustainable supply of nutritious food

The current Interim Constitution of Nepal recognizes "food sovereignty and right to food" as one fundamental right of the people. When people have access to safe food stuffs with sufficient quantities of carbohydrates, proteins, minerals, fats, and vitamins regularly throughout the life cycle, it is nutrition security.

3.2 Basic Functions of Nutritious Food

Nutritious food should perform three basic life functions: i) promote growth and development; ii) provide energy to work and conduct physiological functions; and iii) protect from deficiency and diseases. To perform these functions the human body requires a balanced diet.

3.3 Components of Balanced Diet

A balanced diet consists of safe food stuffs with sufficient quantities of carbohydrates, proteins, minerals, fats, and vitamins. For this purpose each meal

should be based on vegetable products. Cereals should constitute only half of the meal; for protein legume supplements are compulsory; and fruits such as papaya, pineapple, strawberry, mango, guava, banana, temperate fruits or fruit vegetables must be included in the meal, and animal origin food should be equal to or less than 15% of the meal and should always be eaten with vegetables. Variety in foods is best because not one food meets nutrients all required. Fiber is called the body's broom, because the insoluble fiber binds with water to escort waste out of the body. Normally, the acid-alkali ratio in the blood should be 20: 80. Maintenance of this ratio is essential to keep the body healthy. All toxic substances in the body are in the form of acid and to prevent accumulation of acid in the body, we must take food that is mainly alkali-genic. Vegetables like spinach, leafy salad (lettuce), cucumbers, turnips, sweet potato, radish, cabbage, cauliflower, onions are alkali-genic. All these produce alkali-genic effect ranging from 3% to 28%. The alkali-genic vegetables constitute an efficient eliminating and cleansing agency.

3.4 Management of Nutrition Across the Life Cycle

In normal developed economy and urban areas, nutrition education on the required amount of food consumption may work. For the well - off urban people, simple nutrition information may trigger purchase and consumption as they have the affording capacity. For the urban, poor increased wage/employment/cash income and mass nutrition education will trigger nutritious food consumption. Once people are aware of nutrition and have the capacity to buy it, they will buy and consume it. In the urban areas such foods are available and people may have cash income and can afford and consume. But the situation is different in the rural and far-flung areas where poverty is rampant and market economy is rudimentary. How is one to address the problem of nutrition across the life cycle in situations where poverty and food deficit prevails, road access is minimal, cash income is below average, employment opportunities at the local level are minimal, and districts are declared food deficit areas?

Access to and consumption of all required foodstuffs by all people throughout the life cycle is a major issue. The answers and options may be different for different areas and different categories of people. The issue of nutritious food consumption by the poor in remote areas is of prime importance and here the responsibility lies with the state. The alternative options left with such people and areas are to promote production and consumption of safe nutritious foods at the household level. For this; promotion of year-round home

garden with various vegetables and fruits as family - based nutritious food production and consumption campaign is a solution with state support.

4. Agriculture Development Strategy (ADS) and Nutrition Security

The government of Nepal (GoN), with technical support from FAO, has formulated the Food and Nutrition Security Plan (FNSP) that constitutes a chapter in the Agricultural Development Strategy (ADS) for the decade 2013-23. The FNSP also complements the Multi-sector Nutrition Plan for Accelerating the Reduction of Maternal and Child Under-nutrition in Nepal (MSNP). Both the FNSP and the ADS have a vision to ensure national food and nutrition security with specific focus on the agricultural/horticultural sector as the main vehicle that can deliver it.

In FNSP there is a horticultural component in ADS. The main objectives of this component are to deliver food, nutrition, and livelihood of people through increased yields, production, and diversity of high value crops through inclusive, competitive, sustainable, and commercial horticulture and increase the availability and diversity of nutritious food at the household level throughout the country for nutritional improvement and commercialization and marketing in accessible areas for income generation. The component is expected to improve household nutrition and income through the production of fruits and vegetables throughout the year in specific eco-regions applying appropriate technology.

The ADS/FNSP Horticulture component includes more than 20 crop models for which the main interventions include: (i) improving home gardens for year-round production of vegetables, fruits, and spices; (ii) establishing village multipurpose resource nurseries (VMRN) for regular supply of planting materials and establishing home gardens for year-round supply of nutritious food; (iii) training individual producers and cooperatives in marketing of surplus production from home gardens and commercial areas; (iv) supporting farmers in accessible areas to produce sub-tropical, temperate, and deciduous fruits and seasonal and off-season vegetables for local and distant markets; (v) enabling farmers to get organized in cooperatives to enter into production and marketing value chains for improved economy of rural farmers. The proposed commercial models of vegetables, fruits, and spices will generate local employment and make best use of the local resources.

5. Expected Outputs of Horticulture Component under the FNSP

- Improving and establishing home gardens, especially through appropriate technologies, for year-round production of vegetables and spices;

- Establishing village multipurpose resource nurseries (VMRN) for regular supply of planting materials (seed, seedlings, and saplings) at the local level;
- Supporting market development for surplus production from home garden to generate income;
- Supporting farmers in accessible areas for commercial production and marketing of fruits, vegetables, and spices;
- Enabling producer groups to be part of an organized value-chain.

6. Target Beneficiaries

Horticulture component of the FNSP intends to target some 522,500 extremely poor households or over 3 million people of all ecological regions including both accessible and non-accessible far-flung areas. Poor households are further defined, as per the definition of the Poverty Alleviation Fund (PAF), as households whose food grain production from their own land plus wage earnings are insufficient to meet the food requirements of the family for the whole year.

These poor HHs are further sub-divided as follows:

- Households categorized as 'A' or 'Ultra - Poor' if they have food self-sufficiency of less than 3 months;
- 'B' category or 'Medium-Poor' HHs that have food sufficiency for between 3 to 6 months;
- 'C' category or 'Poor' HHs that have food self-sufficiency of between 6 and 12 months; and
- 'D' category or 'Non-Poor' HHs that have food sufficiency of more than a year, among other criteria set by the communities, though these HHs are not of concern here.

Capacity building training and production inputs have to be provided to the target household for home gardening for nutritious food production and consumption and commercial vegetable, fruit or spice production. The outputs from these activities (fruits, vegetables, and spices) are intended for domestic consumption as well as markets. In addition, 1,100 village multi-purpose nurseries shall be established to supply planting materials regularly to home gardeners.

A group approach with 10-15 members in mountains, 15-20 in the hills, and 20-25 in Tarai should be the basis for technical and financial support. Various kinds of fruits, vegetables, and spices have different planting seasons in

different ecological regions. Social mobilization and skill development training should be provided to the group members for implementing the appropriate crop model as per the local ecological conditions.

7. Implementation Arrangements

7.1 Implementation Strategy

Horticulture crops, also generally referred to as high value agricultural crops and commodities (HVACs), can make a very important contribution to income generation, poverty alleviation, food and nutrition security, and livelihood improvement. The strategic interventions are:

- Throughout the districts identified as food deficit and nutritionally poor, home gardening, and commercial production of fruits, vegetables, and spices in road accessible areas with market linkage and value chain approach;
- Increased access to high quality planting materials (vegetable seeds, seedlings/fruit saplings) depending on home gardening and selected commercial model through VMRN and private sector service delivery agents;
- Improved and increased access to quality technical services through government and non-government service providers (horticultural technicians at VDC and production pocket levels);
- Improved cohesiveness and capacity of farmer groups and cooperatives in the horticulture sector for organized value chain and marketing;
- Improved access to credit support and facilitation to make effective use of it;
- Improved access to irrigation and water management and efficient water use system.

7.2 Implementation Modality

The horticulture components would be implemented through a multi-stakeholder strategy. Fruit is a long-term enterprise, and specific fruit crops are fit for a particular region (temperate fruits in high hills and trans-Himalayan region, sub-tropical fruits in mid-hills, and tropical fruits in Tarai). Commercial fruit orchard requires specific geographic locations and desired economies of scale for marketing. Therefore, farmers with relatively larger holdings (>0.5 ha) should be targeted. Abandoned Bari lands, degraded forests under lease, and community

forests can be used for commercialization of fruit crops. This category of beneficiaries will face a relatively higher risk bearing capacity to adopt any enterprise and will be emphasized for C and D category HHs (Section 6). Vegetables are short-term enterprise and can be adjusted to different seasons of the year in different ecological areas for both home gardening and commercialization. Home gardens will be emphasized in all ecological belts (remote high hills, mid-hills, and Tarai villages where under-nutrition is widespread).

Home Garden

A home garden refers to a piece of land near the house where vegetables, fruits, ornamentals, medicinal plants, beekeeping, fish farming, poultry keeping, small livestock etc (whichever possible) are produced, utilizing household waste-water and using family labor for year-round consumption of nutritious foods and surplus sale in the local market. Improving nutrition from home gardening requires basic production skills, production inputs, and food preparation and consumption techniques. Based on the dietary research, 280 gram vegetables including dark green leafy vegetable, legumes, yellow fruits, root-vegetables, and animal products such as liver, fish, egg and other animal products like milk, meat butter etc are required for the healthy body.

The size of home garden depends on the number of family members. At the rate of 280 gm vegetables per day per person will require nearly 100 kg of vegetables per year per person will be necessary of If the family size is six, then, 600 kg cleaned vegetables will be required per year. From one square meter of fertile land, 4-6 kg vegetables can be harvested if managed properly. Generally, three crops can be taken from a piece of land per year. Therefore, for harvesting 600 kg, 50 to 75 square meters land of is sufficient. However, intensive cropping plan and year-round production calendar must be followed.

For those not having sufficient land, rooftop gardening and veranda gardening could be adopted.

7.3 Implementing Agencies

The FNSP envisaged no new additional and parallel institutions to implement the envisaged activities. Coordination and implementation relies heavily on the existing institutions at all levels, including central, district and VDC levels. This is aimed at strengthening the existing institutions and extension system to ensure sustainability and long-term development. The lead implementing agency for FNSP is the Ministry of Agriculture Development. The collaborating Ministries are the Ministry of Health and the Ministry of Education. The District Food and Nutrition Security Steering Committee (DFNSSC) or existing District Agriculture Development Committee (DADC) would be the coordinating body at the district level. I/NGOs, CBOs, and cooperatives working in agricultural activities in the district affiliated with DDC and DADO would work under the

direction of DFNSSC or DADC. Home gardening should be integrated as a cross - cutting component in all agricultural programs/projects. At the VDC level, VDC chairperson would coordinate implementation of FNSP. Agriculture, Forestry and Environment Committee (AFEC) and Citizen Awareness Center (CAC) may play the main facilitating role for CBOs and farmers groups to implement FNSP effectively. AFEC and CAC can implement one window entry point in each VDC for all the development agencies NGOs, I/NGOs, CBOs, and local institutions.

7.4 Service Providers at VDC and Pocket Levels

- For effective service delivery, Horticulture Technician has been envisaged for each VDC for technical backstopping to the farmers at the grassroots level for result-oriented horticulture extension and nutrition education services.
- GoN should also develop private extension service providers by giving them intensive training and licence, and supporting them through a pilot coupon system as Local Service Providers for Demand Responsive Service delivery mechanism.
- The existing Agriculture Service Centers should be converted into a center of excellence for demonstrating new technology whereby horticultural producer groups may see and learn new technology. Thus the Horticulture Technicians will not only play technical and advisory roles, but will be contracting, supervising, and monitoring the DRSP and coupon-contracted advisers.
- VDC matching grants (currently about 15% of the total budget) could be mobilized to develop Village Multipurpose Resource Nurseries (VMRN), support the development of Home Gardens and small tools and irrigation facilities, poly houses and training to target beneficiaries for selected crop models suitable for a particular VDC.
- For nutrition security, home gardening must be made a mandatory component in all agricultural projects and programs and the Government should direct and advocate NGOs and VDCs to implement year-round home gardening for nutrition security. For income generation, commercial enterprise development (market-oriented production of fruits, vegetables, and spices) is recommended with basic support and skill development training.
- For income generation, commercial enterprise development (market oriented production of fruits, vegetables and spices) is to be promoted

with skill development training for at least one model of vegetable or spice or fruit and crop and livestock in each HH in the target districts.

8. Results Expected

More than half a million extremely poor and vulnerable households can be expected to benefit from this component in the three agro-ecological zones, namely, Tarai and plains, hills, and mountain regions. The box below presents a snapshot of the overall expected results:

Expected results from implementation of FNSP

1. More than half a million most vulnerable and food insecure households will have access to nutritious food from their home garden.
2. Per capita per year availability of fruits and vegetables will rise; fruits to 42.9 kg up from 15.9 kg an increase of 170% and vegetable from 67 kg to 102 kg, (increase of 52 %) through increased productivity and efficient marketing.
3. Poverty incidence will be reduced proportionately in ecological regions and the various urban areas to 16.9% from 25.2%.
4. Yields of fruit will reach 12 MT/ha from 10.03 MT/ha (an increase of 20%) and vegetables 18 MT/ha from 12 MT/ha (an increase of 50%) in 10 years
5. An additional 8,000 Horticulture Technician (J.T. /J.T.A.) will be employed in VDCs.
6. Additional 15 million Labor Day's employment will be generated annually in horticulture crop cultivation.
7. Fruit and vegetable import will be substituted by domestic production and export of off-season vegetable and temperate fruits and citrus will increase considerably.
8. Agro-based industries will have improved access to raw materials from increased production.

9. Conclusion

Fruits, vegetables, and spices, the three major sub-components of horticulture, are high value crops for income generation and are major sources of proteins, vitamins, minerals, and calories required for human nutrition. In Nepal's subsistence-oriented agrarian economy, promoting their production, consumption, and marketing can help to achieve the FNSP objectives in terms of immediate, medium, and long-term strategy. There is a wide range of flexibility in selection of long-term and short-term horticultural crop species by the target beneficiaries in all ecological regions. The proposed home garden and Village Multipurpose Resource Nurseries can sustain year-round home gardens for nutritious food supply at the household level. Commercial models of vegetables, fruits, and spices can generate local employment and make best use of local

resources for market - oriented production and income generation. All the proposed crops and technological models have been tested in various eco-zones. In order to reduce the climate change impact, long-term and short-term crops have been proposed to decrease the risk of crop failure.

The key constraints on nutrition security are inadequate technical knowledge of farmers' in home garden and nutrition education among the HHs. Project investment will therefore concentrate on improving the knowledge, skill, attitude, and behavior about nutritious food production and consumption at the household level. Demand-responsive extension service and the establishment and improvement of home gardens with intensive year-round production pattern through group approach and cooperatives have been proposed.

Another constraint of establishing year-round home garden and commercial fruit orchard is the non-availability of seedlings, saplings, and planting material at the community and household level. This component, therefore, envisages the establishment of Village Multipurpose Resource Nursery (VMRN) at the VDC or even at three wards level. This is a fact tested and validated by Helen Keller International and CEAPRED in their home gardening program. The objective of VMRN is to develop a sustainable resource center to produce seedlings, saplings, and other planting materials and sell them to the local beneficiaries. The actual size of the land should be at least 1-2 ropanis to produce the seedlings, saplings, and planting materials required and maintain mother plants of specific fruits locally suitable. Initial support can be provided by the supporting agencies (project, VDC, GoN etc) during the first two years and thereafter it may be sustained as a local service delivery and business enterprise. It should be a sustainable resource center and technical service delivery unit for the target population as a venue for practical training and modern technology demonstration center for commercial production and demonstration. VMRN is a basic resource center proposed under FNSP for continuous supply of planting material supply and service delivery at the local level.

The overall objectives of this component are to: (1) increase knowledge and practices about the nutritional value of horticultural crops locally at the household level; (2) increase consumption of various fruits, vegetables, and other food commodities, and generate cash income; and (3) improve food consumption behaviour. Education on nutritious food production, and consumption of nutritious food is very important. Increased production and consumption and surplus sale of such food crops brings nutrition security and higher rural household incomes and ensures overall food security. Nutrition education helps to improve the nutritional quality of the food consumed. Small-scale local food processing improves access to food products made from local ingredients, and

has been successfully supported by the Poverty Alleviation Fund (PAF) and other rural finance initiatives, as also by media marketing of local food.

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