

FRUIT CROP DEVELOPMENT IN NEPAL: ACHIEVEMENTS AND FUTURE STRATEGY

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ABSTRACT

Nepal, a land locked country with an area of 147,181 sq.km has the total cultivated area of around 3 million hectares, of which around 4.79% is covered by fruit crops. Owing to its greatly varied geographical and climatic conditions, Nepal accommodates wider biodiversity, and this applies to the growing of diverse biotypes of fruit species as well. Southern Terai regions are suitable for cultivation of tropical fruits while mid-hills and high-hills towards north are suitable for sub-tropical to warm and cold temperate fruit and nut species. The total area, productive area, production and productivity of fruits in the Fiscal Year (FY) 2014/15 are 150387 ha, 110802 ha, 992703 mt and 8.96 mt/ha respectively. Despite of increasing area and production and huge potential of fruit cultivation in the country, the quantity and value of foreign importation of fruits is increasing in recent years due to higher rate of the increasing internal demand in comparison to rate of increasing domestic production and supply. The fruit development is still in infant stage due to lower resources allocation and frequent changes of institutional and human resources on fruit research and development, though some good ground work has already been done during the past decades in major fruits produced in the country. Programs such as Apple self reliance program and Citrus orchard rejuvenation Program have a good demand and impact on the respective fruit crops in the implemented districts. In order to make the country self reliant on fruits, the Fruit Development Directorate has proposed a Fruit Decade and a Fruit Plantation Year. For the fruit development of the country, programs on the whole of the value chain of fruits from production to consumer table need to be accommodated. This article tries to summarize achievements done in the past and provide proposed key strategies related to Horticulture sector as per the Agriculture Development Strategy.

Key word: Fruit development, Biodiversity, Self reliant, Future strategy

Introduction

Nepal is a land locked country with 147,181 sq.km in area and has around 28 million population. Agriculture has been playing a dominant role in the Nepalese economy providing livelihood and jobs for 65.6% of its total population and contributing to one third of the national GDP. The total cultivated area is around 3 million hectares, of which around 4.79% is covered by fruit crops. The contribution of the horticulture sector amounts to 15% of Agriculture GDP, of which almost half is constituted by fruits. Owing to its greatly varied geographical and climatic conditions, altitude ranging from 70m (Kechana Kalan in Jhapa) to 8848 m (Mt. Everest) asl, Nepal accommodates wider biodiversity, and this

applies to the growing of diverse biotypes of fruit species as well. There are 45 species belonging to 37 genera of wild edible fruits (Kaini, 1994). Seasonal fruits harvested from the forests can be seen in many local markets even today. Southern Terai regions are suitable for cultivation of tropical fruits while mid-hills and high-hills towards north are suitable for sub-tropical to warm and cold temperate fruit and nut species. The total area, productive area, production and productivity of fruits in the Fiscal Year (FY) 2014/15 are 150387 ha, 110802 ha, 992703 mt and 8.96 mt/ha respectively. Despite of increasing area and production and huge potential of fruit cultivation in the country, the quantity and value of foreign importation of fruits is increasing in recent years due to higher rate of the increasing internal demand in comparison to rate of increasing domestic production and supply. The per capita availability of fruit in the fiscal year 1014/15 is 34 kg/year. Even though Nepal has a few decades of fruit development and research under its belt, it is still in infant stage due to lower resources allocation and frequent changes of institutional and human resources on fruit research and development. However, some good ground work has already been done during the period of less than six decades in major fruits produced in the country. This article tries to summarize achievements done in the past, present status of fruit production, import/export and activities of proposed fruit decade/year, and also provide proposed key strategies that need to be followed.

Achievements

A. Institutional Development

1948	Horticulture unit in Agriculture Station Kakani
1951	Establishment of Plant Introduction Unit, Putali Bagaincha
1955	Horticulture Section under DOA
1960-1973	13 Horticulture Farms were established by the government with the support of Indian Cooperation Mission
1967	Dept. of Horticulture was established along with 4 other depts.
1972	<ul style="list-style-type: none"> • Dept. of Horticulture was merged into Dept of Agriculture. • Fruit Development Division and Vegetable Development Division formed • National Citrus Development Program
1975	Agriculture year-2,00,000 saplings of apples and other temperate fruits were imported and distributed in Karnali Zone.
1978	<ul style="list-style-type: none"> • Commercial farming of Coffee started in Gulmi, Palpa and Arghakhanchi • Strengthening of horticulture farms of Kirtipur and Jumla by HADP (Hill Agri. Devt.Proj) by providing exotic cultivars of warm temperate and temperate fruits.
1981	Junar (Sweet orange) Development Program in Sindhuli and Ramechhap Citrus Priority Program in 5 districts; Dhankuta, Sindhuli, Ramechhap, Kaski and Dailekh

1987	<ul style="list-style-type: none"> • National Agriculture and Service Centre (NARSC) was created to undertake research activities. • Horticulture Development Project was started with the support of JICA <ul style="list-style-type: none"> ➤ Promotion of Junar in Ramechhap and Sindhuli. ➤ Pear and Chestnut in Kathmandu, Bhaktapur and Lalitpur. ➤ Grapes in Banke and Bardiya
1988-1996	Hill Fruit Development Project with loan assistance ADB, launched in 11 eastern districts.
1989-1991	<p>Master plan of Horticulture Development for 20 years- was not implemented.</p> <p>Following programs were suggested:</p> <ul style="list-style-type: none"> • Commercial Fruit Production Program • Subsistence Fruit Development Programme • Horticulture-based Industry Development program • Research and Extension program • Human Resource Development program • Horticulture Export Facilitation Program
1990	Reestablishment of the Department of Horticulture
1991	NARSC was given autonomy and named NARC (Nepal Agriculture Research Council).
1992	<ul style="list-style-type: none"> • Dept. of Horticulture was merged into Dept of Agriculture Development. • 75 Hort. Devt Officers in 75 districts. • Floriculture Association of Nepal (FAN) was established.
1993	Leasing out of 5 govt. horticulture farms (Panchkhal, Darma, Sindhupalchaur, Dhunibesi and Janakpur)- They were returned to govt, after a few years.
1994	Kalimati Fruit and Vegetable Wholesale market was established.
1997	APP implementation for 20 years. Prioritized apples in high hill and citrus in mid hills.
2000	National Tea Policy was also approved
2003	National Coffee Policy was also approved
2005	Karnali zone Agriculture Development Program (KZADP) was launched with major focus on temperate fruits apple and walnut.
2006	<p>One Village One Product (OVOP) program in partnership with FNCCI</p> <ul style="list-style-type: none"> • Nepalese hog plum (Lapsi) in Bhaktapur, Junar in Sindhuli and Ramechhap, Bel fruit (Aegle marmelos) in Bardiya and Siraha, Orchid in Lalitpur
2007-2014	Lime Mission Program in Terathum, Dhankuta, Bhojpur and Makawanpur

2010	High Value Agriculture Project (HVAP) with the support of IFAD in 10 districts
2011	<ul style="list-style-type: none"> • Apple Self Reliancy program in 7 districts; Mustang, Manang, Jumla, Humla, Dolpa, Mugu and Kalikot • High Mountain Agriculture and Livelihood Project in 10 Mtn districts
2013	<ul style="list-style-type: none"> • Citrus Orchard Rejuvenation Program in 8 districts; Dhading, Gorkha, Lamjung, Tanahun, Kaski, Syangja, Parbat and Myagdi • National Floriculture Policy was approved.
2015	Olive Promotion Program for 10 districts

- **Apple Self Reliancy program** is a program that is now highly sought after, with a good impact on enhancing area and quality production of apples in high hills.
- **Citrus Orchard Rejuvenation Program** has also been found to have a good demand and impact on rejuvenating Mandarins in mid hills.
- KZADP, HVAP and Himali projects are also contributing to the development of specific fruits along with other commodities and parameters.
- Many of the commodity programs were terminated even without the specified period of time allocated for the project (Pomegranate, Kiwi, Mango, Litchi, Banana, Floriculture).

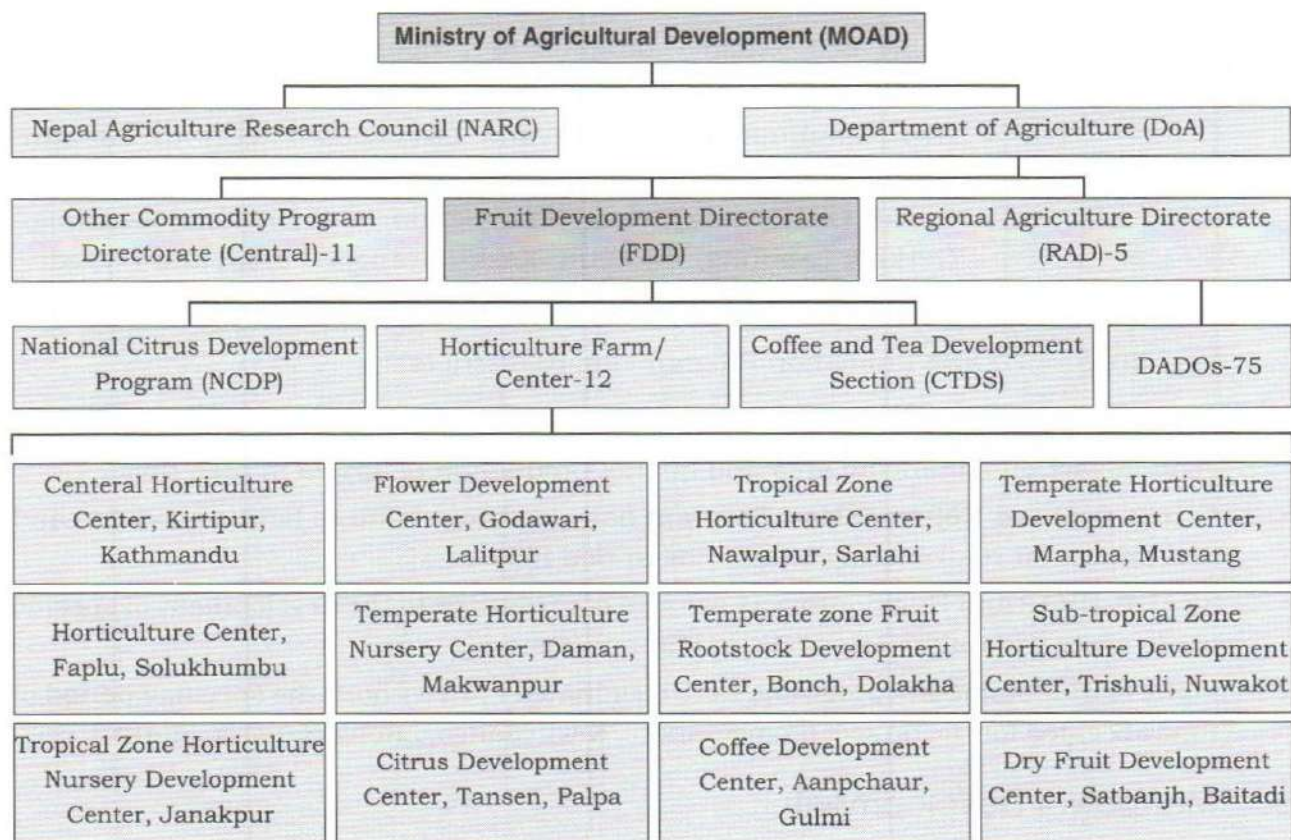
B. Manpower Development

- The 1st horticulturist was appointed in 1941
- The number increased to 16-17 by the 60s and 20 more by the 70s.
- By now, it has gone up to >200 officers and >250 junior technicians under the DOA/ MOAD.
- Very few officers are dedicated to fruit sector, and farm/centers are less attractive to young graduates due to poor resources and opportunities.

C. Infrastructural Development

- Infrastructural development such as roads and transport facility, irrigation, mechanization, storage facility, postharvest and processing facility and market facility are important for fruit development.
- Roads and transport has increased, connecting the production areas to the market. At present >25000 km of roads have been constructed in the country. Road connection to Karnali zone and Manang- Mustang have encouraged the locals to expand fruit growing areas.
- Most of the cultivated orchards are rainfed, while some commercial growers have started using various types of irrigation methods; plastic ponds, drip, sprinklers.
- Postharvest and processing facility and market facility are gaining momentum, realizing their importance in the fruit sector development. Many of the ongoing projects (HVAP, Himali, RISMFP, PACT) have value addition component in them.
- Agriculture Development Strategy also has given importance to value chain development for the development of commodity sectors.

Present Organizational Structure and Activities



Present Status

Major activities of FDD and central offices under FDD

- FDD is the Government technical authority in fruit development sector.
- The directorate coordinates the fulfilling the demand of planting materials of fruits.
- Prepares subject matter specific technical materials in the form of pamphlets, posters and booklets and the distribution of said materials.
- Preparation of plans, working policies for national fruit development program including tea & coffee, floriculture.
- Establishment of technical linkage and co-ordination with other government line agencies, research organization and INGO/NGO for implementing fruit development program.
- Technical support to the farmers and entrepreneurs for commercialization of fruit development program.
- Providing resource personnel for training on fruit, tea & coffee and floriculture.
- Monitoring and evaluation of National Fruit Development Programs.
- Verification and modification of relevant technology through Horticulture centres and private resource centers.
- Quality control of planting materials.
- Collection and compilation of data on Fruit area and production from districts

Major activities of farms/centres

- Fruit saplings production and distribution
- Fruit rootstocks and mother stock production and orchard management,
- Ornamental sapling production and distribution,
- Private nursery monitoring and supervision,
- Technical service to farmers,
- Collaborative study, trial and technology development,
- Germplasms/variety collection and conservation,
- Farmers' training and school horticulture program.

Area, Production and Productivity of Fruits (2014/15)

Fruits	Area (ha)	Productive area (ha)	Production (mt)	Productivity (mt/ha)
Tropical	84227	68691	641759	9.34
Citrus	39035	25261	222789	8.82
Temperate	27125	16849	128155	7.61
Total	150387	110802	992703	8.96

Top Ten Exported Fruits in FY 2013/14 AD

S.N.	Fruit	Quantity (Mt.)	Values (NRs.)	Exported to
1	Areca nuts	23,176.74	4,13,47,63,382	India and China P.R.
2	Mangoes	676.86	99,46,569	India and China P.R.
3	Citrus fruits (orange, lemon, lime)	314.19	34,29,523	India
4	Cherries	22.5	24,06,450	China P.R. and India
5	Dried Apricots	9.47	17,00,721	China P.R.
6	Brazil nuts in shell	288	15,42,000	India
7	Dry fruits	26.44	12,68,320	China P.R.
8	Pears	144.2	12,07,200	India
9	Apples, fresh	22.9	8,32,266	India and China P.R.
10	Strawberries	9.08	8,20,450	India

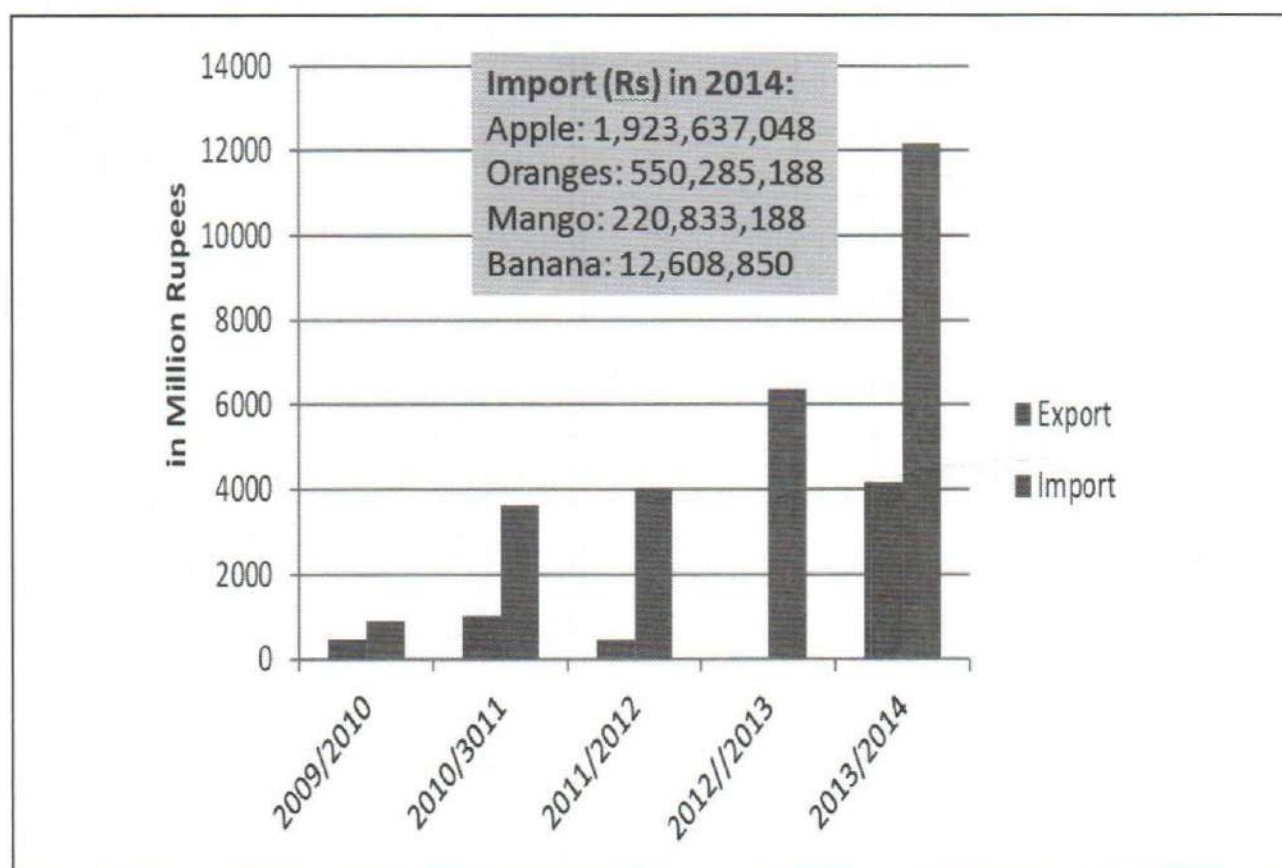
Source: MoAD, 2014

Top Ten Imported Fruits in FY 2013/14 AD

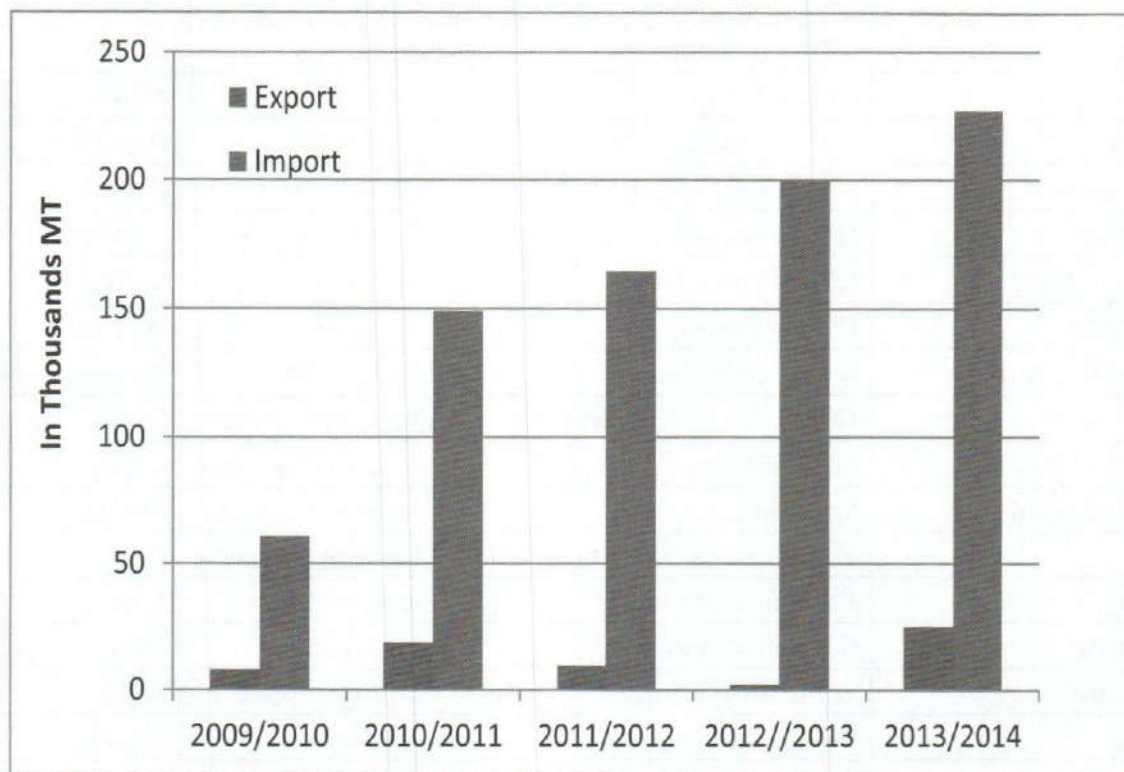
S.N.	Fruit	Quantity (Mt.)	Values (NRs.)	Imported From
1	Areca nuts	78,355.14	7,66,71,62,009	Indonesia, Thailand, India, Malaysia and Singapore
2	Apples, fresh	56,447.02	1,92,36,37,048	China P.R. and India and U.S.A.
3	Citrus fruits (Orange, Lemon, Lime, Grape fruit)	21,503.49	55,02,85,188	India, China and Thailand
4	Cashew nuts	571.64	24,61,27,767	India and Vietnam
5	Desiccated coconut	2,227.39	22,91,99,624	India
6	Fresh Grapes	11,762.28	22,72,49,147	India
7	Mangoes	13,352.61	22,08,33,188	India, Nicaragua & Thailand
8	Almonds, shelled	252.07	13,83,00,382	U.S.A. and India
9	Bananas, fresh or dried	22,556.11	13,49,48,132	India and China P.R.
10	Dates	2,359.66	13,15,60,875	Pakistan, India, China P.R., Saudi Arabia, U.A.E., Thailand and Tunisia

Source: MoAD, 2014

Import and export of Fruits in last 5 years (in Value)



Import and export of Fruits in last 5 years (in Volume)



Major Fruits Grown in Nepal

English Name	Scientific Name	Family	Nepali Name
A. Tropical Fruits			
Mango	<i>Mangifera indica</i>	Anacardiaceae	Aanp
Litchi	<i>Litchi chinensis</i>	Sapindaceae	Litchi
Banana	<i>Musa paradisiaca</i>	Musaceae	Kera
Plantain	<i>Musa sapientum</i>	Musaceae	TarkariKera
Coconut	<i>Cocos nucifera</i>	Anecaceae	Nariwal
Pineapple	<i>Ananas comosus</i>	Bromeliaceae	Bhuinkatahar
Mountain Papaya	<i>Carica candomarcensis</i>	Caricaceae	Paharimewa
Papaya	<i>Carica papaya</i>	Caricaceae	Mewa
Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae	Rukhkatahar
Date	<i>Phoenix dactylifera</i>	Palmae	Chhohara
Bael	<i>Aegle marmelos</i>	Rutaceae	Bel
Sapota	<i>Achras zapota</i>	Sapotaceae	Sapota
Cashew nut	<i>Anacardium occidentale</i>	Anacardiaceae	Kaju
Guava	<i>Psidium guajava</i>	Myrtaceae	Amba, Belauti
Avocado	<i>Persea americana</i>	Lauraceae	Ghewphal
Jujube	<i>Zizyphus mauritiana</i>	Rhamnaceae	Ber
B. Sub Tropical Fruit			
Lime	<i>Citrus aurantifolia</i>	Rutaceae	Kagati
Sour orange	<i>Citrus arantium</i>	Rutaceae	-

Pummelo	<i>Citrus grandis, C. Maxima</i>	Rutaceae	Bhogate
Rough lemon	<i>Citrus jambhiri</i>	Rutaceae	KatheJyamir
Sweet lime	<i>Citrus limettioides</i>	Rutaceae	Chaksi
Lemon	<i>Citrus limon</i>	Rutaceae	Nibuwa
Citron	<i>Citrus medica</i>	Rutaceae	Bimiro
Hill lemon	<i>Citrus psuedolimon</i>	Rutaceae	Paharinibua
Mandarin	<i>Citrus reticulata</i>	Rutaceae	Suntala
Sweet orange	<i>Citrus sinensis</i>	Rutaceae	Mausam
Kumquat	<i>Citrus japonica</i>	Rutaceae	Muntala
Trifoliate orange	<i>Citrus trifoliata</i>	Rutaceae	Tinpatesuntala
Nepalese Hog plum	<i>Choerospondias axillaris</i>	Anacardiaceae	Lapsi
Pistachio nut	<i>Pastaciavera</i>	Anacardiaceae	Pesta
Indian hog plum	<i>Spondias pinnata</i>	Anacardiaceae	Amaro
Tea	<i>Thea sinensis</i>	Combretaceae	Chiya
Aonla	<i>Embilica officinalis</i>	Euphorbiaceae	Amala
Chestnut	<i>Castanea crenata</i>	Fagaceae	Katus
Tamarind	<i>Tamarindus indica</i>	Leguminosae	Imali
Grapes	<i>Vitis vinifera</i>	Vitaceae	Angoor
Fig	<i>Ficus carica</i>	Moraceae	Anjir
Mulberry	<i>Morus alba</i>	Moraceae	SetoKimbu
Mulberry	<i>Morus Indica</i>	Moraceae	Kimbu
Pomegranate	<i>Punica granatum</i>	Punicaceae	Aanar
Coffee	<i>Coffea arabica</i>	Rubiaceae	Coffee
Coffee	<i>Coffea robusta</i>	Rubiaceae	Coffee
C. Warm Temperate Fruit			
Persimmon	<i>Diospyros kaki</i>	Ebenaceae	Haluwabed
Olive	<i>Olea europaea</i>	Oleaceae	Jaitun
Olive	<i>Olea cuspidata</i>	Oleaceae	JangaliJaitun
Apricot	<i>Prunus armeniaca</i>	Rosaceae	Khurpani
Plum	<i>Prunus domestica</i>	Rosaceae	Aalubakhara
Peach	<i>Prunu spersica</i>	Rosaceae	Aaru
Pecan nut	<i>Carya illinoensis</i>	Juglandaceae	ChucheOkhar
Japanese plum	<i>Prunus salicina</i>	Rosaceae	Aalucha
Sand pear	<i>Pyrus communis</i>	Rosaceae	Naspati
European pear	<i>Pyrus pyrifolia</i>	Rosaceae	Bedeshinaspati
D. Temperate Fruits			
Apple	<i>Malus pumila, M. domestica</i>	Rosaceae	Syayu
Walnut	<i>Juglans regia</i>	Juglandaceae	Okhar
Crab apple	<i>Malus baccata</i>	Rosaceae	Mayel
Almond	<i>Prunus amygdalus</i>	Rosaceae	Badam

Status of Private Fruit Nursery (2068/69 BS)

Catagories	Winter	Rainy	Citrus	Mixed	Coffee	Total
Registered	161	53	32	16	10	272
Non ragistered	-	-	139	32	27	198
Total	161	53	171	48	37	470

Source: FDD Year Book, 2069/70

Fruit Year 2018 (2075 B.S)

With the view of making Nepal self reliant, we are going to celebrate the year 2018 as the "Fruit Year" and the FY 2016/17 as the quality sapling production year.

Base:

- Constitution of Nepal 2015
- National Agriculture Policy 2004
- Agriculture Development Strategy 2015
- Master plan for Horticulture, 2091
- Agribusiness Promotion Policy 2007
- Floriculture Policy 2013
- National Tea Policy 2000
- National Coffee Policy 2003
- 27 point Commitments from MOAD

Major Activities of Fruit Year

1. Subsidy on saplings and other inputs
2. High Density Planting
3. Nursery establishment and strengthening for quality sapling production
4. Tissue culture technology and net houses (Banana and Flower)
5. Budwood Certification (Citrus crop)
6. Infrastructure improvement in Farm/centres for quality sapling production (Lab, irrigation, net and shade houses)
7. Research: problem based adoptive/applied/collaborative fruit research activities.
8. Fruit orchard demonstration
9. Fruit orchard rejuvenation Program
10. Fruit orchard demonstration
11. Fruit orchard rejuvenation Program
12. Publication of booklets and leaflets.
13. Soil management program
14. Pest Management program
15. Value chain Development Program
16. Market and Cold storage
17. Fruit Industry promotional program: Encourage private sectors in the establishment of domestic medium and large scale fruit processing and preservation industries in appropriate location

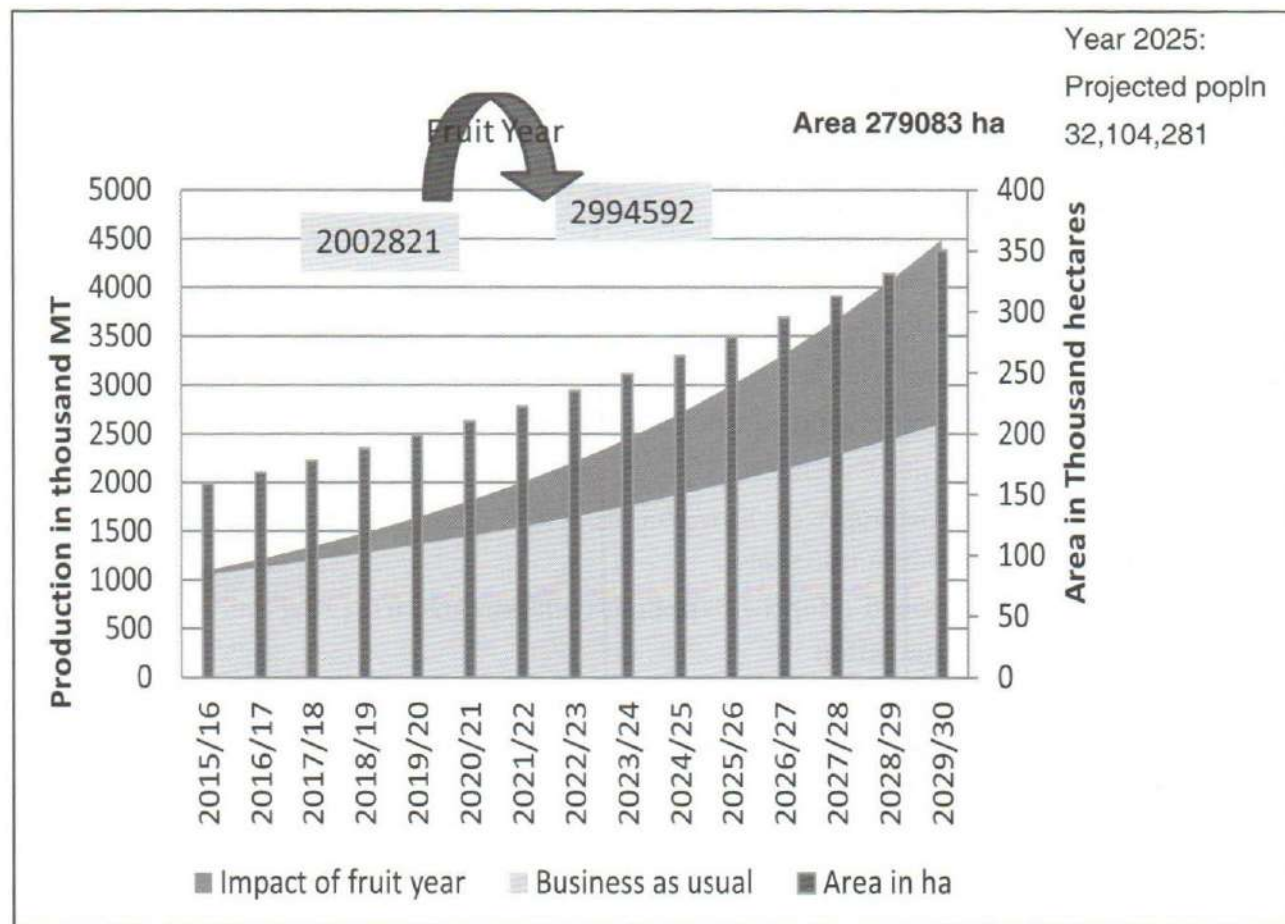
18. Fruit Exhibition
19. Formulation and enforcement of nursery act to produce quality planting materials.

Collaborating and Supporting Institutions

1. NARC
2. Vegetable Development Directorate
3. Plant Protection Directorate
4. Soil Management Directorate
5. Post Harvest Management Directorate,
6. Agribusiness Promotion and Market Development Directorate,
7. Agriculture Training Directorate
8. Agriculture Engineering Directorate
9. Agriculture Information and Communication Centre.
10. NGO/INGO/CBO

Expected Impact of Fruit Year

Production on the 10th year (B.S. 2082/83 or 2025/26):



Expected Output

1. Increased production and productivity
2. Import substitution and export promotion of major fruit crops (apple, mandarins, lemons, mango, banana, olives) by 10 years.

3. Employment generation and poverty reduction
4. Food and nutritional security through increase of per capita availability of fruits from 34 kg to 38 kg by 10 years time.
5. Regional development and balance.
6. Contribution on biodiversity and ecosystem balance.

Agriculture Development Strategy & Fruit Sector

Vision for Horticulture and High Value Crop Development :

“increase income and improve livelihoods, food security and food nutrition of Nepalese people by increasing production and productivity of high value crops through inclusive, competitive, sustainable and commercial horticulture”

The Key Strategies proposed are:

- Formulation and implementation of appropriate land use policy which will significantly help area expansion of horticulture and plantation crops.
- Rejuvenation of old, unproductive, senile plantations through substitution of old varieties with improved high yielding varieties.
- Development of demand-driven technology on improved varieties, cultural operations, pest management, harvesting, post-harvest handling, marketing and processing; promotion of value chain approach in extension and development.
- Public private partnership in developing irrigation schemes including the micro-irrigation, collection centers, wholesale markets, cold storage, processing industries, and encouragement and promotion of packaging and grading centers
- Planning and prioritization of HHVCs' development in the form of projects on the basis of domestic and external demands, economic viability, comparative advantage, employment and income generation, environmental sustainability and use of local resources.
- Enforcement of laws and regulations to ensure adherence to safety, hygiene and other standards as per SPS through relevant public institutions and local authorities.
- Strengthening of present organizations responsible for horticultural and HVC development in the country to be made more accountable to carry out the work responsibilities with new vision, or preferably a separate competent horticulture authority established to coordinate inter and intra ministerial, institutional and departmental agencies and programs.
- Deployment of technically skilled and capable manpower in adequate numbers on the basis of research, extension and training in relation to area of operation and volume of production; and
- Formulation of long-term commodities development plans with program wise investment plans and encouraging significant participation and investment of private sectors in promotion, processing and marketing of HHVCs.
- The productivity increase target of fruit proposed for ADS implementation period is from 10 to 15 Mt/ha

Conclusion

The agro climatic situations and geophysical locations of Nepal favor growing a variety of fruit species that requires tropical, sub tropical, and temperate climates at a same period of time. The government had realized that fruit are very important source for human nutrition as well as improving the rural economy. Fruit development activities were started before 1850 AD in Nepal and fruit plantation in hills received a greater attention since 1975 AD (2032 BS). Different governmental organizations, NGOs/INGOs and private sectors are involved in fruit development activities.

The total area, productive area, production and productivity of fruits are 1,48,208 ha, 1,10,086 ha, 9,65,044 mt and 8.77 mt/ha respectively in the FY 2013/14 AD. Out of total area occupied by fruits 57 % are tropical, 26% are citrus and only 17% are temperate fruit species. Similarly, total area covered by fruits is 4.79% of total cultivated area. It was found that the productivity trend is increasing from 2005/06 (9.47mt/ha) to 2011/12 AD (10.17 mt/ha) and decreasing in 2012/13 (9.25 mt/ha) and in 2013/14 (8.77mt/ha). There is huge gap between exported (24812.17 mt) and imported (2,27,00,266 mt) scenario of different fruits which indicates the immense scope of fruit development in Nepal. Out of 470 fruit nurseries 272 were registered and 198 were non registered. There are all total 12 government horticulture farm/centers involve in horticulture development under Fruit Development Directorate.

There are several constraints to fruit development in Nepal of which production constraints, socio economic constraints, infrastructure constraints, institutional constraints, policy constraints and human resources constraints are major. The government, semi government, NGOs/INGOs and other private agencies should pay adequate attention to solve these problems and constraints and develop proper technology for fruit cultivation in Nepal.

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