

DEVELOPMENT AND OUTLOOK OF CITRUS INDUSTRY

IN NEPAL

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ABSTRACT

Citrus is the main fruit crop of Nepal covering about 25% in total area under fruit cultivation. Many citrus species and varieties are cultivated in the country. Suntala (*mandarin*) is indigenous fruit of Nepal. The fruit quality of local *mandarin* and Junar is excellent and have good markets even in the neighbouring countries. From climatic as well as export point of view, there is good prospect of citrus development in Nepal. At present, the area under citrus cultivation is 15,940 ha. and the production is estimated to be 93,046 MT. And there is increasing trend in area coverage and fruit production. Though since last 25 years the development in area coverage is encouraging but the yield per hectare is low in comparison with other citrus producing countries. An increase in citrus fruit production is essential to meet the increasing demand for domestic consumption and for exports as well. To increase the production and productivity of citrus fruits emphasis should be given to some important measures like development of nursery and commercial orchards, introduction and selection of cultivars, research, training and transfer of technology, development of post-harvest technology and marketing infrastructures.

INTRODUCTION

We have many different citrus species and varieties in Nepal. Among them, the three important species on which modern citrus industry of Nepal has been based are Suntala (*Citrus reticulata* Blanco.) Junar (*C. sinensis* Osbeck.) and Kagati (*C. aurantifolia* Swing). Mandarin (Suntala) is an indigenous fruit of Nepal (Bonavia, 1890). Some other citrus fruits which are being grown in Nepal are lemon (*C. limon* Burma.), hill lemon (*C. pseudolimon* Tan.), rough lemon (*C. jambhiri* Lush.), sour orange (*C. aurantium* L.), citron (*C. medica* L.), pummelo (*C. grandis* Osbeck.), sweet lime (*C. limettioides* Tan.), grapefruit (*C. paradisi* Macf.) calamondin (*C. madurensis* L.), trifoliolate orange (*Poncirus trifoliata*), Kumquat (*Fortunella japonica*), etc. After the establishment of Citrus Research Station at Dhankuta in 1962 some commercial cultivars of sweet orange were introduced from India. Unfortunately these cultivars did not perform well under Dhankuta climatic conditions. During the period of Horticulture Development Project (1985-87), 24 varieties were introduced from Japan and their performance study is continued at Horticulture Development Project's field, Kirtipur (Tomiyasu, 1996).

The mid-hill region of Nepal which accounts about 1.5 million ha. is quite suitable for citrus cultivation. Mandarin, Junar, acid lime, lemon, hill lemon, rough lemon, sour orange, citron, etc. are important citrus of this region. The areas in citrus belt lying between 900 - 1400 m above sea level have suitable temperature range, from 5°C - 35°C

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and annual rainfall of about 1600 mm, and about 80 percent of it occurring during June-September period.

Nepal is considered one of the countries in Asia where some citrus species have originated. Citron (*C. medica*) and *C. latipes* Tan. have been found growing in wild state in Sankhuwasabha and Darchula districts in mid-hill region of Nepal (P.P. Shrestha, found in field survey). A very remote village Of Mangtewa in Sankhuwasabha district, at a distance of about 6-7 days walk from the nearest road head some elderly farmers reported that these exist 100-150 years old mandarin trees which are seedling origin collected by their forefathers from the jungles (P.P. Shrestha, personal communication). In a report of Horticulture Development Project, Kirtipur a 300 year old seedling mandarin tree has been found in Dhading district (HDP, 1995). In many remote villages at difficult terrain of Nepal citrus like mandarin, hill lemon, rough lemon and citron are growing since time immemorial. Citron fruit has religious value in Hindu community of Nepal. It is an important and most essential item in 'Tihar' one of their religious ceremonies. The Himalayan foothill throughout sub-tropic and temperate range from north eastern corner of Burma, Assam, Sikkim down to Punjab can be regarded as their native habitat of *C. medica* and *C. limon*, so this chain can be termed as "Medica-Limon" chain (Tanaka, 1954). He also reported that *C. reticulata* was collected in Himalayan region, Burma and Indo-China. Bonavia reported that mandarin is indigenous in Nepal under semi-wild conditions at Butwal. These facts clearly indicate that mandarin, citron and lemon are indigenous citrus fruits of Nepal. The quality of local mandarin and Junar, the main fruits of Nepal is excellent and possess very good market in Nepal and its neighbouring countries.

At present mandarin, Junar and acid lime are grown in more than 400 pockets of 49 districts in mid-hill and lime and lemon in 6 districts in Terai of Nepal (NCDP, 1990). By the year 1997, the total area and productive area under citrus in Nepal are estimated to be 15,940 ha. and 9,335 ha. respectively. And the total production of citrus in the country is estimated about 93,046 MT. In the total area under citrus cultivation, 58%, 21%, 17%, and 4% are covered by mandarin, Junar, acid lime, and other citrus respectively (Agri. Stat. Div. MOA 1997). Some well known districts for commercial cultivation of *mandarin* are Sankhuwasabha, Dhankuta, Bhojpur, Kavrepalanchowk, Dhading, Gorkha, Lamjung, Tanahu, Kaski, Syangja, Gulmi, Salyan and Dailekh, and for Junar Sindhuli and Ramechhap.

It is presumed that through the years, many strains of mandarin have been developed through limb sports or bud variations. Sixty-nine samples of mandarin collected from 18 main mandarin growing districts were studied at Horticulture Development Project, Kirtipur to select better quality fruit producing lines. The results obtained so far have shown positive indications for the selection of better lines of mandarin which are being cultivated in different parts of Nepal (Tomiyasu, 1996).

REVIEW

The history of fruit cultivation in Nepal is not well documented, but the description of fruits in old scriptures about their importance in religious ceremonies and medicinal values indicate that growing fruit trees in homestead gardens must have been a traditional practice since thousands of years. In Nepal, first fruit orchards were developed in the periphery of royal palaces of Kantipur, Lalitpur and Bhaktapur in Kathmandu valley. And first commercial orchard was established at Seraphant in Nuwakot district during the reign of His Late Majesty the King Rana Bahadur Shah (Sijapati, 1961).

In Nepal, systematic horticulture development activities started only after the creation of Agriculture Development Board in 1937. Later in 1955, Department of Agriculture with Horticulture Section was established in place of Agriculture Development Board. The other important steps taken by the government toward the development of horticulture are the establishment of Horticulture Farms at Godavari, Chhauni and Balaju in Kathmandu valley. Then different fruit species were introduced as mother plants and subsequently saplings of selected cultivars were multiplied vegetatively for the first time in Nepal.

The important activity started for horticulture development in the country is the establishment of Horticulture Farms/Stations at different agri-ecological zones in collaboration with the Government of India. During 1960-73, 14 horticulture farms/stations were established, out of which, 10 farms are still supporting and promoting for the development of fruits in the country (Shrestha, et al. 1995). The main objectives of these farms are to introduce exotic species and varieties of different fruit crops and establish progeny-cum-demonstration orchards, multiply fruit saplings for distribution to the farmers, conduct trials and studies, and provide training and technical services to the farmers.

CITRUS DEVELOPMENT

The first step taken by the government to create institutional organizations required for citrus development in Nepal. Citrus Research Sub-Station at Malepatan, Pokhara in 1961 and Citrus Research Station at Paripatle, Dhankuta in 1962, were established. After the establishment of these two research stations, trials and studies on different aspects of citrus cultivation were started for the first time in the country. Citrus is the main fruit crop commodity of Nepal in terms of area coverage, production and export potential. Realizing the importance of citrus development in raising the economic level of mid-hill farmers, His Majesty's Government created National Citrus Development Programme (NCDP) in 1972. The main objectives of the programme were programme planning, conduct trials and studies, promote to establish nurseries in private sector, conduct training to citrus growers, nurserymen and technicians, provide technical services to the fruit growers and nurserymen, monitoring and supervision of production programme. Establishment of NCDP is the cornerstone for citrus development in Nepal. To promote and develop citrus cultivation in Mid-Western and Far Western Development Regions, Horticulture Farm with major activities on citrus, was established at Dailkeh in 1977.

NCDP was able to achieve most of its objectives by establishment of orchards and nurseries, identification of citrus pockets, collection of local germplasm, finding solution of the problems faced by the citrus growers, training fruit growers and nurserymen and providing technical services to the farmers.

During the last 25 years many citrus groves have been established in more than 45 districts of mid-hill region. Because of more income from citrus plantation and at the same time shortage of arable land in mid-hill districts citrus groves are slowly replacing the traditional upland cereal crops.

In Nepal the major problem in citrus cultivation faced by the farmers are lack of transport facility, organized marketing channels and markets. Beside these problems some serious diseases, like greening, tristeza, phytophthora, etc. are also becoming hazardous for the healthy citrus development in the country.

By the year 1990, the number of identified citrus pockets in 45 hill districts are 461, and citrus nurseries established at private sector are 143. More than 1,500 citrus growers and nurserymen have been trained about improved methods of citrus cultivation and plant multiplication

In the process of restructuring Department of Agriculture, NCDP was degraded by making it one of the sections under Fruit Development Division and drastically reducing the required technical manpower in 1995. It is a setback to NCDP and it may affect to the citrus development of the country.

Initiation of Horticulture Development Project (HDP, 1985-97) under the technical co-operation of the Government of Japan was an important step in fruit development particularly citrus. The primary objectives of the project was to increase the production of citrus and deciduous fruits through technological development, training and extension and thereby to contribute in creating employment opportunities, raising income and nutritional level of the people. First phase covered six districts - Sindhuli, Ramechhap, Kathmandu, Nuwakot, Banke and Bardiya. In second phase, the project areas were Sindhuli, Ramechhap, Kavre, Kathmandu, Lalitpur and Bhaktapur districts. Thrust was given for the development of Junar and mandarin. Some exotic citrus species and varieties were introduced from Japan and performance studies are being conducted at project field, Kirtipur. Besides these, some other trials and studies particularly on mandarin and Junar were conducted with encouraging results. Studies were concentrated on development of cultivation techniques, grafting technique, selection of rootstocks, mandarin, Junar and pummelo, identification of greening free pockets, harvesting and storage technique, etc. Along with the improvement of cultivation techniques long term and short-term training for JT/JTAs and farmers were also conducted at project centre and demonstration farms.

With the objectives to increase the production of mandarin and Junar and thereby increase the cash income and employment opportunities for the farmers, and substitute the import and promote export, government launched citrus priority programme in Dhankuta, Sindhuli, Ramechhap, Kaski and Dailekh districts in 1985. This programme became quite effective in area coverage and production, nursery development, training, integrated approach, monitoring and follow up activities. To implement the priority programme to other citrus growing areas Agricultural Projects Services Centre (APROSC) conducted feasibility study of 16 mid-hill districts in 1989 and designed to bring additional area of 6,300 ha. under on-farm citrus plantation within Seventh Five Year Plan period (Citrus Development Project, Feasibility Study, 1989).

Hill Fruit Development Project under loan assistance of Asian Development Bank (ADB/M) was implemented in 11 hill and mountain districts of Eastern Development Region during the period of 1988-95. Main thrust of the project was to increase the production of citrus fruits in the mid-hill region, apple and other temperate fruits on the upper elevations, banana and pineapple in the lower reaches covering 4000 ha. under commercial orchards and 1000 ha. under homestead gardens within the project period. Along with on-farm development, programme of support services in strengthening fruit research facilities and fruit extension services, construction of market yards and cellar storage, and establishment of fruit nurseries at private sector was also under project objectives (HFDP, 1987). Achievements of the project by the year 1995 were 2660 ha. and 930 ha. under establishment of commercial orchards and homestead gardens respectively. Construction of buildings, laboratories, market yards and cellar storage were completed as per set programme. Thirty-five citrus nurseries were established at private sector (HFDP, 1996).

Master Plan for Horticulture Development (MPHD) in Nepal prepared for Ministry of Agriculture in 1991 by ADB/M serve as the framework for the short-medium, and long-term development of the horticulture sub-sector in Nepal.

The main objectives of MPHD are to meet projected increases in demand for fruits up to 233,595 MT. over the next 20 years, increase farmers' income, reduce imports and increase exports of selected fruit crops particularly citrus (MPHD, 1991). In MPDP priorities highest initial priority to fruits has been given to citrus, both mandarin and Junar. Implementation of MPHD will provide economic, environmental and social benefits to Nepal.

PRESENT STATUS

Districts and Production : The present citrus areas are mainly distributed between 26°45' and 29°40' North latitude, 80°15' and 88°12' East longitude, 900-1400 m above sea level in mid-hill districts of Nepal. At present, 55 districts, 49 in hills and 6 in Terai, covering a total area of 15,940 ha. are producing 93,046 MT citrus fruits in Nepal (Agri. Stat. Div. MOA, 1997). The largest area covering districts, more than 500 ha. are Dhankuta in Eastern Development Region, Sindhuli, Ramechhap, Kavre and Dhading in Central Development Region, and Tanahu and Syangja in Western Development Region. These seven districts produce about 34,465 MT fruits each year. Districts having citrus plantation from 401 ha. to 500 ha. are Panchthar, Ilam, Tehrathum, Bhojpur, Gorkha, Lamjung, Kaski, Palpa and Dailekh with the production of 22,984 MT fruits. Likewise, districts which covers 301 ha. to 400 ha. under citrus are Sankhuwasabha, Gulmi, Rukum, Salyan, Baitadi and Dadeldhura producing 11,566 MT fruits each year. Citrus area in other districts, 8 districts cover 201 ha. to 300 ha., 13 districts 101 ha. to 200 ha. and 12 districts are in the category of less than 100 ha. coverage. The volume of production of these 33 districts is about 24,031 mt.

The area under citrus plantation in Nepal has increased about 6 times from 1975-1997. Among the development regions, Central Development Region ranks first, increased from 650 ha. to 4,715 ha. Western Development Region increased from 650 ha. to 4337 ha., Eastern Development Region increased from 1100 ha. to 3968 ha., Mid-Western Development Region increased from 120 ha. to 1748 ha., and Far-Western Development Region from 80 ha. to 1170 ha. (Table - 1). The total increase in production of citrus fruits since 1975 is about 600% (Fig. 1).

Table - 1 Distribution of Citrus area (ha.) in Nepal, 1975-1997

Development Region/year	1975	1980	1985	1990	1995	1997
Eastern	1100	2100	2439	3331	3730	3968
Central	650	1200	2801	4821	4442	4715
Western	650	1400	1995	3181	3812	4337
Mid-Western	120	300	783	1347	1592	1748
Far-Western	80	200	430	835	1052	1172
Nepal	2600	5200	8448	13515	14628	15940

Source: NCDP, 1979, 1985, 1990 and Agri. Stat. Div. MOA, 1995, 1997.

An increase in area and production of citrus is quite encouraging. The following Table - 2 depicts an increase in area and production of citrus fruits for selected years 1975 - 1997. The total increment in production of citrus fruits since 1975 is about 600% (Fig. 1).

Species and Varieties : At present the citrus species and varieties cultivated in Nepal in commercial scale are local mandarin (*C. reticulata*), Junar (*C. sinensis*), acid lime (*C. aurantifolia*) and hill lemon (*C. pseudolimon*). The other citrus fruits like pummelo (*C. grandis*), rough lemon (*C. jambhiri*), sour orange (*C. aurantium*), sweet lime

(*C. limettioides*), grapefruit (*C. paradisi*), calamondin (*C. madurensis*), kumquat (*Fortunella japonica*) are found growing in homestead gardens. Systematic studies of indigenous citrus (*mandarin*) of Nepal were started in 1978. Mandarin grown at different areas are known by the name of local areas where it has been grown. Some introduced varieties of sweet orange like Shamouti, Pineapple, Washington Navel Orange, Valencia Late, Hamlin, Jaffa, Blood Red Malta, Malta, Mosambi, etc. are being maintained at Horticulture Research Station, Dhankuta. Likewise, 24 types of exotic citrus varieties introduced from Japan are under study at Horticulture Development Project, Kirtipur.

Table - 2 Distribution of citrus area and production in Nepal, (1975-1997)

Year	Area (ha.)		Productive area		Production (mt)	
	Mandarin	Total citrus	Mandarin	Total citrus	Mandarin	Total citrus
1975	510	2600	296	1690	2937	15000
1980	3434	5200	1991	3300	19780	30000
1985	5070	8448	2940	5000	29656	45100
1990	7660	13515	4481	7136	48257	78639
1995	8175	14628	4806	8488	49905	83375
1997	9146	15940	5423	9335	57403	93046

Source: NCDP 1979, 1985, 1990 and Agri. Stat. Div. MOA, 1995, 1997.

Production 1000 mt.

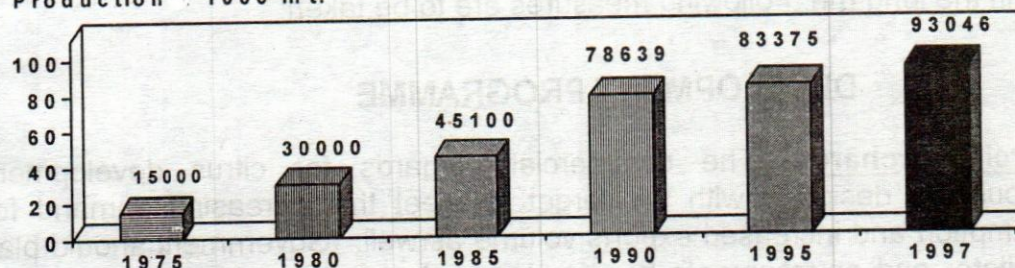


Fig. 1. - Production of citrus fruits in Nepal, 1975-1997

Rootstocks : In Nepal commonly used rootstock for citrus is rough lemon var. Naite Jyamir, Seti Jyamir (*C. jambhiri*). Since sometimes back trifoliolate orange (*Poncirus trifoliata*) is being popularized due to its some good characters like very hardy to cold, resistant to soil diseases, tolerant to tristeza, dwarfing effect, improving fruit quality, etc. The other rootstocks which are under trial on mandarin and Junar are Carizo citrange, troyer citrange, *C. volkameriana*, *C. macrophylla*, *C. tanaka*, *C. megaloxycarpa*, *C. jambhiri* var. Florida Rough Lemon, Kali Jyamir (*C. aurantium*), pummelo (*C. grandis*), Karna Khatta (*C. karna*), acid lime (*C. aurantifolia*), mandarin (*C. reticulata*); hill lemon (*C. pseudolimon*), yuzu (*C. junos*), shikasha, Junar (*C. sinensis*), etc. NCDP, 1985, HDP 1996).

Research : Trials and studies conducted on some important aspects of citrus cultivation at Horticulture Research Stations are as follows:

- ◆ Rootstocks trial on mandarin and Junar. To study the compatibility of different rootstocks on mandarin and Junar.
- ◆ Storage trial on mandarin and Junar. To determine the storage time for mandarin and Junar with marketable standards.
- ◆ Date of shoot tip grafting on Junar. To find out the best time period of grafting Junar
- ◆ Study of citrus greening vector and its bio-control.
- ◆ Study and selection of local mandarin and Junar.
- ◆ Performance study of introduced citrus species and varieties.

- ◆ Citrus tristeza virus (CTV) resistance study on Junar and mandarin.
- ◆ Study on the effect of time and methods of grafting on Junar.
- ◆ Selection of local germplasm.
- ◆ Evaluation of genetic diversity and selection of superior clones of pummelo (*C. grandis*) in Nepal.
 - i. To survey and collection of pummelo germplasm from Terai and mid-hill conditions of the country.
 - ii. To identify promising genotypes with desirable horticultural traits for higher and better quality yield.

OUTLOOK

If we look back to the figures of area coverage and production of citrus for the year 1975, it shows to 2,600 ha. and 15,000 MT. respectively. When we compare these figures with the latest one (1997) which are 15,940 ha. and 93,046 MT., the increase in area coverage and production, comes to about 600%. This achievement within about two decades of time is encouraging but the yield per hectare is low in comparison with other citrus producing countries. So, efforts are to be taken to increase the production and productivity of citrus fruits to meet the increasing demand for home consumption as well as exports in the long run. Following measures are to be taken:

DEVELOPMENT PROGRAMME

Commercial orchards: The commercial orchards for citrus development programme should be designed with the target to meet the increasing demand for domestic consumption and increased exports volume as well. Government should play the role of facilitator and environments have to be made to attract farmers and agro-entrepreneurs in the citrus industry by adopting the following main strategies:

1. Focus resources on production pockets where agro-ecological condition and existing infrastructures will ensure maximum return.
2. Identify and protect disease free production pockets.
3. Assist in the control of serious diseases and insect pests.
4. Promote import substitution and export volume.
5. Focus on increased profit rather than increased yield.
6. Use both formal and informal means of delivery information and technology.
7. Emphasize adaptive research that responds to market requirements.
8. Reduce post-harvest losses by educating producers and harvesters about optimum harvesting time, harvesting techniques, proper packaging and storage.
9. Subsidy programme for commercial citrus orchards should be reviewed.
10. Quality sapling should be available to the farmers from private nurseries/horticulture farm and should be controlled by Nursery Act.

Homestead gardens : The homestead gardens in citrus development programme should be designed to meet the increasing demand for domestic consumption. It also aims to increase per capita consumption of fruits to a level that will meet the minimum nutritional requirements.

Post-harvest : To develop post-harvest in citrus industry of Nepal, it should have the facilities of cold stores, cellar stores, collection shades, wholesale markets, and processing plants with the proper management of the facilities. The private sector be encouraged for the ownership of the facilities.

Selection of local germplasm : As some citrus species are indigenous of Nepal, there are possibilities of finding good clones of citrus fruits. Horticulture Development Project, Kirtipur has already started this activity of collecting local

germplasm of citrus. To select better lines of mandarin, Junar and pummelo, fruit analysis results have shown positive indication from brix and citric acid percentage point of view. For this purpose, 69 samples of mandarin, 29 samples of pummelo and 8 samples of Junar were collected from different citrus growing districts of Nepal (HDP, 1996).

Introduction and rearrangement of citrus cultivars: In Nepal, mandarin and Junar are winter ripening fruits, from last week of October to December. So efforts should be made to introduce exotic varieties, both early and late to extend harvesting period. HDP, Kirtipur has started the study by introducing 24 types of citrus species and varieties. According to the results obtained Yoshida Ponkan mandarin has indicated to be better quality line due to its high brix and low acid percentage. Likewise another variety Murcott has shown late maturing character and good fruit quality (Tomiyasu 1996). And to exploit the agro-ecological conditions prevailing in the country, to increase the volume of citrus production and to extend the harvesting time, it will be a right step to start production programme of citrus fruits like pummelo, grape fruit, acid lime and Kinnow in Terai and inner Terai areas where suitable climatic conditions prevail for their cultivation. According to a study conducted on survey and identification of promising genotypes of pummelo, Agriculture Research Station, Dhankuta has identified for recommendations 7 clones, 2 clones and 1 clone for Terai, low-hills and mid-hills respectively (ARS, 1997).

Nursery development : Citrus nurseries established in private sector can play a very important role in commercial citrus production programme. The private nurseries must be registered for the production and distribution of quality planting materials. And monitoring and supervision of the nurseries should be followed strictly. For the long-term commitment of citrus development in Nepal, programme planning and implementation of citrus certification programme is a must. And Nursery Act should be legislated to regulate the production of quality planting materials.

Training and technology transfe : To increase the production of citrus, a team of technicians are to be trained about improved techniques of citrus cultivation at home and abroad. In this respect, HDP, Kirtipur has been playing very important role in training technicians and farmers at home and abroad. We are very grateful to Japan International Cooperation Agency (JICA) experts, particularly Mr. Y. Tomiyasu, Citrus Expert and Mr. T. Kondo, Japanese Team Leader for working hard to train Nepalese technicians, efforts made toward transfer of technology and ultimately citrus development in Nepal.

Credit: Fruit cultivation involves high initial investment and has a long gestation period. Therefore, the production loan provided by Agriculture Development Bank (ADB/N) should be in the form of soft loan with the minimum possible interest and some grace periods. The present system of charging interest provides no incentives for the fruit growers. The credit system should be made more attractive and beneficial to the farmers.

Research programme: Though citrus research in Nepal has been started long ago, but the continuity could not be maintained mainly due to less importance given to fruit development programme. Even after the establishment of Nepal Agricultural Research Council (NARC) research in citrus production problems has not moved ahead again due to less priority given to fruit crops, lack of effective co-ordination system between NARC and Department of Agriculture (DOA). Horticulture Research Stations do not have competent technical manpower in required discipline.

While introducing citrus planting materials from outside the country there are chances of introducing different serious diseases along with. Therefore, in this context,

Dr. Roistacher (1996) rightly points out the need for an indexing facility and certification programme for citrus in Nepal. Countries, like Nepal cannot afford to carry out original research in small sub-sector like horticulture. Therefore, the strategy for research on citrus should:

- Focus on priority topics, i.e. serious problems seen in citrus cultivation.
- Collaborate with other countries to benefit from their experiences.
- Conduct adaptive research.
- Emphasize on-farm trials in applying adaptive research in production field.
- Find techniques from other countries with similar agro-ecological conditions.
- Encourage private enterprise, where it is appropriate.

DOA through NARC must ensure that its research efforts should be toward problem-oriented issues and based on the above-mentioned strategies.

Marketing: In Nepal horticultural produces including citrus fruits are sold through permanent wholesale and retail markets, "haat bazaars", retail shops in market centres and direct exchange between consumers and producers. Citrus fruits are not graded, mixed sizes are sold at one price. Packaging of the produce is not done properly with proper container, resulting more loss due to damage. Very little information about volume, market price and flows is available.

The present marketing process of citrus fruits shows that there are number of ways that the farmers can dispose off their produces. The present practice include: selling off standing crops in the field, selling in the local markets, and carrying to the road-heads and assembly markets, where it can be sold to traders, commission agents, fruit processing factories and retailers. A large number of traders visit assembly markets and buy the produce.

Toward improving the market efficiencies of citrus fruits some steps to be followed are:

1. Encourage volume handling to reduce the per unit cost at every level of the market.
2. Develop official grades so that produces can be brought and sold by description rather than by inspection.
3. Use new technology in handling products to reduce costs and preserve quality.
4. Use new technology in storage, i.e. cold storage and cellar storage.
5. Develop market information services to ease surpluses on local markets, permitting higher prices to producers and lower prices to consumers. Use standard containers to facilitate handling, transporting and storing.
6. Sort out and process low quality products.
7. Improve harvesting methods and care during transport to reduce losses.

Institution : Agriculture Perspective Plan (APP) which serves a basic guideline for 20 years agriculture development programme in Nepal, has emphasized for citrus putting at the top in the priority list of high-value crops (APP, 1995). Citrus is a very important fruit crop of Nepal and is grown throughout mid-hill, Terai, inner Terai and some parts of mountain right from eastern to western borders. Citrus Development Programme (CDP), the main institution responsible for citrus development in the country, with the present manpower seems incapable to carry out its responsibilities smoothly. Therefore, to make citrus programme effective and productive, it is essential to upgrade the CDP to its original form with the required number of manpower.

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