Second Floriculture Trade Fair

SOUVENIR

FLORICULTURE ASSOCIATION NEPAL

(FAN)

His Majesty King
Birendra Bir Bikram Shah Dev

Her Majesty Queen
Aishwarya Rajya Laxmi Devi Shah

कृषि उद्यम केन्द्र
AGRO ENTERPRISE CENTRE
A Joint-Project of the Federation of Nepalese Chambers of Commerce & Industry and USAID/Nepal
FNCCI Building Sahid Sukra Milan Marga, Teku. P.O. Box 7651, Kathmandu, Nepal Tel 2-32260 Fax 977-1-227322

Message

The Floriculture Association Nepal (FAN) deserves congratulations for their demonstrated ability to promote business ventures with Nepal's floriculture product group, which have begun to show success in terms of new business creation, sales promotion, development of technical/managerial skills and above all growth of professionalism in this field. AEC is proud that the assistance - both technical and financial provided by this organization have been optimally utilized through the FAN. A truly appreciable efforts of FAN are reflected by the impact derived from the assistance provided: such as the outcome of training on floral arrangements which is converging into formation of a group of painstaking women entrepreneurs already starting a flower arrangement and marketing outlet by utilizing the show-room of the WEAN Cooperative, also supported by AEC. The floriculture exhibition organized by FAN last year resulted into sales turnover of Rs. 0.7 mn (approx.) and also attracted a number of new comers in this field. The Gladiolus cut-flower production and marketing program has already been launched, in which FAN supports commercial growers in marketing their products to star hotels in Kathmandu. AEC observes the present flower exhibition with great enthusiasm and expectation in which the growth of sales are expected to double compared to last exhibition, and number of participants, size of audience also grow by the same token. I thank the organizer and expect on behalf of AEC a very positive impact of this exhibition on the floriculture business of Nepal and express my congratulations in advance.

Suraj Vaidya
Chairman
AEC Board

Trade Promotion Centre
(Established by His Majesty's Government
Under the Development Board Act, 2013)

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Message

It is my pleasure to note that Floriculture Association of Nepal is bringing out Souvenir Magazine on the auspicious occasion of Second Flower Trade Fair to be held on 22-25 Chaitra, 2052 at Kathmandu.

Floriculture production and marketing in Nepal is a promising economic activity. Growing global trade on floriculture products has opened the avenues for its commercialization. Widening international market of flower and floriculture products has created opportunities of exports from developing countries like Nepal. Current demand indication of floriculture products in the domestic market also shows bright prospect for flower & floriculture venture. In this backdrop the forthcoming Second Floriculture Trade Fair, which I believe is very timely and crucial in promoting FLOWER BUSINESS in Nepal through creating awareness among general public.

The various promotional activities rendered by FAN are very important in promoting new product like Flower. I believe this Trade Fair will be successful not only in generating floriculture business but ultimately it will help in introducing Flowers from Nepal into the markets abroad.

Finally, I heartily wish the Flower Trade Fair a grand success.

Naresh C. Lamichanne
Executive Director (Officiating
Trade Promotion Centre.

FOREWORD

Floriculture Association Nepal (FAN) was established to enhance the development of the floriculture business in Nepal. Its main objectives are to promote production of floriculture products in the domestic and international markets, to create a suitable environment for the enhancement of floriculture business in Nepal and to encourage entrepreneurs to undertake commercial floriculture production.

Since its establishment on November 15, 1992 FAN has carried out various activities as per the requirement of entrepreneurs in this sector. One such activity is organizing exhibitions & trade fairs. With the objective of creating awareness among the general public regarding flower plants the first Floral Exhibition was held at Royal Nepal Academy premise on April 30 and May 1, 1993.

On April 22, 23, 24 & 25, 1994 the Second Flower Exhibition was organized at the Agro Enterprise Exhibition at the Bhrikuti Mandap Exhibition Hall. FAN had the opportunity of disseminating pertinent information regarding floriculture trade in Nepal and achieved tremendous exposure.

The first Floriculture Trade Fair was held from April 7-9, 1995 at Bhrikuti Mandap Exhibition hall with the objective of commercializing floriculture sector in Nepal. About 10,000 visitors visited the trade fair in 3 days due to which the participants felt they had greatly benefited from exposure to the general public, different agencies, organizations etc. The participants made a total sales of about Rs. 7,00,000.00 and received orders exceeding Rs. 2,00,000.00 For the first time nursery people felt the improving trend in the floriculture trade.

All these have proved that it is necessary to organize a floriculture exhibition/trade fair at least once a year for the commercial growth of floriculture industry. Currently impact of exhibition/trade fair is being directed towards the growth of this sub-sector for the development of the local market, but in due time this effort will have a tremendous impact on the export of floriculture products as well. With this objective Second Floriculture Trade Fair is being held on April 4,5,6 & 7, 1996 at the Bhrikuti Mandap Exhibition hall

FAN takes this opportunity to record the appreciation of the meticulous efforts of the trade fair committee members, 29 participating nurseries/companies, sponsors, advertisers.

FAN would like to express its sincere gratitude to Agro Enterprise Centre for providing financial and technical support in carrying out major activities for the growth of floriculture industry in Nepal. Trade Promotion Centre (TPC) deserves special acknowledgement for its support in publishing this Souvenir magazine on the occasion of the Second Floriculture Trade Fair.

FAN wishes this trade fair a grand success.

Suresh B. Shrestha
President
Floriculture Association Nepal

FOREWORD

The "Second Floriculture Trade Fair" organized under the joint auspices of Agro Enterprise Centre and FAN is being held on 4, 5, 6 & 4 April, 1996 at the Bhrikuti Mandap Exhibition Hall. This has been possible because of the active involvement of members of the trade fair committee the tremendous enthusiasm shown by 29 participants in preparing flowers/plants and other floricultural products for their sta[illegible] interest shown by various sponsors in supporting FAN one way or the other and encouragement and support provided by Agro Enterprise Centre.

Floriculture Association Nepal is very happy to publish the **Souvenir** magazine on the occasion of its Second Floriculture Trade Fair. This Souvenir contains articles on flower & plants executive summaries of business plans of various cut-flowers, the floriculture scenario of Nepal and Worldwide and other pertinent information of this sector.

FAN very much appreciates and thanks Trade Promotion Centre (TPC) for its contribution in publishing the **Souvenir**. FAN also acknowledges the support of the advertizers.

Shashindra Shrestha
Chairman
Trade Fair Committee

Editorial

Dear readers,

It gives me a great pleasure to present you our first issue of Souvenir published on the occasion of **FAN Trade Fair II**, organised to mark the auspicious golden birth anniversary of His **Majesty King Birendra Bir Bikram Shah Dev**. On behalf of FAN, I would like to take this opportunity to extend our sincere felicitations and best wishes for His Majesty's long life & prosperity.

It is an effort on the part of the Association to take one more significant step towards the future as envisaged by the Association in establishing floriculture as a commercially viable, nationally important industry. This publication incorporates a variety of articles ranging from technical information to business plan summaries on the floricultural products. There are also articles of general interest such as the relevance of flowers in our daily life, Bonsai culture, Gladioli cultivation, the language of flowers and so on.

I would like to thank all contributors for their efforts to make this publication informative and interesting. I would also wish to thank Trade Promotion Centre for sponsoring this issue. Thanks are also due to FAN members and others, whose contributions made this publication successful.

I wish you a happy reading and would welcome your suggestions and comments for future issues.

This souvenir publication is sponsored by Trade Promotion Centre

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FLORICULTURE ASSOCIATION NEPAL (FAN)

FNCCI Building, Teku, Kathmandu
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Information of floriculture Association Nepal (FAN)

Floriculture Association Nepal (FAN) was established to enhance the floriculture business collectively. The Association works for the benefits of the industry members including the growers/producers. It has various activities that are directed towards the enterprise growth and that would ultimately establish floriculture as an export oriented business in Nepal. Along with other various studies FAN is also establishing baseline information and other details of the industry to help formulate programs to promote this business.

FAN was formally registered with the government on November 15, 1992 with 11 founding members from nurserymen and people interested in floriculture enterprise.

Fan's objectives

* To promote the floriculture products in the domestic and the external market.
* To make people aware of floriculture as an industry and motivate them to become involved in this business.
* To cary out experimentation to set standards regarding plants, cut-flowers and other floriculture products.
* To work towards creating a suitable environment for the enhancement of floriculture activites.
* To encourage small farmers and entrepreneurs to undertake commercial floriculture production.
* to offer quality training and and information to its members in a effort to produce floriculture products to international standards.
* To perform activities for the promotion of floriculture business.
* To enhance financial income of the country in the long run.

Activities

Since its establishment FAN has carried out following major activites under technical and financial support from Agro Enterprise Centre (AEC):

- Organized the First Flower Exhibition at Royal Nepal Academy premise in April 30 1993.
- Identifies five potential cut-flowers (carnation, chrysanthemum, gladioli, rose, tuberose) that can easily be grown in Nepal.
- Prepared two study reports
* Feasibility study of flower wholesale market in Kathmandu.
* Report on Standards and Quarantine Regulation of Cut-Flowers and Foliage Plants in the Selected Countries.
- Organized the Second Flower Exhibition during Agro Enterprise Exhibition-94 at Bhrikuti Mandap Exhibition Hall in April 23, 1994.

FAN Activites

Opening Ceremony of gardeners' Training

Participants of cut flower arrangement Training

- Organized Gardeners' Training of three months in July 19,1994 at Royal Botanical Garden. (30 Participants)
- Published 1000 copies of the first Directory of Floriculture Enterprise of Nepal.
- Organized one day workshop of floriculture Bulletin since October, 1994
- Publication & distribution of Floriculture Bulletin since October, 1994.
- Provided information of some of the major nurseries of Nepal to AEC during its participation in Agri-Expo held at New Delhi in March, 1995.
- Maintenance and layout of the Garden of Patan Durbar Square for Lalit Festival held in April, 1995.
- Organized the First Floriculture Trade Fair in April, 1995 at Bhrikuti Mandap Exhibition Hall.
- Prepared a manual of Gardeners' Training.
- Prepared "Production, Packaging and Marketing Business Plan of cut-flowers Carnation, Chrysanthemum, Gladioli, Rose, Tuberose.
- Catalogue of Exportable Floriculture products from Nepal.
- Dissemination and collection of pertinent information regarding floriculture trade.
- Active participation in Consultative Meeting on Policy Constraints/Facilitation for Private Sector Involvement in Specific Commodity Sub-Sector organized by AEC in 21-22 November, 1995.
- Organized flower Arrangement Training in November, 1995. (15 participants).
- Program planning for production of Gladiolus cut-flower for the the local market.
- Implementing Gladiolus Program in Kathmandu, Naubise, Hetauda for supplying 100 sticks of high quality gladiolus cut-flower per day to Soaltee Holiday Inn Crowne Plaza from March 21, 1996 to March 21, 1997.
- Participated in Agriculture Trade Fair held at Nepalgunj in Feb. 1996 organized by HMG.

FAN's functional structure

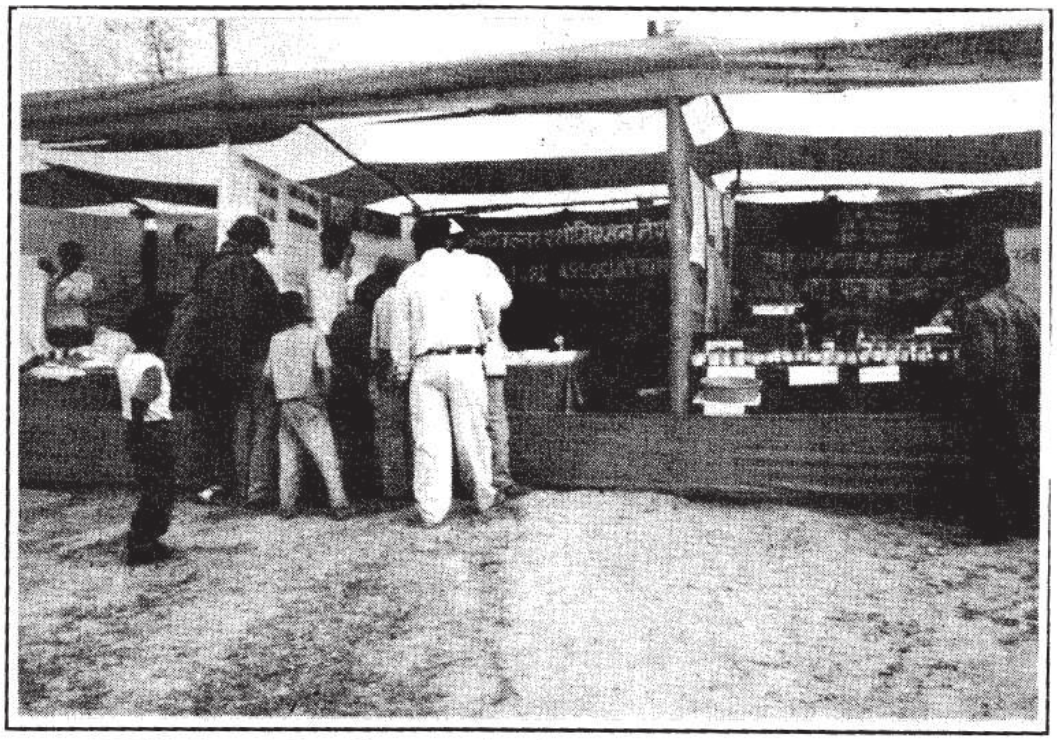
FAN has two types of members. A General Member is any person or organization involved in the production or marketing or the import or the export of floriculture products. An Honorary Member is an individual or organization recognized by FAN's Executive Committe for making an outstanding contribution to Nepal's floriculture industry or the Floriculture Association Nepal.

	Entrance	Annual
Membrship fees:	Rs. 200.00	Rs. 500.00
Honorary Member	Rs. 200.00	Rs. 500.00

Postal Stamps flowers issued by HMG Dept. of Postal Services

FAN Activites

Conducting cut flower arrangment Training



FAN Participation on Agriculture fair at Nepalgunj

The Growth of Cut-Flower Market in Nepal

Rajendra Rai
Parijat Nursery, Godawary

Nobody I hope, will deny the fact that about six years ago, cut flower business in Kathmandu was unknown except for few five star hotels importing cut flowers from Calcutta and Delhi in India and Bangkok, Thailand on special occasion such as wedding ceremony, big meetings and conferences and so on. At that time, flower nurseries were very few and small. They used to grow only seasonal flowers like mearygold, calendula, pansy, geranium, corn flower etc. They used to be sold near Indra chowk and Pasupatinath Temple areas to mostly devotees of Gods and Godesses. Within the last few years, it has been clearly seen that the demand for cut flowers in the capital city has grown in a great degree. Not only five star hotels but other hotels too started purchasing cut flowers to decorate hotel lobbies, guest rooms and offices with flowers to make them beautiful and lively. Moreover, welcoming big desinataries, guests and friends with flower garlands and bouquet came into vogue. The main buyers of cut flowers and flower bouquets are not only hotels but also restaurants, offices and travel agencies. The credit for creating and promoting cut flower market should go to a few cut flower growers who started cultivating new types of flower such as gladiolus and introducing them to hotels and local people. They were fascinated by beauty and strength of gladiolus and started buying in small quantity. In the beginning, some of these flower growers incurred heavy loss due to wrong market speculation. But with faith and determination they continued to grow the flowers and slowly cut flowers picked up market and these growers survived to see for themselves that their product became a valuable commodity for domestic market and hopefully for international market.

It is a high time for cut flower growers in Nepal to identify the better and profitable variety of flowers to grow both for domestic and international market. Various types of flowers such as Gladiolus, Roses, Carnations, Lilies, Gerberas and Chrysanthemum are seen growing in Kathmandu Valley and other areas of Nepal successfully . Among these flowers, Gladiolus has occupied a better place as a cut flower in the market. It has been identified as the best as they are strong. They should be considered as a very good commodity for export. They are not only strong but beautiful too. There is no colour that gladiolus cannot offer except true blue. The colours are white, purple, orange, scarlet, rose, crimson, pink, yellow, violet, blotched in the throat of the bloom. The variety of floral shapes are also amazing-palin petals, ruffled ones, deeply cut, lacniated, petals that rolls back, needle pointed and deeply crinkled and some of them are like orchid in shape. The flowers themselves range in size from about one inch in diameter to the giants of eight inch. They last very long in the vases. So they are very perfect as cut flowers.

The local demand for cut flowers is increasing day by day. Some cut flower traders have been importing huge quantity of cut flowers from Siliguri, Calcutta, Delhi and Bombay in order to meet the increasing demand specially during winter season when local flowers are not available. Some growers are trying to solve these short comings by growing specially gladiolus in the terai areas during the cold season. To some extent they have become successful too. At the same time Floriculture Association of Nepal in co-operation with the Government and Agro

Enterprise Centre of Nepal should find ways and means to provide necessary help such as granting long term, soft term loan, (as in India where the rate of interest is negligible), reduction in the air freight charges both in domestic and international flights, speedy clearance of cargos at the airport by the concerned authorities and many other infrastructure required for this industry.

As a gladiolus grower, I feel, I should jot down a few important hints from my own personal experience about what a grower should bear in mind in the beginning. Generally, gladiolus is of easy culture. Unlike some other flower, Gladiolus is not too particular in its planting requirements, that is one of the advantages. Two very special requirements are full sun and good drainage. As far as the soil is concerned, the red soil is the best. Preparation of the soil is very important in the raising of the gladiolus. The soil should be thoroughly ploughed to a depth of seven to eight inches. This soil preparation should be done when the soil is sufficiently dry. The soil must be dry and friable at the time of planting and should not be wet. Gladiolus prefer a soil with a pH of 6.5. After ploughing the soil at least twice at an interval of 10/12 days raise the bed 4/5 inches high and 2ft. wide allowing 1.5ft. path. Then plant full size corms or bulbs of minimum 1.5" and over in diameter, 6/7 inches deep in loose soil and 6 inches apart. Also bulbs of 1" in diameter may be planted confidently 5 inches apart and 6 inches deeper. In all cases from the time of cultivation till the time of cutting the flower spikes, cultivate the area regularly and keep the weeds under control. Frequent cultivation is required but while doing so care should be taken that the soil and the roots should not be stirred drastically. Generally planting of corms begins from early Feb. till May in the hills and from Oct to Nov. in the plains. One should remember that only rested bulbs with about 3 months rest after lifting from the soil must be planted.

Well decayed cow manure or farm yard manure will do very good for gladiolus cultivation. After having ploughed the soil as described above, spread the said manure all over the cultivated area mixed with soil at the rate of 20 kgs. of manure for a bed measuring 30 ft. x 3ft. Shortly after the planting of the corms or bulbs cultivation of the soil should begin. The aim of cultivation is to keep away the weeds to provide a mulch for the retention of the moisture and to allow free entry of air to the roots of the plants. Watering the soil immediately after planting the corms should be avoided. This practices will damage the bulbs and number of them will not sprout. Giving water may be started just after 5/6 weeks from the date of planting. This should be continued till the spikes are cut off for cut flowers. It is advisable to soak the soil to a depth of 6 to 8 inches once a week rather than to sprinkle lightly everyday. Water at the surface serves very little purpose. It must go down so that the roots can make use of it .

As soon as the gladiolus are planted the process of growth will begin almost immediately. Under normal circumstances the first shoot will appear above the ground within two weeks. After this the growth will be rapid. From sixty five to over hundred days fully developed flower heads will appear ready to burst forth in all its beauty and glory. During this period the gladiolus will require everything as before, food, water, light, air, healthy environment and protection from the enemies. The growers should bear in mind that the land which is used for gladiolus cultivation should not be used every year. The land should be used after a gap of 2 or 3 season. If the same land is used continuously the gladiolus crop will be very poor.

Six weeks after the flower bloomed the new gladiolus bulbs will have matured enough

to be dug up before the foliage turns yellow. It is the correct time to lift the corms. Do not leave them in the ground until the leaves die off. After the corms have been lifted cut off the stem 4 inches from the corms and spread them out in airy shelter to make them dry. No direct sun should be allowed to enter the shelter house. About six weeks later remove the stems and roots from the corms and store them in a cool and dry place. After about 90 days rest period the corms will again be ready for planting for the next season .

Experiences In The Floriculture Industry: Special reference to tissue culture activities

-Rajiv Pradhan
General Secretary, FAN

Floriculture Scenario

The floriculture industry in Nepal is very premature. Reports published by Floriculture Association Nepal indicate that there is a total turnover of Rs. 20 million in the business. It is also estimated that nearly 100 nurseries are active in the trade, and the number of small nurseries is growing with time. However, it is widely seen that all the work in the nursery business is still following the traditional method of farming. Changes towards modernizing the farm are very slow. No new technologies have really been introduced in the nursery farming business, thus, the demand of the market is not being met.

The present practice widely involves trading activities. Finished products are imported from India and sold to the local market, mainly Kathmandu and the newly developed Pokhara market. There is much talk of exports of flowers and plants overseas and even to India. A lot of inquiries are made for the same. Ironically, the concentration is focused on bringing finished products (salable plants) from India, rather than producing the same in Nepal.

It is necessary, thus, to import the propagating material when necessary, estimate the demand; and produce the plants/flowers accordingly. If we can calculate properly, there should be few problems in bringing in the small saplings (seeds) from India or even Europe each year, and selling the same plants each year in the fully grown size. This will help the country retain its foreign (Indian) currency and also develop the practice of producing the plants in Nepal in sizable quantities.

To initiate this practice, certain things need to be created:

1. Regular market survey of the plants being sold (in the Kathmanduvalley to begin with)
2. Publication of the demand viz. 'a viz. the sales data
3. Introduction of new technologies in the nursery farms
4. Introduction of production planning tools to the managers of the farms.

The Floriculture Association Nepal (FAN), through its various programs, is working towards the creation of the pre-requisites for the establishment of the industry.

Tissue culture

Tissue culture is just one of the numerous methods of propagation. The plantlets are propagated in-vitro; inside the flasks that are required for propagation. Plantlets are kept in laboratory conditions for a certain duration of time in flasks. Tissue culture is a means by which numerous plants are produced from one single plant, in less time than the conventional method of multiplication requires.

Tissue culture can be applied to produce disease free plants, but does not necessarily mean the production of disease free plants. Certain techniques have to be employed if the plants are

to be made virus free. Unless measures are taken to protect a plant from various diseases after leaving the laboratory, it will not be disease free.

In addition to the rapid vegetative propagation of plants, tissue culture now has at least four other applications of commercial potential :

- to remove diseases, particularly viruses, from plants
- to cinserve disease-free stocks of plants, particularly collections of crop plants needed for plant breeding
- to bring about genetic change and facilitate genetic engineering' in ways that will be useful to plant breeders
- to produce and extract valuable chemical products from cultured plant cells, rather than directly from plants grown and harvested in the field.

Tissue Culture in Nepal

There are four private companies working in this field with one company involved in only research activities. The Government sector also has a couple of tissue culture laboratories doing basic research work. The research work concentrates on some orchids, agriculture, and horticulture crops, but the private sector has not been able to fully utilize the research results in their labs.

The private sector is mainly concentrating on the production of some horticulture and ornamental crops. Exports to The Netherlands has been initiated by one lab. Other labs are working with horticulture crops in the midhill and terai region of the country.

Investment Opportunities

Tissue culture can be a successful medium in producing the propagating material for any floriculture products in Nepal. Since the floriculture market for different products is increasing in Nepal, tissue culture can serve as a basis for supplying the propagating material. This will ensure timely delivery of the mother plants for the production of various products.

There is also a good prospect for investments in the export-oriented tissue culture operation. In exporting, it is essential to establish the trust of the buyers so that Nepal can produce and supply the tissue culture plants regularly. Hence, it becomes the work of the entrepreneur to convince the buyer the products will be regularly produced and supplied. A successful pilot project would demonstrate consistent, reliable results to prospective buyers.

Investment Tips

After some experience in the field, the following tips are advised for any entrepreneur venturing into this field.

a. The design of the laboratory should be

done appropriately with in-depth study. This design proves critical in the running of the laboratory.

b. The market should be guaranteed before establishing a tissue culture laboratory. In other businesses, we assume a market, but for this particular business, contracts should be made even before operating.

c. The interest for such endeavor should be relatively low and interest should not be compounded.

d. Since the product is ready after nearly 1 year of operation, the construction phase and at least one year of operating phase should be considered as a period of grace.

The future of the tissue culture business can be very bright in Nepal. In addition to the export business, which must be dealt with very delicately, the entrepreneus should either encourage the Government sector to carry out practical adaptable commercial research activities and pass the technologies to the private sector, or carry out the commercial research activities themselves.

With FAN, already carrying out programs to initiate systematic production, commercial research by the tissue culture operators yielding results in one or two years will boost the floriculture industry in Nepal.

Breeding - A potential tool in the development of Floriculture

Neera Pradhan
National Herbarium & Plant Laboratories, Godavari.

Floriculture has become a most popular and profitable industry in many parts of the globe. However in Nepal, it is far behind although there is a great potential of untapped flower production, which could benefit millions of people. The profession of producing ornamental plants and their trade is now fast emerging on many parts of world. Many types of ornamental plants and flowers are grown commercially in developed and developing countries. But in Nepal, floriculture has not recieved the desired attention.

Recently, application of breeding technology has been used for plant improvement such as developing quality and quantity of flower, increasing essential oil content and producing disease and stress resistant plants.

Nepal has diverse agroclimatic and soil type areas, which offer abundant opportunities for cultivation of all kinds of ornamental plants throughout the year. So there is a great chance of producing floricultural crops for national and international trade. Orchids are one of the most important group of ornamental plants in the international cut flower trade. We have several beautiful wild and ornamental orchids, which can be bred and exported. They may open a great scope for improvement and exploitation for the international market. So in order to boost floriculture, breeding technology proves to be a potential tool.

plants are bred for the commercial purpose and also for hobbyists and collectors. Since for the past 3 decades, breeders have been using *Arachnis* and *Vanda* to breed for *Aranda*, a new variety successfully producing numerous cut flower varieties. Breeders have been able to produce beautiful hybrids throughout the years in many genera such as *Aesidovanda, Aranda, Ascocenda* and *Renantanda* etc. In Nepal, orchid breeding is not much developed, only a few hybrids have been successfully produced by breeding.

It has been possible to transfer genes across taxonomic and phylogenetic barriers. Thise is a possible chance to make fragrant cultivars by transferring such genes to species and cultivars that are not fragrant but have beautiful flowers. This has been done in Jasmine, Tuberose and Roses which are the commercially marketable products. The fragrant oil is highly valued in the production of high grade perfumes too. Similarly Gladiolus is internationally most popular cut flower due to long vase life. Fragrant gladioli have been produced by crossing it with a supposed allied genus *Acidenthra.* Breeding helps to produce new disease resistant varieties. For instance, gall mite resistant variety in Jasmine and Fusarium wilt resistant hybrid of gladiolus have been developed successfully.

Furthermore the application of breeding may offer a chance of producing white marigold, blue roses, yellow sweet peas, yellow petunias, pink or red tuberoses, pest and disease resistant cultivars and such other novelties. The present day garden roses are the result of continuous hybridisation and selection throughout

the world. In addition to the conventional breeding through hybridisation, mutation breeding is also considered as a crucial tool in evolving new varieties of roses. There are reports of the successful gene transfer for blue coloration in rose. Transfer of colour to white and fragrant cultivars is more often possible because colour gene is monogenic in inheritance.

Another commercially marketed cut flower in Kathmandu valley is tuberose. This plant is popular because of its delightful appearence and sweet fragrance and is viable for the cut flower trade as well as for the essential oil industry. In this species, increasing the spike length is an important strategy for increasing flower yeild. Interhybrid cross can be done with lengthy spike (11 HR-6) with short spike (11 HR-4) which has compact spike with closely arranged flowers. Similarly in Chrysanthemum, multiple genes are used for inducing early flowering, late flowering, improving flower quality and making disease resistant as well.

Marigold is one of most important annual flower used commercially for making garlands and religious offerings and as cut flowers. An effective breeding programme is possible for producing good quality and long lasting flowers.

Breeding by tissue culture is another important step to produce good quality hybrids by embryo culture, anther culture, meristem culture, somatic hybridization, protoplast culture and gene transfer technology.

Thus above maintained conventional breeding is not sophisticated technique and is easy to apply and low costing too. Therefore if these methods are applied, one should not have to depend on foreign countries for importing floricultural products and hopefully it will help to become country self sustainable.

Nepali Floricultural An Overview

Kiran Raj Pandey
Program Coordinator, FAN

Floriculture is fast emerging as a major venture on the world scene.The profession of production of ornamental plants and their trade, once considered a gardener's activity, is now fast becoming an important commercial venture. Many kinds of flowers and other ornamental plants are grown for domestic and international trade in developed and developing countries. Today floriculture has emerged as a lucrative profession with a much higher potential for returns than most field and some horticultural crops. Flowers and gardens have been very closely associated with Nepali culture from ancient times. However, commercial floriculture in Nepal has not received desired attention for a long time.

World Trade in Floriculture

The world consumption of floriculture products is estimated to be approximately US $ 40 billion. Cut flowers contribute nearly 60 per cent (US $ 25 billion) to the global trade, the remaining being the share to potted plants. Flowers are fast emerging as potential money spinners for many a third world country. The Netherlands, the world's leading flower producer and exporter supplies more than 170,000 tones of flowers to West Germany, which is the biggest importer of flowers in the world. The Dutch share of the world export of cut flowers and foliage plants is 65% and 51% respectively in terms of value. With 11,000 growers, 2500 wholesaler, 10,000 retailers and over 150 breeding and propagation companies and nine flower auction houses, the Dutch control the world export and auctioning of flowers. The other countries with a major share in the international market are Colombia, Israel and Italy (13%, 8% and 7% respectively).

In Israel, where desert conditions prevail in 75% of the area, about $5 million worth of cut blooms are produced and exported each month. There is a daily 'Rose Flight' from Tel Aviv to Holland earning more than $135 million every year. Israel exports everything from rose to Bird of Paradise and sends these directly to Cologne and London.

Kenya, the youngest member of the flower-producing community, has a 120-hectare sulmac farm, the world's largest carnation plantation. It supplied 1.2 million sprays of carnation for the celebration that marked dismantling of the German wall.

Across the Atlantic a dozen cargo planes from Colombia are flying over 25,000 boxes of carnation, chrysanthemums, roses, daisies and Alstroemeria to Miami from where they reach florists all over the USA. Colombia is today the world's second largest exporter, producing 100,000 tones a year and supplying almost 50% of US imports.

Tones of orchids from Thailand, Singapore, Taiwan, Australia and New Zealand find their way to Western Europe, the USA and Japan. Thailand has almost monopolised the cultivation and sale of orchids.

The major exporters of floriculture products are Holland, Colombia, Israel, Italy, Spain, Thailand, France, the USA, South America, New

Zealand, Ecuador etc. The major importing countries are Germany, the USA, France, UK, Holland, Switzerland, Japan, Italy, Australia, Belgium, Hong Kong and the Gulf countries.

The important ornamental crops in the international cut-flower trade are Alstroemeric, Anthurium, Carnation (spray and standard), Chrysanthemum, Gerbera, Gladiolus, Gypsophilla, Liatris, Nerine, Statice, Tosesk, Orchids, Archillea etc. Most of these flowers are grown in our country

Floriculture in Nepal

Floriculture as a hobby and part time business has been practiced widely in Kathmandu. But of late, some of the enterprises have initiated the expansion of the floriculture business in a scale production of cut-flower and foliage plants. Majority of the middle and upper class households maintain their own garden. Pot plants are common in majority of households, activities of organized business sector are still in primary stage. Aside from ornamental/ aesthetic point of view flower/plants have an important place in Nepalese society from the religious point of view. One cannot think of any religious/traditional ritual or ceremony begin performed without ornamental flowers.

Recently, some entrepreneurs have initiated the expansion of this business in a wide scale production of cut-flowers, foliage plants and dry flowers. There are about 90 nurseries successfully operating in 20 districts of Nepal (in about 23 hectare of land). The commonly grown cut-flowers species in local nurseries and farms, mainly include: Gladioli, Rose, Iris, Carnation, Gerbera, Polyanthus, Anthurim, Narcissus, Chrysanthemum, Aster, Begonia, Marigold and a some species of foliage such as Asparagus, Junipers, Araucaris, Dracanena, Ficus, Monstera, Pothos, etc.

The richness of ornamental plants species suitable for cut-flowers production, excluding the Orchids in Nepal, there exist several, including both commonly cultivated exotic and indigenous wild mountain flowers. The notables include Primula, Mecanopsis, Saxifragas, Gentians, Anemones, Irises and Rhododendron.

The major domestic market for floriculture products is Kathmandu. Flowers and plants are sold by producers directly from the nurseries and retail shops or show rooms. Few traders who operate in temple complexes, footpath and in market places sell seasonal local varieties of flowers. Some operate their business in a mobile cart and sell mostly potted flowers and plants. For the year 1995, total estimated value of turnover of floriculture products (cut-flowers, potted plants, foliage, etc.) in Kathmandu valley is Rs. 20 million. The major clients of floriculture products are hotels, traves agencies, foreign missions, INGO's business houses, banks, pilgrims and general public. Trend of purchasing of floriculture products by local people is increasing. It is noted that fresh and cut-flowers business constitutes less than 30 percent of the total floriculture business in Kathmandu valley. Potted plants, foliage plants and other types of plants constitute more than 70 percent of business. Manpower including the owner and management involved in the 90 floriculture enterprises are about 102,111 skilled and 341 semi-skilled and unskilled.

Potential

Nepal's varied agroclimatic and soil types offer abundant opportunities for cultivation of all kinds of ornamental plants practically all year round at one place or the other. We are therefore in a most advantageous position for production

of floricultural crops and their national and international trade. The availability of relatively cheap labour should enable us to produce these crops and supply them to international markets at competitive prices. We also have several beautiful ornamental plants growing wild in our forest, which have not been fully exploited. They offer great scope for improvement and exploited. They offer great scope for improvement and exploitation for international trade. Besides, the consumption of flowers is higher in winter than in summer and flowers production in winter is not economical European countries while this is possible in Nepal. It can benefit by fulfilling the high demand for flowers during Christmas and Easter the great festivals of winter when the prices are at their peak. The direct air link of Kathmandu with Frankfurt, London, Hongkong, Bangkok, Dubai, Delhi, Osaka has brightened the prospect for exporting floriculture products from Nepal. There exists a good opportunity for Nepal to harness its beautiful vegetational resources and develop floriculture industries for internal market as well as to enter into the world market. Nepal possess several advantages such as availability to cheap labour, choice of different climatic regimes extending right from tropical to alphine, closeness to European countries by air distance, wide florist diversity, etc. Regarding all these facts floriculture sub-sector has tremendous business potential in internal as well as international market.

Constraints

* A clear cut national policy on Floriculture development, processing and product promotion is lacking.

* Lack of bank loan at concessional rate.

* Lack of skilled manpower, research activity, trainings in floriculture sub-sector.

* Lack of incentives from the Govt. to this sub-sector.

* Lack of basic infrastructural facilities for post harvest care & handling such as transportation of floriculture products in a refrigerated van, proper storage, etc.

* Lack of specific policy for the marketing of floriculture products on the basis of their quality and standard.

* Lack of organized flower wholesale market in Kathmandu.

* Lack of facilities, modern equipment and skilled manpower at plant or plant product examining laboratory, check point and quarantine station.

* Lack of basic infrastructure like good refrigeration facility, refrigerated van and arrangement for expeditions movement of floriculture products at the Tribhuvan International Airport.

* Air freight is high.

Recommendations :

* The Govt. should prioritize floriculture industry and should provide proper incentives for its growth. There should be provision for input supply (such as quality flower seeds, planting materials, fertilizers) for the floriculture enterprise.

* Floriculture Association Nepal in affiliation with NARC should carry out, monitor, coordinate, analyze and evaluate floriculture research activities.

* Floriculture Association Nepal in affiliation with Department of Plant Resources

HMG (Royal Botanical Garden and National Herbarium, Godavari) and Institute of Agriculture and Animal Science, Rampur should conduct various trainings and produce skilled manpower required for floriculture sub-sector.

* For the promotion of floriculture products in Kathmandu an organized wholesale market with proper storing facility should be established.

* Adeqate facility, modern equipment and skilled manpower are to be provided at plant or plant product examining laboratory, check point and quarantine stations. Plant quarantinerule should be strictly abided.

* Establishment of basic infrastructure like good refrigeration facility, refrigerated van and arrangement for expeditious movement of floriculture products should be done at the Tribhuvan International Airport.

* There is a strong need for the Govt. to provide soft loans at concessional rates to the floriculture exporters.

* Institutional support to coordinate the production by numerous producers and provide them the necessary market intelligence.

* Specific commodity rate for export to major importing countries should be given to floriculture sector to make them internationally competitive.

Role of Micropropagation to FlourishThe Floriculture in Nepal

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The flouriculture industry of Nepal is even not in infancy stage, but we can easily say it is still in it's mother's womb. The growing interest of the Nepalese Private Sector in flouriculture since last few years seems to be promising. The development shows that agro based flouriculture industry is presumably able to be established in Nepal. It is the micropropagation which can play the vital role in agro based flouriculture industry in order to meet the demand of large quantities of disease free and genetically uniform planting material.

The success of the flower industry in country depends upon various factors. It requires the favorable growing condition, the labor cost must be relatively low and the country must be close to its main market for the fast export of the perishable product.

Nepal, the Himalayan Kingdom is well known due to its bioclimatic diversity. It has humid monsoon region of terai, sub-tropical inner valleys and high mountains of temperate zones. Therefore with varied climatic zones it has the excellent growing conditions for flowers of flouriculture importance such as Carnations, Chrysanthemums, Gerberas, Lilies, Roses, Orchids ornamental Ferns and many foliage plants.

The major consumer markets of cut flowers are Germany, North America and Japan. But the Japan is largely self sufficient. Europe not only dominates imports, but also has a 76 percent share in world exports. The Netherlands is leading with 54 percent share of world exports in 1990. Columbia is the world's second largest exporter (Commandeur et. al. 1994).

Nepal, as a developing country, still has cheap labor cost. The cost of production is relatively low than developed countries. The distance from the consumer country is in close proximity by air frieght.

Beside these factors, flower has religious importance as well in our country. However, the domestic market only is not sufficient to flourish the industry. So to expose the position on the world market which has increasing competition with other countries might depend on their technical capacity. All developing countries involved have cheap labour and favorable climate but only a few have a technological capacity of importance. The importance of micropropagation is increasing because it plays the key role in flouriculture industry for (a) rapid and mass propagation (b) disease free clones (c) genetically uniform planting material and (d) maintaining germ plasm.

In Nepal, the Department of Plant Resources, Plant Research Division has developed micropropagation technique for flowers of floricultureimportance ascarnations ,chrysanthemums lilies and orchids. The development of the techniques of microshoots rooting in sand also reduced the cost of production.

a) Rapid and mass propagation :-

The propagation of any plants of floriculture importance by the conventionalmethod will not be sufficient for floriculture industry. Micropropagation is the method for rapid

cloning of elite plants. Commercial production of tissue culture is already in operation in the developed countries. The Netherland has a total of 67 tissue culture laboratories with a production of 61.7 million plants in 1988. (Pierik 1991) Thailand is the largest producer of tropical orchids. It has 18 commercial laboratories. The annual production is estimated at 31.6 million (Gavinleratana 1991). Tissue culture plants are gaining popularity not only in the developed countries but also in developing countries. The rapid and cheap method of producing tissue culture plants has been developed in tissue culture laboratory at Plant Research Division, Godawari. Therefore it is obvious that the tissue culture can play the key role in mass propagation.

b) Genetically uniform plants :-

Micropropagation is the true to type propagation of a selected genotype (Debergh and Read 1991). A rapid multiplication of clones with a high degree of genotypic preservation is apparently possible through shoot tip culture. Our results on carnations, gerberas, chrysanthemums and other plants shows no differences from the elite plants.

c) Disease elimination:-

G.M. Morel (1960) introduced the technique of meristem culture of virus infected *Cymbidium* as a means of vegetative propagation to eliminate virus. His method found almost immediate commercial use. Probably orchids were the first horticulture plants to be propagated by tissue culture. Today the technique developed by Morel is used world wide for the propagation and maintenance of plants in disease free state.

d) Maintaining germplasm :-

Most cut flower producing developing countries including Nepal are fully dependent on breeding in European countries for their planting material. The knowledge of breeding is kept in secrecy. So depending on foreign varieties each time raises production cost. So the mother stock once received can maintain as germplasm through tissue culture until the plants are demanded.

Conclusion :-

The floriculture industry in our country is in its initial phase, and the main inputs such as plant varieties, fertilizers, pesticides and other production technology such as post harvesting all have to be imported. The micropropagation facilities have to set up with public and private investment to flourish the floriculture. Tissue culture can open the possibility to exchange material safely and cheaply. Besides this, for the development of agro-based floriculture sector, large governmental investments are also involved in infrastructure such as roads and cold storage facility just to enable the fast export of the perishable product.

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Bonsai : Miniature Trees

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Pollution and environment are two key words that most of us are talking about these days. It is obvious that plants play significant role in minimising pollution and maintaining the environment. Beside this, plants are grown for aesthetic, economic, and religious values from time immemorial to present days. Most of us love plants and grow plants, specially ornamental annuals, perennials, flowering and fruiting trees in our limited land or limit the plants in the pots. But to grow big trees and enjoy the nature is not practical to the city dwellers due to the limited space. In this situation, growing bonsai or miniature trees could be an alternative to the nature lovers to grow different kinds of trees and enjoy the changes in Nature with limited surrounding that they possess.

Though growing bonsai is mainly known as Japanese art, at present it is also very much popular in other parts of the world, In Nepal, knowingly or unknowingly, it has been in practice since long time ago, without implementing any art and technology, but just limiting the growing area. Bar (*Ficus bengalensis*) and Peepal (*Ficus religiosa*) are grown in small containers or pots in personal Pooja kothas, Varandas and religious areas like Temples to facilitate the daily worship.

Bonsai are artificially dwarfened trees maintained without loosing its natural characteristics. It is an art with little knowledge of maintaining the plant dwarf as well as healthy. Shape and size of bonsai depend upon one's own imagination and choice. But it is wise enough to know the natural habit and character of the plant to prepare a good bonsai.

Bonsai are classified into different headings according to their growing style and shape of the trunk e.g. Upright trunk, Pyramidal, Winding trunk, Cascating, Single or Double trunk, Stone clasped, etc.

Plants raised by seeds, cuttings, layering, and grafting can be grown into bonsai. Young plants or seedlings are easy to train and prune without having much scratches on the stem. But it takes considerably long time to prepare a good bonsai with desirable shape. On the other hand, plants raised from cutting or grafting can be developed into beautiful bonsai within few years.

Many techniques are envolved in growing bonsai. Pinching in the growing season is one of the main techniques. Generally, it is done

during spring season. The unwanted lateral buds, ready to sprout, are to be pinched off. This process not only helps to maintain the shape but also motivate the flower buds. If these buds are not pinched off in time, the lower branches will be weak and die in due course of time which makes the plant leggy and big headed.

Pruning in the resting period or winter season is another method to dwarfen the plant and maintain the desired size. If pinching is done properly and carefully, this operation may not be necessary. But to remove weak and unwanted parts of the plant, pruning is necessary. In case of flowering trees and shrubs, it should be done soon after flowering to get a nice bloom in the next season.

Coiling of branches with copper or galvanized wire is another useful method of training and dwarfing the plant. It can be done from spring to early summer season when the branches are not very stiff. The young and flexible branches are easy to curve into desired shape without any damage to the plant. Winter time is not suitable for this process because the branches become brittle due to cold and little curvature in any part may result the damage and spoil our specimen.

To maintain the plant healthy and vigourous, root pruning and repotting is necessary. Plant in small pot gradually become pot bound and soil will become hard, nonporous & unconductive, hence giving a unhealthy appearance. For this reason, bonsai need to be repotted once in 1,2 or 3 years according to the growth and nature of the plant. In bonsai, repotting does not mean to change the plant from small pot to a bigger one, but to plant with new soil mixture in the same container. Generally, one third of the old soil is replaced by new soil mixture. Root pruning is also done at the time of repotting. Plants are not potted deep in the soil, rather, some old and thick roots are exposed outside the soil to give more natural appearance.

Watering the plants depends upon personal convenience and also the season. In dry season, one may have to water twice a day but daily watering is not necessary in the rainy season. The most important factor in bonsai culture is the drainage. Bonsai pots should have proper drainage holes and the soil mixture should be considerably porous to avoid water logging.

Manuring is equally important. As plant grows, it will absorb the nutrient from the soil. Bonsai mainly grown in small or sallow containers will have relatively small area of soil to absorb the nutrients required for its growth. So, gradually soil will be exhusted. To replace the nutrients, manuring is a must. Oil cakes or any nutrient materials (solid or liquid form) available in the market or personally prepared, are good enough to use. Time interval of manuring depends upon the size of the plant and th

Now a days, these bonsai are grown for its commercial values. In comparison to other annuals or perennials, it takes considerably long time to prepare a good specimen of bonsai. But with patience and continuous effort, we can be successful in this field.

Grow Bonsai, learn the art of miniature trees

Orchids of Nepal in Perspective

J.B. Hankay Rai

The Orchidaceae, one of the most highly evolved families of the entire plant kingdom, comprises over 25,000 individual species, with new discoveries being made and described every year throughtout the world. Its distribution area covers wide range from equator to the arctic circle, from lowland plains almost upto the snowline in mountain areas with various types of species -both epiphytic and terrestrial. Some species of botanical and horticultural interest such *as Habenaria sp., Cirrhopetalum wallichii, Cymbidium grandiflorum var hookerianum, C. macronthon, Spathoglottis ixioides, Cypripedium tibeticum,* growing at an altitude between 10,000 and 14,000ft represent Nepal for the (alpine range). *Dendrobium pierarde, D. moschatum, D. armeri, D. fimbriatum, D. formosum, Rhynchostylis retusa, Aerides multiflorum, A odoratum* etc. represent tropical belt, and in the temperate range grow *Coelogyne cristata, C. ochracea, C. elata, C. barbata, Calanthe masuca, C. plantaginea, Dendrobium nobile, D. densiflorum, D. chrysanthium, D. amoenum, Cymbidium devonianum, C. giganteum, C. gammieanum, C. longifolium, C. ebrneum, and C. mastersii.*

There are many other species, which are found in Nepal, but unfortunately most of them do not come to the mark to qualify for their right contribution to development of floriculture and for the promotion of cut flower.

For a considerable length of time the present author has taken to the matter of selection of the right type of species from the above list of orchids which could help to promote the means of treating high quality flowers for the market of cut flowers. In the process of selection of plants the writer has been able to find out a couple to orchids of high standard. To the auther, the findings of these gifts of nature are true to "one in a million". In the temperate species of *Coelogyne ochracea*, the writer, in more than a decade ago, discovered a type which is absolutely pure ivory white without ochre yellow normally present on the lip. This rare plant in the progeny of *Coelogyne ochracea* has also the plus point with its fragrance which is normally absent in its normal variety. Within a decade, these rare plants have found a high place of culture in the field. By means of modern technology of flask culture of seed germination and tissue culture this gift of nature has been multiplied to a great extent. And every year the stock in hand begets its number. Horticultural and botanical interest, the writer feels, demand its promotion and highlight, and for this, the writer proposes to present it during the FAN exhibition in April 96.

This apart, the writer in persuit for rarety, collected similar rare plants from the progeny of P*aphiopedilum insigne and P. villosum* which flower during October-November. They are potential parents for hybridisation for reason of being fertile stocks. However, in the domain of hybridisation, Nepal is far behind which is not a healthy sign for promotion and development of cut flowers. a few *Cymbidium* crosses are noticeable in Kathmandu with or without names, while comparatively, *Paphiopedilum* has not found its place here. Another fertile stock now in flower with the grower is *Paphiopedilum villosum* var *boxalli*. It is treasured for its use in hybridisation with other *Paphiopedilums* grown outside Nepal.

With the aim in view to encourage and promote indigenous plants, the writer used two different parents of *Cymbidium eburneum* and *C. lowianum* for crossing, the former being indegenous and the latter from the North-East India. *C. eburneum* as a pollen parent where as *C. lowianum* formed the pod parantage. The result of the cross produced *Eberneum-lowianum*. About a decade ago, the writer, by hand pollination made a cross of these two species and its seeds were sown in flask in the lab. Ten to twenty flasks showed good germination, but unfortunately almost all the flasks caught fungus and ruined the valuable germination leaving only a dozon plants which the writer could save with the treatment of fungicides. In the field culture about eighty percent died leaving three plants. To a great surprise these three plants bloomed three years ago. These plants with potential buds will be in bloom soon, and they may give us a surprise in the forthcoming FAN show. The gift of nature, much as the writer could like to show are not available in bloom for reason of their being without flower.

Further, in order to match the quality of production found elsewhere in the developed world the writer feels that Nepal has to introduce valuable plants from outside, especially *Cymbidiums* and *Paphiopedilums*. These exotic species can give an added imputs in building the stocks for multipication through tissue culture.

Ornamental Orchids of Nepal

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Sungava (*Dendrobium densiflorum*), Chandigava (*Coelogyne cristata*) and many other orchids are much popular among people because of their very attractive, beautifully coloured and long lasting flowers. It is one of the largest and advanced group of the flowering plants. Due to the altitudinal and climatic variations, a large number of orchid species (350 spp ; Dahal & Shakya, 1989) are found woildly distributed in Nepal. Some of the most common ornamental orchids with their flowering time are listed below.

Scientific Name	Flowering Time
Aerides multiflora Roxb.	June-July
A. odorata Lour.	May- June
Calanthe plantaginea Lindl.	March-April
C. chloroleuca Lindl.	April-May
Coelogyne corymbosa Lindl.	March-May
C. cristata Lindl.	March-May
C. nitida (Wall. Mss) Lindl.	May-June
= *C. ochracea* Lindl.	
C. stricta (D. Don) Schlechter	April-May
Cymbidium devonianum Paxton	June
C. erythraeum L.	Sept.-Oct.
C. hookerianum Reichb. f.	Jan.
= *C. grandiflorum* Griff.	
C. iridioides D. Don	Oct.-Nov.
= *C. giganteum* Wall. ex Lindl.	
Cymbidium longifolium D. Don	Oct.-Nov
= *C. elegans* Lindl.	
* *Cypripedium cordigerum* D. Don	June
Dendrobium chrysanthum Wall.	Aug.-Oct.
D. densiflorum Lindl.	April
D. fimbriatum Hook.	April-June
D. formosum Roxb.	June
D. moschatum (Buch.-Ham.) Swartz	June
D. nobile L.	April
Esmeralda clarkei Reichb. f.	Oct.-Nov.
= *Aracanthe clarkei* Rolfe	
Rhynchostylis retusa (L.) Blume.	June-July
Vanda cristata Lindl.	March-June

* Tessestrial. Rest are all epiphytic.

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Chrysanthemum

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Commercially, Chrysanthemum is one of the most important plant in the field of floriculture. It is a genus with about 100 species of annual or perennial herbaceous plants which are widely distributed over Africa, America, Europe and Asia. Recently this exquisite flower has taken market quiet remarkably and as a result several million of the cut flowers are being sold annually in North America and Europe only. Like wise, the demand of the potted Chrysanthemum is also increasing rapidly.

Among European countries, West Germany leads the production of ornamental plants-both cut and potted ones, but even there the demand rises by about 15% every 10 years. The Netherland ranks second in the production of floral crops which mainly exports its product to Northern Europe, North America and many third world countries. As far as Chrysanthemum is concerned, the spray varities are the most popular-both in West Germany and the Netherlands. Besides these countries, Columbia is another major exporter of cut flowers, mainly roses and the pompon chrysanthemum. In America, the cut flower industry is worth $223 million, this being primarily based on foliage ornamentals plus Chrysanthemum, lilies and poinsettias.

Chrysanthemum is a year round crop the total wholesale value of which is astonishingly high in the world floricultural market. Japan produces about 2 billion stems per year, and the United States ranks fifth by producing about 300 million stems per year. According to the World Flower Trade Magazine (1987), the production of Chrysanthemum in different countries are as follows :-

Country	Production (in million)
Japan	2000
Netherland	800
Columbia	600
Italy	500
United States	300

Although Japan is the leading producer of Chrysanthemum in the world, most of its productio is sold domestically. The two countries which lea in the world wide trade of Chrysanthemum are th Netherland and Columbia. The Netherland supplie about 60% of the total Chrysanthemum productio in northern, central and western Europe, where a Columbia's export is largely to the United States. I 1985, it was estimated that Columbia exported mor than 1 billion Chrysanthemum flower stems to th United States.

In view of the increasing demand of the orna mental plants every year, it is quiet obvious that fo proper satisfaction of this astronomical demand, flo riculture industry needs millions and millions o platelet at a time. The application of tissue cultura techniques, which can produce millions of platele from a single plant by culturing their parts can solv this prominent problem satisfactorily. The applica tion of this technique for micro propagation of flori culture crops began with orchid. Commercial orchi tissue culture laboratories produce more than 10 mil lion platelet each year. These plants produced ar pathogen free and of better quality also. Now-a-day tissue culture is being increasingly used in the mas production of Chrysanthemum too.

In our country, tissue culture technique ha been successfully adopted for some years now an Chrysanthemum is one such plant in Nepal, which i being produced by this technique successfully . I view of the advantages of this technique such as, ef ficiency, new variety development, better quality an production of pathogen free plants, this techniqu helps in producing the Chrysanthemum in expo level and that in turn will be an important achieve ment in our floriculture field.

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Growing Chrysanthemum Round The Year

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Chrysanthemum is considered as a billion dollar crop which is scoring high up due to it's delightful colours, shapes and sizes. It's multitude colour makes a standing display in garden. It has a long lasting quality as a cut bloom which has resulted in making it as number one flower in the floriculture trade. Chrysanthemum is probably one of the oldest among cultivated flowering plants. The name originated from Greek word Chrysos-gold, Anthemon-flower. It is reported to have originated from China some 3000 years ago which later on reached Japan, America and Great Britain. Now from the ancestor *C. indium* and *C. morifotoum*, many varieties are developed. Chrysanthemum has a very short flowering period which has caused the growers to face an increase in it's cost of production. A revolution was felt among the florist in it's production technique. Later scientists effort made it possible to shorten the long vegetative phase and extend the flowering period.

Chrysanthemum is a short day plant which flowers in the day length shorter than the critical photoperiod (13 hrs). By manipulating the day length and temperature at different seasons of the year, the flowering can be made through out the year. Flowering can be hastened by short days and delayed by long days. Thus by adjusting the day length and temperature, the successful production of Chrysanthemum has been obtained in green house for ten months period.

Procedure for year round program

Long day chamber : The green house should be equipped with lighting facilities for a bed up to 5 ft. apart and 4 ft. above. The plants provide sufficient quantity of light for that area (10 ft. candle-light). Green house is illuminated at middle of the night (from 11 p.m. - 3 a.m.) with the help of an automatic timer. Illumination is most effective during middle of the night, so that not more than 9 hrs. of continuos dark period occurs. Plants remain vegetative and buds remain suppressed in long day chamber, thus delaying the flowering process.

Short day chamber : This chamber is equipped with blackout material through which light does not pass. In natural long days, the plants can be given short day treatment by closing the curtain from 5 p.m. to 7 a.m., thus allowing the plants to remain in continuous period of darkness for 14 hrs. The flowering process is promoted in short days. Buds form under shading, as a result of flower hormone being produced in the leaves and relocated in the growing tips and the hormone is effective only when nights are sufficiently long enough. Complete blackout each night for 13 hrs. not only ensure the hormone is produced but also it is produced in sufficient quantity to satisfy the needs of the shoots lower down the stems as well as those near the top. This is the way one can keep the plants in artificial long days as long as flowering is not required which can be brought into flowering as soon as desired by placing them into artificial short day chamber. Flower can be supplied in off seasons. But it has to be remembered that temperature is the limiting factor in the flowering process. The optimum temperature being 10° C and maximum temperature being 30° C.

Preparation of cutting for the year round production : For year round flowering

programme cuttings are made ready in all seasons. The mother plants after flowering are kept under light as stool plants. Cuttings taken from the stool plants are called stock plants. Stock plant give lateral branches after pinching. More cuttings can be snapped likewise. The cuttings should be strong and healthy, about 2" - 3" in length. Plants should be watered a day before taking cuttings, so that the plants become turgid not wilted. Morning is the good time to take cuttings while they are still turgid. All leaves are removed except few tip leaves which help to feed the plant while new roots are forming.

Holding cuttings : If lots cuttings are ready to be snapped, the cuttings can be packed in the dry plastic bags, standing the cuttings up right and stored in the refrigerator for several days. It's here the rooting process taken place while in the refrigerator. As a result the refrigerated cuttings root faster than the normal cuttings.

Rooting cuttings : Cuttings are dipped in rooting powder and placed in a box with pot mixture and sand 50/50 by volome. The medium should be kept moist but not wet as some cuttings rot very easily. Bottom heat is prefered to speed rooting. By covering the rooting box with plastic sheet gives the extra heat for cuttings. Plants need plenty of light and air, so they should not be kept closer or overcrowded. The distance between the two cuttings should be 3 cm. Rooting takes place in 2-3 weeks time depending upon the varieties.

Potting and repotting : Well rotted cuttings are potted in 4" pots containg soil and compost mixture. They are kept under light. As the plants become full of roots, repotting is carried out in biger pots. To encourage the plant growth high amount of nitrogen is requred which can be supplied by compost or chemical fertilizer. Staking is necessary as the plant growth is in progress. It keeps the plants upright and supports the heavy weight of the flowers as well. Plants are spaced in such a way that maximum light reaches to each individual plant and kept more light condition for the vigourous vegetative growth as long as flowering is not required. As soon as flowering is needed the plants are given short day treatment which hasten the flowering process. The plants start giving buds in 3-5 weeks time depending upon the varieties (Response group). Flowering hermone is formed during short days, resulting in flowering.

As soon as buds appear fertilizer is given which has about equal quantities of Nitrogen and Potash. Cow dung mixed with oil cakes and bone meal have good responce both for vegetative and floral bud development. In addition to this superphosphate is also given for quality bloom. All the fertilizers should be stopped when the buds start showing the outer line of petals. At this time plants should be arranged in such a way that light and air pass right around the lower leaves. If in the field condition distance between plant to plant is 18" and row to row is 2.5 ft.

Pinching : For exhibition varities, three stem per plant is acceptable. For sprays, plants can be made into a bush by pinching the growing tips. Suckers appearing from the soil may be removed as soon as they are seen so that all the energies of the plants are directed to the flowering stem.

Disbudding : If left to develope naturally chrysanthemum will flower in sprays. So for decorative varieties, where flowering is desired to come into large specimen, only central bud is retained removing the surrounding buds. Disbudding is not necessary for sprays and miniatures as maximum density of flowers give much colour to the garden.

Tuning : Production of blooms for a specific date is not a easy task since it is controlled by many factors, like date of rooting, temperature, light etc. But production can be made for specified date by proper planning as follows.

(a) Enter the date on which flowers are required.

(b) Make the allowence for short day treatment from the date of its commencement to the proposed flowering date.
(c) Allow the appropriate number of weeks of long day treatment from the date of planting to the date of commencement of short day treatment.

Flowering can be brought about on the predetermined date by strickly following above steps in reverse order, provided the temperature is favourablc. eg.

- Suppose flowers are required for 7th of June.
- Response variety takes 8 weeks to flower from the commencement of short days.
- Time taken for flower development is 4 weeks (7th May-7th June).
- Short day requirement for bud initiation is 4 weeks (7th April-7th May).
- Long day requirement for proper vegetative growth is 2 weeks (21st March-7th April).
- Rooting time is 4 weeks (21st Feb-21st March).
- Cuttings are to be prepared on 15th Feb.

Now count back the date from reverse order i.e. 7th June → 7th May → 7th April → 21st March → 21st Feb. → 15th Feb.
15th Feb. comes to be the right time to snap cuttings to have flowers on 7th June.

For making chrysanthemum bloom through out the year, the green house should be equipped with extra heating system. The best way is to develope low temperature resistant varieties by breeding. By selecting early and late varieties flowering can occur without controlling day length and temperature. Nursery men could be benefited by this technique. Chrysanthemum has opened a big market in floriculture trade which can make the nursery men self reliant. So it is right time to exploit available technology and human resources and boost the floriculture industry by adopting low cost techniques.

House Plants : Their Care

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There is no plant that can be classified as natural houseplant. Nurserymen and florists in developed countries had searched for those kinds of plants which grow under low light intensity and able to tolerate greater fluctuation of temperature and drier air than their natural habitat. The term "Houseplant" covers a wide variety of plant types including trees, shrubs, climbers, herbaceous, bulbs, tubers or even annuals.

All the plants except few will die soon if insufficient light is provided to meet their natural day-length requirement. To maintain the health of the plant, it needs both atmospheric and soil moisture as well as regular exchange of air. Plants grown in pots, as most houseplants, additional feeding is supplied by using organic or chemical fertilizers to the soil mixture they are potted in. Plants grow best indoors in positions which nearly duplicate their natural habitat. Different rooms in a house provide various range of light, shade and warmth. Bearing these points in mind one should select plants carefully to suit the location.

Soil : Soil should be loamy well drained with enough organic matter. A good general soil mixture would be two parts soil, one part sand, one part leaf mould, some bone meal and one part compost (manure).

Light : Light being the regulating factor in all plant growth, plants must be well- positioned to ensure that they receive their daily light requirement. Most houseplants need long spells of indirect sun shine, with few exception, plants object to being exposed directly to the rays of the sun. However important thing is that most houseplants must have good light. The general rule is to put most plants in the lightest place out of prolonged sunshine in the room, and this usually means near the windows with thin curtain to filter direct sunlight.

Atmosphere : When we walk through a forest (natural habitat of plants) or into a greenhouse we detect the humid atmosphere and that is what plant enjoy and thrive in. This humidity is what lacking in our homes, except during monsoon time, the air is being too dry for the comfort of many plants. A good number of houseplants have a preference for high or moderate humidity. Moist air is imporatant to many houseplants with a preference for high or moderate humidity. So, if success is to be attained, it is necessary to provide humidity in the vicinity of the plants themselves. To do this is to use pebble tray which consist of a half tray filled with pebbles on which pot stands. Water is added to nearly cover the stones. Syringe or spraying of the foliage, particularly in hot weather, assists in maintaining high level of humidity. It is best to spray early in the day rather than late afternoon or evening when teperature begins to fall. Equally fresh air circulation is important for good growth of the plant. If failed to provide fresh air to plant time to time and if the atmosphere is humid there are greater chances of plants being disease prone. Therefore, windows and door should be opened every now and then to allow to scape old air out and let in fresh air.

Water : Water is the second important factor in growth of the plant. Plants are largely composed of water. Also without moisture, chemicals remain locked in the soil and are unavailable for plants' use. Problem associated with watering is too much water at the wrong time rather than too little which causes the failure. It is very important to water plants according to

individual need. Those plants with weak root system require less water than a fibrous- rooted plant in similar sized pot.

Plants with fleshy leaves, such as Cacti, do not require as much watering as the plants with their normal leaves, because they can retain moisture within their tissues. On the other hand, plants with proportionately large leaves require more frequent watering because they have larger surface for evaporation. Generally in a air there are two distinct periods of the average plant, the season when it is actively growing and another when it is resting. During active period, plants need frequent watering and resting period needs less water. Another important factor is the conditions under which houseplant is living. When the temperature is high and the light is bright, its demand for water is high. Similarly a plant kept in a cool dark place requires less water.

Light, temperature and water must be in direct proportion. During winter season when light and temperature are relatively low plants become semi-dormant and need less water. It is advisable to stay on dryer side of the soil condition than wet. Pots should be checked by feeling the soil with the fingers.

Feeding : Plants absorve nutrients from soil to maintain its health & vigour. After some time as plants use the nutrients from the soil, it will be exhausted. So feeding by chemical fertilizers & oragnic compost is required frequently. There are many types of fertilizers, with specific uses available in developed countries which are not found in Nepal. The best way to keep plants healthy is by top dressing with well decayed compost which is readily available. If possible feed plants with complete fertilizer (N:P:K) every 10-15 days interval depending on plant growth rate.

Religion & The Relevance of Flowers in Nepal

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Besides being universally popular for their aesthetic beauty and aromatic fragrance, flowers have been associated with the gods in Nepal since the very beginning of time recorded by mankind. In order to discuss the significance of flowers in the worshipping of gods, it is not possible to demonstrate every aspect of their application as practised by the various ethnic groups living and coexisting in this country. This paper will concentrate upon some of the major deities who influence the lives of devout Nepalese in their daily activities and the significance of specific plants and flowers associated with them.

Religion in Nepal is unique because of the very harmonious coexistence between the Hindu and the Buddhist communities which has allowed for many deities to cross the bounds of one set of beliefs and appear with a different name in the other set of beliefs.

Lotus- Flower so pure

To both the Hindu and the Buddhist populace, the most significantly important flower is the KAMAL or PADMA which is more commonly known as the Lotus (*Nelumbo nucifera*).

The Hindus hold the belief that Brahma, the Creator of the Universe, emanated out of a golden lotus which grew from the navel of Vishnu the Preserver. The flower is thus considered to be the door or the opening of the womb of the universe. The cosmic lotus is believed to be the generative organ of water which is considered to be the female and therefore the procreative aspect of the Absolute Being. In the Brahmanical cult of worship, the lotus is predominantly significant because of the presence of the essence of Brahma within the plant.

The lotus is also very closely associated with Lakshmi, the Goddess of Wealth and consort of Vishnu. She is also believed to have first appeared out of a golden lotus which sprang out of Lord Vishnu's forehead. Lakshmi is therefore also addressed by the names PADMA SAMBHAVA (the Lotus born) and PADMINI or PUSHPAKARNI (Abounding with lotuses). Likewise Lord Vishnu himself is often addressed as PADMAPRIYA (to whom the lotus is dear). Among the Mahayana sect of Buddhists in Nepal, Lakshmi is depicted as Prajna Paramita, the highest personification of the female gender.

It is a strongly held belief that Gautama BUDDHA walked seven steps immediately after being born and from those steps sprang seven lotus flowers. Manjushree, the Bodhisatva from northern China who drained the waters out of Kathmandu Valley in order to make it inhabitable is also shown sitting on a lotus. While the valley was still under water, a lotus had bloomed and illuminated the spot where Manjushree later built the temple of Swayambhunath. Bodhisatva Avolokiteswor is also represented as the "one who was born out of a lotus". He is, therefore always shown with a lotus in his hand and also addressed as Padmapani or the" one with the lotus in his hand" The holy chant "Om Mani Padme Hun !" is recited in praise of this deity as the "Jewel in the Lotus".

Dubo-The grass of immortality

Although legends and myths vary between the followers of Hinduism, one common factor which associated the Dubo grass or Bermuda Grass (*Cynodon dactylon*) with immortality is its affiliation with ambrosia, the drink of the gods which ensured perpetual life. One version of the legend tells about a crow which stole and drank all the elixir-of-life which was being brought to earth from heaven by the great sage Narada, son of Brahma. Besides unknowingly attaining immortality after having consumed ambrosia meant for mankind, the crow wiped and cleaned its beak on the Dubo grass making the grass immortal.

Another version mentions that the Dubo grass was produced at the time when Mohini, the elusive metamorphosis of Lord Vishnu Became a courtesan in heaven and was serving Amrit (ambrosia) to the gods out of a vessel balanced on her hip. While serving, a few drops of the ambrosia landed on the ground sprouting Dubo wherever it contacted the earth.

This grass is therefore regarded as a symbol of Purity and long-life and is an essential part of any important Hindu religious ceremony. Hindu brides and grooms exchange garlands made from Dubo to symbolize and immortal relationship as well as perpetual rejuvenation.

Dubo Garlands are also used together with garlands made from Makhamali (*Globe amaranthus*) during the festival of Bhai Tika Brother worship). This is the day when sisters pray for their brothers long life and prosperity and perform specific rituals which are meant to protect them form Yama, the God of Death.

Shiva & TheThorn Apple Plant

Lord Shiva is also associated with several plants and flowers, the foremost among them being the Dhatura or thorn Apple Plant (*Datura stramonium*). The plant contains potent hallucinatory properties which is believed to assist the lord whenever he desires to submerge into cosmic thoughts beneficial to mankind.

Likewise the BEL or WOOD APPLE TREE (*Aegle marmelos*) is believed to the another favourite of Lord Shiva. The fruit of this plant is supposed to have acted as a cooling antidote when the lord once drank the poison which had churned out of the raging sea and almost destroyed all living beings on this earth. Devotees of Lord Shiva continue to offer Bel Leaves and fruits along with flowers from the Dhatura plant.

Not only is the Bel a favourite of Lord Shiva but is highly regarded by the Newar Community who have a unique tradition of wedding their girls to the Bel Fruit. The corresponding expression for the Bel tree in the Sanskrit language is "Shriphala" Which traslates as the fruit of plenty and is associated with active and healthy reproductive powers the marriage between virgin Newari girls and the Bel fruit is held before the girl attains puberty. The fruit in this case represents Kumar, the Eternal Bachelor and son of Lord Shiva. the Bel fruit used during I-hi (the spiritual wedding) must not only be undamaged but also have a rich and shiny look. If the fruit is damaged by any chance, it is believed that the girl is likely to be spending her life with an ugly and unfaithful husband. However, the most significant aspect of this sort of weedding is that once married to God, the women remain pure and chaste and never become windows.

Sharadha (Ancestor Worship) & The Yellow Jasmine *(Jasminum nudiflorum)*

The elderly and senior members of Nepalese families are well loved and respected all through their lives. This practice of respecting the ancestors is carried on after their deaths in a ceremony known as Sharadhya a term which originates from the word Shradha meaning Devotion. During the death anniversary or Sharadhya the ancestors are offered special prayers and innumerable fruits and food, specially their favourites whilst living, together with the Yellow Jasmine flowers. This is the only flower considered worthy of being offered during this ceremony. If the particular flower is not in bloom any alternative that is offered has to be yellow in colour. Although very little is known as to the specific reasons for using this flower it is believed that yellow represents giving up of materiallistic things such as the colours of the robes of the ascetics. Plants and Flowers are thus not only considered as beautiful objects but play a very significant role in the everyday lives of Nepalese people. As the saying goes:

"THE WORSHIP OF THE PLANTS AND TREES IS THE COMMONEST FORM OF ADORATION AND REVERENCE. IT SYMBOLIZES THE WORSHIP OF THE VEGETABLE KINGDOM AND PART OF THAT CURIOUS ASSOCIATION OF MEN WITH ANIMALS AND PLANTS WHICH IS SO MARKED A CHARACTERISTIC OF BOTH THE HINDUS AND BUDDHISTS FORMS OF FAITH."

Ferns For Manking

Mrs. Bina Shrestha

Ferns comprise an extensive family of plants and are absolutely popular on account of the beauty and gracefulness of their foliage. The ferns attract the attention of general public for its ornamental value but to taxonomist it constitutes a introduction of the land plants in the history of plant evolution. It is believed that the ferns appeared on the Earth more than 350 million years ago.

Ferns are found in all parts of the world except the dry deserts and the cold region. There are about 10,000 species of ferns world-wide. Most ferns grow in Tropical Regions especially in South-East Asia where there are about 2500 species. In Europe, about 150 species are reported to be in existence where as in North America, more than 300 species are reported to be found. In Nepal only 84 genera and 375 species of ferns are reported to be found (Bull. of Bot. Soc. 1984).

Ferns are mostly perennial herbs with the stem often in the form of rhizome by which they are generally multiplied vegetatively. The stem may branch and usually grow slowly and may live for 100 years or more. The root anchrs the stem to the ground and absorb water and nutrients. The leaves are pinnately compound and consist of two parts : the leafy portion, the fronds and the stalks called the stipe. The yound fronds are circinate that is, they are coiled inwards in the upper surface and are charaterised by the apical growth. The lateral leaflets borne by the axis are known as the pinnae. The latter may be deeply pinnately lobed and each lobe is called the pinnule. The stem and the petioles are covered with numerous brownish scales known as the ramenta.

Propagation of the fern is carried by the division of the rhizome or the roots during rainy season in the plains while in the hilly region this is done in the spring season. The fern may be propagated by means of germination of spores where a fern becomes pot bound, remove it from the pot separate the roots making two or more plants. Various media are utilised for the germination of spores depending upon the type of fern. According to the literature Bordies's Nursery, Inc. Santa Ana California, Six fern varieties *Crytomium balcatum, Dicksonia antarctica, Nephrolepis exaltata, Polystichum setorum, Rhumora adiantiforme and Sphaeropteri cooperi* are produced using a nutrient agar solution. the germinated young fern gametophytes are said to be transplanted onto a growing medium where fertilisation lead to fern sporophyte formation and finally transplanting young sporophytes to develop into linex sized plants. But the spore gamination requires perfect skill with the medium free of contaminants, uncrowded and well supplied with nutrients. A novel method for surface sterilising and sowing. fern spores is described in American Fern Journal (1986).

The micropropagation of *Nephrolepis exaltata*, important ornamental plant, has been described previously. This plant can also be propagated sexually through spores or asexually by the shoot formation on the runners.

The germination of spore would be difficult for a amature, because the spores are very small and sterilizsation is not very easy and the possibility of contamination may lead to the wastage of the materials and labour.

A few ferns may be propagated by means of bulbils which are produced on the upperside of the fronds e.g. *Asplemium bullatum*. When a fern becomes polloned, remove it from the pot,

separate the roots making two or more plants.

The principle requirements for the development of furnery are shady location, moist atmosphere and well drainage at the root system. Most of the ferns hate direct exposure to the sun light and the change of the site. Therefore, it is better to carry some soil from the original place while transplanting a fern. A good soil mixture for the growth of fern plant may be one part each of loam leaf mould, sand and broken pieces of charcoal and mortar pieces of about 1/2 to 1 inches size and half part farm yard manure with a handful of lime and ash each.

Ferns represent excellent house plants with variety of shape, size and colour of the foliage. As the foliage gives a fresh, inviting air to an entrance, it is very effective to put varieties of ferns with other plants. They are effective for the decoration of the hall and in the embellishments of varandahs. Their cut fronds impart a special additional charm while arranging a flower vase.

Some of the common ferns which can be cultivated in home garden are briefly decribed.

Adiantum - One of the most popular fern known as the "Maiden hair fern" as the main stem is dainty and black hair like with small roundish leaves on both sides. It can tolarate damp ground and can be grow in shady locations.

Anemica - It is also called "Ash Fern" as the leaves possessed by this plant is ash coloured.

Asplenium (Spleen wort) - It is commonly grown out-doors in shady location and has the capacity to tolerate damp ground. it is a genus with varied species from large leaved *A. niders* (Birds nest fern) to very fine leaved *A. myrophyllum.* In bird nest fern, which is a native of Brazil, leaves are broad shinning and pale green in colour with a dark brown central vein. The centre of the plant is broad enough to make a birt's nest.

Cyathea - Popularly known as "Tree Fern" as this fern is slow growing and the trunk afterwards resembles like that of a tree. *Cyathea gigantea* has been declared as a threatened plant.

Devallia - It is known as hare's foot fern or squirrel foot fern because of the unusual foot like shape of the creeping stem. They are commonly grown outdoors in partial shade. *D. bullata* is one of the most handsome species with delicate foliage and strong creeping stem.

Drynaria - A genus with large ferns growing from high hills to the plains. *D. querifolia* possesses finger like rhiromatous roots.

Drynaria - Wood fern or shield fern. They are commonly grown out-doors in partial shade with moist ground. Although it is a moisture loving plant, it grows satisfactorily in ordinary garden soil which may be acidic or neutral *Dryoptris filix -mas* (male fern) is a vigorous hardy fern which can thrive in dry shade, shallow, chalky soil and heavy clay. The fronds remain green until late in the year with the thick roots thus making good ground cover.

Lygodium - a climbing fern with thread like stem is commonly grown in shady location with damp ground.

Nephrolepis - A genus which can thrive even under the conditions of extreme drought and heat to very cold and moist atmosphere possesses various species. The most common varieties are *N. cordifolia N. exaltata* and *N. acerminata.*

Onoclea sensibilis (Sensitive fern) - A fern with decorative green foliage in which the sterile fronds turn brown during the first frost of autumn. The furile fronds which are conspicuous bear lead like spores from mid summer onwards. Its roots and foliage make good ground cover in all soils that remain permanently moist or damp.

Osmunda regalis (Royal fern) is suitable for damp soils in partial shade. In the lime free moisture retentive soil this splendid fern grows well to a magnificently large size. It bears a few upright fertile fronds which at first sight look

like flowers. The leaves turn into yellowish brown in autumn.

Matteuccia struthropteris (Ostrich Feather fern) the beautifully symmetrical sterile fronds of this fern are fresh and delicate in spring time. In winter, the previously inconspicuous fertile fronds remain looking decorative despite being dark and wothered. The roots spread quite widely especially in the damp conditions which suit it best.

Platycerium - The most common specis is *P. alcicorne* which is called "stag horn fern" because of the similarity of the fronds with the horns of a stage. It can be grown on a log of wood with roots covered by mosses or in a pot containing a mixture of charcoal pieces and leaf mould.

Polypodium - The popular specis *P. vulgare* has long fronds arising singly from a creeping rhizome. *P. aurcum* has fronds which are deeply cut and bluish green in colour. The Polypods are moist loving plants that commonly grow in partial shade.

Pteris - Includes some pretty varietgated fronds as in *P. exsiformes* and finely serrated leaves as in *P. dentata.* or smooth ones as in *P. cretica. P. major* also likes a damp atmosphere and huminity. They require a lot of water in spring and a minimum of water in winter.

Polystichum - It is a fern with decorative green foliage. *P. setiferum* is one of the beautiful form of soft shield fern with more that usually lacy foliage. Its large fronds spread spirally more that usually lacy foliage. Its large fronds spread spirally from a central crown. *P. aculeatum* is a hard shield fern which is tough and leathery and make clumps of dark shinning greenary.

Besides, many other ferns can be selected for the establishment of fernery on the basis of location and surrounding atmosphere. *Ceratopteris* (water fern), *Cruyptogramma* (Rock brake), *Cyrtomium* (holy rern), *Cystopteris* (bladder rern), *Dennstaedtia punctilotsula* (hay secnted fern), *Ophioglossum vulgatum* (adder's tongue fern), *Pteridium aquilinum* (blacker beake) are commonly grown outdoors in shady location with damp ground while *Cheilanthes* (Lip fern), *Pityrogramma, Pellaca* (Cliff brake), *Woodwardia* (chain fern) are commomly grown in partial shade. There are some fern like *Dennstaedtia punchlopula* (Italy scented fern), *Onoclea sunibilis* (Sensitive fern), *Osmunda cinnamomea* (cinnamon fern) *Pellaca* (cliff brake), *Pteridium aqilinum* (Bracken, brake) *Woodsia* and *Woodwardia verginica* (common chain fern) are commonly grown outdoors possibly in full sun.

Ferns are not only important for the decoration but also for the edible purpose. Because of the possession of the high nutritive value, many ferns can be cultivated for the agricultural purpose.

The study and research work in ferns & allies was initiated by the Department of Plant Resources since the beginning of its establishment and at the same time managed a fern section with fernery at the heart of Royal Botanical Garden, Godavary .

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Ferns, the ever green plant for decoration.

Gladiolus

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Scientific name	- Gladiolus
Common name	- Sword Lily, Florists glads, Painted Lady, Garden Gladiolus.
Family	- Iridaceae.
Origin	- Europe and Mediterra nean region, South west Asia, Tropical and South ern Africa.

Gladiolus is derived from the Latin word 'Gladius' meaning for a small sword, refering to the shape of the leaf. Gladiolus, the sun lover is the universal leader among the favourite flowers of summer. It is a genus of 300 species and about 10,000 cultivars have been introduced. It is popular for cut flowers and decoration because of its excellent, long keeping qualities and even spikes cut before opening the petals gives a nice bloom if it is placed in water.

The colourful gladiolus flowers are widely funnel shaped with a short tube and three larger upper petal lobes and three smaller lower ones which are after patterned. They are produced on one-sided, stiff fleshy spike of 2 to 3 ft or more long, with flattened sword-shaped leaves in rank, produced on bulb-like corm. Most of the plants in cuttivation are hybrids. Some kinds are suitable for the rock-garden, others for borders, but many are cultivated primarily for cut flowers. The corms of some gladiolus species are source of food and beverage used by various African tribes.

The main groups of Gladiolus are

1. Large flowered (Gandavensis) hybrids

Large flowered gladioli are most adaptable and generally the most satisfying. They are easy to grow, the plants reaching 3.5 -5 ft in height and ranging in colour from white to almost black.

They are equally suited to garden decoration and cut flowers being particularly valuable where large arrangements are needed. They can be timed to flower since the early flowering sorts bloom 90 days after planting, the mid season 100 days, and for the late flowering allow 120 days from time of plantation.

2. Primulinus hybrids

Primulinus hybrids are distinguished by their dainted and hooded flowers. More and more people are growing for charming flowers which are refined in shape and colour. The height of the plant is almost 2-3 ft. Individual flowers are usually 2.5 - 3.5 in. across according to variety. The individual flowers are larger than those of the miniatures and smaller than the large- flowered hybrids.

3. Miniature hybrids

The height of miniature hybrids reaches 2-4 ft with small flowers ideal for cuttings. They include Butterfly gladioli characterized by waved and fluffy petals with rich markings in contrasting shades. Each spike of Butterfly gladiolus has 6-8 florets open at a time with vivid strong amd bright throad markings, about 10 very charming and blotched colours varieties are found in Butterfly hybrids. They are newer race of small flowered one and most useful for cut flowers.

4. Peacock hybrids

Peacock hybrids are much more recently introduced. They are early flowering hybrids than the others. The size of bloom, stem and

height resembles that of the Primulinus hybrids, but the petals are more pointed and reflexed. They are excellent for cuttings.

5. Star- flowered hybrids

This is a race raised by unwins of Cambridge, England with flat, star-like flowers.

Apart from these types there is a spring flowering Kind called *Gladiolus colvillei* (Syr. *G. nanus*), Which is mainly grown under glass for early flowering. They are aften planted in sheltered positions out of doors in "November" *G. colvillei* is the hybrid between two south african species (*G.tristis* and *G. cardinales*). The plant is almost 1.5 ft. tall. Flowers are almost erect with pointed scarlet petals, the lower ones with marking inside. There hardier species are the most resistant to cold and can therefore be left in the ground undisturbed all winter without problem.

There are not many varieties but the Bride with pure white flowers and Peach Blossom with rosy pink flowers are two that are popular. Crimson and pale purple Coloured are the other.

Cultivation

Gladiolus is not difficult to grow. The successful cultivation of all types of gladiolus is the same. Almost any soil will do, but to produce the best spikes and flowers, soil should be well enriched and also should contain plenty of humus, supplied by rotted compost, organic matter or peat. So ground should be well prepared in advance by digging at least-8 in deep and mixing with manure. previously. Gladiolus do not like freshly manured ground.

Plantation

When choosing planting site, we must select sunny situations and avoid wind swept positions. Plantation of corm can begin any time after frost is out of the ground and it is dry enough to work readily, usually from mid. March. Succession planting may continue, at intervals of 2-4 weeks from "mid March" unwards to "mid May" for fine spike in the autum.

The gladioli corms can be planted about 4-6 in. deep and 6-8 in. apart according to size of corms. Plantation can be done in groups for display or in rows for border and cuttings. If the soil is heavy some sand placed underneath the corms which will help their drainage but on lighter soil this is not necessary. Staking should be done in position quite early, because many good spikes may be lost in heavy winds. By mid May the young shoots of the early planting will begin to show above the soil. From them soil around the plants should be hoed frequently. If weather is dry in June or July, we should water regularly. One good soaking is much more effective than a number of sprinklings because gladious prefer abundance of moisture. Mulching with compost or moist peat is helpful for both moisturing and preventing weeds.

Early cutting of the spikes can be done as soon as the bottom florets begin to open. By deeping the spikes in containers of water upper remaining florets begin to open slowly one after another.

In the autum, lifting of the corms should be done carefully to save all the small corms and cormlets. After selecting and separating the size of corms (rank of corms), it is very necessary to store them in labelled bags or ventilated boxes in a dry frost-proof place for winter.

Magnificent Flowering Plant Clematis

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Clematis are becoming increasingly popular, but there are still many people who are shy of growing these magnificent plants. I Think the reason for this is the fact that their huge flowers look so exotic that the ordinary gardener despairs of ever producing so glorious a display in his garden. He is of course, completely wrong as clematis, although exotic in apperance, are as hardy as the oak, living to a great age, flowering annually for an immensely long period, and with only a little care, can be made to flourish in any garden.

Another reason for the shyness of many gardener towards there beautiful climbers is the fact that they have obtained a bad repretation for suddenly dying when in full growth. This rare disease is known as clematis wilt, and so far there is no known care; the only thing one can do is to cut the plant back immediately this wilting is noticed, and if this is done quickly the plant will sauvive and be none the worse for its attack. A useful tip in regard to this die-back is to soak the ground round the plant with chestnut compount and spray the stems as well; This should be done when planting and during the spring when the plant is in full growth. This preparation usually used to prevent damping-off in seedlings, will afford a certain amount of protection to clematis and strengthen them to resist attacks of the dreaded wilt. As soon as your plants are well established and mature, they will be immune to this disease. Clematis are lime loving prants, but can be grown quite successfully in lime free soil, a handful of bone-meal worked in around the plant every autumn will help a lot. A mulching of well-rotted manure or compost in both autumn and spring helps to maintain the vigour of the plant and provides shade for the roots. Before mulching, make sure the ground is moist, as the mulching prevents evaporation and keeps the soil cool and moist-the ideal condition for clematis, which is the wild state grow with their roots hidden under the shelter of hedges, and so on only their flowering woods being visible in the full Sun. A top dressing of Sulphate of Potash given in the spring will work wonders, and at all times make sure the plants are well watered, as they are moisture loving plants and hate to be dry at the roots.

Planting may be done at any time as the plants are grown in pots. But September and October are much the best months for this operation. They like good drainage, so the soil should be well broken up to a depth of about 2 ft and some good drainage material should be placed in the bottom-old mortar rubble is greatly loved by clematis. Put a good fork-full of old manure on top of this and then plant in the ordinary garden soil enriched perhaps with a handful of bone-meal and some peat or leaf-mould to hold the moisture. There is no need to disturb the ball of soil when planting, as the roots will take to the surrounding soil. Plant little deeper than the top of the ball of soil, as clematis will root from the stem and provide extra support. If the ground at the base of the wall is very dry one could plant about a foot away and lay the stem of the plant in under the soil. A cylinder of wire-netting round the bare of each plant will prevent the stem being severed by the hoe or damaged by animals.

Clematis provide a wealth of material for indoor decoration. The flowers are produced in many diverse forms from the small nodding, blue *C alpina* to the 8 in flower of 'Lasurstern' and these make wonderful flowers for a vase or

floating bowl. Holding the cut stem in a flame for a secord will ensure that the flower will last for several days, even up to three weeks, in water. After the full flush of bloom in the spring and summer months the autumn provides us with still more flower with a few varieties one can have clematis in flower from January until November and following varieties will provide the enthusiast with a good selection of plants that can be obtained from good nursery or from collector of these plant.

Early - Flowering Evergreen

The earliest variety of all these flowers is the attractive evergreen fern- leaved *C. calycina*. This species is also known as *C. balearica*, after the islands of its origin. The flowers are bell-shaped and a pale lemon colour spotted within with red freckles; it blooms during the mild spells from January until March. This is followed by another very handsome evergreen called *armandii*, which has white flowers similar to *C. montana*, but the large glossy green three - lobed leaves are its main attraction; there is also a pink variety of *C. armandii* called Apple Blossom; both bloom during March and April.

Late spring and early summer bring us the wealth of bloom of the *C. montana* varieties. These splendid plants will grow practically any where- on cold north walls, through trees and bushes, or will cover unsightly sheds in next to no time. They need little atention and only need pruning if they get cut out of hand. This should be done when necessary, directly after flowering when they can be cut back quite hard. They produce their main growth, often up to 30 ft in the summer and autumn, so the sooner they are cut back after flowering the better. A favourite of mine in this section is the lovely *C. montana* 'Elizabeth' a beautiful apple blossom - pink with delicious fragrance, and flowering at the same time is the lovely but little known *C. spooneri*, which has pure white flowers, quite large for this typw, with striking yellow centre, the leaves being quite distinct and the growths turning almost black in the winter- a plant of great interest and merit.

Wel - known 'Nellie moser'

After the mass of smaller flowers we come to our first large flam boyant flowers, and 'Nellie moser' is so well known it needs little description, its pale pink flowers with a carmine stripe down the centre of each sepal giving a superb display for several weeks. This variety fades rather badly on a South wall, however, and it is as well to place it in a more shady position-even a sheltered north wall will give and keep a green colour. An improved variety, ' Bee's Jubilee' is of better colour and is a fine strong plant 'Laburstem' is another "must" for the early summer a most handsome variety which bears deep blue flowers of tremendous size with striking white stamens. 'Barbara dibley' another fairly variety has rich deep carmine flowers with an even deeper bar and is very free- flowering.

The lanuginosa group contains such long flowering and well loved varieties as 'Mrs Cholmondeley' which produces a full flush of lavender-blue flowers in May and June and then carries on throughout the summer, flowering profusely on the young wood. *Clematis henryi* and 'madame le coultre' are enormous whites, the former with a dark centre, the latter with a yellow one. 'Lady North cliffe' is another popular clematis in this section can be left unpruned.

The Jackmanii and viticella varieties are perhaps the best known, and these give us a continuous mass of flower from late June untill the autumn. Here it is impossible to beat the old favourite *C. Jackmanii*, which always produces a magnificent display of purple flowers for about three months- a plant that should be in every garden. 'Comtesse de Bouchard' is a lovely Satiny-rose and equally free-flowering. 'Madame Edouard Andre is a good velvet-red, and 'perled azur' is a lovely sky- blue. A new comer to this section is 'Hagley Hybrid' this has quite large blooms for Jackmanii type and they are of a most exquisite shade of deep shell pink, the September flowers being of a particularly good colour. All these varieties do best when pruned back hard in the early spring. In this way one keeps the plant well clothed from the vase and good strong vines are produced bearing manes of large flowers.

Pruning In Rose - Why ? When ? & How ?

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Very often we see tall and lanky rose plants in most of the gardens. The plant bears flowers during the season and everything seems to be alright for a common man because he enjoys the beauty of the flower only. But for a professional, this means the plant is not maintained in the right way. (I was in this situation couple of months ago when I visited one of my friend's garden.) Many of the rose growers and lovers might agree with me. But some of you one still question; How can you say that the plant was not maintained in the right way when it is bearing beautiful flowers ? In the following paragraphs I justify my statement.

Rose is one of the most important cut-flowers of Nepal, it ranks first among the cut-flowers in terms of consumption in the country. It is found growing from the plains to the high hills and comes to bloom in the winter while in the hills it flowers best in the spring. It is commercially used in Nepal as cut-flowers, in the preparation of garlands, bouquets and also as a decorative plant both in pots and in the gardens.

Now, the importance of rose plant varies depending on the grower. If he is a commercial man, his interest will be in quality as well as quantity of flowers, quality being more important. But for a plant lover, quality become more important than the quantity. However, both agrees to have a healthy plant. And the answer to all these questions is _____ PRUNING.

WHY ?

Pruning is an important operation of rose which involves removal of dead, old and undesirable branches to get economic yield and quality bloom. Besides it helps to maintain plant health and to regulate steady supply of flowers in the market.

The main objectives of pruning are as follows :

1. To keep the plant in good shape.
2. To remove weak, diseased and dead wood/ twigs.
3. To encourage vegetative growth and flower bud.
4. To get full sun-light/air circulation
5. To manufacture food efficiently
6. To remove the suckers from the root stock.

Pruning in rose may be of three types

1. HEAVY : In heavy pruning each bush will have 2-4 canes and each cane will have again 2-4 buds.
2. MODERATE : In this case, each bush will have 4-6 canes and each cane will have again 4-6 buds.
3. LIGHT : Here, each bush will have 6-8 cane and each cane will have again 6-8 buds.

Generally, moderate level of pruning is practiced for display as well as cut flower purpose. But if the plant is too old, heavy pruning and if too young light pruning is done.

WHEN ?

Pruning time varies from place to place. But in general for the plains Sept.-Dec. and for the hills Jan-March is recommended. In this regards, a general rule of pruning time is that the activity of the rose plant should be least and at dormant or near dormant stage.

In plains like Chitwan, pruning can be done immediately after the monsoon from Sept.-Nov. but for places like Kathmandu pruning may be done between Jan.- March.

HOW ?

Before you plan pruning, make sure you have the following items

,1. Secature
2. Pruning knife
3. Bordeaux paste/Enamel paint
4. Farm yard manure
5. Rose mix
6. Plants for pruning

After, you have selected your plants for pruning decide which level of pruning you are going to do. This depends upon the age and purpose of the plant. So for better understanding a mock pruning is mentioned below.

Mock pruning schedule
Description of rose plants to the pruned

Variety	- Queen Elizabeth
Age	- 3 years
Present nature of plant	- canes tall about 4-5 feet branching and drooping
Purpose	- Display as singly
No. of canes	- 10
Pruning records	- Never done

Step 1 : select at least 4 canes or branches which are to be removed considering its state (dead, old or densely populated).

Step 2 : remove 4 canes upto the base and the rest of the canes can be cut at about half a cm. above a vigorous growing bud by giving a slant cut.

Step 3 : to cut these canes care should be taken to retain 4-6 buds and while doing so retain the topmost bud which is facing out-wards.

Step 4 : apply Bordeaux paste or enamel paint.

Step 5 : apply 4-5 kg of FYM and 30 gm of rose mix per plant and irrigate copiously.

The Language of Flowers

Form victorian times, and in some cases even earlier specific Flowers when given as a gift have been credited with 'secret' meanings. Such meanings may accordingly be related to the emotions of the giver as aroused by the recipeint several of the manings of individual flowers have changed somewhat over the decades, but in general the lish retains a considerable element of the traditional.

ACACIA . *Secret love*
ALMOND BLOSSOM . *hope*
AMARYLLIS . *pride, splendid beauty*
ANEMONE . *forsaken*
APPLE BLOSSOM. *preference*
BELLFLOWER, WHITE . *gratitude*
BLUEBELL. *constancy*
BROOM . *humility*
CAMELLIA, RED . *unpretending excellence*
CAMELLIA, WHITE . *perfect excellence*
CARNATION, RED. *alas for my poor heart*
CARNATION, STRIPED . *refusal*
CHAMOMILE . *patience*
CHRYSANTHEMUM, RED . *I love*
CLEMATIS . *mental beauty, purity*
COLUMBINE . *folly*
DAISY. *innocence*
ELDERFLOWER . *compassion, consolation*
EVERLASING FLOWER . *unfading memory*
FORGET-ME-NO. *fidelity, true love*
HAWTHORN BLOSSOM . *hope*
HEARTSEASE . *remembrance*
HIBISCUS . *delicate beauty*
HONEYSUCKLE . *devotion*
HYACINTH . *unobrusive loveliness*
HYACINTH, BLUE . *constancy*
JASMINE, WHITE . *amiability*
JASMINE, YELLOW . *happiness, grace and elegance*
JONQUIL . *I desire a return of affection*
LAVENDER . *silence*
LILAC, PURPLE . *First emotions of love*
LILAC, WHITE . *youthful innocence*
LILY. *purity*
LILY-OF-THE VALLEY . *purity, return of happiness*
MAGNOLIA . *grief*
MARIGOLD . *joy*
MICHAELMAS DAISY . *farewell*
MIGNONETTE . *your qualities are superme*
NASTURTIUM . *patritism*
ORANGE BLOSSOM . *purity and loveliness*
PANSIS . *love, thought*
PEONY . *bashfulness*
PINKS . *love*
POPPY, RED . *consolation*
PRIMROSE . *early youth*
ROSE . *love*
ROSE, MUSK . *capricious beauty*
ROSEBUD . *pure and lovely*
ROSEMARY . *remembrance*
SNOWDROP . *hope*
STOCK . *lasting beauty*
SWEET WILLAM . *gallantry*
TULIP . *love*
VOILET . *modesty*
WALLFLOWER . *fidelity in adversity*
ZINNIA . *thoughts of absent friends*

Executive Summery of Business Plan for cut flower Tuberose Prepared by FAN

Tuberose occupies a special position to flower loving people. It has a great economic potential for cut-flower trade. Cultivation of tuberose is no quite common as rose and chrysanthemum. It's cultivation has been confined among few nurseries and flower hobbyist in Kathmandu valley. Due to difficulties on obtaining planting materials and ignorance on economic significance. tuberose is not popular among flower growers.

Current demand for tuberose cut-flower in Kathmandu Valley is estimated about 125,000 sticks per year. Local production has met less than 27.5 % of the demand and rest is met through import mainly from India. Promotion of tuberose cultivation in Kathmandu valley will substitute the flowers currently imported from India. Techno-economic assessment indicate that Tuberose cultivation is feasible in Kathmandu valley.

Following points should be considered while initiating tuberose cultivation in Kathmandu valley.

Production Aspect

a) Tuberose grow in mild climate without extremes of high or low temperatures even though it can be grown under a wide range of climatic conditions. Commercial cultivation of tuberose is mainly confined in warm, humid areas with average temperature range form 20-35^0 C. Very low temperature and frost also damages the plants and flowers. It can grow well in sunny situation. Loam and sandy loam soils having a pH range from 6.5-7.5 with good aeration and drainage are considered suitable for its cultivation. The soil should be rich in organic matter and retain sufficient moisture for proper growth.

b) Tuberose farming can not be carried out successfully on the lack of trained technical manpower and entrepreneur must manage at least one trained worker in the enterprise.

c) Fresh bulb of tuberose should not be planted and a storage of few weeks is essential for better growth and flower production. Clumps of bulbs should be dug-out of soil when plants cease to grow and are stored in well ventilated semi-shady place for at least one month before planting

d) Tuberose bulbs be obtained from Madras, Calcutta and Patna for better result of crop. In general a bulb having diameter 2-3 cm are suitable for planting. Bulbs hould be planted in 30 cm. apart in rows and 24 cm apart between plants. It may vary from 4-7 cm depending on the size of the bulb, nature of soil and growing region.

e) Soil should be manured and fertilized based on soil test result. For normal soil, during land preparation land a basal application of leaf mould, farm yard manure at the rate of 1- 1.25 ton per ropani depending on climatic conditions and soil type should be done to ensure better growth and flowering. Further application of 2.5 kg of Nitrogen, 3.5 kg of Phosphorous and 3.5 kg of Potash per ropani should be added for good flower and healthy plants.

f) Soil should have sufficient moisture at the time of planting. Field should be irrigated before planting to provide optimum moisture for sprouting. No further irrigation is required until the bulbs sprouts. Frequency of irrigation depends upon soil type, stage of growth and weather condition. Field should be irrigated regularly and develop-

ment of irrigation infrastructure is must for successful production.

- Mulching, hoeing and weed control are the activities to be performed for successful Tuberose farming.
- flower production varies with cultivars and depends upon bulb size at planting time, density of planting and cultural practices adopted. As far as cut-flowers, on an average each p .t gives 5-7 standard stalks and approximately 12,000-14,000 stacks will be produced in a ropani of land.
- Tuberose are prone to many diseases like stem rot, flower bud rot, etc. and insects like grass hopper, weevils, aphids, thrips, red-spider mites, nematodes, ect. There should be technical personnel capable to diagnose the incidence of these diseases and initiate the control measure.
- Land is the most limiting factor for initiating tuberose cut-flower business in Kathmandu valley. Initiation of this business by purchasing land is not profitable, only investors possessing land or finding land on rent basis can start this business. Unavailability of seeds, fertilizers, pesticides and chemicals, lack of technical know-how on production and post harvest handling technique, etc. are other constraints on production.

arvesting and Packaging Aspect

- Tuberose is harvested by cutting the spike from the base for table decoration or the individual flower is picked from the spike for making garlands and other ornaments. Picking of the flower should be done in cool hours of the day either in the morning or evening.
- Tuberose bulbs should be harvested at proper stage of maturity for storage of bulbs and their growth. The bulbs reach maturity when the flowering is over and plant growth ceases. At this stage the old leaves become dry and bulbs are almost dormant. The leaves are cut at the ground level and bulbs are taken out of the soil.

c) Cut-flower spikes should be graded according to length of spike, length of flowering zone and quality of individual flowers and then bunched in round bundles each having about 100 sticks. The stem portion of the bundles is wrapped in wet newsprint sheet. To avoid damage of the flowers and buds, the whole bundles should be wrapped in soft, white tissue paper or polythene.

d) flowering stalk can be presented in flower vase, ikebana, bouquet, etc. in different hotels, reception hall, etc.

e) Harvesting should be done in the morning and dipped in water bucket as soon as they are harvested and stored in cool and shady place.

Marketing Aspect

a) Hotels, travel agencies, foreign missions, INGOs, business companies, banks etc. are major consumers of cut Tuberose flowers.

b) Marketing is done either through direct relationship betweeen growers and consumers or by establishing the show room. Showroom for sale of tuberose cut flowers are established by few individuals and nurseries namely Bodhi Brisha, The Flower, Parijat, Chameli, Nursery Tropicana International. etc.

c) Marketing cost to the producers of Kathmandu valley for selling Kathmandu consumers is less than 10% of farm gate price.

d) There is virtually no market competition among producers in Kathmandu valley.

e) Lack of knowledge about demand, quality, packing, freshness and preservation, market information and promotion, etc. are marketing constraints faced by producers in Kathmandu valley.

f) Demand for tuberose cut-flower is estimated at 125,000 stick per year in Kathmandu valley. Of the total demand producers of Kathmandu valley supply approximately 25, 000 stick and remaining 100,000 sticks are supplied through import from Nepal terai and India.

g) Price of tuberose cut flowers are fixed by flower growers based on demand and supply situation on the market. Price of tuberose cut flower range between Rs. 3/-and Rs. 6/- per stick with and average of Rs. 4/50 per stick.

Economic Aspect

a) Tuberose cultivation for cut-flower is not economically viable in less than 3 ropani of land.

b) Fixed investment is required for the purchase of mother plants, machineries and equipments (sprayer, spade, pruning knife, etc.), land rent or tax, construction of office building, laborus quarter. development of irrigation facilities. depreciation, repair and maintenance, etc. Fixed investment for first year for three ropani land has been estimated at Rs. 236, 410/- and Rs. 18,010/- in the second year which is growing @ 10 % each year from second year onwards.

c) Operating expenses are required to meet the cost for labor, manure, chemical fertilizer plant protection chemicals interest on variable cost and other aspects. Annual operating cost for first year is Rs. 120,933/- growing @ 10 % per year.

d) Gross return for the first year is estimated at Rs. 221, 778/– and it is projected to be the same in the second, third, forth and fifth year.

e) In general tuberose cultivation is financially attractive and economically viable. Investment on this business will result a IRR of 40.37% BCR of 1.09 and NPV of Rs. 59083/ – at 16% discount rate.

Executive Summary of Business plan for cut flower Carnation prepared by FAN

Carnation is one of the most important commercial flowers of the world. There is great scope of growing Carnation for producing quality cut-flowers. Due to its excellent keeping quality, wide range of forms, ability to withstand long distance transportation strees and remarkable ability to rehydrate after continuous shipping. Carnation is preferred by growers to roses and chrysanthemum. Despite Carnation cultivation is not quite common as rose and chrysanthemum as it is not commonly planted flower in the garden of common households. Current level of its cultivation is confined with nursery man and flower hobbyist.

Current demand for Carnation cut-flower in Kathmandu valley is estimated about 200,000 sticks per year. Local production has met less than 30% of the demand and rest is met through import from Nepal terai, India and Overseas countries. There is high prospect to initiate Carnation cut-flower business in Kathmandu valley. Techno-economic assessment indicate that Carnation cultivation is feasible in Kathmandu valley.

Following points should be considered while initiating Carnation cultivation in Kathmandu valley.

Production Aspect

a) Carnation requires ample sun-shine. The best plant growth is obtained in locations of high light intensity during winter and cool temperature during summer. Direct sunlight however may cause sun-born and affect quality of flowers. It needs well-drained and aerated sandy-loam soil for better plant growth. The ideal soil pH is between 6.0 and 7.0. Both higher and lower pH have been found to show adverse effects on flower quality.

b) Carnation farming can not be carried out successfully on the lack of trained technical manpower and entrepreneur must manage at least one trained worker in the garden.

c) Widely demanded double varieties of Carnation with red, pink and white flower types such as weller and lady harmi should be selected from marketing and yield perspective.

d) F^1 seeds must be used for Carnation plantation. On the lack of Carnation breeding places within Nepal, seeds should be imported from countries like Japan, UK, USA and India. Taki Seed Company, Japan, Kyato Japan, Sutton Sons, India etc. are some of the seed company supplying quality Carnation seeds.

e) Planting should be carefully done. Planting time varies according to light intensity, photoperiod and temperature. In Kathmandu valley, seeds are sown late summer or in early autumn. Cutting can be done in early spring and layering in summer. Distance of between plants should be 1 ft. and rows should be 1.25 ft.

f) Soil should be manured and fertilized based on soil test result. For normal soil, add 2 ton of well decomposed farm yard manure, 3 kg of Nitrogen, 4 kg of Phosphorous and 5 kg of Potash in one ropani of land.

g) Soil should have sufficient moisture at the time of planting. Carnation require plenty of water during dry months. Frequency of irrigation depends largely on type of soils and prevailing weather conditions. Development of irrigation infrastructure is must for successful production.

h) Mulching, heoing, weed control, pinching and disbuding are the activities to be per-

formed for successful Carnation farming.

i) Flower yield in Carnation varies depending on type of cultivars, growing region and environment, plant density, planting time, pinching, disbudding and management practices adopted. On an average each plant gives 10-15 standard stalks and approximately 20,000-22,000 stalks will be produced in a ropani of land.

j) Carnation are prone to many diseases like fusarium wilt, stem rot, rust, bacterial wilt, bacterial leaf spot, etc. and insects like red spider mites, aphids, thrips, maggot, nematodes, etc. There should be technical personnel capable to diagnose attack of these diseases and initiate control measure.

k) Land is the most limiting factor for initiating Carnation cut- flower business in Kathmandu valley. Initiation of this business by purchasing land is not profitable, only investors possessing land or finding land on rent basis can start this business. Unavailability of seeds, fertilizers, pesticides and chemicals, lack of technical know-how on production and post harvest handling technique, etc. are other constraints on production.

Harvesting and Packaging Aspect

a) Bud size and petal growth should be used to judge the stage of harvesting. Buds should be harvested after they reach either large bud (tight buds, size 15 mm dameter) or cross bud (petals visible, size 15-20 mm) stage. The buds harvested too early do not open properly and had short vase- life.

b) Harvesting is done by cutting them with a sharp knife or with small pruning shears.The length of stem cut with the flower depends on the time of the year. During fall, the cut should be made high enough to encourage more lateral shoots while the flowers can be cut with longer stems when the plants are to be discarded. The best place of cutting stem is the area where leaves are well-shaped and where at least 2 axillary shoots appears.

c) For local markets cut-Carnation may be taken submerged in water but for distant markets these should be packed. Carnations are packed incorrugated cardboard containers. About 800 flowers can e packed in standard size cartoon 30 cm high, 50 cm wide and 122 cm long. The boxes or containers should be well insulated and should have a lining of vapour barrier like polythene to help in maintaining high relative humidity inside the package.

d) Flowering stalk can be presented in flower vase, ikebana, bouquet, etc. in different hotels, reception hall etc.

e) Harvesting should be done in the morning in order to increase the life and dipped in water bucket as soon as they are harvested and stored in cool and shady place.

Marketing Aspect

a) Hotels, travel agencies, foreign missions, INGOs, business companies, banks, etc. are major consumers of cut Carnation flowers. Its demand is high in diplomatic mission of European and American origin.

b) Marketing is done either through direct relationship between growers and consumers or by establishing the show room. Showroom for sale of chrysanthemum cut flowers are established by few individuals and nurseries namely Bodhi Brisha, The Flower, Parijat, Chameli, Nursery Tropicana International, etc.

c) Marketing cost to the producers of Kathmandu valley for selling Kathmandu consumers is less than 10% of farm gate price.

d) Market competition among producers in Kathmandu valley is virtually non-existent.

e) Lack of knowledge about demand, quality, packing, freshness and preservation, market information and promotion, etc. are the marketing constraints faced by producers in rural area of Kathmandu valley.

f) Demand for Carnation cut-flower is estimated at 200,000 stick per year in Kathmandu valley. Of the total demand producers of Kathmandu valley supply approximately 50,000 sticks and remaining 50,000 sticks are supplied through import from Nepal terai and India.

g) Price of Carnation cut flowers are fixed based on demand and supply situation on the market. Price of Carnation cut flower range between Rs. 3/- and Rs. 6/- per stick with an average of Rs. 4/- per stick.

Economic Aspect

a) Carnation cultivation for cut-flower is not economically viable in less than 3 ropani of land.

b) Fixed investment is required for purchase of seeds, machineries and equipments (sprayer, spade, pruning knife, etc.), land rent or tax, construction of office building, labors' quarter, development of irrigation facilities, depreciation and repair and maintenance. Fixed investment for three ropani land has been estimated at Rs. 236,410/- in the first year, Rs. 18,010/- in the second year and growing @ of 10% each year from second year onward.

c) Operating expenses are required to meet the cost for labor, manure, chemical fertilizer, plant protection chemicals, interest on variable cost and other aspects. Annual operating cost for first year is Rs. 155,321/- for second year the annual operating cost is Rs. 83,879/- which grows @ of 10% every year from second year onwards.

d) Gross return in the first year is estimated at Rs. 210,278/- and it is projected to be Rs. 210,278/- in the second year onward.

e) In general Carnation cultivation is financially attractive and economically viable. Investment on this business will result a IRR of 44.50% BCR of 1.16 and NPV of Rs. 93,984/- at 16% discount rate.

Executive Summary of Business Plan for cut flower Chrysanthemum prepared by FAN

Chrysanthemum is a popular flower crop of commercial importance. In terms of value of crop produced, chrysanthumum is next to rose in many flower producing countries. It is one of the popular flower throughout Nepal. Cultivation of local cultiver (mainly small flowered variety) is quite common through-out Nepal and this flower is more popular than rose. Mainly nursery man and flower hobbyist grow chrysanthemum as cut-flowers.

Current demand for chrysanthemum cut-flower in Kathmandu Valley is estimated about 300,000 sticks per year. Local production has met less than 50% of the demand and rest is met through import from Nepal terai and India. There is prospect to initiate chrysanthemum cut-flower business in Kathmandu Valley. Techno-economic analysis of this enterprise indicate that chrysanthemum cultivation to be a viable preposition. Following points should be considered while initiating chrysanthemum cultivation in Kathmandu valley·

Production Aspect

a) For the successful cultivation of chrysanthemum mild climate is ideal while very hot and too cold atmospheric conditions are harmful. The day temperature should range between 10^0 and 15^0 C and relative humidity between 70 and 90 % is optimum for its growth and development. Well drained, friable soils rich in organic matter and nutrients are preferable for its growth. Chrysanthemum thrive best in slightly acidic soils with pH ranging between 6.2 and 6.7.

b) Chrysanthemum farming can not be carried out successfully on the lack of trained technical manpower and enterpreneur must manage at least one trained worker in the enterprise.

c) Widely sold cultivers like royal purple, cream giant, sonar bangla. golden giant and yellow tokyo should be selected in the context of Kathmandu valley for Chrysanthemum cultivation.

d) Good quality chrysanthemum seedlings can be obtained either from the private nursery like Parijat, The standard, Botanical Enterprise, etc. located in Kathmandu Valley or from tissue culture laboratory located in Godavari, Jawalakhel and Baneshwor. A total of 2190 seedlings are required for a ropani of land.

e) Planting should be carefully done. Cuttings should be planted immediately after they are rooted. Rooted cuttings should be graded according to size and those of same size be planted together for uniform growth. Deep planting in too wet soil should be avoided.

f) Optimum planting time for chrysanthemum seedling is mid April-mid May. Plant density influences the growth and development and plays an important role in producing quality flowers. The distance of planting between plants and rows is 30-45 cm.

g) Soil should be manured and fertilized based on soil test result. For normal soil, add 2 ton of well decomposed farm yard manure, 4 kg Urea, 5 kg Phosphorous and 5 kg Potassium in one ropani of land. In addition 5 kg bone

meal and 1 kg of oil cake should be added in a ropani to supplement other nutrients.

i) Chrysanthemum need plenty of water during dry months. Frequency of irrigation depends largely on type of soils and preventing weather conditions. Development of irrigation infrastructure is must for successful production.

j) Mulchi. hoeing, weed control, pinching and disbudding are the activities to be performed for successful chrysanthemum farming.

k) Flower yield in chrysanthemum varies depending on types and cultivars, growing region and environment, plant density, pinching, disbudding and other management practices adopted. Under normal practices, on an average each plant produces 5-7 standard stalks and approximately 10000-13000 stacks will be produced in a ropani of land.

i) Chrysanthemum are prone to many diseases like root, foot rot, stem rot and wilt, powdery mildew, white rust, bacterial blight, bacterial leaf spot, etc. and insects like aphids, hairy caterpillars root cutting grubs, thrips and nematodes. There should be technical personnel capable to diagnose the attack of these diseases and rocommend to initiate control measure.

m) Land is the most limiting factor for initiating chrysanthemum cut-flower business in Kathmandu valley. Initiation of this business by purchasing land is not profitable, only investors possessing land or finding land on rent basis can start this business. Unavailability of seedlings, desired type of fertilizers, pesticides and chemicals, lack of technical know-how on production and post harvest handling, etc. are other constraints on production.

Harvesting and Packaging Aspect

a) Single cultivars of chrysanthemum are harvested when maximum number of flowers are open but before the pollens are shed from the outer row of disc florets. Standard chrysanthemum can be harvested at unopened stage when only a few outer ray floret unfurl.

b) Chrysanthemum produce flower from september of November. The size of each standard stalk is 60-70 cm. 60-70 cm long stalk bearing flower with 20-30 cm size is the best and have good market value. The flower stalk should be cut early in the morning and wrapped in white soft paper. These stalk then should be dipped in fresh water. For longevity, the stalk should be kept in flower life solution and stored in 7-10^0 C.

c) For local markets cut-chrysanthemum may be taken submerged in water but for distant markets these should be packed. Most of the standard chrysanthemums are placed in sleeves and packed in display boxes measuring 91 x 43 x 15 cm. They are placed in the boxes according to size and colour (grades).

e) Flowering stalk can be presented in flower vase, ikebana, bouquet, etc. in diffrent hotels, reception hall, etc.

f) Harvesting should be done in the morning in order to increase the life and dipped in water bucket as soon as they are harvested and stored in cool and shady place.

Marketing Aspect

a) Hotels, travel agencies, foreign missions, INGOs, business companies, banks, etc. are major consumers of cut chrysanthemum

flowers.

b) Marketing is done either through direct relationship between growers and consumers or by establishing the show room. Showroom for sale of chrysanthemum cut flowers are established by few individuals and nurseries namely Bodhi Brisha, The Flower, Parijat, Chameli Nursery, Tropicana International, etc. Botanical Enterprise and the Standard Nursery also sale the Chrysanthemum cut-flower.

c) Marketing cost to the producers of Kathmandu valley for selling Kathmandu consumers is less than 10% of farm gate price.

d) Market competition among producers in Kathmandu valley is minimum. Market of this prodct exhibit a sort of oligopolistic competition as there are few producers and few consumers. Cartel among wholesalers is also emerging in Kathmandu market.

e) Lack of Knowledge about demand, quality, packing, freshness and preservation, market information and promotion, etc. are the marketing constraints faced by producers in Kathmandu valley.

f) Demand for Chrysanthemum cut-flower is estimated at 300.000 stick per year in Kathmandu valley. Of the total demand producers of kathmandu valley supply approximately 125,000 stick remaining 175,000 sticks are supplied through import form Nepal terai and India.

g) Price of chrysanthemum cut flowers are fixed by flower growers based on demand and supply situation on the market. Price of chrysanthemum cut flower range between Rs. 4/50- and Rs. 7/50- per stick with and average of Rs. 6/ per stick.

Economic Aspect

a) Chrysanthemum cultivation for cut-flower is not economically viable in less than 3 ropani of land.

b) Fixed investment is required for the purchase of seedlings, machineries and equipments (sprayer, spade, pruning knife, etc.) land rent or tax, construction of office building, labors' quarter, development of irrigation facilities, depreciation, repair and maintenance, etc. fixed investment for first year for three ropani land has been estimated at Rs. 235, 640/- in the first year and Rs. 17,240/- in the second year growing @ of 10 % each year from second year onwards.

c) Operating expenses are required to meet the cost for labor manure, chemical fertilizer, plant protection chemicals, interest on variable cost and other aspects. Annual operating cost for first year is Rs. 139,007/- growing @ of 10 % each year.

d) Gross return for the first year is estimated at Rs. 220,792/- and it is projected to be Rs. 220, 792/- Rs. 234, 592/- Rs 24,839.00 and Rs. 24, 839/- respectively in the second. third, forth and fifth year.

e) In general chrysanthemum cultivation is financially attractive and economically viable. Investment on this business will result a IRR of 27.42% BCR of 1.05 and NPV of Rs.33,177/- at 16% discount rate.

Chrysanthemum adds briliant colours to your gardens in the season

Executive Summary of Business plan for cut flower Rose prepared by FAN

Rose rightly deserve reputation as queen of flowers. Rose occupies a pre-eminent place amongst flower crops and it is one of the oldest fragrant flowers ever cultivated by man-kind. Rose makes one of the best cut flowers and as such it has . great demand in the internal and foreign market.

Current demand for rose cut-flower in Kathmandu valley is estimated about 3000 sticks per day or 900000 sticks per year. Local production has met less than 50% of the demand for seven to eight months. Fifty percent of the demand during this period and 100% demand during four winter months (November to February) are fulfilled through import. Thus, there is ample scope to promote the rose cut-flower business in Kathmandu Valley. Techno-economic analysis of this enterprise indicate that rose cultivation is a viable preposition in Kathmandu valley.

Some of the worth considering points for starting rose cut-flower farming within Kathmandu valley follows as under.

Production Aspect

a) Rose requires sunny and well drained field with sunshine for at least six hours. Site should be free from tree shades and protected from strong winds. Medium loam soil with sufficient organic matter is suitable for rose farming. Soil pH should range between 6.0 and 7.5. Soil chemical status should be known prior to planting.

b) Rose farming can not be carried out successfully on the lack of trained technical manpower. There should be at least one trained worker in the enterprise.

c) Sites should be planned prior to rose planting. Simple and informal plant can be effective for rose garden and design of beds. Rectangular beds have advantage for maintenance.

d) Mother plants should be received from reliable source. New investors can obtain roses either domestically or import from India. Horticultural Farm, Sarlahi (Nawalpur) and areas around Biratanagar are the domestic source for rose plant. Good cultivers of rose are available in major Indian towns boardering Nepal namely silguri. Locknow (private and botanical garden). Calcutta (Suttan and Sons), Banaras. Banglore and Delhi. A totoal of 680 mother plants are required for a ropani of land.

e) Planting should be careful done. Prior to planting all immature, dead. inward growing or diseased shoots and unduly long, dead snags, shoot to the next outward growing bud must be cut and leaves including dried and yellow ones and all suckers growing below the point of union should be removed. Planting must be done in thoroughly prepared beds. Soil should neither be too wet nor too dry at the time of planting. In case of own rooted plants, they should be set at the same depth as grown in the nursery while in case of budded plants, position of bud union should be looked into account.

f) Planting may be done either in autumn or in spring when plants are dormant and easy to handle. Autumn planting result in earlier flowering hence preferred than spring planting.

g) Pruning is an important operation for main-

taining floriferousness, flower quality and vigour of plants and remove unproductive growth, ensure production of large number of strong and healthy shoots to be flowered and improve the quality of blooms. Pruning should be done either to thin-out or shorten the stem. Best time for pruning is the period when the activity of the rose plant is least and plant is at dormant to near dormant stage. Most appropriate time for pruning is October-November after rains are over and cold season is approaching.

h) Soil should be manured and fertilised based on soil test result. For normal soil, two ton of cattle manure, 25 kg of Ammonium Sulphate, 20 kg of Super Phosphate and 20 kg of Potassium Sulphate should be added in one ropani area. After pruning 1 kg of well rotten cow-dung manure, 25 gm of bone meal, 5 gm each of super phosphate and potassium sulphate and 2 gm of ammonium sulphate should be applied every week for 3-4 times to maintain pH, liming should be done.

i) Adequate soil moisture at all stages of vegetative growth and flowering is essential for rose plants. Excess water is harmful as rose plant cannot tolerate waterlogging. Irrigation arrangement is must for successful rose farming.

j) Mulching, hoeing and weed control are the other practices required for the rose cultivation.

k) Yield of rose cut flower depends on factors such as cultivers, plant density per unit area, flower quality, duration of flowering, pruning, fertilization and other cultural practices adopted. A healthy plant produce 7-10 standard stalks in the first year and the number of standard stalks increases every year by 20-25 % till 8-9 years. Standard size of flower stalk is 60-75 cm.

i) Roses are prone to many diseases like die-back, powdery mildew, black spot, rust, etc. insects like white ants, cater-pillers, thrips, digger wash, etc. and nematodes.Rose growers must have trained staff to diagnose these disease and pest and initiate control measures provided in this report.

m) Land is the most limiting factor for initiating cut-flower business in Kathmandu valley. Initiation of this business by purchasing land is not profitable, only investors possessing land or finding land on rent basis can start this business. Unavailability of mother plants, fertilizers, pesticides and chemicals. lack of technical know-how on production and post harvest handling technique, etc. are other constraints on production.

Harvesting and Packaging Aspect

a) Cut flowers should be harvested at tight bud stage when buds show full colour and petals have not yet started unfolding. Flowers harvested at this stage last longer in vases or during trasportation, retain colour and freshness.

b) Flowers should be cut early morning before sunrise or late in the afternoon when sun is about to set so as to avoid damage of buds due to high temperature during day time.

c) Flowers with uniform colour, stem length and development must be grouped together at the time of cutting and kept in separate containers. Stalks should be dipped in fresh water after cutting and stored in 8-10^0 C before transporting.

d) Packaging is not required if flowers are to be sold in Kathmandu market. Packaging is

required in case of distance sale. For packaging cut-blooms should be graded according to length of stem and packed in corrugated cardboard boxes. Size of boxes varies with quality and quantity of roses to be packed. A box of 100 cm long, 32.5 cm wide and 6.5 cm high accommodates 80 roses with 60-70 cm long stem.

e) Flowering stalk can be presented in flower vase, ikebana, bouquet, etc. in different hotels reception hall, etc.

Marketing Aspect

a) Hotels, travel agencies, foreign missions, INGOs, business companies, banks etc. are major consumers of cut rose flowers.

b) Marketing is done either through direct relationship betweeen growers and consumers or by establishing the show room. Showroom for sale of rose cut-flowers are established by few individuals and nurseries namely Bodhi Brisha, The Flower, Parijat, Chameli Nursery, Tropicana International, etc.

c) Marketing cost of the producers of Kathmandu valley for selling Kathmandu consumers is less than 10% of farm gate price.

d) There is little market competition among producers in Kathmandu valley. Market of this product exhibit a sort of oligopolistic competition as there are few producers and few consumers. Cartel among wholesalers is also emerging in kathmandu market.

e) Lack of knowledge about demand, quality, packing, freshness and preservation, market information and promotion, etc. are the marketing constraints faced by producers in rural area of Kathmandu valley.

f) Demand for rose cut-flower is estmated at 900,000 stick per year in Kathmandu valley. Domestic supply from producers of Kathmandu valley is estimated at 350,000 sticks and remaining approximately 550,000 sticks are supplied through import from Nepal terai and India.

g) Price of rose cut flowers are not fixed by any flower growers. They charge high or low price according to demand during the season. Price of rose cut flowers range between Rs. 4/- and Rs. 8/- per stick with an average of Rs. 6/- per stick.

Economic Aspect

a) Rose cultivation for cut-flower is not economically viable in less than 3 ropani of land.

b) Fixed investment is required for the purchase of mother plants, Machineries and equipments (sprayer, spade, pruning knife, etc.), land rent or tax, construction, repair and maintenance, etc. Fixed investment for base year for three ropani land has been estimated at Rs. 222,503/- and Rs. 21010/- rs. 19430/- and Rs. 17200/- respectively in first, second and third year. From third year onward, investment cost increase by 10% each year.

c) Operating expenses are required to meet the cost for labor, manure, chemical fertilizer, plant protection chemicals, interest on variable cost and other aspects. Annual operating cost for the base year is Rs. 62. 248/- growing of @10 % per year.

d) There will be no return in the base year. Return in first year is estimated at Rs. 137911/- Gross returns has been projected to be Rs. 165528/- Rs. 206698/-, Rs. 261437 and Rs 302878/- respectively in year two, three, four and five.

e) In general rose cultivation is financially attractive and economically viable. Investment on this business will result a IRR of 26.14 % BCR of 1.16 and NPV of Rs. 78872/- at 16% discount rate.

Executive Summary of Business Plan for cut flower Gladiolus prepared by FAN

Current demand for gladiolus cut-flowers in Kathmandu valley is estimated about 2500 sticks per day or 750000 sticks per year. Local production has met less than 30% of the demand of this flower and rest is met through import form Nepal terai and India. There is ample scope to promote the gladiolus cut-flower business in Kathmandu Valley. Techno-economic analysis of this enterprise indicate that gladiolus cultivation is a viable preposition in Kathmandu valley.

Some of the worth considering points for starting gladiolus cultivation in kathmandu valley follows as under.

Production Aspect

a) Gladiolus prefer sunny situation and requires at least 80% of the total sunlight for their proper growth and flowering. During winter, lack of sufficient light may result in abortion of flower spikes. Well drained, friable soils rich in organic matter and nutrients are preferable for gladiolus cultivation. For best result they require a slightly acidic soil of about pH 5.5 to 6.5 where most of the nutrients become available to plants.

b) Gladiolus farming can not be carried out successfully on the lack of trained technical manpower. There should be at least one trained worker in the enterprise.

c) Of the different cultivers of gladiolus, double flowering cultivars with flowers of good size, shape and large demand such as Gladiolus gardavensis. Hortorum hybrid (summer variety) and *G. segetum* John. Bellendeon ker (syn. *G. talicus*) philip milleer (spring variety) are suitable for Kathmandu valley. For cut flower purpose at least number 1 size corm is preferred.

d) Gladiolus corms can be obtained either from nurseries in Kathmandu Valley or Indian city of Kalingpong. Being the bulbous nature of the corm, they are susceptible to fungus disease and difficult to import for major Indian towns and overseas country. A total of 5476 corms are required for a ropani of land.

e) Planting should be careful done prior to planting corms should be checked and only healthy, disease free corms should be planted. Each corm should have about 6 eyes or potential shoot and all the eyes except the strongest and closest to the centre should be removed to obtain best cut-flower. This deeyeing is done with a sharp-pointed knife or a potato peeler.

f) Optimum planting time for corm of gladiolus is mid February-early April. Plantation can be done in February for spring variety and in May for summer variety. Depth of planting depends on the size of planting materials and soil type. Medium and small sized corms are generally planted up to 7 cm deep while large or jamboo corms are planted to a depth of up to 15 cm. In light soil the depth is more as compared to heavy soils.

g) Plant density plays an important role in producing quality blooms per unit area. Distance of planting between plants and rows is generally in 15 cm apart for plant to palnt and 30 cm for row to row.

h) Soil should be manured and fertilized based on soil test result. For normal soil. 2000 kg of manure should be applied each year with

3 kg Nitrogen. 4 kg Phosphorous and 4 kg Potash per ropani of land.

i) Soil should have sufficient moisture at the time of planting corms so that no watering is required till sprouting. Gladioli need plenty of water during dry months but not a wet feet. Frequency of irrigation depends largely on type of soils and prevailing weather conditions. During warm weather. watering should be done twice a week sufficiently to wet the roots.

j) Mulching, hoeing, weed control, lifting, curing, cleaning and grading of corms, breaking of dormancy, etc. are some of the activities to be done for profitable gladiolus farming.

k) Yield of gladiolus cut flower depends on factors such as cultiver, corm size, planting density and management practices. Generally one plant produces single marketable spike and plantable size of corm. High plant density with proper managment have been found to give higher yield per unit area. Approximate yield of flower spike would be around 5000-6000 per ropani of land.

i) Gladiolus are prone to many diseases like vascular disease/core rot, spongy rot, dry/neck rot, rust/smut, bacterial scab blight and spots. etc. and insects like seed corn maggot aphids, thrips, cut-worm and large number of nematodes.

j) Land is the most limiting factor for initiating gladiolus cut-flower business in Kathmandu valley. Initiation of this business by purchasing land is not profitable. only investors possessing land or finding land on rent basis can start this business Unavailability of mother plants, fertilizers pesticides and chemicals, lack of technical know how on production and post harvest handling technique, etc, are other constraints on production .

Harvesting and Packaging Aspect

a) Gladiolus spikes should be inspected regularly in the field for their growing style, placement of flowers and for other possible mishaps. Cutting of flowers should be done at tight bud stage with at least four leaves left on the plant and from one to five buds showing colour so that these may easily indoors one by one. Leaves left on plants are needed for development of corms and cormels.

b) Usually spring variety give flowers after 55-65 days of plantation where as summer variety give in 40 days after plantation. There are about 7-9 flowers in a standard stalks and these stalks are cut after opening of 2 or 3 flowers at the base. Standard size of stalk is 65 cm - 80 cm.

c) After harvesting, they are graded as per market demand into fancy, special. standard and utility.

d) For local markets spike may be taken submerged in water but for distant markets these may be carried dry in cardboard or wooden boxes or in trunk. Boxes may be prepared having 1.2 m length, 60 cm width and 30 cm height, perforated at several places for circulation of air. This box accommodates about 100 spikes.

e) Flowering stalk can be presented in flower vase, ikebana, bouquet, etc, in diffrent hotels, reception hall, etc.

f) Harvesting should be done in the morning and dipped in water bucket immediately after harvest and stored in cool and shady place in order to increase flower life.

Marketing Aspect

a) Hotels, travel agencies, foreign missions.

INGos. business companies, banks, etc. are major consumers of cut gladiolus flowers.

b) marketing is done either through direct relationship between growers and consumers or by establishing the show room. Show-room for gladiolus cut-flowers sale are established by few individuals and nurseries namely Bodhi Brisha. The Flower, Parijat, Chameli Nursery, Tropicana International etc.

c) Marketing cost to the producers of Kathmandu valley for selling to Kathmandu consumers is less than 10 % of farm gate price.

d) There is little market competition among producers in Kathmandu valley. Market of this product exhibit a sort of oligopolistic competition as there are few producers and few consumers. Cartel among wholesalers is also emerging in Kathmandu market.

e) Lack of knowledge about demand, quality, packing freshness and preservation, market information and promotion, etc, are the marketing constraints faced by producers in rural area of Kathmandu valley.

f) Demand for gladiolus cut-flower is estimated at 750, 000 stick per year in Kathmandu valley. Domestic supply from producers of Kathmandu valley is estimated at 250,000 sticks and remaining approximately 500,000 sticks are supplied through import from Nepal terai and India.

g) Price of gladiolus cut flowers are fixed by flower growers based on demand and supply situation on the market. Price of gladiolus cut flower range between Rs. 5/- and Rs. 8/- per stick with an average of Rs. 7/- per spike.

Economic Aspect

a) Gladiolus cultivation for cut-flower is not economically viable in less than 3 ropani of land.

b) Fixed investment is required for the purchase of corms. marchineries and equipments (sprayer, spade, pruning knife, etc.) land rent of tax, construction of office building, labors' quarter, development of irrigation facilities. depreciation, repair and maintenance, etc, fixed investment for first year for three ropani land has been estimated at Rs. 194440/- in the first year and Rs. 16340/- in the second year and growing @10 % each year from second year onwards.

c) Operating expenses are required to meet the cost for labor, manure, chemical fertilizer, plant protection chemicals, interest on variable cost and other aspects. Annual operating cost for first year is Rs. 137.599/- while it is Rs. 53586/- in the second year and growing @ 10% every year.

d) Gross return for the first year is estimated at Rs. 110,396/- and it is projected to be Rs. 121,436/-, Rs. 113,579/-, Rs. 146,937/- and Rs. 161,631/- respectively in the second, third, forth and fifth year.

e) Production of corms and cormels constitutes major products in gladiolus farming. There is assured market for these products. If return from these product are not considered. Gladiolus cultivation is not financially attractive and economically viable.

All the Business plans are available at FAN Office

Seasonal alternatives 'A'

S.No.	Scientific Name	English Name	Family	Height	Seed Sowing time	Germination Period	Flowering Period	Seed rapening Period	Flower Colour
1.	Antirrhinum majus	Snapdragon	Scrophulariaceae	1.5 ft.	Sep.– Oct.	2 Weeks	Feb–Mar.	May–June	Multi colour.
2.	Amaran thus caudatus	Love-lies bleeding	Amaranthaceae	2-3 ft	,,	,,	,,	,,	Red.
3.	Althaea rosea	Hollyhock	Malvaceae	5-6 ft	Sopt. or Oct.	,,	,,	,,	Red, Pink, White & yellow
4.	Brassica oleracea Var acephala	Kale	Cruciferae	1ft	Sept.	,,	,,	,,	Green, Purple & White (foliage)
5.	Calendula officinalis	Pot Marigold	Compositae	1 ft	Sep-Oct	"	"	"	Bright orange, or Deep orange & yellow
6.	Centaurea moschata	Sweet Sultan	"	1-1.5ft	"	"	"	"	Multi colour
7.	C. cyanus	Corn flower	"	2-3 ft	"	"	"	"	"
8.	Cineraria hybid	Cineraria	"	1 ft	"	"	"	"	"
9.	Dianthus barbatus	Sweet william	Caryophyllaceae	1-1.5ft	"	"	"	"	Multicolour
10.	D. chinensis	Indian Pink	"	1.0 ft	"	"	"	"	White Rose pink & Voilet
11.	Digitalis purpurea	Foxglove	Scrophulariaceae	2 ft	Sept.	"	"	"	White & Purple
12.	Delphinium ajacis	Larkspur	Ranunculacee	2-3 ft	"	"	"	"	Pink,Blue & White
13.	Echium plantagineum	Viper's Bugloss	Boraginaceae	1.5 ft	"	"	"	"	Blue,Pink & White
14.	Eschscholzia californica	Californian Poppy	Papaveraceae	2 ft	"	"	"	"	Orange Red & Bright Yellow
15.	Helichrysum bracteatum	Straw flower	Compositae	1-2 ft	"	"	"	"	Pink, Yellow & Red
16.	Helipterum roseum	Acroclirium	"	"	"	"	"	"	Pink, Yellow & Orange
17.	Iberris amara	Candytuft	Cruciferae	1 ft	Sept-Oct.	2 weeks	Feb-March	May-june	White

18.	Lupinus	Lupin	Leguminosae	1.5-2ft	"	"	"	"	Blue
19.	Lathyrus odoratus	Sweet Pea	Papilionaceae	5-6 ft	Late Sept - Early Oct	1-2 "	"	"	Red, Maroon & Pink
20. or	Linum grandiflorum var. rubrum	Scarlet flax	Linaceae	1-2 ft	"	"	"	"	Pink, Bright Red Dull Blue
21.	Linaria maroccane	Toad flax	Scrophulariaceae	1-1.5ft	"	"	"	"	White, Yellow Purple, Pink Rose,Blue
22.	Limonium sinuatum	Sea Lavender	Plumbaginaceae	2-3ft	"	"	"	"	Multicolour
23.	Mesembryanthemum criniflorum	Ice Plant	Aizoaceae	2-3inc.	"	"	"	"	Multicolour
24.	Matthiola incana	Stock	Cruciferae	1-3ft	"	"	"	"	Purple,Pink, White
25.	Papaver sominiferum	Opium, Puppy	Papavaraceae	1-2 ft	"	"	"	"	Blue & White
26.	Petunia hybrida	Petunia	Solanaceae	8-10in.	"	"	"	"	Voilet, Pink & White
27.	Phlox drummondii	Phlox	Polemoniaceae	1-1.5ft	"	"	"	"	"
28.	Schizanthus	Butterfly flower	Solanaceae	2-2.5ft	"	"	"	"	Blue, Pink & White
29.	Silene armina		Caryophyllaceae	1-2ft	"	"	"	"	Pink
30.	Tropaeolum majus	Nasturtium	Tropaeolaceae	1 ft	"	"	"	"	Golden Yellow
31.	Viola	Pansy	Violaceae	7 inch	"	"	"	"	Multicolour
32.	Verbena officinalis	Verbena	Verbenaceae	2-3inc	"	"	"	"	Red, Blue, Pink & White
33.	Venidium fastuosum	Namaqualand Daisy	Compositale	1-1.5ft	"	"	"	"	Orange

Source : Floriculture Association Nepal (FAN)

Seasonal alternatives 'B'

S.No.	Scientific Name	English Name	Family	Height	Seed Sowing time	Germination Period	Flowering period	Seed riperning period	Colour
1.	Amaranthus tricolor	Joseph's coat	Amaranthaceae	2 ft.	May– June	2 Weeks	Aug–Sept.	Nov-Dec.	Orange, Red & Yellow
2.	A. Caudatus		"	2-3 ft	"	"	"	"	Red.
3.	Coleus blumei	Flame Nettle	Labiatae	1 ft	"	"	"	"	Red & Yellow
4.	Celosia argentea	Cocks coms	Amaranthaceae	1 ft	"	"	"	"	Red, Yellow & Orange
5.	Capsicum anum	Ornamental Peper	Solanaceae	1 ft	"	"	"	"	Fruit Red & Yellow
6.	Callistephus Chinensis	China Aster	Compositae	1-2 ft	"	"	"	"	Yellow, Pink Voilet & Blue
7.	Gomphrena globosa	Globe Amaranth	Amaranthaceae	"	"	"	"	"	White & Maroon
8.	Helianthus annus	Double sunflower	Compositae	4-5 ft	"	"	"	"	Yellow
9.	Impatiens balsamina	Garden Balsam	Balsaminaceae	1-1.5ft	june-july	1 week	"	"	Red, Pink & Purple
10.	Kochia Scoparia	Summer cypress	Chenopodiaceae	3 ft	"	2 weeks	"	"	
11.	Portulaca grandiflora	Rose, Moss	Portulaceae	2-3in.	"	1 week	"	"	Red, Yellow, White & Orange
12.	Solanum	Pinter Cherry	Solanaceae	1 ft	may-June	2 weeks	"	"	Fruit-Red &Yellow
13.	Salvia Splendens	Scarlet Sage	Labiatae	2-3 ft	"	"	"	"	Red, Voilet
14.	Tagetes	Marigold	Compositae	6 inch	"	1 week	"	"	Yellow & Orange
15.	T. erecta	African Marigold	"	4-6 ft	"	"	"	"	"
16.	T. patula	Freneh Marigold	"	1 ft	"	"	"	"	Red & Yellow
17.	Zinnia elegans	Zinnia	"	1-2.5ft	"	"	"	"	Multicolour.

Source : Floriculture Association Nepal (FAN)

Second Floriculture Trade Fair
Participants' List

S.No.	Name of Nursery/company	Stall NO.
1.	Clay & Craft	W_{33}
2.	Yesoda Enterprises Impex	E_{16}, E_{17}
3.	Homes & Gardens	E_{19}
4.	parijat Nursery	E_{18}
5.	Sugam Nursery	E_{11}
6.	Shree Ganesh Nursery	E_9
7.	Botanical Enterprises Pvt.Ltd.	W_{38},W_{39},W_{40}
8.	The Jaazer Nursery	E_2,E_3
9.	The standard Nursery	E_4
10.	Agriculture Trading Centre	
	(ATC Flower & Plants)	E_6
11.	Sun Flower Nursery	E_{10}
12.	Akarshan Furniture	W_{22}
13.	Garden Services Pvt. Ltd.	W_{23}
14.	Shree Malika Nursery Farm	E_7
15.	Women entrepreneurs' Group	W_{37}
16.	Jai Kishan Nursery	W_{28}, W_{29}
17.	Chameli Nursery	W_{34}
18.	Nursery Tropicana	W_{35}
19.	The standard Enterprises	E_5
20.	Ganga Nursery	W_{32}
21.	Flora Farm	W_{21}
22.	Hankay Rai & Sons	W_{30}
23.	Sunakhari Nursery	W_{25}
24.	Tree Seeds & Flower	E_1
25.	Ever Green Nursery	W_{36}
26.	Nursery Enterprises	W_{36}
27.	Bodhi Brikchya	W_{31}
28.	Ambar Nursery	W_{26},W_{27}
29.	Ritu Nursery	W_{24}

FAN Second Trade Fair Committe Members

Shashindra Shrestha
(Chairman)

Suresh B. Shrestha
(President FAN)

Rajeev Pradhan
(General Secretary FAN)

Rajendra Rai

Renchin Yonjan

Kumar K.C

S.D. Manandhar

Kiran R. Pandey
(Programme Cordinator FAN)

FAN acknowledges the support and contributions of the following:

1.	Agro-Enterprises Centre	-	Main Sponsor
2.	Trade Promotion Centre	-	Souvenir Publication
3.	Elite International Pvt. Ltd.	-	Computer Programming for Accounting
4.	Devtech Nepal Pvt. Ltd.	-	Landscaping
5.	Unlimited Software Net Work Pvt. Ltd.	-	Landscaping
6.	Nebico Pvt. Ltd.	-	Ticket Printing
7.	Hotel Manang	-	Press Conference
8.	Gopalaya Studios	-	Sound System
9.	Botanical Enterprises Pvt. Ltd.		Raffle Tickets
10.	HAZAMA Corporation Pvt. Ltd.		

Banner Sponsors

1. Unlimited Software Net Work Pvt. Ltd.
2. Parijat Nursery
3. Amber Nursery
4. The Standard Nursery
5. Yesoda Enterprises Pvt. Ltd.
6. Nebico Pvt. Ltd.
7. Botanical Enterprises Pvt. Ltd.
8. Flora Farm

Raffle Sponsors

1. Parijat Nursery
2. Garden Services Centre
3. Bodhi Brikchya Nursery
4. Akarshan
5. Clay & Craft
6. Chameli Nursery

Best Stall	- Certificate and Cash prize of Rs. 15,000/- Courtesy Choudhary Group
Most Innovative product (Self-created & Indigenous)	- Trophy - Courtesy VOITH (Vaidya's Organization of Industries & Trading Houses)
Plant of the Show	- Prize Valued at Rs. 5,000/- courtesy VOITH
Recognition:	
1. Nursery of the Year	- Running Trophy Courtesy Pancha Kanya Group of Industries
2. Exporter of the year	- Running Trophy Courtesy Thosam Carpet Manufacturers

1. Trade Promotion centre: an introduction

Trade Promotion Centre (TPC), an agency of His Majesty's Government of Nepal was established in 1971 to promote the expansion and diversification of exports as well as to encourage the growth of country's export capacity and explore export potentiality of the country. Being a non-profit making and focal point organization for the promotion of foreign trade in general and export trade in particular, its' all means and resources are diverted towards the development and strengthening foreign trade by carrying on export promotional programme as its core activity. Recently implementation of import management programme has also been included in the function of TPC with a view to best utilize available resources including foreign reserves. The main functions of TPC are:

- export promotion in traditional and non-traditional market abroad..
- identification, adaptation and development of export products aiming at diverse market requirements abroad;
- internationl market research;
- development of export consciousness and entrepreneurship through publicity and manpower development programme;
- servicing for flow of business opportunities on behalf of businessmen both at home and abroad;
- providing general information on potential trade opportunities;
- conducting research to assessing domestic export potentials'
- providing marketing research including consultancy;
- collecting trade statistics and other relevant data;
- serving as a catalyst agent between exporters and government agencies;
- providing consultation and trade documentation facilities with regard to domestic and foreign market segments and disseminating trade informantion;
- promoting business contacts between exporters and importers, etc.
- creating awareness about international trading practices in export as well as import management of the cuntry;
- implementation of effective programme for export growth and achieve favourable balance of trade;
- maintaining liaison service between export sector of the country and international agencies and import promotion organizations.

The centre has its' Central Office in Kathmandu. It has also a Regional Office at Biratnagar in Eastern Development Region to carry out regional export promotional programme and a EC Project (STABEX Project) in Kathmandu to implement programme helpful to stabilize the export earning from leather and lentil. The Centre has different divisions viz. Trade Development Division, Market Development Division, Trade Information Division, Planning and Manpower Development Division and Administration & Finance Division to engage into and support export promation programme of the Centre.

Major Activities of Trade Promotion Centre

- Identification, adaptation and development of export products.
- Export marketing promotion abroad.
- International market research for information network and consultant's services.
- Development of export consciousness and entrepreneurship through publicity and manpower development programmes.
- Dissemination of information on trade opportunities both at home and abroad.
- Creating awareness about national & international trading practices in export as well as import management of the country.
- Maintenance of professional links with international agencies like ITC (UNCTAD/WTO (GATT)/Geneva, ESCAP/Bangkok, EC/Brussels and other import promotion agencies abroad.

Trade Promotion Centre

Kathmandu, Nepal
P.O.Box: 825
Tel: 478144/478145
Tlx: NP 2302 TPC
Cable: NIKASI Kathmandu
Fax: 977-1-478143

AGRO ENTERPRISE CENTRE
कृषि उद्यम केन्द्र

The Agro Enterprise Centre (AEC) established as an operating division of the **Federation of Nepalese Chambers of Commerce and Industry**, assists Nepalese entrepreneurs create agro-enterprise, improve their competitive market position, and increase their exports of high value agriculture products. The AEC provides services to clients on a cost sharing basis, routinely or on request. For agricultural prosperity through agro enterprise development, contact:

The Agro Enterprise Centre, FNCCI Building, Sahid Sukra Milan Marga, Teku, Kathmandu
P.O.Box No. 7651, Tel: 232260, 242971 Fax: 977-1-227322 E-Mail: agroaec@mos.com.np

The AEC:

* Maintains a data bank with domestic and international market and price information, an inventory of agricultural processors, producer groups and associations, and relevant laws and regulations.
* Prepares and circulates periodically the AEC newsletter focusing on agro enterprise development.
* Offers business, marketing and technical skill training in, e.g. post-harvest operations, quality assurance and marketing of agriculture products.
* Advocates and educates, on behalf of private agro entrepreneurs and commodity associations, on such concerns as changing the rules and regulations which affect the growth of private agro business, preventing unnecessary market regulations, etc.
* Identifies and encourages innovative venture proposals that serve multiple sector, small farmers and firms.
* Assists the formation of the agro based Commodity Associations and their promotion.

On request the AEC:

* Initiates research and directs environmental appraisals.
* Carries feasibility studies on specific commodities, markets and processes.
* Advises clients on their agro business plans.
* Undertakes contract research to improve product quality and competitiveness.
* Assists with high value agricultural products' export promotion.